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

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

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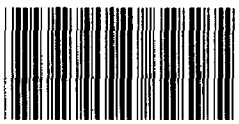

The Honorable John F. Lehman
The Secretary of the Navy

Dear Mr. Secretary:

Subject: The Navy Should Improve Its Management of Defective Government-Furnished Materials (GAO/PLRD-82-115)

The Navy provides billions of dollars of Government-furnished material (GFM) to contractors for use in the construction, overhaul, and repair of its ships, airplanes, and missiles. This GFM includes parts, components, assemblies, raw and processed materials, and supplies that are attached to or incorporated into end products, such as ships and aircraft. Providing GFM has resulted in the Navy spending millions of dollars each year to repair or replace materials found to be defective after contractors receive them. However, neither we nor the Navy know how much it is spending to replace or repair defective GFM because the reporting systems it has established to identify these costs are not working. The Navy's failure to identify the magnitude of defective GFM, and its associated costs for repair or replacement, has precluded management from having the oversight needed to take effective action to correct the problems.

On the basis of our limited review of eight contractors, we identified about $17.6 million that the Navy either spent or obligated for GFM repairs. Of this total, $11.0 million was spent over a 30-month period and $6.6 million was spent over a 3- to 4-year period. (See enc. I for further details on the results of our review.) Moreover, the Navy estimates that it will spend an additional $13.8 million with one of the contractors for repairs and correction of failures for Fast Frigate ships' GFM.

The Navy has no central point of control or accountability over defective GFM. Instead, the Navy's management is fragmented among the various systems commands, which have developed their own reporting systems. These systems were developed as a result of Department of Defense (DOD) Directive 4155.1, which requires

each DOD component to establish such a program. Such systems are not monitored to assure the consistency and the interface needed to provide management visibility of the magnitude of the Navy's GFM problems. And, although the basic regulations and directives for managing a quality assurance program are the same, they were not interpreted and applied in the same manner.

All of the systems were experiencing problems with (1) underreporting of defective GFM and (2) the submission of inaccurate data on the quality deficiency reports (QDRs). These problems result in a lack of assurance that the information produced by the systems is reliable for making management decisions or taking action to solve the problems. Consequently, the data developed, which indicated vendors who habitually provided defective items, was not being used effectively to encourage those vendors to correct deficiencies or to avert additional purchasing from those vendors.

The Navy was not taking action to make vendors financially responsible for poor quality products provided as GFM. Generally, the contracting officers believed that simply paying the contractor that received the defective item to repair or replace it was an adequate solution. This procedure is not only costing the Navy millions each year, but it is relieving the producing vendors of their accountability for the quality of products. Changes in the Defense Acquisition Regulations (DAR) have been made to strengthen this area and to better protect the Government's interest.

We recommend that you direct the systems commands and other applicable organizations to:

--Bring the Navy's QDR systems into agreement with DOD Directive 4155.1 and DAR.

--Develop a system for maintaining overall financial and logistical data that will provide the management visibility needed to identify the nature and magnitude of the problems with defective GFM.

--Ensure consistency and compatibility of the various Navy QDR systems with each other and with other DOD components.

--Use the data developed by the QDR systems to hold vendors accountable, either by having them take corrective action or by preventing future purchasing from them. Alternative sources should be developed if a sole-source vendor does not improve the quality of its products.

We also recommend that you establish a focal point within your office to oversee the accomplishment of these recommendations.

We discussed this report with Navy and DOD officials. Although they generally agreed with our conclusions and recommendations, they did point out some areas in which they believed clarification was needed. Where appropriate, the report was changed to reflect these positions.

As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Secretary of Defense; the Director, Defense Logistics Agency; the Chairmen, House and Senate Committees on Appropriations and on Armed Services, Senate Committee on Governmental Affairs, and House Committee on Government Operations; and the Director, Office of Management and Budget.

Sincerely yours,

Donald J. Horan
Director

Enclosures - 2

IMPROVEMENT NEEDED IN THE NAVY'S MANAGEMENT OF GOVERNMENT-FURNISHED MATERIALS

BACKGROUND

The Navy provides billions of dollars of GFM to private contractors for construction, overhaul, and repair contracts. This GFM is either owned or acquired by various commands.

