MISSILE DEVELOPMENT AND SPACE SCIENCES

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C., Tuesday, February 10, 1959.

The committee met at 10 a.m., in room 356, Old House Office Building, Hon. George P. Miller temporarily presiding.

Present: Representatives Brooks (later), McCormack, Fulton, Miller, McDonough, Anfuso, Sisk, Mitchell, Quigley, Hall, Wolf, Karth, Daddario, Moeller, King, and Roush.

Mr. MILLER. In the absence of the chairman, the committee will be in order. I am informed that the chairman will be a little late. In order to get on with the meeting we will start now.

The first witness will be Rear Adm. J. T. Hayward, Director of Research and Development. Admiral Hayward.

Admiral HAYWARD. Mr. Chairman, when the committee adjourned last Wednesday, Admiral Raborn, head of the Polaris project, finished his presentation in executive session. To resume the Navy briefing today, I suggest we hear first Captain Wagner whose subject is the Pacific Missile Range and whose testimony can be heard in open session.

Following his presentation, I would stand ready to answer further questions the committee may have that can be properly handled in open session. We would then proceed to closed session. If you wish to question Admiral Raborn on the Polaris project, I will arrange to have him here at that time. Following that I have two classified projects to cover, the navigation satellite and another satellite.

Mr. MILLER. Well, we will proceed to hear the Captain then.

Admiral HAYWARD. All right.

Mr. MILLER. And we would like to hear Admiral Raborn.

Admiral HAYWARD. We will get him in closed session then. Captain Wagner.

STATEMENT OF CAPT. E. O. WAGNER, COORDINATOR OF MISSILE RANGES, OFFICE OF DEPUTY CHIEF OF NAVAL OPERATIONS (AIR)

Captain WAGNER. Mr. Chairman, gentlemen, in order to take care of the increased load in the ballistic satellite field we have had to expand our national facilities. We now have three national ranges, the White Sands Missile Range operated by the Army, the Atlantic Missile Range operated by the Air Force at Canaveral, and the Pacific Missile Range operated by the Navy on the west coast.

The Pacific Missile Range differs somewhat from the other two in that in addition to normal routine R. & D. activities it will include training for missile firing fleet ships and aircraft squadrons and also furnish training to ballistic missile units based at Vandenberg Air Force Base for training.

The other big difference, of course, is that it will become in fact an operational facility in direct support of the fleet with the introduction of military type satellites when they become operational and the range is completed. The big difference right now is that this range is under construction and is not very operational at the moment. The guidance for this range was handed down by the Secretary of Defense with instructions that it should support only approved missile projects, but we should also make provision for the introduction of satellites and space vehicles. This posed a considerable planning problem because in developing a range sometimes the facilities on the range have a longer lead time than the missiles themselves. So, in reviewing this we realized that we had a responsible job and we had to think big and we had to look forward.

On this basis we broke out the crystal ball, dusted it off, and took a big look. I would like now to present this look which is our tentative master plan. The first chart, please.

The heart of the Pacific Missile Range is at the Naval Missile Center at Point Mugu. This is the nucleus from which we are to expand. We will expand its facilities to take care of the added load. We will take its sea range which is now a little area of 125 by 250 miles and expand it to an area of 500 by 1,500 miles. We will build an IRBM range out to 1,500 miles with underwater impact location systems. We will have three ICBM impact targets, at Midway, Wake, and Eniwetok. The layout can be projected to 10,000 miles or more into the Indian Ocean if required in the future.

In addition to these basic facilities we will require for a polar orbit range, an equatorial orbit range, an antimissile range and a satellite recovery area for both polar orbits and for equatorial orbits. The latest thinking we have on the equatorial range is that NASA will take this over.

On the antimissile range the Army is now planning to move into Kwajalein and Johnston Island, which will become closely integrated into the PMR in that area. In order to give the necessary flexibility and allow us to take care of the unexpected, we are planning to evolve a fleet of 12 fully instrumented range ships which we can station throughout the area to do what becomes necessary for different jobs as they come up. Also not shown here is the necessity to provide a launching facility for nuclear-powered satellite vehicles.

Now, I would like now to show you where we stand and how we propose to attack this overall master plan.

Mr. MILLER. Now this is at Point Mugu.

Captain WAGNER. Yes, sir.

Mr. MILLER. How far is Point Mugu south of the Vandenberg Air Force Base?

Captain WAGNER. I have a chart to show this. Point Mugu is located here on this chart and is the nucleus from which we will begin the development of the master range. This naval missile center at Mugu has been in operation for some 12 years and we are taking

this background of experience of some 5,000 naval personnel, both military and civilian, as the nucleus to grow into the major complex. This [pointing to chart] is the beginning of the sea range which is now, as I said, 125 by about 250 miles which we will expand. Up the coast we come to what used to be known as Old Camp Cook, an Army facility which was turned over to the Air Force and the Navy. The upper two-thirds of it is now known as Vandenberg Air Force Base. The southern one-third is now the Naval Missile Facility, Point Arguello.

Vandenberg is a SAC base for training, as you know. The naval missile center here will be the big step in developing the Pacific Missile Range. It is from here that the major ballistic missiles and the new family of satellites and space vehicles will be fired. You will notice that the geography here is east and west which allows a polar launch to the south to go directly over nothing but ocean from here to the South Pole. This is the major reason why this site was selected, to make it safe from the more populated areas down the coast.

The next chart shows that the terrain of the Point Arguello facility is rather rough and mountainous. These hills are 2,500 feet high and the canyons lend themselves well to security from observation for classified shots and also protection from blast for the larger thrust engines we will be developing in the next few years. The surveillance radars and communications and other instrumentation will be on the top of these hills.

In more detail the next chart shows the siting of the various facilities in the naval missile facility area, such things as public works building, transmitter buildings, radio receiver building range operations, telemetry building, tracking radars, and launching complexes. The areas in blue are by and large nearing completion. The others are still in the planning stage and just beginning.

This area down here called Sudden Ranch is a large ranch owned by a Mr. Sudden, with whom our authorities have been negotiating for purchase. We would like very much to acquire this to get a clear shot. Right now we have negotiated with him for overfly rights and to help him to evacuate some of his cowhands whenever we will shoot over the ranch.

Now to put the whole thing in a little better focus I would like to go over briefly on the next chart what the 1960 budget is going to buy for us. This probably will give you a fix as to just where we stand in this development.

Coming back to Point Mugu we will give it a new headquarters building and other facilities to carry the increased load and we will expand the sea test range to an area of 260 by 500 miles. That is the first good-sized increment toward the larger area that I mentioned before. We will improve the impact area of the IRBM range; incidentally, you will recall one missile has already been fired into this range here.

As we stand now, the Wake Island impact area is virtually complete, but the 1960 budget will complete the impact areas at Eniwetok and Midway to complete the whole complex of the ICBM ranges, with communication links which we use for clearing the areas before firing and for reporting back on the results. It will initiate the polar orbit launching facility at Point Arguello and it will provide 1 partially

instrumented launching ship, the first of the 12 that I mentioned to do this job.

The tab on this particular budget here is $126 million.

I thought it would be interesting to review the various budget levels that have gone into the facility at Mugu and how these are increasing to take care of the Pacific Missile Range. In 1956 it was $30 million; 1957, $26 million; then $42 million, and from here on it goes up at about $40 million a year increase. This is a very conservative guess. The demands we think are going to be much larger than that.

This cost includes new construction, operation, maintenance, and salaries. This, incidentally, is beginning to pose a rather difficult problem under the total ceiling budget. As these figures get larger it means that the Navy has to reprogram within its overall budget ceiling to take care of these increasing projects. This is a problem now under the Secretary of Defense to determine how best to pay for these facilities. These sums will get so large that they will become a national problem in the next few years.

I am trying to put everything in perspective by showing the White Sands Missile Range 1960 budget is $80 million, the Pacific Missile Range budget is $126 million, and Atlantic Missile Range, Canaveral, is $127 million, for a total of about $333 million to support the total project costs of the national missile and space program of $6.7 billion. This works out to a shade less than 5 percent of the total bill. Actually the national program is more than $6.7 billion, but this is as close as we could draw the line because these projects are so vast that they induce other costs. This is a thumbnail sketch, sir, of the situation at the Pacific Missile Range.

The CHAIRMAN. Thank you very much, Captain. Now, questions. Mr. McCormack.

Mr. MCCORMACK. Can you give us any idea what the leadtime, generally speaking, is in our country in comparison with the leadtime in the Soviet Union, Admiral?

Admiral HAYWARD. It will be hard to give you a definite answer, Mr. McCormack.

Mr. MCCORMACK. You notice I said a general idea.

Admiral HAYWARD. Yes. Well, if you go back over past history such as aircraft it takes us from 5 to 7 years to get it from conception to operation. With our big missile systems we do not have any system yet to really say what this would be. We have the Thor experience, but—I could give you some answer for the record——

Mr. MCCORMACK. Is the leadtime longer here as a rule than in the Soviet Union?

Admiral HAYWARD. Well, on some of the aircraft they have surprised us; yes, sir. Our judgment, of course, is based on what we have learned. We do not know how long they have been working, for instance, on the MIG series. They come out with a new model in short order. I have the feeling that it is longer here, Mr. McCormack. I cannot justify it at the moment with any definite figures.

Mr. MCCORMACK. I realize the difficulty, but the information I have is pretty much along the lines that you have answered

Admiral HAYWARD. Well, Dr. Livingston wrote a good article from Harvard on leadtime in the United States which you may be

familiar with, which gives a pretty good analysis of the problems that face us.

Mr. McCormack. I realize that, but on practical projects or activities, that leadtime could be important, could it not?

Admiral Hayward. Yes, sir. We have done this on the Polaris program, for instance. The initiation of the Polaris program, actually, of course, was in 1956, as I remember it, and we have chopped the leadtime down on that whole system from 1963 to 1960.

Mr. McCormack. The Polaris—the estimated maximum distance, as I remember, was about 1,500 miles; was it not?

Admiral Hayward. Yes, sir, that is the answer.

Mr. McCormack. Now, you are concentrating on a 900-mile——

Admiral Hayward. I would rather answer those questions with Admiral Raborn in closed session. This is not true what you read on that.

Mr. McCormack. Well, my questions are based on what I read in the papers. Without asking you anything further, you have said that what is carried in the papers about the directions to limit it to a 900-mile radius is not correct.

Admiral Masterson. Could I answer that, Mr. McCormack? Mr. Holaday put out a release on that last week. Our objective has always been in the neighborhood of 1,200 miles for the speeded-up program. That is sufficient to meet our requirements.

