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Industrial Management Review Of The Naval Air Rework Facility, Alameda, California B-133014

Department of the Navy

UNITED STATES
GENERAL ACCOUNTING OFFICE

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JULY 3, 1973

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D C 20548

LOGISTICS AND COMMUNICATIONS
DIVISION

B-133014

The Honorable
The Secretary of Defense

Dear Mr Secretary

We have reviewed industrial management activities at the Naval Air Rework Facility, Alameda, California. The report identifies opportunities for improving both management of maintenance operations and productivity of the work force and suggests that additional emphasis on the industrial management review approach is needed by the Department of Defense.

We are sending copies of this report to the Director, Office of Management and Budget, the Chairmen, Senate and House Committees on Appropriations, Government Operations, and Armed Services, the Chairman, Subcommittee on Priorities and Economy in Government, Joint Economic Committee, and the Secretary of the Navy

Sincerely yours,

for J K Fasick
Director

Contents

ABBREVIATIONS

ASO	Aviation Supply Office
DOD	Department of Defense
GAO	General Accounting Office
M&S	Methods and Standards Division
NARF	Naval Air Rework Facility
NAVAIR	Naval Air Systems Command
NICRISP	Navy Integrated Comprehensive Reparable Item Scheduling Program
NORS	not operationally ready--supplies
RFI	ready for issue

GENERAL ACCOUNTING OFFICE
REPORT TO THE
SECRETARY OF DEFENSE

INDUSTRIAL MANAGEMENT REVIEW OF THE NAVAL AIR REWORK FACILITY, ALAMEDA, CALIFORNIA
Department of the Navy B-133014

D I G E S T

WHY THE REVIEW WAS MADE

In a February 26, 1971, report (B-159896), GAO advised the Congress that industrial management reviews can effectively identify ways a Government contractor's costs can be reduced and that it would be practicable for GAO to undertake such reviews

Because of similarities between operations of Government contractors and those of Department of Defense (DOD) maintenance facilities, GAO applied industrial management review techniques to the activities of the Naval Air Rework Facility, Alameda, California

FINDINGS AND CONCLUSIONS

There are opportunities to

--improve production control (see ch 2),

--increase the productivity of direct labor (see ch 3),

--improve the quality assurance program (see ch 4),

--initiate an effective equipment maintenance program (see ch 5),

--evaluate and improve the packaging and preservation program (see ch 6),

--revise certain accounting procedures (see ch 7), and

--establish more frequent reviews of component "make or buy" decisions (see ch 8)

DOD teams should conduct similar reviews at other industrial activities These review teams should report to a high enough level to insure that recommendations are carried out

RECOMMENDATIONS

DOD should plan periodic comprehensive reviews of its industrial facilities Because of manpower requirements the reviews should be conducted at those locations and in those functional areas that appear to offer the greatest potential for savings

The review team should be independent of the industrial facility involved, make maximum use of prior examinations by both internal audit and other review teams, and determine that previously cited inefficiencies have been corrected

The results should be reported to that management level having sufficient authority over commands whose decisions significantly affect the facility's operations. In most instances, this would be the Secretary Provision should also be made at that same level for periodic followup on corrective actions

In addition, the Secretary of Defense should monitor the actions taken or planned by the Navy to correct weaknesses discussed in this report, to insure that the weaknesses are corrected. (See ch. 9)

AGENCY ACTIONS AND UNRESOLVED ISSUES

GAO discussed its observations and recommendations in detail with top officials at Alameda and the Naval Air Systems Command As a result, many corrective actions have been taken The command requested other Naval Air Rework Facility commanders to take action as they find necessary to identify and correct similar problems in their facilities (See app VI)

DOD told GAO that it was exploring the feasibility of making industrial management reviews DOD believed, however, the type of study GAO performed at Alameda was being made at other facilities through internal audit, Inspector General, and other functional management reviews

GAO examined reports on management reviews and Navy audits of Alameda operations which were completed at the time of its review. In most instances the types of observations and findings GAO made were not identified in these reports.

GAO examined past audit reports of other Navy rework facilities Collectively and over a period of years the reports disclosed a number of management deficiencies similar or related to conditions discussed in this report. However, these deficiencies had not been identified with or corrected at Alameda at the time GAO's work was done (See ch. 9.)

CHAPTER 1

INTRODUCTION

Industrial management reviews attempt to determine the efficiency of an organization's overall performance and relate this to the cost of the items produced Emphasis is placed on evaluating the system of operation, management, and cost control and especially on procedures to achieve efficiency and economy

In a February 26, 1971, report (B-159896), we reported to the Congress that this type of review could effectively identify ways to reduce Government contractor costs and that it would be practicable for us to undertake reviews Because of the similarities between the operations of Government contractors and Department of Defense (DOD) in-house depot maintenance facilities, we made an industrial management review of the overall performance of the Naval Air Rework Facility (NARF), Alameda, California

Alameda is one of seven NARFs operated by the Naval Air Systems Command (NAVAIR) During fiscal year 1972, Alameda's operating costs totaled $124 9 million. As of June 30, 1972, there was a civilian work force of 6,090, of which 3,611 were classified as direct employees and 2,479 as indirect employees Total building and equipment costs amounted to $59 2 million

Alameda's mission is to

--Perform aircraft rework, including overhaul, progressive maintenance, modernization, modification, conversion, analytical and specialized rework, and repair and preservation of aircraft, engines, and aircraft accessories and components

--Overhaul, repair, and maintain missiles

--Manufacture parts and assemblies.