No single Navy activity is responsible for overall GFM financial or logistical accountability, policy formulation, management, or oversight. The same also is true for defective GFM. The only data available on the magnitude of defective GFM is fragmented among various Navy commands and offices and is often incomplete and inaccurate.

In June 1981, the Navy reported to the House Committee on Government Operations, Subcommittee on Legislation and National Security, that as of September 30, 1980, there was $3.4 billion of GFM in the hands of contractors. However, GAO and the Navy have found that this figure was highly inaccurate. Although the Navy could not provide a total figure for defective GFM, it admitted that it may have understated the figure by as little as $91 million and as much as $3 billion. However, data developed for production contractors with over $1 million in GFM shows that they alone had $6.8 billion of GFM.

Historically, GFM has been cited as the reason for many contract problems. As early as 1972, we reported 1/ that defective and late delivery of GFM was one of five basic factors causing Navy deficiencies that increased contract costs. In 1975 we reported that when equipment is defective, rework is required. We also reported 2/ that this, in turn, interrupts shipbuilders' schedules for fabricating and installing supporting structures and service systems.

The Naval Audit Service and others also have reported problems associated with defective GFM. For example:

--In June 1977, the Naval Audit Service estimated that defective GFM had led to 36,000 maintenance actions annually at a cost of more than $14 million. The

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1/"Causes of Shipbuilders Claims For Price Increases" (B-133170, Feb. 1972).

2/"Status of Shipbuilders' Claims For Price Increases:--Settlement Progress--Navy Claim Prevention Actions--Need For Caution" (PSAD-76-24, Nov. 5, 1975).

Service noted that a number of Navy commands were not negotiating equitable price adjustments for these repairs.

--In May 1978, the Naval Audit Service reported that inadequate receipt inspections by a major contractor had resulted in escalating repair costs because defective GFM was installed in aircraft.

--In May 1979, the Navy Inspector General reported that noncomplying materials were being shipped to contractors. The report noted that this noncompliance, coupled with late delivery of GFM, had delayed and disrupted ship availabilities and caused claims to be placed against the Government.

In 1978 DOD, recognizing the need for a quality information system, issued DOD Directive 4155.1. This directive requires DOD components to establish a quality assurance program, as a component of the acquisition and support process, and to conduct audits to ensure that quality products and services are obtained. Also, this directive states that contractors (1) are to be held responsible for the quality of goods and services they provide, (2) must establish quality control programs, and (3) are responsible for the quality of products and services their subcontractors provide. Finally, DOD components are to establish inspections at the destination point, whenever practical, and are to ensure that contracts are not awarded to contractors known to provide unsatisfactory products or services.

To comply with DOD Directive 4155.1, each Navy systems command has implemented its own QDR program under the overall guidance provided by the Naval Material Command (NAVMAT). The Naval Sea Systems Command (NAVSEA) established a QDR program to identify vendors that habitually provide defective GFM and deficiencies involving operational systems. The Naval Air Systems Command (NAVAIR) established a QDR program to identify operational and design problems with NAVAIR's systems. The Naval Electronics Systems Command's (NAVELEX's) QDR system monitors QDRs for electronic items that NAVELEX and the Ships Parts Control Center have procured. In contrast, the Naval Supply Systems Command's (NAVSUP's) program not only monitors QDRs for selected items managed by the Ships Parts Control Center, the Defense Logistics Agency, the General Services Administration, and the Army and Air Force, but it also purges the supply system of defective material.

Recently, the Under Secretary of Defense for Research and Engineering reported:

ENCLOSURE I

"Our productivity and the quality of U.S. manufacturing facilities have deteriorated. There are reports of up to 40 percent rework (labor and materials) taking place in some industrial plants. Significant cost reductions can result from the elimination of rework operations by the use of better manufacturing methods and defect prevention techniques at contractors' plants."

DOD is also establishing a productivity/quality panel on the Defense Science Board.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to (1) identify the Navy systems for discovering, monitoring, and correcting defective GFM and (2) determine how the systems contributed to the Navy's management of defective GFM. Problems resulting from defective material had come to our attention during a prior review 1/ of the Navy's management of materials in the custody of ship construction and repair contractors.

At headquarters, we interviewed officials of five of the major commands and compared their management policies and procedures for dealing with defective GFM. We obtained information on the management of defective GFM from five Supervisors of Shipbuilding, Conversion, and Repair (SUPSHIP), four naval plant representative offices, and one naval shipyard that performs SUPSHIP functions. (See enc. II.)