The Chairman. Mr. Fulton.

Mr. Fulton. I am glad to have you here again, Admiral. We have had testimony by the Army as to the development of antimissile missiles and of a radar screen, both pretty costly, to meet the threat of ICBM's. Does the Navy have a program for, first, detecting ICBM's that might be hostile, and, secondly, does it have a program for knocking down or diverting such hostile ICBM's that might be fired in the direction of the United States or the free world?

Admiral Hayward. Mr. Fulton, I will answer that in detail in closed session. In other words, the Navy is in the A.S.W. business. If a missile comes from the sea, we have to be in a position to knock it down, because we are working on the good side of the trajectory, but I would rather go into details in closed session.

Mr. Fulton. So your program is really directed at a missile that might come out of the sea, an ICBM that is antagonistic to the United States, rather than a land-based missile.

Admiral Hayward. That is correct, Mr. Fulton.

Mr. Fulton. You are not, then, developing an antimissile missile in competition with the Army's announced system, are you?

Admiral Hayward. No, sir.

Mr. Fulton. Could you comment for us on what the Navy is doing in that field and, of course, I must add within the strict grounds of security, because I have some knowledge——

Admiral Hayward. I would comment on that in closed session.

Mr. Fulton. All right. The question comes up whether the White Sands Proving Ground, the Atlantic Missile Range, and the Pacific Missile Range are all necessary, or is that an overlapping construction?

Admiral Hayward. I would say they are all necessary; yes, sir. They have different jobs to do. At Cape Canaveral, of course, the Atlantic Missile Range is primarily the R. & D. range. You must

remember that you cannot fire a polar orbit from Cape Canaveral and you have to have a place to train the actual enlisted men of all of the services really in the use of these missiles, and you could not saturate Patrick or the Atlantic Missile Range this way, or you would not have any R. & D. work done.

Mr. FULTON. The Atlantic Missile Range is necessary now because it has a range of 4,000 or 5,000 miles.

Admiral HAYWARD. That is correct. It is 4,400 nautical miles to Ascension.

Mr. FULTON. At the White Sands Proving Grounds, could you tell us what they do there that is not possible at the other bases?

Admiral HAYWARD. Of course the Army runs that. My knowledge is based on when I worked out in that area. Usually they did the first part of the trajectory X, Y, and Z, in Space versus Time of these missiles up to a hundred miles and there was an awful lot of work to be done, for instance in the Talos business that we have on our ships, that this was the only place we could really do it. I would rather defer to the Army, Mr. Fulton, to answer that.

Mr. FULTON. My final points are on budget. There is, of course, a budget ceiling on the Navy as on every service. You may have to reprogram your plans for the fiscal year 1960 and possibly cut out some things from what we always refer to as the "shopping list," from what you would like to have.

Could you explain to us the effect of this budget ceiling that has been put on the Navy for the fiscal year 1960 with regard to the research and development program. Refer especially to how much room you are going to have in your Research and Development Agency in the Navy, which you head, for basic research. May I just finish with a comment on that. Last year, when we passed the act, a large part of the work was done by this committee. Our then chairman, Mr. McCormack, as well as our present chairman, Mr. Brooks, and myself, have felt there should be room in the military services for broad programs and progressive programs for basic science that are not budgeted on the basis of immediate application to weaponry systems.

Now, in order to carry out that general basic objective, what room do you have in the 1960 budget? Would you comment on that? And where, if it pinches, could this committee help you, because our jurisdiction generally is science generally, covering military as well as civilian at this point.

Admiral HAYWARD. Well, to begin with, it has been Admiral Burke's policy for the Navy to not reduce the basic research on the applied research side of the programs. Last year in Congress we got an additional $15 million for basic research. We got this from the Secretary of Defense actually, and we have kept the same level this year as that increased level of last year in the basic and supporting research part of the program.

As you know, I am a program sponsor and Admiral Burke would be probably most unhappy with me if I ever said I had enough money. I have to compete and he has to make the decisions for the rest of the Navy. We are at a constant dollar level in these 2 years really and because of inflation naturally you do less in some areas. We have tried to stick to the areas that look most promising, but in

the budget formulation he is the man who has to make the decision on what he does, of course, and does make the decision as to how much will go into R. & D.

Now in the Navy we do have a system where we have money, where our scientific people can do exploratory research. It has no application, whatsoever, to any program. We have them in the solid state physics; we have them in straight physics, low energy physics, high energy physics. We have quite a large program.

As I told you the other day, we have 1,500 contracts with various universities and nonprofit institutions, roughly 1,500, in which this is being done.

Now, to give you an idea of this work we have done in the Navy, particularly the Office of Research, Admiral Bennett's people, from the years of about 1947 to 1954, 39 percent of the doctorates in this country that were given in the physical sciences were in some way or other aided and supported by ONR projects in these basic fields. We feel very strongly in the Navy and have always felt that we have got to do this in the service or we run out of what I call our seed corn. So naturally I could use more money in basic research.

Mr. FULTON. How much money would you consider as necessary for basic research programs for the Navy in the budget for the fiscal year 1960 that you did not receive, that is, your own personal judgment?

Admiral HAYWARD. Well, I will give you that answer for the record. That is on the basic and applied side. We had a true requirement of $770,733,000 for all R. & D., that is including the systems. Of this, there was $422 million in what we call the part 2 of the budget which is the basic applied and supporting research. Under the $522 million program which I finally got, there is $322 million of it in this basic applied and supporting research. So that would mean $100 million was cut out of that side of our R. & D. program in this budget process.

Mr. FULTON. How many echelons of command are there above you on R. & D. projects, and space projects particularly, before you can get a go-ahead signal?

Admiral HAYWARD. Well, in the Navy, of course, I work directly for Admiral Burke. Under the Navy system, we have the deputies of the Navy sit as a board on all of the budget. Once I get an R. & D. figure such as the $522 million, this is presented, of course, to the Department of Defense, Assistant Secretary of R. & D., Dr. York.

Mr. FULTON. I was going to say do you go to Dr. York, Mr. Holaday, or Mr. Johnson? How do you arrange that?

Admiral HAYWARD. Well, let me say if I have a system in R. & D., I would present it first to Dr. York. Dr. York might present it to Mr. Johnson or he might refer it to Mr. Holaday. However, I believe that Mr. Holaday's division is now a part of Dr. York's shop. I am sure of it actually. Dr. York would be the man who gave us the technical decision. He is a very fine scientist, and he is my direct contact in the research and development side.

Mr. FULTON. Practically, then, where does Roy Johnson fit into this picture on authority?

Admiral HAYWARD. If it were a space program, for instance, Dr. York would refer it to Mr. Johnson, but I would get the go-ahead from Dr. York.

Mr. FULTON. You would not put it through the Civilian-Military Liaison Committee, established under the Space Act, before you got the go-ahead, would you?

Admiral HAYWARD. Well, this depends on the funds. If it is ARPA's funds, for instance, it would be coordinated; as I am an alternate member of that committee, for instance, I would certainly know what NASA was doing. I would not put it through them; no, sir. Dr. York might. As the head of R. & D. for the Navy, he would be my contact.

Mr. FULTON. Then, finally, you would not put it through the National Aeronautics and Space Council, either?

Admiral HAYWARD. I would not; no, sir. Dr. York might. He might be required to present the Department of Defense's programs to the Space Council for Mr. McElroy.

Mr. FULTON. And you would not have direct contact with the National Security Council.

Admiral HAYWARD. No, sir.

Mr. FULTON. But the Security Council would still have a veto on your programs, too, would it not?

Admiral HAYWARD. They have a veto on any program, yes, as far as I am concerned.

Mr. FULTON. So that actually you have about 10 various places that can veto you.

Admiral HAYWARD. This is correct, yes, sir.

Mr. FULTON. And you go up about four steps within the Department of Defense, do you not, on a space program or a basic research project?

Admiral HAYWARD. Yes, sir, I go to my immediate superiors in the Navy, of course, Admiral Burke. We present it to the Department of Defense, and then, of course, the system, as I said the other day, you have these four things you have to remember. Appropriations, obligations, apportionment, and expenditure.

Now after the appropriations are made, they come back again. I, once again, to get my apportionment, have to justify my program.

Mr. FULTON. Yes, and you have to justify it likewise to the Secretary of the Navy and also the Comptroller of the Department of Defense, who takes a slice out of it.

Admiral HAYWARD. Yes, sir, that is correct.

Mr. FULTON. Well, how do we get out of this maze of places where all these programs go to where so many people have the right to veto and say "no" and such a hard path to get a "yes"?

Admiral HAYWARD. Well, Mr. Fulton, speaking for myself, and I have had General Trudeau and Lieutenant General Wilson, who hold the same position in their respective services, it is not the veto that bothers us so much as the fact that we should only have to go one place to get technical approval, and this is the place that we hope Dr. York fills.

Now, if the Comptroller wants to do anything because of expenditures or budget, it should not be a technical review. The Comptroller is not in a technical business, and I would certainly be willing to abide by any decision that Dr. York made technically.

Mr. FULTON. So, really, the Bureau of the Budget should not act technically either.

Admiral HAYWARD. No, sir, this is correct.

Mr. FULTON. But they likewise can take a slice at you, can't they?

Admiral HAYWARD. This is correct, but from the technical appraisal, we feel that we should only have one competent technical agency to go to, which is Dr. York. This was the idea of the legislation and the reorganization, which I was glad to see.

Mr. FULTON. Now, when the Army witnesses were here yesterday, they said they couldn't tell who it was that was advising the Department of Defense, the Secretary of Defense, against some of their programs. When the decisions were made, I asked who this group of ghosts are that are able to say "no" when the Army feels there should be a "yes" on a vital security program for Army purposes.

Do you have that problem? You can't tell who says "no" to you when you get up so high and run into a bunch of advisers or a committee of advisers in the Department of Defense?

Admiral HAYWARD. I have no difficulty finding out who says "no."

Mr. FULTON. The Army couldn't even find out who said "no."

Admiral HAYWARD. Dr. York is the technical adviser, of course, to Mr. McElroy and to Mr. Quarles. Mr. Quarles is a very competent technical man himself. I know where the "no" is, Mr. Fulton.

Mr. FULTON. And it is hard to find where the "yes" is.

Admiral HAYWARD. Well, I will put it this way: If you get a "yes" at a certain level, it doesn't mean that the program will go. You have to get a "yes" from Dr. York, and you have to get a "yes" from the Secretary of Defense.