--Furnish other services or products

During fiscal year 1972 Alameda expended the following by major program category

Program	Amount	Percent of total
Aircraft	$ 38,734,178	31
Missiles	6,060,546	5
Engines	17,304,336	14
Components	34,319,500	27
Manufacturing	3,924,393	3
Other support	24,554,290	20
Total	$124,897,243	100

CHAPTER 2

PRODUCTION CONTROL

Alameda's "production control system" is defined as predicting, planning, and scheduling work--taking into account manpower, facilities, material available, and other capacity and cost constraints--to provide the quantities and quality of maintenance and rework necessary to support Navy aircraft Production control is very complex, it encompasses a wide array of management subsystems, policies, and programs, all of which must be closely coordinated to achieve efficient and effective operations

Alameda's production control system is affected by elements which are outside its control and those which are within its control

ELEMENTS OUTSIDE ALAMEDA'S CONTROL

Alameda's workload depends on outside sources

--Rapidly changing rework requirements are furnished primarily by NAVAIR and the Aviation Supply Office (ASO), Philadelphia, thus Alameda must maintain a high degree of flexibility.

--Its workload involves a wide range of items which support different aircraft models, thus long production runs generally are not possible

--Naval Air Stations control the records showing the number and condition of components available for rework ASO used erroneous data from the records in scheduling work requirements for NARFs

The workload for aircraft and engine overhaul is allocated quarterly The components workload is determined somewhat differently ASO provides, through the Navy Integrated Comprehensive Repairable Item Scheduling Program (NICRISP), a weekly list, by priority, of specific items to be reworked The workload mix changes weekly, therefore, information needed for adequate advance planning was not available to Alameda and thus forced uncoordinated and uneconomical production runs

ELEMENTS ALAMEDA CAN CONTROL

Alameda's production planning, scheduling, and control system contained weaknesses which limited its effective and efficient scheduling of items for rework. Appendix I describes this system and its major defects Briefly, we found that

--In loading the shops, total available labor hours were reduced, somewhat arbitrarily to

1 Allow time for reworking components which might be received from other shops (Although definitive data was available to determine actual hours required for such work, each shop continued to estimate on the basis of past experience)

2 Recognize expected shop inefficiency (Though it is appropriate to reduce total expected output by realistic factors concerning expected performance, the factors Alameda used were outdated, reflected incorrect efficiency, and provided no planned improvements in output)

--All components scheduled for rework were assumed to be in the worst condition, though, in reality, about 15 percent were not

--There was general lack of discipline and control over the standards program in the production shops, which caused incorrect recording of significant amounts of work accomplishments (See ch 3)

--Selection of components to be inducted is based on priority, once the components are inducted, however, Alameda uses computer-assigned "due dates" to control the movement of components through the various repair shops This approach overrides the priority system because (1) due dates are based on normal shop flow times (not related to priority) and (2) the approach does not recognize that subsequent requirements are often more urgently needed

--Although NICRISP, a very sophisticated system, inputs rework by priority on the basis of Navy-wide needs,

components removed from aircraft and engines being overhauled are routinely inducted for rework without regard to or visibility of systemwide priority or need

The planning, scheduling, and control problems caused a series of missed delivery dates, high in-process inventory, and a large backlog of critically needed items It was not possible to quantify the impact of all our observations individually, because each observed weakness interacts to varying degrees with others to produce one or more combined effects.

QUANTIFIABLE WEAKNESSES

Some of the weaknesses which could be quantified are described below Over 85 percent of all component rework was overdue, and low priority components were being processed while higher priority items waited in backlog The following examples illustrate the impact of these weaknesses

1 From March 13, 1971, to May 9, 1971, Alameda required 57 8 calendar days to rework the average highest priority component, whereas rework should have been accomplished in 22 days, on the basis of Alameda's scheduling criteria (See app. II.)

2 Throughout the year ended July 31, 1971, an average of 13,424 components were in process and were overdue on the basis of established criteria This represents an increased investment of about $20 million worth of additional components to compensate for the inordinate timelag required by Alameda to repair these assets The Government's cost for borrowing money to finance this level amounts to over $1 million a year

3. Data for May 1970 through September 1971 showed that needed components with an average value of $5 4 million had been returned by Alameda to base supply because repair parts were not available to complete their rework. (Base supply is an operation of the Naval Air Station and is not under the control of the NARF)

4 On the basis of available labor standards, an estimated $2.2 million to $2 5 million in rework costs was incurred each year for rework time which consistently exceeded labor standards, this appeared to result from a lack of control over rework costs on an item-by-item basis

ACTIONS NEEDED TO IMPROVE PRODUCTION PLANNING, SCHEDULING, AND CONTROL

Production planning, scheduling, and control can be improved in the following ways