To evaluate the reporting systems, we selected activities that had large construction, repair, or overhaul contracts involving GFM and that had QDR systems. We also selected subordinate commands to obtain a good mix of contract functions, weapons systems, and geographic locations.

Through a statistical sampling of QDRs of three systems and a review of all QDRs for another, we assessed the quality of QDR data, the reliability of computer processing of the data, and the results of QDR analyses and investigations.

1/"The Navy Is Not Adequately Protecting the Government's Investment in Materials Furnished to Contractors for Ship Construction and Repair" (PLRD-81-36, June 9, 1981).

ENCLOSURE I

Our review was performed in accordance with GAO's current "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions".

THE NAVY'S SYSTEMS ARE NOT PROVIDING MANAGEMENT VISIBILITY OVER DEFECTIVE GFM

The Navy's systems do not provide overall management visibility over defective GFM because they do not interface with each other and therefore cannot be used to develop overall information on the magnitude or nature of GFM problems within the Navy. Also, the data within the systems is limited because of (1) underreporting by Navy activities and (2) inaccurate and/or incomplete data on QDRs that are submitted.

Systems do not interface

Although all of the systems were developed from the same basic DOD and Navy instructions and use the same reporting format, they do not interface with each other or with other DOD components.

This problem was reported by the Chief of Naval Material in 1978. He stated he had no visibility over the scope of the QDR effort, the functions performed, the resources assigned, or the measures of effectiveness. Each systems command had a significant QDR capability, but because of the lack of management visibility and central coordination this capability was underutilized or misdirected. Also, each systems command had developed its own reporting standards, forms, and data banks that precluded interface among the various systems, causing different systems' results and a lack of conformance to regulations.

Systems do not identify the magnitude of the problems of defective GFM

The information required to be submitted on the QDRs should provide the Navy overall data on the magnitude of the GFM problem. At least at the systems command level, this is not working. The information on the cost to repair and the value of the defective items either is not provided by the submitters or is not added after the problem has been resolved. Often, the submitters cannot provide this data because they are not given the GFM costs. The cost-to-repair data is highly fragmented because it is generally included in change orders to the individual contracts involved, but not accumulated or included in the QDRs submitted.

ENCLOSURE I

We consider the cost involved in dealing with defective GFM to be significant. The table below shows the amount of money the Navy either paid or obligated from January 1, 1979, to June 30, 1982, for GFM repairs.

Contractor	Amount (millions)
Todd Shipyards, Seattle, Wash.	$a/1.6
Lockheed Shipyards, Seattle, Wash.	.4
Ingalls Shipyard, Pascagoula, Miss.	1.9
Todd Shipyards, Long Beach, Calif.	.8
Bath Iron Works, Bath, Maine	.4
Grumman Aerospace, Bethpage, N.Y.	b/4.2
Lockheed California Co., Burbank, Calif.	b/1.7
Total	$11.0

a/An additional $490,000 was under negotiation at the time of our review.

b/January 1980 to June 1981 only; calendar year 1979 data not available.

It should be noted that these figures do not include the costs of Navy contracts with onsite vendor representatives who also repair and replace GFM. Time constraints precluded the development of these costs, but we did identify eight contracts with onsite vendors at Grumman Aerospace and five contracts with onsite vendors at Lockheed California Company.

We also identified $6.6 million paid to the Sperry Systems Division to repair combat system failures and defective GFM for the Fast Frigate ships. However, Sperry was unable to break down the costs incurred for the above-mentioned time frame. The Navy estimates that it will spend an additional $13.8 million to repair combat system failures and defective GFM.

Therefore, with only limited audit work at eight contractors, we identified $31.4 million spent or planned to be spent for the repair of defective GFM. We believe the figure is much higher Navy-wide.

Significant numbers of defects go unreported by Navy activities

NAVSEA requires its shore activities to report unsatisfactory material problems for screening, analysis, and action to prevent recurrence. Despite this requirement, many GFM defects are not reported.

During the previously mentioned 30-month period, the number of defects reported by the five NAVSEA activities we visited was low in comparison to that reported by contractors, as shown in the following table.

