

AUTHORIZING LEGISLATION

HEARING BEFORE THE SUBCOMMITTEE ON LEGISLATION OF THE JOINT COMMITTEE ON ATOMIC ENERGY CONGRESS OF THE UNITED STATES

EIGHTY-FIFTH CONGRESS

SECOND SESSION

ON

AUTHORIZING LEGISLATION
FOR
DESTROYER REACTOR PLANT

MARCH 14, 1958

Printed for the use of the Joint Committee on Atomic Energy



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1958



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AUTHORIZING LEGISLATION FOR DESTROYER REACTOR PLANT

FRIDAY, MARCH 14, 1958

CONGRESS OF THE UNITED STATES
SUBCOMMITTEE ON LEGISLATION,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The subcommittee met, pursuant to notice, at 10 a. m., in room 457, Senate Office Building, Hon. Chet Holifield (chairman of the subcommittee), presiding.

Present: Representatives Holifield, Durham (chairman of the full committee), Price, Van Zandt; Senators Pastore and Dworshak.

Present also: James T. Ramey, executive director, John T. Conway, assistant director, and David R. Toll, staff counsel, Joint Committee on Atomic Energy.

Representative HOLIFIELD. The committee will come to order.

The Subcommittee on Legislation of the Joint Committee on Atomic Energy is meeting this morning to receive testimony from AEC officials concerning a proposed bill for \$35 million for the destroyer reactor plant, and for other purposes.

At this point, without objection, I will insert in the record a copy of that part of the proposed bill which pertains to the destroyer reactor plant.

(The material referred follows:)

PROPOSED BILL FOR AUTHORIZATION OF APPROPRIATIONS PURSUANT TO SECTION 261 OF THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, AND FOR OTHER PURPOSES

A BILL To amend Public Law 85-162 to increase the authorization for appropriations to the Atomic Energy Commission in accordance with section 261 of the Atomic Energy Act of 1954, as amended, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 101 of Public Law 85-162 is hereby amended by striking the figure "\$222,230,000" and inserting in lieu thereof the figure "\$257,230,000."

SEC. 2. Section 101 (e) of Public Law 85-162 is amended by adding at the end thereof a new subsection, reading:

"16. Project 58-e-16, destroyer reactor plant, West Milton, New York, \$35,000,000."

An unclassified description of the project has also been furnished the Joint Committee by the Commission, and, without objection, I will insert it in the record at this point:

58-e-16 Destroyer Reactor Plant, West Milton, N. Y., \$35 million

This project consists of a land prototype (D1G) of the destroyer nuclear propulsion plant and related installations required for support and test operations of the plant. The prototype will consist of a section of a destroyer hull consisting of the reactor compartment with steam generating equipment, including related controls

and auxiliary systems. Steam produced will be used to operate the main propulsion plant. The prototype will be located at the AEC West Milton site. The hull will be installed in the sphere that was previously used for the submarine intermediate reactor (S1G) prototype. Maximum use will be made of existing installations to handle the increased electrical power and cooling water requirements.

This plant is required to provide for development of the lightest practicable pressurized water reactor plant which can be effectively utilized in the Navy's nuclear-powered destroyer which is included in the fiscal year 1959 shipbuilding program. In order to meet the Navy's requirements for this ship, the D1G prototype must be in operation in 1960. The destroyer prototype will be used to evaluate the design and operation of the lightest weight pressurized-water plant attainable using the latest technology in a reactor of advanced design. The reactor design will include advances in the areas of nuclear physics, heat transfer, reactor control, fuel element design and core life.

Cost elements are:

Buildings, site facilities, and hull structures.....	\$3, 875, 000
Prototype propulsion plant.....	27, 375, 000
Contingency.....	3, 750, 000
Total.....	35, 000, 000

Representative HOLIFIELD. Mr. Fields, has this request come to you from the Department of Defense?

STATEMENT OF K. E. FIELDS, GENERAL MANAGER; W. K. DAVIS, DIRECTOR, DIVISION OF REACTOR DEVELOPMENT; D. M. MORRIS, ASSISTANT DIRECTOR, DIVISION OF REACTOR DEVELOPMENT; AND DONALD BURROWS, COMPTROLLER, ATOMIC ENERGY COMMISSION

Mr. FIELDS. It has; yes, sir.