Mr. FULTON. My final question is, does the getting of the "yes" from these various levels take too much time? This is supplemental to the question Mr. McCormack has been asking. Is the administration so complicated that it takes a lot of time just simply to work through it before you can get the program in, and going?

Admiral HAYWARD. My answer to that would be "yes," it is complicated. I want to make clear, however, Mr. Fulton, that having Dr. York in his position is a tremendous help to us for the simple reason now I have a competent scientist, I have a competent technical man, and I can fight with him on his own grounds. With the Comptroller this is difficult in the technical field.

Mr. FULTON. We are trying to simplify the space and science programs so that we can get good, efficient, executive approach and quick decisions. When it started out, Dr. von Braun was before us last year, and I believe testified he had 23 levels of decision to go through before he could get a final "yes" on a research and development program.

Thank you. That is all.

Mr. MILLER. Well, Admiral, as I follow Mr. Fulton's comments, it used to be then that you had to fight with the Comptroller's nontechnical people. So now, instead of throwing to first base, it becomes Hayward to York to the Comptroller, isn't that true, just relaying the ball?

Admiral HAYWARD. No, sir. Our hope, of course, is that Dr. York has enough stature in the Department of Defense that when he gives a technical "yes," it will be a "yes" for the Department of Defense. This was our whole assumption and the way the law reads to me. He has this authority.

Mr. MILLER. I hoped that that was the case, but in your experience in the Navy, no matter how we try to soften this thing, and in the Defense Department generally, doesn't it always resolve itself down to the fact that you are limited to the man who actually says "yes." He is the fellow who merely looks at the debit and credit side of the ledger. It comes down to the Comptroller finally; isn't that so?

Admiral HAYWARD. No. If in my program of $525 million I see it would be better to shift from one project to another project I would propose it. Now, before you had a real good technical man who understood what you were doing, if you did this shifting, the Comptroller was likely to say, "Great, we will take the money from project 39, but we won't put it in project 30." Whereas, the technical man will say, "That makes good technical sense to take that money from 39 and put it in 30."

Now, if Dr. York says that to the Comptroller—because you must remember this is all within the confines of the overall program, which is the flexibility which we would like to have. Now, if there is any doubt in my mind if I cancel 39 to go into project 30, that the Comptroller is going to take the money, the human reaction would be not to do this.

Mr. MILLER. Not to cancel it?

Admiral HAYWARD. That is right, not to cancel it.

So in discussing this with Dr. York, he understands our problem, and I think under the existing law and organization that he has the authority to do just that.

Mr. MILLER. In other words, you now have a contact directly with the Secretary of Defense?

Admiral HAYWARD. This is correct. Dr. York has an open door to me, and to General Trudeau and to General Wilson. We can walk in his office any time, and we meet every 2 weeks, together with our Assistant Secretaries for R. & D., and we are his counsel really, so we do have an opportunity to do this.

Mr. MILLER. This is an opportunity you haven't had before?

Admiral HAYWARD. Yes, sir. I don't know whether the committee realizes what a tremendous thing it is in Government to get such a competent physicist as Dr. York.

Mr. MILLER. I want to say that I agree with you, and coming from a district in which Dr. York did some of his greatest work—the Livermore Laboratory happens to be in my district—I join you in paying compliment to him and to his competency.

Admiral HAYWARD. You see, our problem before has been that we didn't have the technical competency at that level. We have it now, and I think anybody in the scientific world will agree. I only hope we can keep him.

Mr. MILLER. I am very hopeful that having obtained Dr. York, you will still retain the vigor and the ability to battle down this rather solid individual which may masquerade in the white sheet of a ghost, but isn't a ghost at all. It is the Comptroller of the Department of Defense.

I have no further questions.

The CHAIRMAN. Mr. Anfuso.

Mr. ANFUSO. Mr. Chairman.

I think the ground has been very well covered. I should like to make a request of you, anyway.

Is it possible to get the different branches of the service, as well as our space agency, to furnish us charts depicting the different echelons they must go to in order to get a decision and also the time that has been consumed on previous decisions?

The CHAIRMAN. I understand we are already engaged in collecting that. Our staff is working on that.

Mr. ANFUSO. Thank you.

The CHAIRMAN. Furthermore, I will say this: I believe some of these questions can be cleared up when we get the Defense Department here.

Mr. FULTON. We are doing pretty well there.

Mr. SISK. I have just one question.

The CHAIRMAN. Mr. Sisk.

Mr. SISK. We were discussing this chain of command and who can say "no" and who can say "yes," Admiral Hayward, and discussing particularly Dr. York. I, personally, would like also to pay tribute to Dr. York's capabilities. Certainly, I know from personal experience with him that we do have a man that is really capable.

But now, who is Dr. York's boss?

Admiral HAYWARD. Mr. McElroy.

Mr. SISK. Where does Mr. Roy Johnson fit into the picture? I thought Mr. Roy Johnson was head of ARPA.

Admiral HAYWARD. He is the head of ARPA, yes, sir.

Mr. SISK. Well, how is Dr. York connected with ARPA?

Admiral HAYWARD. I would have to get the reorganization law and read it. It is quite direct in the law. Dr. York is the most powerful man in the Department of Defense from my point of view. He has the authority, as I understand the way the law reads. He comes directly under the Deputy, Mr. Quarles, and Mr. McElroy, the Secretary.

Mr. SISK. I appreciate the fact, and I understand.

Admiral HAYWARD. Now, there is one difference with ARPA, you must understand. ARPA is the only part of the Department of Defense that really has money for programs. You see, ARPA has its own funds.

Mr. SISK. That is right.

Admiral HAYWARD. That is the difference between any of the other sections of the Department of Defense. ARPA has its own projects, the Advanced Research Project agency runs the WS–117L vehicle, for instance. It has helped us in some of our fields. It gave us some programs using the services, but they have the actual money themselves, and it is not part of my $522 million, for instance, in this basic program. So that is where they differ. But the relative seniority, as I read it, is Dr. York is the boss in research and development and test and evaluation. He is the man who has the authority under the law.

Mr. SISK. Well, I appreciate that they are going to be before us next week, and at that time we will ask some questions. But in line with some information that we have had recently, there seems to be some question whether Dr. York can overrule Mr. Johnson or Mr. Johnson can overrule Dr. York. Frankly, I will admit to some bit of confusion as to this chain of command. I was just curious as to what you feel, and others at your level in the picture feel, to be the

top people. In other words, who can overrule who and who can say "No?" And frankly, that was the only purpose I had in posing the question as to who was Dr. York's boss.

Dr. York, in your opinion then, is responsible directly to Mr. McElroy?

Admiral HAYWARD. That is correct; yes, sir.

Mr. SISK. Secretary McElroy has only one boss and that is the President of the United States.

Admiral HAYWARD. That is correct.

Mr. SISK. That would be the chain of command as you see it?

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. Would the gentleman yield there?

Mr. SISK. I would be glad to yield to the floor leader.

Mr. MCCORMACK. Suppose Dr. York and Mr. Johnson disagreed on a matter that the Navy has jurisdiction over. What position are you in then?

Admiral HAYWARD. Well, our problem would be down fighting with both of them. That is what I would do, Mr. McCormack.

Mr. MCCORMACK. I imagine you would, but I just want to know where you stand.

Admiral HAYWARD. Well, I can assure you I would be there if they were fighting over something.

Mr. MCCORMACK. Furthermore, if the Comptroller got interested—of course where the money is the power is, you and I know that——

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. You and Dr. York might agree on technical policy, but the old money is what puts it into operation.

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. You can't make the mare go without the money.

Admiral HAYWARD. That is correct.

Mr. MCCORMACK. And if the Comptroller should interest himself in the financial angle, then you have another phase to battle with or subject yourself to.

Admiral HAYWARD. But then I have Dr. York, who is the top man in the Department of Defense, on my side, you see, which is a tremendous help.

Mr. MCCORMACK. Oh, I am not underestimating that, but we are just trying to do a little probing of our own. We want to see how this organizational setup is.

Mr. SISK. If I could pursue that question a bit.

Let's say Dr. York was not on your side, that he was on the opposite side.

Admiral HAYWARD. He can overrule me, yes.

Mr. SISK. But you are in there fighting for your cause, and I want to compliment you now, Admiral, and say you are a great fighter for your cause. I appreciate that. I am glad we have people like you in there working on these programs, who are not going to give up because Dr. York is against you. You are going to appeal to somebody who can override Dr. York, if you firmly and vigorously believe in the program that you are working on.

Admiral HAYWARD. That is correct. And I have done this.

Mr. SISK. Who would you deal with?

Admiral HAYWARD. I would go to Mr. McElroy, myself, and to Mr. Quarles. I would go to anybody who would sit still and listen to me, even the Killian committee; anybody who would sit still and listen to why I wanted to do it.

Mr. MCCORMACK. Where might that leave you in connection with future promotions?

Admiral HAYWARD. I don't know, Mr. McCormack. We will see very soon.

Mr. SISK. One concluding question, Mr. Chairman. I would like to ask——

Mr. MCCORMACK. I don't think that question will hurt you if the case should arise. I didn't mean it to hurt you.

Admiral HAYWARD. No, sir; I understand, Mr. McCormack.

Mr. SISK. Well, because of some confusion that exists, let me ask you this: From your viewpoint, would you recommend any specific or general change in law with reference to this so-called chain of command? Do you feel that the Congress possibly should take another look at just how this order should proceed? Do you have any comments at all on that, Admiral?

Admiral HAYWARD. No, I better not comment on that, Mr. Sisk.

Mr. FULTON. Would the gentleman yield?

Mr. SISK. Yes, I will yield.

Mr. FULTON. With all this maze of command, where are the Secretaries of the various services, the Army, Navy and Air Force? In addition, where are the Joint Chiefs of Staff? What happens to them? We have almost left them out of the discussion.

The CHAIRMAN. Would the gentleman yield there?

Mr. SISK. Yes; certainly.

The CHAIRMAN. Of course ARPA is the result of a separate piece of legislation that was tied onto the Defense Act about 2 years ago. It places the responsibility directly under the Secretary of Defense. Isn't that right?

Admiral HAYWARD. That is correct.

The CHAIRMAN. Which, in effect, bypasses the Secretaries of the several departments.

Admiral HAYWARD. That is correct.

The CHAIRMAN. That is the reason why, with your chain of command going up, you would go directly to McElroy. That is correct, isn't it?

Admiral HAYWARD. Yes, sir.

Mr. SISK. Mr. Chairman, if I could interject a question here. In other words, you at no time, then, in this program, go to the Secretary of the Navy?