--Reduction of concurrent rework and adherence to a priority system should reduce out-of-service time for aircraft and engines undergoing rework, as well as the costs incurred for reworking components for which there is no immediate need The Navy should consider reporting all aircraft and engine components through the NICRISP program and supplying components and parts for aircraft and engine rework directly from supply Only when components and parts are not available from normal supply channels should they be scheduled for concurrent rework

--Scheduling components in economical lot sizes reduces production costs per unit This requires improved planning data, which necessitates better coordination among all activities and commands which input workload planning information--NAVAIR, ASO, and Naval Air Stations

--Improved procedures for identifying and controlling work in process should provide management with timely information on potential production delays and enable it to better react to priority changes

--Repair parts shortages can be reduced by improved procedures for (1) identifying parts requirements earlier, (2) recording demand history on parts obtained from additional components which are routinely inducted as sources for repair parts, and (3) using advance planning data to identify potential parts shortages before they delay production.

--Increased emphasis and reliance on engineered labor standards, together with realistic estimates of schedule disruptions, rather than total reliance on "historical norms," should allow optimum shop loading of the most urgent items and increase shop efficiency

--Increased accuracy of base supply and Alameda inventory data should improve scheduling and shop efficiency by concentrating efforts on units which are truly required and can be completed

We discussed each of our proposals with Alameda officials. They in turn provided us with data outlining actions which they had taken or planned to take to improve their operations They later told us that the corrective actions had led to substantial improvements. They told us, for example, (1) turnaround time for high-priority components was reduced from 58 to 20 days, (2) the number of components in process was reduced by 20 percent, and (3) the number of overdue high-priority items was reduced from 61 to 23 percent

The Navy generally concurred that there was a need for management attention in the areas discussed above. It stated that the Work-In-Process Inventory Control System and the Weekly Induction Scheduling System, if successfully implemented, at Alameda will further improve production planning, scheduling, and control Examples of other corrective actions affecting production control which the Navy told us were initiated at Alameda include

--A report developed to identify the location of overdue components on the basis of assigned shop flow time (due dates).

--A reconciliation report to permit daily correction of records which were out of balance between the rework facility and base supply

--A system to identify units delayed pending action by material planners

CHAPTER 3

LABOR STANDARDS

Productivity levels cannot be determined, let alone achieved, without some means for comparing actual accomplishments with planned or standard accomplishments Normally labor standards are used to make this comparison. They indicate the time necessary for an operation to be performed by an experienced operator working effectively at a normal pace in a predetermined manner, allowing adequate time for fatigue and personal needs

In addition to measuring the efficiency and effectiveness of the work, labor standards are valuable in (1) determining manufacturing costs, (2) planning, scheduling, and controlling men, material, and machines, (3) improving equipment utilization, and (4) pricing direct labor of in-process and finished goods inventories Alameda management was not effectively using labor standards in its production planning, scheduling, and control as discussed earlier (See ch. 2)

Alameda has developed an extensive program for establishing and maintaining labor performance standards and measuring actual labor hours against these standards Two classes are used Class A standards are generally based on methods time measurement, elemental standard data, and work sampling Class C standards are best estimates based on methods which do not qualify under class A

Reported labor efficiency at Alameda was relatively high For example, recent data showed the efficiency of the Production Department has averaged about 97 percent Although Alameda's labor-efficiency-measuring program is conceptually sound, we noted a number of weaknesses in the procedures for, and control over, the recording of labor hours earned (standard hours) and expended (actual hours) For example, 32 percent of all earned and expended hours could not be used to judge efficiency because (1) standard hours were not adjusted to reflect true work content, (2) actual hours were charged not by task or individual unit but by major product (such as an aircraft), and (3) actual hours were charged when incurred while standard hours were not earned until the major product was completed Appendix

III describes Alameda's efficiency-measuring program and gives further details concerning defects in recording data under the system

After completing our work on Alameda's efficiency-reporting system, we measured the level of personnel activity in selected shops using a ratio delay analysis [1] On the basis of 4,894 observations over 3 months, we found that direct labor personnel were productively working 65 percent of the time and not working 35 percent of the time We estimated that approximately 18 percent of the nonwork time was either work related or otherwise unavoidable (See app IV)

The Navy did not agree that there is a need to increase the reliability of the efficiency-reporting system or to increase employee productivity at Alameda

However, on the basis of weaknesses noted in the labor-effectiveness-measuring program and the results of our ratio delay analysis, we believe there is potential for significant improvements

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[1]Ratio delay analysis is a generally accepted statistical technique for measuring the level of productive effort

CHAPTER 4

QUALITY ASSURANCE

Quality assurance strives for a reasonable degree of perfection through quality control and inspection. Quality control systematically regulates manufacturing variables which affect the degree of perfection in the end product, in short, it is an effort to attain quality in manufactured items. Inspection is an effort to see that this level is maintained

Quality defects are likely to occur in any production process, particularly if the items produced are sophisticated and are processed through a number of different shops. Whether the causes are poor workmanship, inadequate inspection, or other causes, it is important to identify and diagnose them so that remedial action can be taken It is also important to record the costs associated with correcting quality defects so that the cost effectiveness of alternative solutions can be measured

Alameda's quality assurance program appeared to provide reasonable assurance that quality defects would be identified and corrected before returning items for customer use. However, Alameda did not adequately provide for accumulating data on the incidence of poor workmanship or on recording the costs for correcting defects.