Mr. DAVIS. Yes, this, of course, is tied in with our requirements from the Department of Defense and their plans to initiate the construction of the actual destroyer.

In order to tie in with their plans and their requirements to us, we have got to get moving on the land based prototype, which is what the item of \$35 million is for.

Representative HOLIFIELD. Has the House Appropriations Committee approved the project in legislation?

Mr. FIELDS. We have had appropriations that cover the research and development in conjunction with this.

Representative HOLIFIELD. I am not talking about that. I am talking about the hull. Is this a naval project which has been approved?

Mr. DAVIS. The actual construction of the ship is in the Bureau of Ships proposed 1959 shipbuilding program.

I believe it has been discussed with them, but I do not believe, I simply cannot tell you whether there has been any decision, or not.

Representative PRICE. They have not come up with an authorization yet, sir. Are you talking about the authorization now, or the appropriation?

You see, we authorize on a tonnage basis. I understand this is supposed to be in their program.

Mr. FIELDS. We understand it is to be in their 1959 shipbuilding program on the ship itself, but I don't know the status of it—

Mr. DAVIS. All I can say is that it is my understanding that Admiral Rickover has been up to testify in the Navy budget hearings on this, but I cannot give you any particulars on it.

Mr. RAMEY. He also testified in executive session of the Joint Committee in connection with it.

Mr. FIELDS. Mr. Chairman, the committee is fully aware that the prototypes have to be built in advance of the ships themselves.

This, of necessity, must go forward at this time if that ship is in the shipbuilding program, sir.

Representative DURHAM. Has this item been cleared by the Budget Bureau?

Mr. FIELDS. Yes, sir; the item has been cleared; yes, sir, that we are requesting.

Representative DURHAM. You do not know whether or not the Navy has requested this in their 1959 tonnage?

Mr. DAVIS. They have requested the ship itself.

Representative DURHAM. It is in there?

Mr. DAVIS. Yes, sir.

Representative HOLIFIELD. This corresponds to project 58-e-10, which we approved last year for destroyer reactor development plans, \$750,000; does it not?

Mr. DAVIS. That was a facility for doing some of the development work associated with developing this plant. This is a wholly new land-based prototype that will be put into the existing sphere at West Milton.

Representative HOLIFIELD. What relation does this particular plant have to the development work for the nuclear aircraft carrier? Is this the same type of reactor?

I understand that there are eight reactors to be put in the nuclear aircraft carrier. Does this pertain to developing that, or are you developing a different kind here for the destroyer than the eight you are developing for the nuclear aircraft carrier?

In other words, is there a duplication here of research and development or if you do the job for the aircraft carrier, could you use one or more of that type of reactor in a destroyer?

Mr. DAVIS. Mr. Holifield, I was trying to make sure I could answer you without getting into any classified information.

The requirements on a powerplant for a destroyer are even much more severe than those for the aircraft carrier in terms of the pounds per shaft horsepower, in the terms of what must be done.

This is a step in the development beyond that that is required in the aircraft-carrier development.

Representative HOLIFIELD. The research and development could not be done for a reactor which could be used in the multiple stage in a nuclear aircraft carrier and used in a single or dual stage in a destroyer? Or has any thought been given to that type of economical procedure?

Mr. DAVIS. I believe it is a question of phasing. As you know, we have the prototype aircraft carrier reactor at Idaho, which is the land-based prototype which is nearing completion. This is required in order to proceed with the aircraft carrier which is now underway. These reactors would not be adequate for use in a destroyer.

The point I am trying to make is that if upon the completion of this development which is the stage beyond what has been done with the aircraft reactor, then it may be feasible to utilize the technology developed here to build even better aircraft carriers.

Representative HOLIFIELD. You are already in the phase, or should be, of completion of the aircraft carrier type of reactor?

Mr. DAVIS. Yes, sir; the land-based prototype for that is nearing completion at Idaho; yes, sir.

Representative HOLIFIELD. In the planning of this type of project, are you planning an advanced type, a completely different type, or are you just building a different size reactor, practically the same type that you are using in the new aircraft carrier?

