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

NATIONAL SECURITY AND
INTERNATIONAL AFFAIRS DIVISION

9 AUG 1983

Vice Admiral Earl B. Fowler, Jr.
Commander, Naval Sea Systems Command

Dear Admiral Fowler:

Subject: Improved Performance and Workload Information Could Enhance Maintenance Management for the Navy's MK-46 Torpedo (GAO/NSIAD-83-39)

The GAO has completed a review of the Navy's management of its intermediate-level maintenance for the MK-46 torpedo. The objectives of the review were to evaluate (1) how the Navy determines intermediate maintenance requirements and capabilities; (2) the Navy's policies and procedures used to budget for and monitor required intermediate maintenance; and (3) the utilization and productivity of the facilities performing that maintenance. This review was conducted as part of our ongoing effort to determine whether military equipment maintenance programs and procedures are achieving optimum efficiency and effectiveness. Enclosure I describes the scope and methodology used in the review and also identifies activities visited.

We found that the Navy is completing the intermediate maintenance needed to meet the Fleet's training and readiness requirements for the MK-46 torpedo. However, because the Navy has not collected consistent workload and maintenance activity performance information, we could not adequately evaluate the Navy's efficiency in performing this maintenance. Similarly, this lack of information has prevented the Navy from (1) measuring, evaluating, and comparing the performance of maintenance activities to highlight problems and encourage productivity, and (2) quantifying the total maintenance workload to ensure that the resources needed to do this work are optimized.

Navy officials stated the lack of information was primarily caused by an insufficient number of people working in the performance measurement area. However, we were also told that the Navy recognizes the need to standardize performance reporting and that efforts have begun in the area to improve reporting and performance evaluation.

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These matters are discussed in more detail below.

BACKGROUND

The MK-46 torpedo, introduced in the 1960's, is the primary antisubmarine weapon used by Navy surface ships and aircraft. After launch, this high-speed, deep-running torpedo uses self-contained homing systems to locate and destroy both conventional and nuclear submarines. The Navy is presently modifying this weapon to improve its effectiveness. The improved torpedo, known as the MK-46 Mod 5, will continue to be used into the 1990's.

Much of the maintenance performed on this weapon occurs at the intermediate level. Intermediate-level maintenance consists primarily of (1) routine, periodic maintenance tasks to keep the torpedo inventory at a high level of readiness, and (2) reworking torpedoes that have been fired (without warheads) for training or tests. This maintenance is performed mainly by enlisted personnel at four Naval Weapons Stations and seven other shore-based Navy facilities (Enclosure I identifies the facilities). One of the facilities, Moffett Field, is scheduled for closure in fiscal year 1983. In fiscal year 1981, costs were about $8 million in operating and maintenance funds plus the cost of approximately 350 military personnel.

Program management responsibility for MK-46 maintenance is assigned to the Naval Sea Systems Command (NAVSEA) in Washington, D.C. As such, NAVSEA is responsible for overall management and coordination of torpedo support including the preparation and execution of financial budgets. Within NAVSEA, these responsibilities are carried out by the Undersea Weapons and Test Subgroup. The Atlantic and Pacific fleet commands assign and coordinate the actual maintenance workload among the maintenance activities.

PERFORMANCE EVALUATION REQUIRES CONSISTENT, UNIFORM DATA

Top management of a weapon maintenance program should ensure not only that the maintenance needed to support training and readiness requirements is accomplished, but also that this maintenance is performed economically and efficiently. To do this, detailed workload and performance feedback information is needed to allow managers to (1) keep the minimum resources needed to meet maintenance requirements; (2) measure, evaluate, and compare the performance of maintenance activities; and (3) promote efficiency and productivity at every level.

Department of Defense and Navy instructions recognize that performance measurement and evaluation are necessary for making

sound resource allocation decisions and for monitoring performance. Current Navy policy requires managers at all levels to pursue performance improvement programs, including the use of labor standards in a work measurement system. However, despite these requirements and GAO recommendations concerning similar maintenance programs, [1]/ the Navy has not established an adequate work measurement system for torpedo maintenance. Only one of the seven activities we visited had tried to develop standards for MK-46 work. Consequently, the Navy cannot ensure that its torpedo maintenance is being accomplished as efficiently as possible, and thus may be losing opportunities to cut costs.