REPROCESS ORDERS

Written procedures required that labor costs incurred to repair items reworked and accepted at the shop level but later found defective be charged separately on forms called reprocess orders. Management can then analyze the reprocess orders to determine the location, frequency, and cost of reprocess work

Reprocess orders, however, were not consistently used. Instead, this work was charged on handwritten shop orders where it could not be readily distinguished from original processing charges. Our analysis of a sample of completed engines revealed that about 36 percent of the labor hours earned and shown on handwritten shop orders actually related to reprocess work.

The effect of this problem could be measured accurately only in the engine program since necessary records were not available in other programs However, if Alameda's experience with engines is indicative of the annual labor charges to all programs, over 200,000 hours of reprocess work may have been charged as original work Under these circumstances, it is difficult for management to reduce the number of "do overs" and improve overall efficiency

Though the Navy did not concur in our estimate of the frequency of the problem, after our review Alameda issued an instruction providing clarification on defining and charging reprocessing occurrences

TEST CELL REJECTS

Reworked or repaired aircraft engines are tested before they are accepted as ready for issue (RFI) If an engine fails, it is removed from the test cell, reprocessed to varying degrees, and then retested This procedure continues until the engine passes The frequency of engine reject is, therefore, a key measure of the effectiveness of work

For fiscal years 1970 and 1971, Alameda records support the following test cell reject rates for overhauled engines

	Reject rate (note a)	
Engine type	Fiscal year 1970	Fiscal year 1971
T-56	20 8%	14 3%
J-65	23 4	28 9
J-52	32 4	30 0
Overall	25 1	23 0

[a]Total number of test cell failures divided by total tests

On the basis of data provided by a commercial engine rework facility, an overall engine reject rate of 9 to 11 percent for comparable engines, when computed on a basis consistent with the above, is reasonably attainable

In accumulating and recording engine rework costs, initial costs were not distinguished from those incurred after test cell reject Furthermore, procedures did not provide

for accumulating adequate data on specific causes of engine rejects, as do those of commercial facilities, or for data needed to evaluate the effectiveness of corrective actions Correction of these weaknesses is necessary to achieve a minimum engine reject rate

The Navy told us Alameda reduced its test cell reject rate to 15.2 percent in fiscal year 1972. Although the Navy disagreed with our conclusion that frequency of engine reject is a key measure of the effectiveness of work, it agreed a reject rate of 9 to 11 percent is a reasonable goal

The Navy considered that adequate controls already exist at Alameda but that, through applying more sophisticated automatic data processing, many refinements can and will be made. Further, the Navy indicated that a local directive incorporated at Alameda in May 1972 provides for implementing system improvements.

CHAPTER 5

PLANT EQUIPMENT

Important to manufacturing efficiency are plant equipment analysis and preventive maintenance Keeping equipment utilization records is essential to these functions

As of June 30, 1971, Alameda had over $30 million worth of plant equipment About $9 6 million worth of this equipment was acquired during the past 3 fiscal years

Largely because equipment utilization data was not maintained (1) there was inadequate justification for new equipment and (2) little basis for a preventive maintenance program (such programs are based on utilization data and are designed to remedy minor defects before they cause the need for major repairs or equipment failure)

PLANT EQUIPMENT UTILIZATION

Once acquired, plant equipment should be used to the extent practicable on those jobs for which it is most efficient. Equipment utilization data is needed in making decisions concerning alternative manufacturing approaches, resolving potential schedule conflicts, and evaluating relative economies of equipment retention, replacement, or upgrading Such data, however, was not collected Although elapsed-time meters have been installed on some equipment to show actual use time, the meter readings were not recorded.

An Alameda study conducted during our review showed that, on the basis of 20,000 observations, equipment in the Metal and Process Division Shops had only 36-percent utilization After eliminating special-purpose equipment, utilization still amounted to only 43 percent A goal of 70-percent utilization for this type of equipment has been set under some DOD facility contracts

The Navy told us that it considered the 70-percent level relatively high Alameda agreed, however, that equipment utilization was lower than desired, and, as manpower permits, it would do the necessary research to establish

utilization goals The Navy advised us that a system is being developed which will provide for adequate utilization records

JUSTIFICATION FOR NEW EQUIPMENT

Equipment justification documents submitted for selected large plant equipment items contained statements of annual benefits which were often unsupported Furthermore, the justifications did not always discuss the true reasons why Alameda requested the equipment

For example, a numerically controlled milling machine, valued at $293,096, was to replace five existing machines originally acquired for $35,569 The new machine was to save over $200,000 a year by eliminating the direct labor costs of operating the old machines on a continuous two-shift-a-day basis But utilization data was not used to support this estimate, nor was there data to indicate that each old machine was actually used continuously on two shifts

Many other equipment requests also contained justification computations based on questionable amounts For example, the justifications frequently assumed equipment would be utilized on a 2,080-hour basis (100-percent one-shift utilization) Others assumed that installation costs of $350 would be incurred regardless of the size and complexity of the new equipment

Alameda officials agreed that the justifications were often inaccurate and sometimes did not address the true reason the equipment was needed We were told at Alameda that little reliance was placed on written equipment justifications and that decisions to purchase were based on oral discussions during annual conferences with NAVAIR officials.