Admiral HAYWARD. Oh, yes, sir. I must say, you see, that my Assistant Secretary for Research and Development, who is in the Secretary's office, was Mr. Norton, and I don't know who the new one will be, but Mr. Gates—in the Navy we have this bilineal organization—he goes with me. I need one very badly, and he should be here today with me.

Mr. SISK. I think you are doing very well.

Admiral HAYWARD. But he goes with me to Dr. York and sits with the other Assistant Secretaries.

Mr. McCormack. You used the word "if," didn't you? "If he goes"?

Admiral Hayward. Well, no, sir. He can overrule me also. Yes, sir, there is no question about that.

Mr. Sisk. That was the point of my question.

Admiral Hayward. The Secretary of the Navy, yes, sir. I work for Mr. Gates.

Mr. Sisk. Well, that is the point in getting this whole chain linked together here. You first must go to the Secretary of the Navy. He actually then becomes in essence your first boss.

Mr. Miller. If the gentleman will yield, first he goes to the Assistant Secretary.

Admiral Hayward. To Admiral Burke.

Mr. Miller. Well, yes, then to the Asistant Secretary of the Navy for Research and Development, then to the Secretary of the Navy. Isn't that right?

Admiral Hayward. Yes, sir.

Mr. Sisk. Well, Admiral Burke is Chief of Naval Operations.

Admiral Hayward. Yes.

Mr. Sisk. You go to him first?

Admiral Hayward. Yes; he and Mr. Gates. In the Navy our civilian secretaries, we live real closely with them, and I can't say too much for them, Mr. Sisk, because they are our best fighters. It is a tremendous loss to us to have Mr. Gates go, because he lives with us. He knows an awful lot about the Navy. Mr. Franke does also.

Mr. Sisk. I agree with your comments.

I would just like to get clear the chain of command in the programs you propose. You would go first to Admiral Burke, or to someone who is Chief of Naval Operations at the time?

Admiral Hayward. That is correct; yes.

Mr. Sisk. Then to the Assistant Secretary in charge of your particular research and development program.

Admiral Hayward. In going to Admiral Burke, I go to the Secretary at the same time. Mr. Gates and Admiral Burke live very closely together, and when I propose a program such as my testimony on the AMP business in the joint committee, Mr. Gates came with me that day rather than Admiral Burke.

Mr. Miller. Would the gentleman yield?

Mr. Sisk. Yes; I would be glad to yield.

Mr. Miller. Now, they live closely together?

Admiral Hayward. Yes, sir.

Mr. Miller. So you talk with them as one. But suppose they were not too closely together? Suppose Admiral Burke said, "Well, I think this proposition"—we will call it 42—"is a good one," and Mr. Gates didn't think so much of it. The buck stops right there, doesn't it? Progress stops there, doesn't it?

Admiral Hayward. I don't know, sir.

Mr. Miller. But practically speaking, isn't that right?

Admiral Hayward. Well, this is civilian run.

Mr. Miller. But there is an opportunity for the Secretary to veto at that point?

Admiral Hayward. Admiral Burke has the opportunity to present his side right to the top, you see. He is also a member of the Joint Chiefs, and he has an appeal, let me say.

Mr. MILLER. He can appeal from the Secretary to Dr. York.

Admiral HAYWARD. He can appeal to the Secretary of Defense.

Mr. MILLER. Well, he would go to Dr. York, I assume, for technical approval?

Admiral HAYWARD. He probably would; yes, sir.

Mr. MILLER. Or would he go to the Secretary and the Secretary would call in Dr. York for technical advice? There is a good deal of difference between Dr. York acting as an adviser to the Secretary of Defense or Dr. York being in the echelon where he can say "No" before it goes to the Secretary.

Admiral HAYWARD. Well, maybe I should clarify how the programs are made.

We have a long-range objective plan for the Navy. We have programed objectives. These are published and worked over. They go to the Joint Chiefs, the unified commanders. Usually in this particular business of starting one particular program I don't think we have that problem that you have envisioned there. You might have it in an operational matter. You might have it in the canceling of a system, but usually in starting the programs the programs are to support a definite objective, and if the objective is changed, you might have your argument there. But usually the arguments between a Secretary and a Chief of Staff would not normally be technical arguments, Mr. Miller, I don't believe. I may be wrong. But I am no expert on organization, I assure you. The law was passed, and we have a famous saying in the Pentagon now: "If you can't cook it, kiss it, or mimeograph it; you reorganize." That is the limit of my knowledge on it.

Mr. SISK. I hesitate to pursue this, Admiral, but I do feel that in view of the confusion—and I don't know that we are going to resolve this confusion here this morning—but for my own satisfaction I am interested in just briefly the chain of command from the standpoint of authority, because someone in each case has the authority to override.

Let's take your chain of authority to the President of the United States. First is your Chief of Naval Operations, as I understand it?

Admiral HAYWARD. Yes.

Mr. SISK. Then next is the Assistant Secretary in charge of R. & D.

Admiral HAYWARD. That is correct.

Mr. SISK. OK.

Next is the Secretary of the Navy?

Admiral HAYWARD. Yes, sir.

Mr. SISK. That would be Mr. Gates. All right.

From there it goes to where, now?

Admiral HAYWARD. It will go to the Secretary of Defense.

Mr. SISK. And from the Secretary of Defense, of course, then it goes to the President?

Admiral HAYWARD. Yes, sir.

Mr. SISK. That is the top.

Now, actually these other groups which enter into the picture, such as ARPA, along with Johnson and York, are simply a part of the Secretary of Defense's organization?

Admiral HAYWARD. That is correct.

Mr. SISK. That is used to handle and orientate the program?

Admiral HAYWARD. That is correct. They advise the Secretary of Defense on his decision, and the decision is the Secretary of Defense's decision.

Mr. FULTON. They are the ones that can say "No" from the gallery seats. That is the trouble.

Mr. SISK. I will yield to the gentleman from New York.

Mr. ANFUSO. Admiral, you, as a scientist, suppose you had the OK on a project from Dr. York, but a political Secretary of the Navy overruled you, which prevented you from going any further, would you still go to the Secretary of Defense?

Admiral HAYWARD. If Dr. York approved it, he would be the man that would take it to the Secretary of Defense.

Mr. ANFUSO. He would overrule the Secretary of the Navy?

Admiral HAYWARD. Under the law, he has the authority.

Mr. ANFUSO. Thank you.

The CHAIRMAN. Of course, you have a little bit of this situation: You have the appeal of the project in one way and yet personally you have got an obligation the other way.

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. In other words, you work under the Secretary of the Department, but the project you are working on follows a different chain of titles, isn't that true?

Admiral HAYWARD. Well, when I take it to Dr. York—when we take it to the Secretary of Defense, let us say, Mr. Chairman, the Secretary of the Navy will actually sign the letter to the Secretary of Defense. If we proposed a program such as on this nuclear propulsion business, the Secretary of the Navy writes a letter to the Secretary of Defense. I do all of the work, and he sends the letter there. Then actually I work with Dr. York directly in the overall R. & D. programs, but on specific items for approval of this kind it goes from Mr. Gates to Mr. McElroy.

Now, Mr. McElroy may take Dr. York's advice. He may not. He has this choice.

The CHAIRMAN. You get the idea of what I mean?

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. You have a little bit of conflict there between personnel jurisdiction and project jurisdiction; isn't that what it is?

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. Isn't that what probably is confusing a good many members of the committee?

Admiral HAYWARD. I think that is correct.

The CHAIRMAN. Because the law has set up the fact that ARPA comes under the Secretary of Defense, but now you yourself operate under the Secretary of the Department.

Admiral HAYWARD. That is correct.

The CHAIRMAN. Therefore, the Secretary of the Department uses personnel control, whereas the Secretary of Defense controls the project. In effect it works out to about the same thing.

Mr. ANFUSO. Will you yield to me, Mr. Chairman?

The CHAIRMAN. I will recognize you, Mr. Anfuso.

Mr. ANFUSO. Did I understand you to say that you must get a letter from the Secretary of the Navy to go to the Secretary of Defense?

Admiral HAYWARD. I don't mean it the way you are saying, Mr. Anfuso. I mean on aircraft nuclear propulsion or any big, large new program that we are proposing, it will be proposed—even Polaris, where we feel we have a certain need, it will be proposed in an official letter from Mr. Gates to the Secretary of Defense. Now, it has lots of implications.

As the chairman very aptly pointed out, there is the project control, there is the budgetary control. So Mr. McElroy has to get lots of answers before he approves it or doesn't approve it.

Mr. ANFUSO. Now, supposing you had Dr. York's OK, as I said before, but a political Secretary of the Navy refuses to sign that letter to the Secretary of Defense, then where are you?

Admiral HAYWARD. The Secretary of Defense can still go ahead with the program.

Mr. ANFUSO. But you can't get to the Secretary of Defense unless you have a letter from the Secretary of the Navy.

Admiral HAYWARD. That is officially correct, but it would be——

Mr. ANFUSO. Well, it could happen?

Admiral HAYWARD. Yes, sir.

Mr. ANFUSO. A political secretary, Democratic or Republican, could overrule it and say, "I will not sign such a letter to the Secretary of Defense." Then where are you?

Admiral HAYWARD. Well, I have another fight going on.

Mr. SISK. One last question, Admiral.

By the time you get one of these programs justified, do you have any time to do the work on the program?

Admiral HAYWARD. Well, I am quickly forgetting all I knew about physics, I assure you. We try to protect our working people as much as we can that work on the programs and try not to bother them too much. We are already starting on the 1961 budget, you see, and this is a continental process.

Mr. SISK. Thank you, Mr. Chairman.

The Chairman. My suggestion is this:

Of course these things disturb the committee, but we are in sort of the situation that the gentleman just referred to. If we are going to take up all of our time trying to find out from each service just how these things are processed, we may not have time to get down to our basic work.

Now, why wouldn't it be a very good thing for this committee to let the staff go ahead and work this out. Then we will have the witnesses come here and they can give us the answers. There will be no difficulty and you won't embarrass any of these witnesses in working out this. I think we would save a lot of time.

Mr. FULTON. Could I comment?

I believe the committee is doing a good job in bringing this out for the public, so that they will have knowledge of the difficulties that these scientific and research programs are going through. If we can bring pressure to bear through this examining of these various services to show that each service has a different problem, and they don't know what their echelons of command above are, and the lines are not definite on authority, and many people can say "No" without any particular responsibility, and they have to get a "Yes" every place or it doesn't go through, we will have accomplished something. Now, we are doing a job, and I think we should go ahead on it.