Mr. DAVIS. These are both pressurized water types of reactors. This does utilize quite a number of new ideas and improvements which I cannot discuss here to try to achieve the technical requirement of weight and size and so on that are required in a destroyer, which are more severe requirements than those in an aircraft carrier.

Representative HOLIFIELD. Has there been any thinking along the line of trying to utilize research and development on the aircraft carrier for this same purpose?

Mr. DAVIS. It would not be possible to use the reactor now being developed for the aircraft carrier in a destroyer.

Representative HOLIFIELD. Is that the judgment of the engineers and the scientists who have worked on it or is this just an arbitrary decision to spend \$35 million additional when possibly you can work the 2 projects together?

I am concerned that you are using the same type of reactor and although you may be making a new modification in it, it seems to me that you could do the development in the aircraft-carrier type of reactor and then adapt it to a destroyer?

Mr. DAVIS. This has been studied extremely carefully. In fact, a rather large number of different kinds of reactors altogether from the pressurized water reactor have been considered and studied in considerable detail for the destroyer application.

The conclusion is that an advanced type of pressurized water reactor, namely, the one that is contemplated here, and on which development work is being done, can probably do the job, but it must be advanced over anything that has so far been done in the naval reactor propulsion field. This is the objective of this particular program.

I would say this is the result of a considerable amount of study by the various contractors and by the Naval Reactor Branch and is concurred in by our Division.

Representative HOLIFIELD. It is concurred in by the Naval Reactor Branch?

Mr. DAVIS. Yes, sir; this is their project.

Representative VAN ZANDT. Mr. Davis, is it not true that the mission of a destroyer is different from that of a carrier?

Mr. DAVIS. Yes, sir.

Representative VAN ZANDT. The speed factor enters into it, also, as does the space factor. Then also, fitting a reactor into the hull of a destroyer you face many more technical and design problems than when fitting it into the hull of a carrier?

Mr. DAVIS. That is what I had hoped to say.

Representative VAN ZANDT. The pressure you apply to the shaft and the speed you get from the propellers, and so forth, is all different from that of the carrier?

Mr. DAVIS. Yes. The basic problem is one of space and one of weight. In a destroyer one requires a level here which goes a full step beyond what has been achieved in either the surface reactors for the carriers, the cruiser, or for the submarine reactors.

Representative VAN ZANDT. This reactor you are asking authorization for would serve as a pattern for reactors not alone in destroyers, but in frigates and other types of naval craft; is that so?

Mr. DAVIS. Yes, sir; this is very true. If the developments that are contemplated here are successful they will have then a very far-reaching effect on what is done in the other naval applications.

Representative VAN ZANDT. That is all.

Representative HOLIFIELD. Of course, the Chair is aware of the fact that a destroyer is different from a nuclear aircraft carrier.

Also, I am aware of the smaller space factor. I was thinking of the fact that you have 8 reactors in the nuclear aircraft carrier and you might have either 1 or 2 connected in tandem or otherwise at the same time and if it is substantially the same type of reactor, pressurized water reactor and if there is no substantial difference, it would seem to me that it would be desirable to look into the matter of whether the 1 or an adaptation of the type of reactors being built for the nuclear aircraft carrier could be used in a destroyer.

Mr. DAVIS. Mr. Holifield, this has been examined. It simply would not be adequate for a destroyer.

Representative HOLIFIELD. In view of the many Navy reactors that you have built for submarines and the aircraft carrier prototype reactors, in your considered judgment then there is enough of a difference in demand for power and adaptability that there has to be \$35 million spent for a new type of reactor in this instance?

Mr. DAVIS. My judgment is that I think this is a necessary step.

Representative HOLIFIELD. The land prototype I am speaking of?

Mr. DAVIS. Yes, sir; the land-based prototype.

Representative HOLIFIELD. Will you get more pressure out of this than you will out of the submarine type and the aircraft-carrier type?

Mr. DAVIS. I think the interrelationships, the pressures and weights, are at the core of this problem. One does have to have a higher performance.

If one can go to lower pressures and thereby save weight, at the same time achieve temperatures, this is one important way that one might be able to make this advance that we are talking about here.