The written resumes for these conferences provided little additional insight into the factors considered in deciding on specific items of equipment Although these resumes showed changes in some justifications, reasons for these changes were usually omitted For example, the resume for fiscal year 1970 stated that the payback periods for two items were revised from 6 and 5.3 years to 3.2 and 2.2 years, respectively Alameda officials told us the revisions were made at NAVAIR's request so that the two items would appear

more desirable The Navy stated there was no need to institute a more reliable system for justifying the modernization and replacement of wornout equipment because written Navy policy and procedures provided clear direction for all NAVAIR activities for identifying and justifying new plant equipment Our review was not designed to evaluate the Navy's overall policy and procedures but to evaluate actions taken under these policies and procedures We believe Alameda's equipment justification practices need improvement.

PREVENTIVE AND CORRECTIVE MAINTENANCE OF PLANT EQUIPMENT

Preventive maintenance is periodically cleaning, servicing, inspecting, and replacing worn parts to minimize serious breakdowns In arriving at the kind and frequency of equipment maintenance, manufacturers' recommendations, equipment use, and past experience in maintaining certain equipment should be considered Alameda, however, did not properly consider these factors, as evidenced by several procedural weaknesses, such as inadequate records, disregard of manufacturers' recommendations, inadequate preventive maintenance checks, and poor work scheduling Preventive maintenance checks were based on fixed time intervals which were often not adhered to, and the instructions for these checks were inadequate For example, during unannounced checks of the maintenance crew, we noted

1 There was a general absence of supervision

2 Corrective maintenance was being performed and charged to the preventive maintenance code

3 Assigned personnel appeared to be poorly utilized

4 Written instructions were incomplete and allotted time was inappropriate.

By improving its maintenance, Alameda can achieve significant benefits, such as effective use of its maintenance work force, increased useful life of its equipment, reduced equipment downtime and work disruptions, and lower scrap and rework costs.

The present program, however, is not a viable system and lacks management direction and control For this

reason, Alameda has no assurance that the $2.2 million it spends each year for maintenance labor provides any of the advantages of a well-run program

The Navy agreed that Alameda maintenance records to some degree lacked uniformity and completeness The Navy did not agree, however, that manufacturers' recommendations were completely disregarded in the maintenance program. We believe that increased regard for manufacturers recommendations, along with improved records, better work scheduling, and adequate maintenance checks, will greatly improve maintenance

According to industrial engineering authorities,[1] the absence of an effective maintenance program at an industrial plant generally results in a measured level of ineffectiveness

We were advised that measures have been taken to insure the recording of equipment maintenance actions and that this data, when combined with a new system currently being prototyped (the Plant Equipment Management Application Program), should provide adequate information for effective and efficient maintenance

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[1]Elmo J. Miller and Jerome W Blood, editors, "Modern Maintenance Management" (New York, American Management Association, 1963)

Bernard T Lewis, "Developing Maintenance Time Standards" (Boston, Industrial Education Institute, 1967)

L.C Morrow, "Maintenance Engineering Handbook" (New York, McGraw-Hill, 1957).

Naval Area Audit Service, "Audit Report C 41710/C 46610" (Norfolk, Va , Naval Air Rework Facility, April 20, 1970).

CHAPTER 6

PACKAGING AND PRESERVATION

Packaging and preservation are essential in the shipping and storage process, with the destination, storage conditions, and mode of transportation being major considerations in the design of all packages Packaging design should have as its objective (1) minimization of product breakage, (2) ease of handling, and (3) conformity with commodity classification regulations Overpackaging and underpackaging are costly and should be avoided

DOD has established these three levels of packaging to uniformly, efficiently, and economically protect supplies and equipment

--Level A the degree required for protection against the most severe conditions known or anticipated during shipping, handling, and storing

--Level B the degree required for conditions less severe than in level A but more severe than in level C.

--Level C the degree required for protection under known favorable conditions

Alameda, however, packaged all RFI components and most non-RFI components at level A before returning them to base supply. The majority of the units were subsequently reissued for use within Alameda. Packaging costs can be substantially reduced by packaging items at a level more consistent with their ultimate destination

Alameda officials agreed that a significant number of non-RFI components could be packaged lower than level A, and a directive has been issued downgrading the packaging of these items

The Navy advised us that since there was no way of knowing the ultimate destination of RFI components returned to the base supply, they must all be packaged at level A We disagree Historical supply requisition data can be effectively used to determine the number and type of components which can be packaged for subsequent onstation requirements.

A lower level can then be used for those RFI components returning to the NARF or other onbase activities One alternative, such as the Air Force Fast Pack System, appears to be advantageous for such units We estimate that during fiscal year 1971, between 18,900 and 45,000 units could have been packaged in Fast Pack containers at a savings of $277,000 to $659,000.