The CHAIRMAN. Well, all right, the Chair was simply thinking of this: We are lagging far behind in the hearing of the witnesses that we had scheduled to hear. Now, we can do this: We will be out of town several days this week. When we come back, we can just double up and have some night sessions, and catch up, or we can try to work it out in a way that will save time. Whatever the committee wants to do will satisfy me.

Mr. FULTON. And we are learning, too, I might add.

The CHAIRMAN. I think we ought to have it worked out so we know what is the trouble in each department so we can assist.

Mr. Mitchell.

Mr. MITCHELL. One question, Mr. Chairman.

Admiral, Captain Wagner in his presentation as to the Pacific Missile Range, for 3 years subsequent to now, he said he could conservatively estimate it will require some $246 million in 1963 as compared with only $126 million for fiscal year 1960.

Now, I would appreciate it if you would sort of elaborate on the reason for this increased cost for each—I assume that will be true of each of the Pacific missile ranges as well as Pacific?

Admiral HAYWARD. No, sir.

Mr. MITCHELL. It will not?

Admiral HAYWARD. No, sir. The Pacific Missile Range is just coming into being. You have those ships he mentioned. You have the instrumentation, and you must remember, as he pointed out, that the leadtime for facilities sometimes takes longer than for the actual program.

Now, a missile range such as this is at the mercy of the planners, really. You go to the Army or to NASA or to ARPA and say, "What are you going to shoot on this range in such and such a year?" They tell you. You have to plan for it. This is the same way we do in the Atlantic range. We have to tell General Yates yes, we are going to shoot so many Polaris or we have to do this or that. If there is something peculiar in that program, the program sponsor has to build that particular facility, so you can see that these are really educated guesses, and that the reason the others are not going to go up in cost is that the Atlantic Missile Range is built, and so is the White Sands, and the Pacific Missile Range is not built.

Mr. MITCHELL. When will the Pacific range be in full operation?

Admiral HAYWARD. Captain Wagner, do you want to answer that?

Captain WAGNER. It will probably be difficult to define what full operation is. It is in partial operation now, but with the normally accepted definition of the term, I would say in 1963 it should be pretty close to full operation at that time.

Mr. MITCHELL. That is all. Thank you.

The CHAIRMAN. Mr. Quigley.

Mr. QUIGLEY. No questions.

The CHAIRMAN. Mr. Wolf.

Mr. WOLF. No questions.

The CHAIRMAN. Mr. Karth.

Mr. KARTH. I have one, Mr. Chairman.

I was interested in the questions precipitated by Majority Leader McCormack's initial question, sir.

You and others who have appeared before the committee have pretty much agreed that the Russian technical know-how is pretty much on a par with that of the United States: that they have good scientists.

Admiral HAYWARD. Yes, sir.

Mr. KARTH. If this is true, and let's assume that it is for the moment, and if the leadtime is longer in the United States than it is in Russia, is it rather fallacious reasoning to assume that we can catch up?

Admiral HAYWARD. Well, as you remember my first statement was, as I said, the challenge was across the board, and we have to tell our people that there is no substitute for hard work, and our people are not alert to the challenge today. The newspapers say how many ICBM's the Russians have versus how many we have, and that is the only part of the challenge, but if you read in detail, take Khrushchev's last speech, if you look at the economic side, the political side, and the psychological side, we have to get to work, and this is the answer I gave the other day when they asked whether we were at war. We are at war now. These people have sworn to destroy us, but we are not just at war in the ICBM field, we are at war across the whole spectrum. This is important for the American people to know.

Mr. KARTH. Well, Admiral, in the field of missiles, do you feel that with the leadtime as it is today, that is, without the necessary appropriations to cut this leadtime and reduce this long, drawnout affair, redtape and everything else that is involved, do you feel we can really catch up with Russia, assuming that they are working hard, too, sir?

Admiral HAYWARD. Yes, sir; they are working hard.

Technically, I feel sure we can catch up with them. We are ahead in many basic fields.

Mr. KARTH. I mean in the missile field.

Admiral HAYWARD. I believe in the missile field, too.

Mr. KARTH. Hard work is your answer there?

Admiral HAYWARD. Yes; hard work is my answer to that, too.

Mr. KARTH. And this is brought about by letting the technical people in the missile field in our country, like yourself and Dr. York, make some of these decisions, rather than having them go upstairs to people who really don't have the technical know-how. Is this correct, sir?

Admiral HAYWARD. Well, that is a complex question. It goes all of the way back to the end of World War II.

Mr. KARTH. Yes; but I am trying to see how we can cut down this leadtime, because the Russians' leadtime is less than ours, and their know-how is just as great, or possibly—well, let's say just as great. I am wondering how we can catch up unless we give more authority to people like you to make the decisions.

Admiral HAYWARD. Well, if you just refer to the missile field, the curve is getting pretty flat now. I think that we will surpass them in the missile field. I am talking about the Navy's point of view—the Polaris system, I think this system is far superior to anything the Russians have today. It isn't in operation, no, but it will be, and in that period of time I feel that we will have beaten them in the missile field, but this isn't the end. This isn't just the objective. That is the point that I am trying to make. It goes deeper than that. And this struggle is going to exist for the rest of my life and the rest of your life, unfortunately.

So we have to work hard and to sacrifice to make sure that we keep our freedom.

Mr. KARTH. However, do you feel that cutting down on the leadtime will give us more security in the field that we are talking about today insofar as gaining and catching up more quickly with Russia?

Admiral HAYWARD. Oh, certainly.

Mr. KARTH. And you feel the way to cut down this leadtime is to provide greater appropriations in this field? Do you feel that this would reduce the leadtime, sir?

Admiral HAYWARD. Well, yes, sir. In my request for money I asked for $770 million, for instance, and I was given $522 million.

Mr. KARTH. I was just wondering whether this money could reduce the leadtime, which apparently today is just as long or longer than it is in Russia.

Your answer apparently is "yes."

Admiral HAYWARD. Yes.

Mr. MCCORMACK. Will the gentleman yield there?

Mr. KARTH. Yes, sir.

Mr. MCCORMACK. We have the brains, Admiral, haven't we?

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. And we have the facilities?

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. It is the question of leadership that will coordinate them into concentrated activity. That means a combination. Essentially, wouldn't it be quick and early decisions and then the money?

Admiral HAYWARD. That is correct.

Mr. MCCORMACK. The way to shorten your leadtime, or one of the ways, is to cut down this long period of time that is taken in connection with making the decision to go ahead or not go ahead.

Admiral HAYWARD. That is the answer to the Polaris program.

Mr. MCCORMACK. And once the decision is made, to follow up with the money?

Admiral HAYWARD. That is correct.

Mr. MCCORMACK. We then have to rely on you and other dedicated men. That is all we can do.

Admiral HAYWARD. That is correct.

Mr. KARTH. No further questions.

The CHAIRMAN. Mr. Hall.

Mr. HALL. Admiral, have you done any work on antimissile missiles?

Admiral HAYWARD. Yes, sir; and I am prepared in closed session to discuss what we have done on that, on the blackboard, when we have the closed session.

Hr. HALL. Is there anything you can say about it in open session?

Admiral HAYWARD. No, sir; except it is the Navy's responsibility to defend the continental United States against submarine-launched missiles. There is no sense in finding a submarine and telling somebody back here he has just launched a missile. You should do something about it right then. So that is our responsibility, and we looked at it from that point of view.

Mr. HALL. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Admiral, in answer to one of the questions put to you by Mr. Miller, you said, "I hope Dr. York has the stature to accomplish this." I think that is a direct quote.

Do you think that a program of this magnitude and importance should depend upon such a hope?

Admiral HAYWARD. I don't recall saying—I say that Dr. York has the stature to accomplish this technically, particularly with technical questions.

Mr. DADDARIO. Well, doesn't this really go back then to having some kind of program that does not depend upon men of stature being in the right place at the right time, but rather a program which can make more easy and more expeditious the accomplishment of these problems, so that when you do present a program, you don't have to go through such a myriad of people in order to get your final "yes," and then get down to work.

Admiral HAYWARD. Well, my feeling—emphasizing the man that we have at the technical level—unfortunately the people that come into Government in our country, primarily their background is law or fiscal. Very seldom are they technical. Now, he could be a very fine person but if he didn't have the technical background, he would be at the mercy of anybody who came in and sold him a technical program, so it has to depend on people, and we have to depend on getting good people into the Government of the type, as Dr. York.

Mr. DADDARIO. Well, I remember a lawyer from my State, Brien McMahon, who headed the Joint Atomic Energy Committee, and he seemed to realize these problems. Don't you think it goes back to what was said the other day, that we need something on the order of the AEC in order to accomplish in this field the same or greater accomplishments that were performed there?

Admiral HAYWARD. My testimony last year was along that line. Of course, Brien McMahon was an unusual person, and I give tremendous credit to this man for the atomic energy program we have today. He had vision and good technical vision, and he was a tremendous American. I join you in admiration for that man.

Mr. DADDARIO. We have a prototype really in the AEC and in the vision which the late Senator McMahon exemplified to again utilize that similar approach to this problem, which is before us today. It worked there, and that was a complex problem. It can work here, can it not?

Admiral HAYWARD. Yes, sir. Of course Congress went into this, I am sure, as the chairman pointed out last week. A lot of us testified along this line last year, before Mr. McCormack on it.

Mr. DADDARIO. Thank you, Admiral.

The CHAIRMAN. Mr. King.

Mr. KING. Admiral, there was recently a feature article in the Saturday Evening Post written by an American scientist, and I believe his name was Cohn or Cohen, who had toured Russia. His conclusion was that in almost every field of scientific endeavor, with the possible exception of chemistry, the Russians were either ahead or they had developed a momentum, a pace, that assured them that they would be ahead within the foreseeable future. That was the thing that alarmed him so much, the accelerated pace, the tremendous impetus that they had given in the fields in which we were admittedly ahead at the present time.

Well now, my question is this: Do you feel that the pace, the momentum, that the Russians have set in this satellite field right now is greatly ahead of ours, even in those areas in which we perhaps are technically ahead of them, so that actually they will remain ahead of us or overtake us unless we can accelerate our pace, which we have not done?

Would you want to discuss that?

Admiral HAYWARD. Well, they are ahead in the rocket engines, but from their instrumentation I am not so sure that I buy his statements, because they took our spectograph right out of the Vanguard and put it in their Sputnik III and had no hesitation to do it. They didn't have anything of this nature. There are a lot of other fields where I don't think they are ahead. However, I agree the momentum is tremendous in the scientific and technical fields in Russia. They have made the statement that they are going to beat us technically, and they are really putting tremendous effort into it, along this line, but I feel they have a tremendous way to go yet, and we have to get working and working real hard.