The performance data that the activities do maintain varied considerably among the seven activities we visited. We found two activities collect sufficient labor-hour and cost information to measure performance, two activities collect insufficient data and three activities collect no data of this type. Also, although all MK-46 activities follow the same written maintenance procedures, the terms used to describe completed units of work vary among the 11 activities, making comparisons even more difficult. For example, we found that 27 different terms were used by the activities to describe the 5 major MK-46 maintenance tasks listed in Enclosure 2. Moreover, when identifying completed work, some activities group the various minor maintenance tasks under the major actions differently. Thus, even when two activities use the same term to describe a unit of work, the actual tasks performed are sometimes different.

Some activity managers told us that the lack of standard terms has occasionally hindered communication and caused confusion in the daily management of the program. Also, without consistent definition of maintenance workload terms and with no uniform reporting of actual performance, NAVSEA cannot make comparative analyses of activity performance to help identify problems and to encourage productivity.

Officials at the six activities without standards stated that they had developed none because either they lacked the necessary resources, they felt standards were not necessary, or higher commands had not directed them to do so. NAVSEA officials also stated that the Navy does not have enough personnel to develop standards and design work measurement systems for all Navy maintenance programs.

NAVSEA officials also stated, however, that they recognize the need to standardize workload definitions and reporting and efforts have begun in this area to improve the monitoring of activity productivity.

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[1]/"Navy Missile Maintenance Can be Done Cheaper by Improving Productivity" (LCD-80-43), April 9, 1980, and "Improved Work Measurement Program Would Increase DOD Productivity" (PLRD-81-20), June 8, 1981.

TORPEDO MAINTENANCE WORKLOAD AND CAPACITY NEED BETTER QUANTIFICATION

To meet its torpedo maintenance requirements at the least cost, the Navy must match its total MK-46 maintenance workload with the optimum combination of facilities, equipment, and manpower required to accomplish this work. However, because of the information problems discussed above and because the Navy has quantified only part, not all, of its annual maintenance workload and capacity, the Navy cannot ensure that the current workload and capacity match is justified and not excessive.

For example, in estimating its requirements, the Navy has estimated the number of maintenance tasks required annually for only one of the several categories of recurring major maintenance tasks-exercise turnarounds. Yet, other tasks--such as conversions, launch preparations, and inspections--account for a significant portion of MK-46 intermediate maintenance expenditures. Similarly, capacity estimates for the most part are based on the annual number of exercise turnaround actions a shop can perform. This figure, in turn, is based on available "afterbody lines"--the workspaces, equipment, and personnel needed to disassemble, refurnish, and reassemble the torpedo's engine and fuel tank. The Navy estimates that each "afterbody line" can complete 200 exercise turnarounds a year. This estimate of capacity does not consider the other MK-46 maintenance tasks which must be performed.

The seven maintenance activities we visited exhibited some confusion regarding maintenance capacity. Officials at two activities said their capacities were greater than the Navy's estimate, while one activity said its capacity was lower. Officials at the four other activities did not know what their capacities were.

While the Navy's total MK-46 maintenance workload and capacity have not been fully quantified, officials in the MK-46 program office told us that current maintenance capacity is greater than maintenance workload requirements. They cited a 1977 MK-46 facility study which concluded that all intermediate maintenance for the MK-46 torpedo could be handled by only five maintenance activities. However, the Chief of Naval Operations decided to retain 10 rather than 5 maintenance activities because of readiness and geographical concerns expressed by fleet commanders.

This decision was made without evaluating the economic impact of retaining twice as many facilities as the study had recommended. Nor did the Navy try to determine whether any cheaper alternative would have met the fleets' concerns which for the most part were not clearly specified. This decision meant that additional equipment and other improvements had to be be procured for the additional shops, at a total cost of about $2.8 million.

Two of the additional shops retained--Jacksonville, Florida, and San Diego, California--were justified partly by their geographic proximity to both air and surface units. We found that for the most part these activities are supporting only nearby air units. The neighboring surface units are being supported by other, more distance activities. For example, from October 1981 through May 1982, surface ships in Mayport, Florida, recived 131 torpedoes trucked from the Charleston maintenance activity 260 miles away instead of from the Jacksonville shop only 20 miles from Mayport. Similarly, we found that the Seal Beach activity prepared many of the torpedoes used by ships in the San Diego area, even though Seal Beach is 90 miles further away.