The Navy did not agree that this offered savings because of (1) the initial investment in Fast Pack containers and (2) the fact that reusable metal containers exist in inventory in sufficient quantities to satisfy most needs. Our computation allowed for the initial investment in containers Thus the initial investment would be more than offset by reduced direct labor and material costs

DOD packaging practices are the subject of a recent report of ours (B-157476, May 21, 1973)

CHAPTER 7

ACCOUNTING

Good management requires accurate and complete information on the cost of producing individual units to insure that management decisions will result in optimum economy and effectiveness Weaknesses in Alameda's cost accumulation procedures limited the usefulness of data provided to management for cost control Those procedures outlined below are in addition to others discussed in our February 2, 1971, report to the Congress (B-159797) on questionable and nonuniform cost accounting practices followed at DOD in-house maintenance facilities

--Job orders for individual aircraft and engines were charged fixed amounts for estimated material costs Differences between the fixed amounts and actual material costs were accumulated and charged to the final job order in the series This procedure for the engine program alone resulted in a quarterly adjustment amounting to $3.5 million

--In the components program a single quarterly job order was used to accumulate all costs for reworking identical components Cost variations among the grouped components were not reported, nor could they be subsequently traced

As a result of the above procedures, Alameda's management did not have accurate data on the actual labor and material costs incurred to rework individual aircraft, engines, and components Management, therefore, could not realistically evaluate the efficiency of its rework operations.

Improvements in cost accounting are necessary before DOD management can compare the costs of its maintenance facilities and evaluate alternatives, such as rework by contract as opposed to in-house rework and procurement in lieu of rework.

Alameda officials advised that action has been taken to eliminate prorating of fixed material costs in the engine and aircraft programs.

Although the Navy told us it would be uneconomical to establish individual job orders for each component, we believe the feasibility of establishing monthly job orders for identical components should be investigated to allow for better visibility and management control over rework costs

CHAPTER 8

MAKE OR BUY

The Navy, when procuring a new weapon system, holds provisioning conferences to determine the sources for satisfying projected spare parts requirements. If an item expected to have little or no usage can be manufactured with the tools and facilities at a given maintenance activity, it is coded for an in-house manufacture. ASO officials advised us that (1) manufacturing costs are not of paramount importance in these source-coding decisions and (2) procedures do not provide for periodic review of initial source-coding decisions to see whether actual in-house manufacturing costs are reasonable in relation to probable procurement prices Some parts manufactured by Alameda were available commercially at significantly lower prices. For example, two of three contractors informed us they manufacture the same parts the Navy codes for in-house manufacture One contractor provided data showing specific items which could have been procured for as much as 97 percent less than Alameda's incremental cost to produce

PROCUREMENT AS ALTERNATIVE TO REWORK OR MANUFACTURE

In industrial activities decisions frequently must be made as to whether it is more economical to make or to buy needed items. Many items are routinely reworked and manufactured at Alameda without adequate consideration or procurement As a result, excessive rework and manufacturing costs have been incurred.

Alameda planners select components for rework on the basis of weekly requirements forwarded from ASO, Philadelphia. Although Alameda had data on the average cost to rework components, neither its planners nor ASO used it to determine whether rework was more economical than procurement To illustrate, 19 indicators were reworked during fiscal year 1971 at an average incremental cost of $338, or $230 more than the procurement price of $108 We estimate that, as a result of this and similar examples, rework costs were incurred for items which might have been procured at a savings of about $992,000 per year.

The Navy agreed in principle that more frequent periodic review of initial source-coding decisions should be made to determine whether in-house manufacturing and rework costs are reasonable in relation to probable procurement costs. We were told that NAVAIR had developed a new report which compares rework costs with replacement costs and shows those items considered uneconomical to repair. The Navy pointed out that there will always be instances when items must be reworked at what appears to be excessive costs but that the alternative could be a NORS (not operationally ready due to a lack of supplies) aircraft. We agree. In such instances rework should be done immediately.

CHAPTER 9

RECOMMENDATIONS, AGENCY COMMENTS, AND OUR EVALUATION

RECOMMENDATIONS

We recommend that the Secretary of Defense monitor the actions taken or planned by the Navy, to insure that the management weaknesses discussed in this report are corrected. We also recommend that the Secretary establish a program of periodic industrial management reviews at major DOD industrial facilities. Because of manpower requirements, the reviews should be conducted at those locations and in those functional areas that appear to offer the greatest potential for savings. The review team should be independent of the industrial facility involved, make maximum use of prior examinations by both internal audit and management review teams, and determine that previously cited inefficiencies have been corrected. The results should be reported to a management level with sufficient authority over commands whose decisions significantly affect the facility's operations. In most instances, this would be the Secretary Provision should also be made at the same level for periodic followup on corrective actions

AGENCY COMMENTS

NAVAIR requested the commanders of the remaining NARFs to take action as they find necessary to identify and correct problems at their NARFs which were similar to those found at Alameda. (See app. VI.)