I am afraid I cannot give you some of the numbers and some of the figures in an open hearing that we could in a closed one.

Representative HOLIFIELD. Well, we are not asking for security figures, of course. We are asking for a general statement in regard to certain principles that are involved.

Now, do you have any idea what the powerplant of an ordinary destroyer costs?

Mr. DAVIS. I think I could make a reasonably good guess, but I don't have any factual information on it; no, sir.

Representative HOLIFIELD. In what area would it be?

Mr. DAVIS. I would guess it would cost something of the order of \$5 million, but I emphasize this is a sheer guess on my part.

Representative HOLIFIELD. The prototype is \$35 million; what will you be able to build a production type for?

Mr. DAVIS. I would hope somewhat less than that.

Representative HOLIFIELD. I suppose that this presupposes a fleet of destroyers of this type with the subsequent high cost that will be involved?

Mr. DAVIS. Yes, sir.

Representative HOLIFIELD. In other words, if we have a nuclear carrier we are going to have to have a flotilla of nuclear destroyers on top of the water and a flotilla of submarines under the water?

Mr. DAVIS. Yes, sir; I think it is certainly contemplated that the Navy will make use of nuclear power on a very broad basis.

I think it is equally clear that the nuclear powerplants are going to be more expensive to build and to operate, but that we cannot afford to have anything except the best ships that we can build.

Representative HOLIFIELD. What peculiar advantage do you have in a surface craft with nuclear power that you do not have in a conventional craft?

Mr. DAVIS. Essentially one of range.

Representative HOLIFIELD. Without refueling?

Mr. DAVIS. Yes.

Representative HOLIFIELD. Is it not true that you have a very wide range already with conventional types?

Mr. DAVIS. Not on a destroyer, sir. A destroyer at full power can only operate for a very short period without being refueled.

Representative VAN ZANDT. When you talk about a destroyer nuclear powered, you have a destroyer with unlimited cruising capabilities. In our program of ASW, antisubmarine warfare, a destroyer with unlimited cruising capabilities is a necessity.

Also, in the operation of a nuclear powered carrier a destroyer with unlimited cruising capability is necessary for security purposes.

Mr. DAVIS. It provides a capability you simply cannot get any other way; that is quite correct.

Representative HOLIFIELD. Not necessarily additional speed?

Mr. DAVIS. Not necessarily; no, sir.

Representative HOLIFIELD. What did the prototype of the *Nautilus* cost?

Mr. DAVIS. From my recollection, sir, I believe it is in the order of \$25 million, but I would have to check that figure. It has been too long.

Representative HOLIFIELD. Why with all the knowledge that you have already in the naval reactor program, do you now come forward and ask for \$35 million for another reactor?

Mr. DAVIS. This is a very greatly improved reactor over the original *Nautilus* prototype. It is of the order of magnitude improvement.

Representative HOLIFIELD. I would hope it would be greatly improved, but you have all the basic information already on the *Nautilus* and on the nuclear aircraft carrier models.

It would seem to me that \$35 million is pretty high for this.

Mr. DAVIS. One of the difficulties, Mr. Holifield, is that in putting a new and advanced type of propulsion plant in an operational ship that you are gambling the whole cost of the ship as well as that of the nuclear powerplant on its success.

It has been found that these prototypes when you do reach a new state of performance really pay for themselves in being able to test this thing out on land before you are actually having to try out the experimental features on a ship, which is a very bad place to try some of these things.

Representative HOLIFIELD. What is included in contingencies on your sheet?

Mr. DAVIS. \$3,750,000.

Representative HOLIFIELD. Do you have a breakdown on it, or is this just a guess?

Mr. DAVIS. I am sorry, sir; it is a contingency to cover things that we do not know about today, or things that come up during development that will have to be done or for increases in costs that are not known today.

Representative HOLIFIELD. Will you please furnish to the committee for the record a breakdown on the first and last item there in your list, the building site facilities, hull structures, and contingency fund?

And also, if you have it, a breakdown on the \$27,375,000 item, if you have any further information on that, showing estimates and justifications.

Mr. FIELDS. Mr. Chairman, the breakdown would have to be a classified submittal.

Representative HOLIFIELD. That will be all right.