Mr. KING. This Dr. Cohen pointed out that they could draw on such a vaster potential of incoming scientists. He gave a lot of figures. I don't remember them. But in engineers it was 3 to 1 over us, and in other fields it was comparable to that, He said their ability to draw on this great potential of incoming scientists, plus the fact that they were given better consideration in budgetary matters, and the fact that their scientists were made the heroes of Russia instead of the athletes and the movie actors, and so on, that all of that gave an impetus to this thing that just seemed to be carrying them forward a lot faster than we were able to accomplish here.

Admiral HAYWARD. Well, essentially he is correct. If you look at the scientists who have won prizes from our Government, you can count them on one hand. Dr. MacLean, Enrico Fermi, Lawrence. Over there you will get people such as the other Mikoyan, Gurovich, who will have won four or five Lenin prizes, which are equivalent to about $35,000 apiece, tax free. They are the heroes of the Soviet Union. Of course they work under this dual system. If they are not the heroes and they don't do their job, they are liable to get shot or sent to Siberia, which gives them a great incentive, but they have a completely controlled setup this way, and they have rewarded their scientists very well.

Mr. KING. It seems to be paying off in their case rather dramatically, doesn't it?

Admiral HAYWARD. Yes, it does.

Mr. KING. That is all.

The CHAIRMAN. Admiral, let me ask you this: You say they took a part of the Vanguard out and used it in Sputnik III?

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. How did they get ahold of that part?

Admiral HAYWARD. The whole design of the Vanguard was an unclassified project, you remember, and they knew everything we were doing in the I.G.Y. This was perfectly open information, not classified information. It was strictly scientific.

The CHAIRMAN. Did we give them all of the machinery, all of the technical equipment and all that we had in the Vanguard?

Admiral HAYWARD. Sir, they have a tremendous advantage on us in that respect, Mr. Chairman. They spend roughly a billion dollars a year in getting every technical journal we put out into the Western World and translating it and when they start a project they have all of the advantages of everything they have read so they start where we left off.

The CHAIRMAN. You mean they spend a billion dollars on that?

Admiral HAYWARD. A year, yes.

The CHAIRMAN. What do we do in that connection?

Admiral HAYWARD. I do not know, but it is not that much. We have our National Science Foundation effort and other efforts that you will probably get into on the committee. But this is something they have done for years.

The CHAIRMAN. Do we give them all of the inner working and machinery of the other missiles, such as the Zeus?

Admiral HAYWARD. They subscribe to every technical magazine. What you read in Aviation Week they read. What you read in the American Physical and Chemical Society they read, they translate. I try to get as much of theirs as I can.

The CHAIRMAN. Did we give them the Redstone?

Admiral HAYWARD. Whatever is published in open magazines is available to them on subscription.

The CHAIRMAN. Other than that they get no information.

Admiral HAYWARD. No, sir.

The CHAIRMAN. But your point is it is all published.

Mr. ANFUSO. Mr. Chairman, will you yield to me?

The CHAIRMAN. I yield.

Mr. ANFUSO. The Russians have boasted that everything they do they publish and they have published scientific magazines of everything they do, and those scientific magazines are piling up in our libraries with nobody to translate them.

Admiral HAYWARD. The American Physical Socity of course has done work in this line and the National Science Foundation. It is a tremendous job. Technically we would like very much to be able to do this on machines if we could and we are putting some effort into trying to do this but another thing we are doing is we are teaching a lot of our children how to speak Russian, too, and to translate, but the effort should be increased in this field, of course.

Mr. ANFUSO. Is it true, Admiral, that most of the things they do are actually published in a Russian scientific magazine?

Mr. MCDONOUGH. And available to the rest of the world.

Mr. ANFUSO. Yes.

Admiral HAYWARD. Quite a bit of it is. I do not believe anything they say unless I have documents to prove it.

Mr. ANFUSO. Anyway you have seen many Russian magazines.

Admiral HAYWARD. Yes.

Mr. ANFUSO. Do we have the means of translating them and making that available to the people who should have the information?

Admiral HAYWARD. There are certain technical societies who do this. I know in my society, the American Physical Society, the translations on all of the high energy machines, the bevetrons, things of this kind that the Russians are doing. We translate all of those articles at places such as the University of California radiation laboratory where they are vitally interested in it.

Mr. ANFUSO. How about any of our branches of Government?

Admiral HAYWARD. Yes, sir; we have the National Science Foundation and the Congressional Library.

Mr. ANFUSO. Thank you.

The CHAIRMAN. Mr. Roush.

Mr. ROUSH. Mr. Chairman. Admiral, as I have sat through these hearings the past couple of weeks, I get the impression that all of our questions are directed toward the thought that America feels we are behind Russia. Now today you stated that you thought our solution was perhaps a little more money for some of your projects, but mainly hard work. I sat in on a meeting not too long ago in which the question was asked of General Medaris of what can we do to catch up with Russia, other than provide funds, and he made this statement: If we could have a decision which would be irrevocable for 2 years we could catch Russia.

Do you experience any difficulties of that sort, Admiral?

Admiral HAYWARD. In getting decisions, yes, sir. However, on the systems on which we have gotten a decision, you see the Polaris system was one where the decision was made and it was implemented with funds, and that system will be the result of an early decision and an implementation. There is no question about it, Mr. Roush, if you have the decision and implementation, you can make progress.

Mr. ROUSH. Well, all of these "yes's" and "no's," though, they hinder that, do they not, this power to make a decision and stick with it and follow through until we have something concrete and real?

Admiral HAYWARD. Yes, sir. In connection with that, last year in the hearings before the Johnson committee, I recommended one of the best things you could do for research and development was to make the budgetary cycle 2 years. I will tell you exactly what happens just to show you.

I go through now the 1960 hearings. I get my money July 1. Then I justify it through the reapportionment procedures. Until I get it apportioned I do not really know what I have. I am already cranking through the next year's budget and I do not know what programs I will have this year. The fiscal processes instead of being comptrollers, they are controllers. This is what we have gotten ourselves into. A 2-year budget cycle for the research and development appropriation, which is what I recommended and my Assistant Secretary of the Navy, Mr. Norton, mentioned last year, would certainly help the process of the decisions General Medaris is talking about, because each year he goes back to rejustify his decision and they may change the decision.

That is what I think he was talking about.

Mr. ROUSH. Thank you. That is all, Mr. Chairman.

The CHAIRMAN. Mr. McDonough.

Mr. MCDONOUGH. Well, outside of Government, Admiral, there is a lot of research and development in private industry that is of aid to our whole scheme of things here.

Admiral HAYWARD. That is tremendous; yes, sir.

Mr. MCDONOUGH. There are no budgetary requirements there, there are no congressional investigations and hearings, there is no line of command. They just go right ahead and develop. If they come up with something, they bring it to the Government as a proposal to put

into effect because they think it will work. Does it not come around that way? You have any number of reliable institutions in this country in private enterprise that are making proposals all the time to improve our missile and satellite program. Is that not true?

Admiral HAYWARD. That is true. Of course they have another fact or that is governed by their proposal, I have seen a lot of them, and that is the profit and loss statement. It is hard sometimes to—well, let me say industry goes about it in two ways with us. They will develop something proprietary and come and propose it or they will come with a proposal for a path to go down and they do a tremendous amount of work in American industry that is applicable to our program.

Mr. MILLER. Would the gentleman yield?

Mr. MCDONOUGH. I would just want to pursue another thought. You say profit and loss. That applies, of course, to the private institutions.

Admiral HAYWARD. That is right, they have to have an incentive.

Mr. MCDONOUGH. That does not altogether apply and there is not any reason for it to apply where the Government itself is attempting to arrive at a conclusion. But the profit and loss motive has no application at all in Russia, evidently.

Admiral HAYWARD. That is correct.

Mr. MCDONOUGH. So the reason they go ahead without regard to whether it is going to be profitable or otherwise is merely the decision of the heads of the Government that "we want this done, we do not care what it is going to cost;" probably they would not say it that way, but we want this accomplished, so if we are going to match our system against their's with the idea of exceeding them in those things that we may be behind, we have got to set the profit and loss feature aside and we have got to forget some of this complication of the line of command. The question in my mind is how much of that do we have to do and in what lines. I have never been convinced that we are not at least on a level with them in most of the scientific development in space and ICBM development. We are behind or probably a little behind on some of these things.

What this committee, I think, would like to know is in what avenues should we go without regard to profit and loss and without regard to military commands that encumber this operation. That is more of a statement than a question, Admiral.

Admiral HAYWARD. Yes, sir.

Mr. MCDONOUGH. Mr. Miller.

Mr. MILLER. I just wanted to say, we talk about private industry doing some of this stuff. Well, there is another phase, where you go to private industry, give them the guidelines and say, "we want you to develop this and we will pay for all this."

Admiral HAYWARD. That is right, and then we have the proprietary rights.

Mr. MILLER. And there is more of that than anything else; is there not?

Admiral HAYWARD. Yes.

Mr. MILLER. A great deal more.

Admiral HAYWARD. They are dependent on us for that.

Mr. MILLER. They are dependent on you for that, so that falls into the same category.

Mr. MCDONOUGH. In the broad advance on the scientific front, insofar at physics is concerned and metallurgy and biochemistry for space exploration, on the broad front, in your opinion, do you think we are behind Russia?

Admiral HAYWARD. No, sir; I do not.

Mr. MCDONOUGH. Then we are doing a lot of other things Russia is not doing, but they are concentrating on some particular objective and making a spectacular advance in certain places.

Admiral HAYWARD. They are doing real well in the psychological war.

Mr. MCDONOUGH. That is the point.

Mr. ANFUSO. Would you yield?

Mr. MCDONOUGH. Yes.

Mr. ANFUSO. There is a lot of talk about what private industry can do and I am a great believer that private industry can do a great deal. But when it comes to security and safeguarding our country, I believe that it requires an awful lot of initiative from Government itself. Is that not so?

Admiral HAYWARD. Yes. However, the private industry is awfully good.

Mr. ANFUSO. Private industry is always seeking to make a profit.

Admiral HAYWARD. Yes, but some of them have passed over profits for the good of our country.

Mr. MILLER. Once they have been given a project.

Admiral HAYWARD. I can show you concerns today that are putting their own money in the antisubmarine warfare business with no contract or anything else because they think the problem is important.

Mr. ANFUSO. Let me give you this example, Admiral. You remember Dr. Dornberger.