SUPSHIP/shipyard	Defective GFM reports filed by contractors	QDRs sent to NAVSEA
SUPSHIP, Bath, Maine	2,117	65
SUPSHIP, Long Beach, Calif.	2,136	21
SUPSHIP, Pascagoula, Miss.	3,519	299
SUPSHIP, Seattle, Wash.	1,722	20
SUPSHIP, Philadelphia Naval Shipyard, Pa.	(a)	-
Total	b/9,494	405

a/Data not maintained.

b/These figures do not include the QDRs for all contracts administered by the SUPSHIPs during this time frame.

Although some of the QDRs covered more than one deficiency, most QDRs were for single items. Consequently, reporting only 405 QDRs for 9,494 deficiencies is extremely low.

We also found that in the past 3 to 4 years, only one QDR had been filed by the Navy's Contract Administrator for defective GFM repaired by a land-based test facility. This underreporting is a serious omission because the Navy has already expended $6.6 million and plans to spend about $13.8 million for repairs of failures and defective GFM by this contractor. Moreover, during the 30-month period, the contractor performed 3,452 repairs to the GFM it received.

This low reporting prevents NAVSEA from developing reliable, overall data on the GFM deficiencies being experienced by its activities. It also prevents taking action to avoid future problems, as one contractor noted:

ENCLOSURE I

"Failure of the original government supplied keys resulted in our disassembly and subsequent reassembly of these blowers numerous times. It was only after we decided the design was deficient that we discovered 'others' recognized the problem on earlier blowers and had substituted heavier drive keys. I can only conclude that had we not decided to stop trying to make the 'original' type keys work, we would have been forever disassembling and reassembling blowers due to drive key failures."

NAVAIR also was experiencing problems with low reporting by its activities. For two naval plant representative offices visited, we found significant underreporting during the 18-month period ended June 1981.

Naval plant representative	Defective GFM reports filed by contractors	QDRs sent to NAVAIR
Bethpage, N.Y.	4,021	1,109
Burbank, Calif.	3,202	357
Total	7,223	1,466

The official in charge of NAVSUP's QDR system told us he has no statistics to prove his system is experiencing underreporting. However, he believes underreporting is probably occurring because of the (1) lack of incentive for activities to file QDRs after items have been repaired or replaced and (2) the low dollar value of many items.

The NAVELEX QDR system is smaller and more specialized in the kinds of items it requires to be reported than either the NAVAIR or NAVSEA system. As shown below, only 177 QDRs have been processed since 1978.

Calendar year	QDRs submitted
1978	8
1979	87
1980	60
1981	22
Total	177

ENCLOSURE I

However, even considering these factors, the system is experiencing a serious decline in numbers of QDRs filed which may indicate underreporting by NAVELEX activities.

Navy officials cited various reasons for the underreporting of defective items. One reason cited was that activities have no incentive to file QDRs because they have usually repaired or replaced defective items before the QDR is ever filed. Another reason was that reporting activities are confused as to what they should report. Most activities have implemented local instructions that specify what should be reported, but these are not reviewed to ensure that all activities are reporting vital, comparable data. Finally, the QDR systems provide solutions or corrections too slowly.

Information provided on QDRs is often inaccurate or incomplete

On the basis of our review and analyses of statistical samples of QDRs for the four systems, we concluded that the information submitted is often inaccurate or incomplete. For example:

--A sample of 175 NAVAIR QDRs showed 39 items were missing national stock numbers, 54 the dollar value of the material, and 175 the estimated cost to repair the item.

--A sample of 100 NAVSEA QDRs showed 35 items were missing the national stock number, 34 the dollar value of the material, and 88 the estimated cost to repair the item.

--A sample of 200 NAVSUP QDRs showed many activities did not even know how to determine whether an item was GFM. Many considered an item GFM if it came from a Government source, regardless of the item's end use. Most of the GFM QDRs were from activities that normally did not deal with GFM.

--A review of 166 NAVELEX QDRs indicated that 70 of the QDRs were classified erroneously as NAVELEX items and should have been sent to NAVSUP. In addition, 25 of 96 QDRs were missing the dollar value for the items.

We believe these errors and omissions, coupled with the problem of underreporting, render the systems' QDRs of limited value in identifying the magnitude of defective GFM items and, therefore, in solving the related problems.