Representative DURHAM. You will have to do it before the Appropriations Committee.

Mr. FIELDS. I believe the original submission may have had that in it. We certainly will see that it is resubmitted.

Representative HOLIFIELD. Are there any further questions?

Representative PRICE. I would like to ask one question on this matter of the destroyer prototype, but it brings up another item.

In testimony given in January in regard to our research program on a reactor for the destroyer, which because of its large size is also referred to as a frigate, Admiral Rickover testified at that time that if he could obligate \$400,000 in 1958 of AEC funds, he could speed up that job by half a year.

Now, there were other representatives of the Commission present at that meeting. It was the understanding that they would check into that to see if it was not possible to permit the advance allocation on the basis of AEC 1958 funds so that that project could be speeded up.

Do you have any information on that?

Mr. DAVIS. We have recently reprogrammed some money, but I cannot answer that question specifically.

Representative PRICE. Is there anyone here who can answer that?

Mr. BURROWS. I am not aware that Admiral Rickover in any way held up 1958 on the basis of current financial plans. There have been some readjustments.

Representative PRICE. Mr. Tammaro was present at that meeting. I thought it was the understanding that it would be checked on to see if it was not possible to accelerate this matter.

Mr. DAVIS. Mr. Price, we have recently completed a reprogramming of our funds in the division and have tried to take care of Admiral Rickover's request.

I cannot answer specifically as to whether he still wanted this and whether we were able to find it for him.

Representative PRICE. The chairman, on February 26, 1958, wrote a letter to the Commission regarding the release of the money. I imagine within a short time we will be furnished with the information.

Mr. DAVIS. I am sure you will get an answer very shortly.

(The letter referred to and the AEC reply follow:)

AUTHORIZING LEGISLATION

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C., February 26, 1958.

Mr. K. E. FIELDS,
*General Manager, Atomic Energy Commission,
Washington, D. C.*

DEAR MR. FIELDS: On January 16, 1958, the Military Applications and Research and Development Subcommittee held a hearing with regard to current and future prospects of the Naval Reactors Branch. Adm. H. G. Rickover, Mr. A. Tammaro, Mr. L. H. Roddis, and other Commission representatives were present.

During the hearing, Admiral Rickover discussed the work being done on the nuclear-powered frigate and stated that he could expedite the project by about one-half year without any additional overall expenditure of funds provided he could obligate an additional \$400,000 of AEC money in fiscal year 1958. He stated that the Navy Department agreed to make design money available for their portion of the project to permit the more speedy action.

In view of the importance of this project and the fact that a saving of one-half year can be accomplished without any additional total cost to the project, it would appear most desirable, that the \$400,000 be made available in fiscal year 1958 and not be delayed to fiscal year 1959. I would, therefore, appreciate being advised what action the Commission has taken with regard to this matter.

Sincerely yours,

CARL T. DURHAM, *Chairman.*

ATOMIC ENERGY COMMISSION,
Washington, D. C., March 24, 1958.

HON. CARL T. DURHAM,
*Chairman, Joint Committee on Atomic Energy,
Congress of the United States.*

DEAR MR. DURHAM: In your letter of February 26, 1958, you inquired as to the action the Commission is taking to expedite development of a reactor plant for the nuclear-powered frigate (destroyer).

On January 6, 1958, funds in the amount of \$880,000 were made available to undertake design of the prototype reactor plant and work is now underway. As I indicated to you in my letter of February 28, 1958, the Commission has submitted to the Congress a request to amend Public Law 85-162 in order to permit construction of this facility to be initiated in the current fiscal year. Depending upon favorable action on this request we plan to proceed with procurement of long lead-time components for the prototype utilizing funds currently available to the Commission. It is estimated that approximately \$400,000 will be costed in fiscal year 1958 for long lead-time procurement.

The destroyer reactor plant is regarded by the Commission as having a high priority. Let me assure you that every effort will be made to proceed with development of the reactor plant as rapidly as possible.

Sincerely yours,

LEWIS L. STRAUSS, *Chairman.*

Representative HOLIFIELD. Are there any further questions? If not, this subcommittee stands adjourned.

(Thereupon, at 11:40 a. m., the subcommittee adjourned.)

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