Admiral HAYWARD. Yes.

Mr. ANFUSO. Dr. Dornberger used to be connected with the German V–2 missiles.

Admiral HAYWARD. That is correct.

Mr. ANFUSO. In private industry he developed this Dyna Soar. Is that correct?

Mr. MCDONOUGH. He is developing it.

Admiral HAYWARD. It is a proposal, let me say. It is on paper.

Mr. ANFUSO. He had it in pretty good condition, I would say, and it took him 7 years to get the go-ahead sign. Is that not right?

Admiral HAYWARD. To get the hardware, as we say it.

Mr. ANFUSO. Yes.

Mr. MCDONOUGH. Mr. Chairman.

The CHAIRMAN. The Chair recognizes Mr. McDonough.

Mr. MCDONOUGH. As to this initiative on the Dyna Soar, if they proceeded faster than they should have and if on the Government level they spent a couple of million dollars they should not have and produced nothing, what is the result of that? These men in uniform are subject to this committee and the Congress and we call them in at the drop of a hat. There may be an error where a lot of money is spent and nothing results. They are dealing with your opinion and my

opinion and the opinion of the other Members in the House and Senate. That does not apply in Russia.

The CHAIRMAN. Any other questions? Mr. Ducander.

Mr. DUCANDER. No questions at this time.

The CHAIRMAN. Mr. McCormack.

Mr. MCCORMACK. Admiral, I see the across-the-board picture you give, but I would like to get your opinion as to the immediate problem that confronts us in connection with possible danger. We are told that our main retaliatory power is SAC. Do you agree with that?

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. The general impression is that the Soviets are ahead of us in the field of intercontinental ballistic missiles. Do you agree with that, as of today?

Admiral HAYWARD. As of today, I think, in the rockets, we are behind.

Mr. MCCORMACK. And we are behind in the field of intercontinental ballistic missiles?

Admiral HAYWARD. I think in the guidance we are ahead and I think in the rocket engine itself we are behind, so guidance is on the top of the missile and the rocket engine makes it go.

Mr. MCCORMACK. Is it not fair to assume they are working, too, on guidance?

Admiral HAYWARD. Oh, yes, sir.

Mr. MCCORMACK. And overcoming the other difficulties in connection with the missile hitting its point of destination?

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. Suppose they complete the intercontinental ballistic missile and make it a workable military instrument before we do and at the same time they devise a pretty good defense against our intercontinental bombers. Where are we?

Admiral HAYWARD. We are in trouble.

Mr. MCCORMACK. Serious trouble; are we not?

Admiral HAYWARD. We have to prevent that from happening.

Mr. MCCORMACK. That is true. And it is fair to assume they are considering a defense against our bombers; is it not?

Admiral HAYWARD. Oh, yes, sir.

Mr. MCCORMACK. Now, I want to refer to something that has not been gone into that has interested me for years. I sense that there is a pretty good spirit existing now between the men who wear the uniforms and the scientists.

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. Several years ago there were some conflicts; is that correct?

Admiral HAYWARD. Yes, sir.

Mr. MCCORMACK. And is my inference correct that that has improved?

Admiral HAYWARD. Speaking for the Navy, very definitely, of course. We have lived very closely with the scientists for a good many years.

Mr. MCCORMACK. Well, you are one yourself; is that correct.

Admiral HAYWARD. Yes.

Mr. McCormack. So while you wear the uniform of a rear admiral you are a scientist, just like a doctor is a doctor. He might wear the uniform, but he is a doctor.

Admiral Hayward. Yes, sir; I always call myself Physicist Third Class, Mr. McCormack.

Mr. McCormack. Now, what has been done in connection with building up within the Navy—and the same should apply to the other services, but you are here in your position and rank in the Navy—what has been done in the Navy to building up a specialized corps of young career officers starting out to devote their entire military or naval life to this highly specialized field? That involves also the opportunity of advancement, which is human, and so forth. What has been done in that direction, Admiral?

Admiral Hayward. We are really working on this. I can give you some concrete things we have done already. I feel very strongly that the officers of the future, your Chiefs of Staff and the top people, have got to be competent technically to make some of these horribly complex decisions. So we are looking for the time when all of our officers in the Navy will have had postgraduate training in some specialty.

Last year, for instance, we selected the top five at the Naval Academy to pick for graduate training right away, to put them through to get their doctorates. We are getting a great number of the people that we put into school shortly after World War II with their degrees and we are looking forward to the time when they will specialize all of the way up to commander, whether they are aviators or missile people, and when they got to that rank you would begin to give them the broad general education, because it is when they are young that they should really get the technical and the scientific training in their specialization. Mr. Jackson, who is our Assistant Secretary for Personnel, has taken a very active interest in that, and we are overhauling our whole program for the education of the officer corps of the Navy.

Now we have another group which are the boys that enlist in the Navy—I enlisted in the Navy, and when I was an enlisted man the only opportunity I had was to go to the Naval Academy, to get a university education. Now, however, we have a program where the people who mature late enlist in the service and get to be 22, 24, 25 even where they are married or whatever their status is, if they can qualify to go to a university we will send these enlisted men to universities. This program has been a marvelous success.

Incidentally, the No. 1 engineering student in Purdue University today is an electronic technician first class, 29 years old, who is married and has five children. When they graduate from this university, of course, they become officers. We are trying to make a broad frontal attack on the whole educational problem that faces your officer corps. They have to be professional really and they cannot just be technicians. As you know, there is a great difference between a technician and a professional, and we have to give them the opportunity of advancement to make it a really worthwhile career for them in the service of their country. I have great hope for it.

You know we are really proud in the Navy that the first American Nobel Prize winner in physics was a naval officer. Most people do not know this, but he was Michaelson who was the graduate of the class of 1876 from the Naval Academy and did the basic work in light

and it was his work with Max Planck that gave rise to Einstein's theory. So we in the Navy have a great deal of pride in our professional and technical qualification really, and we are going to see that we even do more of it, and my boss, Admiral Burke, is a very strong proponent of this. It is a problem and we should do just what you say.

Mr. MILLER. Would you yield?

Mr. MCCORMACK. I would be glad to.

Mr. MILLER. Admiral, would these men be officers of the line or will they be staff officers? Will their promotion come or will they have to have a running mate?

Admiral HAYWARD. My particular feeling, and as I say I am no personnel expert——

Mr. MILLER. Presently, what is it?

Admiral HAYWARD. Having come all of the way up from apprentice seaman, I think that they should be line, myself. I do not think that they have to be staff corps. I think that the great usefulness to the country and to the Navy is to know their specialty, but also to have the general background. You would not want to keep a technical man from being a Joint Chief of Staff or a chief of a service and if you do this across a broad front you will get this type of people. If you restrict it, I do not think you will.

Mr. MILLER. I want to say that I agree with you that they should be line officers. May I say for my colleagues who may not be familiar with this that in the Navy you have officers of the line and then you have staff officers. Staff officers are limited to certain fields as to what they can do and their promotion is determined by a line officer who enters the Navy about the same time they do. So, no matter how good they are, they cannot go up any faster than their running mate.

Mr. HALL. A satellite, so to speak.

Mr. MILLER. Yes, a satellite.

Admiral HAYWARD. Well, Mr. Miller, I think they should be line and, of course, you know I was captain of a ship. There was a time in Washington that I guess I was one of the few Democrats anyway because they made me captain of the *Franklin D. Roosevelt* and I felt that I was qualified to be captain of that ship even though I had technical training. The responsibility and authority that go along with the command of a big ship like that is a tremendous thing. It is the best job in the Navy. When you say "Go right" it goes right.

(Discussion off the record.)

The CHAIRMAN. Admiral, may I ask you a question? By the way, I will say this, I for one do not qualify you as only physicist third class, as you indicate there. I think you are doing a good job. I want to ask you in your narration of the advantages that the seaman in the Navy has. Did you put in the Holloway plan; did you include that?

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. Is that available to the seaman himself?

Admiral HAYWARD. Yes, sir; if he can qualify. The difficulty with a lot of the young boys that go into the service, they go as I did. I was not going to go to school, but they have not had the background in their high school to qualify to enter into a university. In our case with the enlisted men, the people that you get in that age bracket all of a sudden realize if they do not get an education they cannot go any

place. They are really highly motivated and we will help them in our prep school to really be ready to take on the university.

The CHAIRMAN. You can send them under the Holloway plan to a university if they are capable.

Admiral HAYWARD. Yes, sir; if they can qualify they can go.

Now, of course, the age brackets and the marital status are different in that plan than they would be in the straight enlisted man's plan.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. I believe we should go back and take a look for a minute at the size of the budgets between our two countries. For example, you have said that on the space and missile program for the fiscal year 1960 it was proposed to spend $6.7 billion. On the recently announced Russian program for their overall scientific program, their currently announced budget is 71 billion rubles, which is about $18 billion in our money in the current calendar year. Of course, that includes both private and public and all of the effort toward science.

Could you estimate for us the rate of spending that we are doing in the space and missile field compared to that of Russia and also the overall effort that we in this country are putting on science? Is our budget for science big enough, overall, compared to the Russian $18 billion budget for this current year?

Admiral HAYWARD. Well, Mr. Fulton, I do not believe their figures, because they really are meaningless. They have such control. The Russian scientists have told my friends who have been there that there is no such thing as worrying about the budget. If they are going to go ahead with a program, money is just made available to them. Now, how they arrive at those figures I do not know, and I would not put too much faith in the actual figures.

Mr. FULTON. So you do not believe then that we can put any credence on whether we are ahead or they are ahead or the effort either country is putting into it by the budgetary figures alone.

Admiral HAYWARD. No, sir; I would not believe the budgetary figures. I feel their effort is a tremendous one, but to try to equate it to our dollar effort would be most difficult.

Mr. FULTON. There is one thing that has caused me some trouble from the previous testimony and I wish the Navy would check with the Office of the Attorney General. I have done some work on this space law with our counsel and others on the committee. To me there are no over-fly rights whatever for anybody in the satellite or the high-missile field. So, in our Pacific missile program, if we are going to deal with a nearby ranch on over-fly rights on polar satellites that over-fly the earth, I think we are getting into real difficulty.

It has been our policy with regard to space that it is akin to the freedom of the seas. No country has the right to block us and no country has any sovereignty over it, nor does any individual living within the country have an effective property right. So, I think you are following the wrong course. I do not think the Federal Government should have to pay over-fly rights to any individual within this country, to any citizen in a foreign country, or to any foreign country.