Because of the length of the Navy's comments on our draft report, we have not included them in full in our final report. Revisions have been made throughout, however, to recognize the principal Navy comments and the corrective actions planned or taken

Generally the Navy's position was that the Navy already knew of most of our findings and that, when needed, remedial action had been initiated The Navy did not concur that this kind of a review would be useful in determining the efficiency of an organization's overall performance. It maintained that Inspector General visits and internal Navy audit and

management reviews already include appropriate industrial management concepts Additionally, it stated that, with current restrictions on manpower, assigning industrial engineers to dedicated review efforts, as we envisioned, would further constrain the existing capability of headquarters and field activities to effectively manage industrial facilities.

In commenting on our draft report in a letter dated September 26, 1972 (see app. V), DOD told us that it was exploring the feasibility of utilizing reviews of this kind for industrial facilities throughout DOD. However, DOD believed the type of study performed at Alameda was in fact being made through internal audit, Inspector General, and other functional management reviews applicable to DOD industrial facilities

OUR EVALUATION

We do not intend to downgrade the value and significance of existing management reviews These reviews have contributed greatly to improvements in Government operations over the years, and they no doubt will continue to do so Indeed, considering the complexities associated with advances in technology, management concepts, management systems, interdisciplinary functions, etc , the importance of management reviews is greater than ever.

These same complexities, however, add impetus to the need for developing new review concepts, which are sufficiently broad in scope, considering both internal and external constraints, to span all interrelated functional areas of DOD's industrial facilities.

It is not an issue of whether to abandon a proven review concept in favor of a less familiar one. Rather the issue is whether the benefits of new review concepts sufficiently supplement existing concepts to warrant their adoption

The results of the review at Alameda, we believe, demonstrate that industrial management reviews are beneficial.

NEED FOR IMPROVED PRODUCTION CONTROL PROCEDURES

Components with mixed priorities flow into rework shops from different sources, including the aircraft engine (concurrent rework) programs, the component program (NICRISP), and other rework shops. For this reason, effective procedures are necessary to (1) control the physical movement of the items through the series of shops, (2) insure that each item is worked in accordance with its priority, and (3) continuously track the location and status of the items through the rework process These procedures should insure that production resources are allocated on the basis of greatest need and that potential production delays due to labor, material, or facility shortages are identified, diagnosed, and, if possible, remedied before disruptions occur

Each quarter Alameda negotiates with ASO the number of direct labor hours to be spent in reworking components The negotiated hours are then allocated to the shops which rework the components Total hours available at shop level are further broken down to show hours to be spent each week of the quarter

Alameda receives from ASO the weekly NICRISP report identifying components required and the priority Individual shop planners determine the components on the list which will be inducted, using as their criteria the shop's available direct labor hours

These procedures are basically sound and should form the basis for good production planning, scheduling, and control But there are elements, described below, which tend to weaken the effectiveness of the basic procedures

Components processed usually pass through two or more shops. Before shop planners select components to be inducted under NICRISP, they arbitrarily reduce total available hours for each shop by (1) an estimated amount of workload which may or may not materialize from other shops (shop planners are not provided definitive information which would enable them to accurately determine the extent of this workload) and (2) applying an easily attainable level of efficiency (Although it is appropriate to recognize past performance in assigning workload to a shop, the level of work assigned should include realizable productivity improvements Alameda,

however, applied performance levels which were outdated, low, and inconsistent with reported shop efficiency)

After the above reductions are made, the remaining hours available for each shop are then applied sequentially against the weekly NICRISP priority list, using the component's standard, until all available hours are exhausted The standard used for assigning available hours, however, is that for components which are in the worst possible state About 15 percent actually required less time than allowed by the standard and thus underloaded shop manpower and facility capacity.

Although components are initially inducted on the basis of ASO-assigned priorities (representing Navywide requirements), once inducted, an Alameda-assigned due date became the shops' priority for scheduling work This further weakens production planning, scheduling, and control, considering that (1) items inducted involve more than one shop, (2) average processing time at Alameda took 70 days to complete, (3) new inductions with higher priorities are made weekly, (4) other components not under NICRISP are processed simultaneously under the concurrent aircraft and engine rework programs, and (5) shops' priorities (due dates) for concurrent rework may inappropriately take precedence over ASO's priority

Further, after components left the first shop after induction, Alameda's system did not accurately show the location or stage of completion of components or of their parts

Also components are frequently inducted and rework is begun before discovering parts shortages The uncompleted components were being routinely reassembled, packaged, and packed at a level sufficient to withstand severest conditions for shipment, storage, and handling, only to be returned to base supply and later reinducted for rework at Alameda (See ch 6) The lack of parts support in some cases has become so common that planners routinely induct additional components as sources for repair parts

These weaknesses, combined, had the following impact

--During the year ended September 30, 1971, Alameda averaged about 70 calendar days to process components,

compared to the average assigned processing time of 22 calendar days According to our estimate, 85 5 percent of all components in process at any one time were overdue

--Relatively low-priority NICRISP and aircraft components were being processed while high-priority components backlogged

--Erroneous quantities of components were inducted to meet NICRISP requirements because of poor control over scrapped components

--Parts obtained from scrapped or additional units inducted as a source of parts support and used in rework distorted demand history because they were not recorded This tends to perpetuate and intensify parts support problems for subsequent workloads