ENCLOSURE I

THE NAVY IS NOT HOLDING VENDORS RESPONSIBLE FOR THE QUALITY OF THEIR PRODUCTS

The Navy generally is not holding vendors responsible for the repair or replacement of defective GFM. The solution usually taken by SUPSHIPs and the naval plant representatives visited was to have the item repaired at Government expense by the receiving contractor or an onsite vendor representative. There was seldom any attempt to go back to the vendor to obtain a repair or replacement or to adjust the price to compensate for the Government repairing the item.

This management philosophy results in increased contract costs, in the millions, each year. For example, for seven contractors visited, the Navy paid or obligated $11 million for the repair of defective GFM, not including payments to onsite vendor representatives for repairs, during a recent 30-month period. For another contractor, the Navy has expended $6.6 million for GFM repairs and failures and estimates it will spend an additional $13.8 million before the contracts are completed.

Navy officials said they do not go back against the vendors because most of the items purchased are inspected and accepted at the vendors' plants by Defense Contract Administration Service representatives. They also said the Navy has no recourse against the vendors if the materials are found to be defective later, except as regards to latent defects, fraud, or such gross mistakes as amount to fraud. These officials believed most of the defective GFM problems they are experiencing are due to the inadequacy of these source inspections.

Although we did not evaluate the adequacy of source inspections, we did find that a high percentage of QDRs indicated that the cause of the deficiency was vendor related, as shown below.

QDR system	Cause of deficiency	Percent of total resolved/completed cases
NAVSEA	Quality	97.0
NAVAIR	a/Vendor	39.0
NAVSUP	Manufacturing defect	46.5
NAVELEX	Poor quality control/ workmanship	63.6

a/The defect was determined to be the vendor's responsibility.

ENCLOSURE I

We also found one QDR which had been filed with NAVSEA that indicated numerous manufacturing problems with a missile launcher. The following is a selected list of the problems:

--Hydraulic pressure for magazine does not meet specifications.

--Latch unit for hoist bound up making hoist inoperable.

--Guide arm and train positioner leaking oil.

--Hydraulic lines chafing and vibrating.

--Magazine blowout parts leaking anti-icing fluid.

--Train regulator dial face installed improperly.

--Train and elevator brakes operate incorrectly.

--Hand pump mounting bracket is missing.

According to the QDR, these problems were experienced with the missile launchers for five ships. However, we were unable to determine the cost to the Government to repair or replace the launchers since the information was not included on the QDR, as required.

An official of the Office of the Deputy Under Secretary of Defense told us DOD had the same interpretation as the Navy of the Government's right of recourse based on DAR. DAR states:

"Except as otherwise provided in the contract, acceptance shall be conclusive except as regards latent defects, fraud, or such gross mistakes as amount to fraud."

* * * * *

"Unless this contract specifically provides for earlier passage of title, title to supplies covered by this contract shall pass to the Government upon formal acceptance, regardless of when or where the Government takes physical possession."

This same official also pointed out that DAR allows the Navy to simply pay the receiving contractor to repair or replace the item based on the following clause:

ENCLOSURE I

"* * * in the event the Government-furnished property is received by the contractor in a condition not suitable for the intended use, the contractor shall, upon receipt thereof, notify the contracting officer, of such fact and as directed by the contracting officer, either (i) return such property at the Government's expense or otherwise dispose of the property, or (ii) effect repairs on modifications."

DOD and Navy officials agreed that DAR and DOD Directive 4155.1 are inconsistent. The DOD directive is more specific than DAR about holding vendors responsible for the quality of goods and services provided, particularly in the case of critical or repetitive defects. It requires DOD components to assure contracts are not awarded to vendors with previous histories of providing products or services of an unsatisfactory quality. In addition, the DOD directive gives the Government the option of exercising its right to reject or return any and all defective items for repair, correction, or replacement.

Both Navy and DOD officials said they believed the DOD directive more adequately protects the Government's interest than does DAR. They also said they submitted a request to the DAR Council in 1979 and 1981 to have the DOD directive incorporated into DAR.

In June 1982, the DAR Council approved the inclusion of some of the requirements in DOD Directive 4155.1 in DAR. Specifically, DAR now allows DOD components to hold vendors responsible for the quality of items provided. This is accomplished by denying contract awards to vendors with a history of providing poor quality material.