We believe the Navy should more precisely quantify its total MK-46 maintenance workload and capacity so that any excessive capacity can be measured. With this information, Navy managers are in a better position to assess current and future capacity decisions in view of both readiness and the economic factors involved.

CONCLUSIONS AND RECOMMENDATIONS

The Navy is completing the intermediate maintenance needed to meet the fleets' training and readiness requirements for the MK-46 torpedo. However, management's ability to analyze and encourage efficiency in the accomplishment of this maintenance has been hindered by the lack of uniformity in the definition, collection, and reporting of key performance information. Also, ensuring that the Navy has enough but not too much maintenance capacity requires detailed analysis of projected workload and activity capacity. Yet, current requirements and capacity estimates include only a portion, not all, of the tasks which must be performed. As a result, the Navy cannot ensure that the current combination of facilities, equipment, and personnel is at the optimum level needed to accomplish the required workload.

Accordingly, we recommend that you ensure that MK-46 maintenance managers (1) standardize the definitions used by the maintenance activities in reporting units of torpedo maintenance work completed, (2) collect and evaluate uniform performance information from all maintenance activities with a view towards improving productivity, and (3) quantify torpedo maintenance workload and capacity based on all required tasks to ensure that the workload and capacity match is optimized considering both readiness and economic factors.

Sincerely yours,

Dick Helmer/for

Henry W. Connor
Senior Associate Director

Enclosures - 2

ENCLOSURE I

SCOPE AND METHODOLOGY FOR THE REVIEW

The review was conducted from January through September 1982 at those Navy Commands which manage torpedo maintenance: the Naval Sea Systems Command (NAVSEA) in Washington, D.C.; the Commander in Chief, U.S. Atlantic Fleet in Norfolk, Virginia; the Commander in Chief, U.S. Pacific Fleet, and the Commander, Naval Logistics Command, U.S. Pacific Fleet in Honolulu, Hawaii. We also visited 7 of the 11 MK-46 intermediate maintenance activities: 1/

-- Atlantic Fleet Weapons Training Facility, Roosevelt Roads, Puerto Rico

-- Charleston Naval Weapons Station, Charleston, South Carolina

-- Earl Naval Weapons Station, Colts Neck, New Jersey

-- Jacksonville Naval Air Station, Jacksonville, Florida

-- Lualualei Naval Magazine, Oahu, Hawaii

-- North Island Naval Air Station, San Diego, California

-- Yorktown Naval Weapons Station, Yorktown, Virginia

These activities were chosen to provide broad representation of the Navy's torpedo maintenance facilities, including those managed by NAVSEA and by fleet commands. We also included one activity operated by a Navy contractor and two activities planning expansions.

1/Activities not visited include Cubi Point Naval Air Station, Moffett Field Naval Air Station, Commander Fleet Activities Yokosuka, and Seal Beach Naval Weapons Station. The Moffett Field maintenance facility is scheduled to close during FY 1983.

ENCLOSURE II

DESCRIPTION OF MAJOR

MK-46 TORPEDO INTERMEDIATE MAINTENANCE TASKS

Class "A" Maintenance	- Performed at 3-year intervals between class "B" maintenance; consists of a limited system inspection.
Class "B" Maintenance	- Performed at 6-year intervals; consists of an overhaul of the torpedo engine and fuel tank and a complete system check.
Exercise Turnaround	- Performed on torpedoes that have been fired without warheads for training or test purposes; consists of an overhaul of the torpedo engine and a complete system check.
Conversion	- Performed on armed torpedoes to convert them into unarmed weapons for exercise firing, or vice versa.
Inspection	- Performed on torpedoes returned unfired from Navy units; consists of visual inspection and touch-up painting.

ENCLOSURE I

The review was performed in accordance with generally accepted Government audit standards. We reviewed relevant agency directives, regulations, reports, studies, plans and budgets, and interviewed Navy officials regarding torpedo maintenance. At each facility visited, we (1) observed maintenance underway; (2) interviewed planners and managers concerning local policies and practices; (3) collected and analyzed available workload, use, and productivity information for fiscal years 1981 and 1982 through May 1982; and (4) examined the scope and justification for any planned facility expansion. We also obtained some information on the maintenance activities we did not visit. Because several activities did not collect workload and performance data, we were unable to fully evaluate and compare the performance of the facilities visited.