UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

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PROCUREMENT, LOGISTICS, AND READINESS DIVISION



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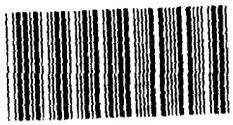


The Honorable Trent Lott
House of Representatives

Dear Mr. Lott:

Subject: Evaluation of the Navy's Decision to Replace Waste Heat Boilers on the DD963 Class Ships (GAO/PLRD-82-102)

In response to your June 18, 1981, request, we have reviewed the Navy's decision to convert the waste heat boiler steam system on DD963 Class ships to an all electric system. You requested this review because of allegations that such replacements would

--create greater problems than those being experienced,

--be significantly more expensive than the $500 million estimated for the conversion, and

--be more expensive than other alternatives for resolving the boiler problems.

Our analysis disclosed that the Navy, as an interim measure is modifying the existing waste heat boiler. The Navy's original decision to convert the DD963 Class waste heat boiler steam system to an electrical auxiliary system has been suspended in lieu of an approach which will test and evaluate two options. These options include converting to the electric auxiliary system or adopting a new waste heat boiler system being installed on the DD997 and the CG47 Class ships. The Navy plans to complete its evaluation of the options by August 1984. We believe the approach formulated by the Assistant Secretary of the Navy (Shipbuilding and Logistics) is appropriate, and we will be asking the Navy to notify us of the decisions reached.

We made our analysis at the Headquarters, Naval Sea Systems Command (NAVSEA), and interviewed officials of the Waste Heat Boiler Independent Design Review Team, DD963 Project Office, Systems Engineering Division, and the Manning and Controls Branch. We also obtained information from the

--Deputy Chief of Naval Operations, Surface Warfare Plans/ Combatant Requirements/Readiness Branch;

--engineering staffs of the Navy's Supervisor of Shipbuilding, Conversion, and Repair for the DD963 Class ship; and

--Ingalls Shipbuilding, the builder of the DD963 Class ship.

## DD963 WASTE HEAT BOILER PROBLEMS

The Navy has 30 DD963 Spruance class destroyers in its ship inventory. Each of these destroyers is equipped with three gas turbine generators. Each generator's exhaust piping is connected to a waste heat boiler which recovers heat from the generator exhaust and uses the heat to convert water to steam. The steam is used in auxiliary equipment to (1) convert salt water to fresh water, (2) heat fuel and lubrication oil, and (3) make hot water and steam for the ship's galley, laundry, and hotel services.

Since the DD963 commissioning in 1975, the Navy has experienced some operating and maintenance problems with the waste heat boilers. Although the builder of the DD963 Class ships made improvements to the boilers, problems continue. For example:

--Boiler components are located in a cramped area and inaccessible for servicing.

--Proper water chemistry is difficult to maintain, thus causing leaks in tubes housing the steam.

--The gas turbine generator can be operated when the waste heat boiler is out of commission following strict generator load limits.

Correcting the problems will require design changes and ship modifications.

## THE NAVY'S ORIGINAL SOLUTIONS TO THE WASTE HEAT BOILER PROBLEM

The results of a study done by the Navy's waste heat boiler independent design review team showed that the existing DD963 Class waste heat boiler could be improved. However, the review team was concerned that satisfactory levels of reliability and maintainability could not be achieved with the modified system. The team therefore recommended that the best long-term remedy to the problem would be to add a fourth gas turbine generator, and then replace the steam auxiliary systems with electric auxiliaries.

According to NAVSEA estimates, the conversion would cost $436 million in fiscal year 1981 dollars. The costs include material, installation, and the design work for ship alterations. Also included is the research and development on a commercial fresh water producing distiller unit that has not yet been approved for service use. As to the accuracy and completeness of NAVSEA's estimate, we were unable to develop sufficient data to arrive at a realistic figure for the conversion. We did, however, discuss the estimate with the engineering staffs of NAVSEA and Ingalls Shipbuilding. According to the engineers at Ingalls, the $436 million estimate is low and would only reflect about half the amount needed.

The Chief of Naval Operations' July 17, 1981, letter to you comfirmed the Navy's decision to proceed with the removal of waste heat boilers and conversion to electric auxiliaries on its 30 DD963 Class destroyers.

## THE NAVY'S NEW PLAN

In a memorandum to the Chief of Naval Material, dated November 9, 1981, the Assistant Secretary of the Navy (Shipbuilding and Logistics) stated that at this time concurrence with the arguments in favor of the all electric conversion was not possible. Instead, approval was given to a program to develop, test, evaluate at sea, and then compare the reliability and costs of (1) a prototype electric auxiliary system proposed for application on all DD963 Class ships and (2) a new waste heat boiler system presently being installed on DD997 and CG47 Class ships. The approval to explore options was based on the following conditions and comments:

--Only one DD963 Class ship will initially be converted to electric auxiliaries.

--Conversion of the fleet of DD963 Class ships to electric auxiliary will not be initiated until at least 1 year of sea service experience has been gained on the initial electric auxiliary installation as well as 1 year of sea experience on the new boiler being installed on the DD997 and CG47 Class ships.

--The DD997 and CG47 Class ship boiler be evaluated at sea at the earliest practical date.

We concur with the Assistant Secretary's approach to reaching a decision on which option is most economical and effective to resolving the problems on the DD963s. As agreed with your Office,

in view of the Navy's approach to resolving the waste heat boiler problems, we did not solicit written agency comments. We did discuss the contents of this report with Navy officials to verify the facts presented. Also, as arranged with your Office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time, we will send copies to interested parties and make copies available to the Navy and will ask the Navy to notify us of the decisions reached.

Sincerely yours,

Donald J. Horan

Donald J. Horan
Director