THE NAVY CONTINUES TO AWARD CONTRACTS TO VENDORS WITH HISTORIES OF PROVIDING UNSATISFACTORY PRODUCTS

The Navy is awarding contracts to vendors with a previous history of providing products of an unsatisfactory quality. If quality input data is received, QDR systems can produce data that will adequately document item defects and flag those vendors that are providing defective items. However, even the information currently being produced is often ignored by Navy contracting officers. For example:

--In an October 1981 analysis of 12 Navy contracting activities, NAVSEA identified the award of 929 contracts to vendors that had previously been

ENCLOSURE I

reported as having a history of providing poor quality products. Thirty-one of 54 vendors involved had been on quality deficiency lists over the past 2 years.

--During a recent 3-month period, NAVSUP awarded 111 contracts to vendors for the same items for which those vendors had a previous record of providing poor quality products.

NAVMAT officials told us they had been trying for 5 years to get the systems commands to use the data produced by the various QDR systems to, at least, flag problem vendors and to require purchasing officers to review the records before placing additional contracts. They have not accomplished these goals even though internal studies have indicated that many of the items in the supply system are defective.

According to NAVSUP officials, the NAVSUP QDR system does not provide adequately documented data with which to elicit corrective action by or to prevent purchasing from vendors providing defective items. Therefore, the information produced by the QDR system is not being passed on or used at higher management levels where corrective actions can be taken.

Our review of the NAVELEX system showed no one was using the data generated to solve the problems of defective GFM, to prevent purchasing from problem vendors, or to make other management decisions. NAVELEX officials said they are trying to improve this situation.

NAVAIR was using the data it generated to help solve system problems and occasional design deficiencies. But we found no evidence that the system was being used to prevent purchasing from problem vendors. Officials said the reason for this was that the system was not vendor oriented as was the NAVSEA system.

The NAVSEA system has not been used as effectively as it could be used. However, system officials are making efforts to get more action on the part of Defense Contract Administration Service representatives performing source inspections. System officials are holding joint meetings with these representatives or are monitoring vendors identified as providing defective products. The Director of NAVSEA's system told us that over the past 2 to 3 years, NAVSEA has been successful in persuading 160 vendors to improve their products to the point they could be removed from NAVSEA's deficient vendor listings.

ENCLOSURE II

LIST OF NAVY AND CONTRACTOR ACTIVITIES VISITED

NAVY

Naval Material Command, Alexandria, Virginia

Naval Supply Systems Command, Alexandria, Virginia

Fleet Material Support Office, Mechanicsburg, Pennsylvania

Naval Sea Systems Command, Alexandria, Virginia

Naval Material Quality Assessment Office, Kittery, Maine

Naval Air Systems Command, Alexandria, Virginia

Naval Weapons Engineering Support Activity, Washington, D.C.

Naval Electronics Systems Command, Alexandria, Virginia

Naval Electronics System Command Detachment, Mechanicsburg, Pennsylvania

Supervisor of Shipbuilding, Conversion, and Repair, Bath, Maine

Supervisor of Shipbuilding, Conversion, and Repair, Long Beach, California

Supervisor of Shipbuilding, Conversion, and Repair, Newport News, Virginia.

Supervisor of Shipbuilding, Conversion, and Repair, Pascagoula, Mississippi

Supervisor of Shipbuilding, Conversion, and Repair, Seattle, Washington

Philadelphia Naval Shipyard
Philadelphia, Pennsylvania

FFG-7 Project Office, Alexandria, Virginia

Strategic Systems Project Office, Alexandria, Virginia

Naval Plant Representative Office, Bethpage, New York

Naval Plant Representative Office, Burbank, California

Naval Plant Representative Office, Great Neck, New York

Naval Plant Representative Office, Sunnyvale, California

CONTRACTORS

Bath Iron Works, Bath, Maine

Grumman Aerospace Corporation, Bethpage, New York

Ingalls Shipyards, Pascagoula, Mississippi

Lockheed California Company, Burbank, California

Lockheed Missiles and Space Corporation, Sunnyvale, California

Lockheed Shipyards, Seattle, Washington

Sperry Systems Division, Sperry Corporation, Ronkonkama, New York

Todd Shipyards, Long Beach, California

Todd Shipyards, Seattle, Washington