Admiral HAYWARD. Well, when a booster goes you do not want to kill a man or his cattle. It is a little more than the over-fly rights. As it goes over there if a booster falls off——

Mr. FULTON. Now you are talking tort law, but you are not talking contract law of taking a property right when you deal with him to negotiate for over-fly.

Admiral HAYWARD. The best solution to that, Mr. Fulton, would be to buy that land.

Mr. FULTON. I would be glad to do it, but I do not want the Government setting the policy of buying over-fly rights from anybody for a polar missile range.

Admiral HAYWARD. We will make sure we do not.

The CHAIRMAN. We already pay for over-fly rights. We do it around airports frequently. Is that not correct? We have been doing it for years.

Admiral HAYWARD. For air rights, Mr. Chairman, you are correct, and this is in the atmosphere.

The CHAIRMAN. And this is in the atmosphere leading up to a base, so the principle is the same as that which we have already been doing for years. Is that not right?

Admiral HAYWARD. That is right, yes, sir. It is going to be dangerous for those cows, Mr. Chairman.

The CHAIRMAN. I remember when we authorized it. Now, are there any further questions?

If not, we will go into executive session. There are some things we want to take up in executive session.

(Whereupon, at 12:02 p.m., the committee went into executive session.)

EXECUTIVE SECTION

The committee met in executive session at 12:05 p.m., in room 356, Old House Office Building, Washington, D.C., Hon. Overton Brooks, chairman, presiding.

The CHAIRMAN. Before I came in this morning, Admiral, a request was made for you to be here, sir, and you have some things you want to show us in executive session.

Admiral HAYWARD. Well, they wanted some questions answered, Mr. Chairman.

The CHAIRMAN. The admiral is prepared to answer any questions.

Admiral HAYWARD. I don't know whether the committee wants to finish up this morning. I have two space projects I was going to show them plus a discussion on the question Mr. Fulton asked me about the moon relay station * * *

The CHAIRMAN. I would suggest this, that you show us whatever you have first, and then we will have the questions.

Admiral HAYWARD. Commander Peters will give a presentation on a navigation satellite. This is a program designed to use space better for our tasks and missions. Of course navigation is one of them. * * *

Commander Peters is the program manager from the Bureau of Ordnance.

Go ahead, Commander Peters.

STATEMENT OF COMDR. IRVIN G. PETERS, PROGRAM MANAGER, NAVIGATION SATELLITE, BUREAU OF ORDNANCE, DEPARTMENT OF THE NAVY

Commander PETERS. Mr. Chairman, gentlemen, as the admiral has said, the unclassified code name for this project is * * *, and the * * *

Before getting into the principle, however, I would like to go into the history of this project briefly.

During the time that the first satellites were launched there were various methods used for tracking them. One method utilized angular tracking, another method used telescopic cameras which could record the motion as the satellite passed through the skies, and a third method used the Doppler system. * * *

This reverse process consisted simply of this: * * *

This proposal by the Applied Physics Laboratory was brought to the Navy. The Navy considered it in the Bureau of Ordnance and in Admiral Hayward's Office, and we in turn wrote to ARPA and expressed a desire to proceed with this subject.

ARPA, in turn, reviewed the proposal. It appeared to be sound to them, and they agreed to finance the project through at least the feasibility stage. * * *

I would like to discuss for a moment what the principle of operation is. * * *

The CHAIRMAN. Well, let me ask you this:

The Weather Bureau is using the same principle. * * * system, for testing storms. How does that work with them?

Commander PETERS. For testing what, sir?

The CHAIRMAN. Storms.

Commander PETERS. * * *

The CHAIRMAN. The difference in the sound of the storm, then?

Commander PETERS. Yes, sir. * * *

Mr. MCDONOUGH. Just a question there. * * *

Commander PETERS. Exactly the same; yes, sir. * * *

The CHAIRMAN. Mr. McCormack.

Mr. MCCORMACK. How far would this navigational satellite be projected into outer space?

Commander PETERS. I will get into that in a little bit. But to answer the question now, the satellite is designed for a circular orbit 400 miles above the earth.

Mr. MCCORMACK. How many of them would you have up at one time?

Commander PETERS. * * *

Mr. MCCORMACK. How long would they remain up?

Commander PETERS. They would have, as we anticipate now, a 5-year life. They would use solar batteries, and the solar batteries are adequate for the low-power output.

Mr. MCCORMACK. * * *

Commander PETERS. When I say "our position," I mean the exact position of any ship or aircraft, or it could even be a ground station.

Mr. MCCORMACK. Would that also mean in case of war an enemy?

Commanders PETERS. * * *

Mr. McCormack. From a military angle, of what significance would that be to us?

Commander Peters. * * *

Mr. McCormack. That is what I asked. * * *

Commander Peters. Yes, sir.

Mr. McCormack. * * *

Commander Peters. Yes, sir.

Mr. McCormack. That is why I asked the question.

Mr. Sisk. Mr. Chairman, could I ask a question? * * *

Commander Peters. I will not say that in the way that you have put it.

Mr. Sisk. * * *

Commander Peters. Yes, sir.

Mr. Sisk. * * *

Commander Peters. This system will give you a refinement on positions throughout the world, * * *

Mr. McCormack. In other words, * * *.

Commander Peters. Yes, sir.

Mr. Sisk. Well, if I might pursue, then, a little further, I understood when you started in on this * * * it would be a navigational aid.

Commander Peters. Yes, sir.

Mr. Sisk. That is, it enables ships, planes, or any other moving item to pin its position, worldwide?

Commander Peters. Yes, sir.

Mr. Sisk. * * *.

Admiral Hayward. * * *.

Mr. Sisk. Well, that is fine, then, Admiral. That gives me the explanation I was seeking. This is primarily to pin your position.

Admiral Hayward. Yes.

The Chairman. Mr. Quigley.

Mr. Quigley. Admiral, this is basically a navigation aid and not a fire control?

Admiral Hayward. That is correct.

The Chairman. Let me see if I understand you correctly now. That will assist you in making more accurate maps of the whole world?

Admiral Hayward. That is right, yes, sir.

The Chairman. Now, if you had a case like we had last week of that ship off the coast of Greenland, sinking there, you would not have to send ships up and down the sealanes to locate that, but you could pinpoint that * * *.

Admiral Hayward. If the Norwegian had the system and had sent, he could have sent us an accurate position and we would have known where to go.

The Chairman. Immediately.

Admiral Hayward. Yes, immediately.

But it was a stormy day and everything else. He doesn't have a sight——

The Chairman. If that were a Russian submarine instead of a boat sinking, what about that? Would you be able to locate that submarine * * *.

Admiral Hayward. No, sir. This is a straight navigational system.

The CHAIRMAN. And it depends upon some action from the target there?

Admiral HAYWARD. Yes, sir. In other words, if you have your earth systems today, your hyperbolic systems like loran, this is just another navigational system. However, it is a more accurate system * * *.

But this is a system where it could help us in the Navy tremendously, and actually the cost of it when you begin to think of people out on various stations where they have to put them, it may be considerably cheaper.

The CHAIRMAN. * * *.

Admiral HAYWARD. That is right. However, we will show you we have another system for just what you gentlemen are talking about.

Mr. MCDONOUGH. Just one question at this point. * * *

Commander PETERS. * * *

Mr. MCDONOUGH. Now, do I understand you send a signal from the earth to the satellite and then that in turn——

Commander PETERS. * * *

I will go into some of the ideas along this line.

Mr. MCDONOUGH. Describe those various curves. * * *

Commander PETERS. No, sir, I will describe these now. * * *

What this might amount to in a sense is saying this: * * *

Mr. MCDONOUGH. Now, as I understand it, this is a scheme that is under consideration but not now in operation?

Admiral HAYWARD. That is correct. It was proposed. ARPA is funding it up to feasibility stage, and as I have pointed out, ARPA is the part of the Department of Defense that has money for space projects in the Department of Defense.

Mr. MCDONOUGH. This is a principle in physics, isn't it?

Admiral HAYWARD. Yes, sir.

Mr. MCDONOUGH. And it is known to the Russians or are they using such a system?

Admiral HAYWARD. It is known to them, yes. * * *

The CHAIRMAN. Proceed, sir.

Commander PETERS. There is one question which might have occurred to some of you. * * *

The CHAIRMAN. When do you think that is going to be?

Commander PETERS. * * *

The CHAIRMAN. What is that system going to cost us?

Commander PETERS. * * *

The CHAIRMAN. * * *

Commander PETERS. * * *

The CHAIRMAN. * * *

Commander PETERS. Yes, sir.

The CHAIRMAN. You will be able to reach any part of the world?

Commander PETERS. * * *

The CHAIRMAN. Would that system be available to other peoples as well as to the United States?

Commander PETERS. * * *

The CHAIRMAN. * * *

Commander PETERS. * * *

Mr. QUIGLEY. Mr. Chairman.

The CHAIRMAN. Mr. Quigley.

Mr. QUIGLEY. Does the Navy visualize that this will be so accurate that they would only need to take * * *

Commander PETERS. * * *

Mr. QUIGLEY. Now, one other question: * * *

Commander PETERS. * * *

Mr. QUIGLEY. * * *

Commander PETERS. Yes, sir.

Mr. QUIGLEY. And the ship or the plane is just using its instruments to determine its relative position at any given time?

Commander PETERS. Yes, sir.

Mr. QUIGLEY. * * *

Commander PETERS. Yes, sir.

Mr. QUIGLEY. * * *

Commander PETERS. Yes, sir.

Admiral HAYWARD. * * *

The CHAIRMAN. I think it might be an excellent idea, Admiral.

My plan now is to adjourn somewhere around 1 o'clock. I don't believe we are going to be able to complete this today, but we can complete the hearing next Thursday.

Admiral HAYWARD. All right, sir. I would like to save Polaris until next Thursday, * * *

The CHAIRMAN. Go ahead.

(The top secret presentation was not made a part of the written record.)

The CHAIRMAN. Gentlemen, it is 5 after 1. The staff is in this shape: They are going to be pretty busy getting ready to leave tomorrow, and my thought is this: We have set up a program for Monday. I think it is weather. ARPA is Tuesday and Wednesday. Now, we can continue this Thursday, if that would be all right.

Admiral HAYWARD. Yes, sir.

The CHAIRMAN. It would seem to me, at this late hour, rather than go into questions, it would be better to do that.

So, if there is no objection, the committee will adjourn until Monday morning at 10 o'clock.

(Whereupon, at 1:09 p.m., the committee adjourned, to reconvene Monday, February 16, 1959, at 10 a.m., on another subject.)