--There were unnecessary packaging costs

--Because parts shortages were not reported promptly, induction requirements on NICRISP reports were distorted Management data on effectiveness of ASO's parts support was also distorted

--Errors in the Alameda weekly overdue-in-process report for components resulted because (1) personnel who reported the causes of delays did not always know where the components were or what held them up and (2) status of overdue assets was reported weekly while delays occurred more frequently The reports were therefore of little benefit to management

It is not possible to quantify the impact of our observations individually, because each observed weakness interacts to varying degrees with others to produce one or more effects (See chart below for examples)

APPENDIX I

WEAKNESSES	EFFECTS: 85 PERCENT OF COMPONENTS OVERDUE IN PROCESS	ERRONEOUS LABOR EFFECTIVENESS REPORTS	LOW PRIORITIES REWORKED WHILE HIGH PRIORITIES BACKLOGGED	ERRONEOUS QUANTITIES INDUCTED	DEMAND HISTORY DISTORTED	INDUCTION REQUIREMENTS DISTORTED	INACCURATE REPORTING OF COMPONENTS OVERDUE IN PROCESS
COMPONENTS ASSUMED TO BE IN WORST CONDITION	X	X		X			
AVAILABLE HOURS RE DUCED BY ROUGH ESTIMATES OF WORK FROM OTHER SHOPS	X	X		X			
AVAILABLE HOURS REDUCED BY OUT DATED INFORMATION ON EXPECTED SHOP EFFICIENCY	X	X		X			
CONCURRENT WORK PLANNED SEPARATELY	X	X	X	X	X		X
AIRCRAFT AND ENGINE WORK NOT PLANNED ON BASIS OF STANDARDS				X			
WORK SELECTED BASED ON DUE DATES, NOT PRIORITIES	X			X			X
POOR PHYSICAL CONTROL OF SHOP FLOW	X	X	X		X	X	X
POOR CONTROL OF SCRAPPED COMPONENTS	X			X	X	X	X
SALVAGED PARTS NOT ACCOUNTED FOR	X			X	X	X	
PARTS SHORTAGES NOT REPORTED PROMPTLY	X	X				X	X
STATUS OF OVERDUE COMPONENTS NOT PROMPTLY REPORTED	X	X					X
LACK OF DISCIPLINE OVER STANDARDS IN PRODUCTION DEPART MENT	X	X		X		X	

POTENTIAL IMPACT OF EXCESSIVE REWORK TIME ON OPERATIONAL CAPABILITY

Operating forces obtain needed components from supply When supply stocks become reduced to preestablished levels, they are replenished by procuring new items or by repairing defective units turned in. ASO identifies and assigns priorities to the specific components which Alameda must rework

When NARFs cannot satisfy an assigned requirement or take excessive time in reworking the components, stock levels may become severely reduced We could not readily ascertain the ultimate effect on stock levels each time a component is not reworked on a timely basis However, where ASO has indicated that the need for a component is of top priority, the ultimate impact on operational readiness can be estimated

When an aircraft is not fully operational because it lacks required components, it is said to be in NORS condition. ASO uses priority rank "0" to designate components to be reworked to fill backordered NORS requisitions To the extent that rank "0" requirements are not satisfied, existing NORS conditions are perpetuated (assuming integrity in ASO's priority ranking system) If the time required to satisfy these requirements is reduced, the number of aircraft not fully operational will also be reduced and the number fully operational will be increased

The number of NORS aircraft which can be made fully operational by more timely Alameda rework of "0" rank components can be estimated as follows [1]

During fiscal year 1971 Alameda reworked 2,650 rank "0" components. The average repair time for these components was 57.8 calendar days, or 35 8 more days than assigned for

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[1]The methodology for this computation and data on (1) total Navy NORS days and estimated NORS aircraft, (2) average aircraft replacement cost, and (3) number of "0" components reworked in fiscal year 1971 was taken from Audit Report C56421, dated December 15, 1971, issued by the Naval Area Audit Service, San Francisco

reworking an average component. The excessive rework time represents 94,870 NORS days (35 8 x 2,650), or 3 36 percent of the Navy's total NORS days in fiscal year 1971 (94,870 - 2,815,451). A 3 36-percent reduction in the number of NORS days would increase the number of fully operational aircraft by 26.2 (3 36 percent x 780, the estimated number of NORS aircraft) Using the average unit replacement cost for current in-service aircraft of $3.3 million, the value of additonal fully operational aircraft from more timely completion of "O" rank components is estimated at $86 5 million

LABOR-EFFECTIVENESS-MEASURING PROGRAM

The Methods and Standards Division (M&S) at Alameda develops and maintains labor standards and reviews standards entered into the system by others Two classes of standards are used Class A standards are generally based on engineering techniques which measure the time required to perform a task or operation such as methods time measurement, elemental standard data, and work sampling Class C standards are estimates based on methods which do not qualify under Class A

Standard hours for each task are determined and entered into the computer in the following ways

1 Computerized shop orders Alameda has documented many of the items regularly reworked with Master Data Records When such items are inducted, computerized documents are produced to control the movement of the items through rework processing The computerized shop orders list the various tasks normally performed and show the M&S-approved standard hours for each task Information concerning the control number identity of the computerized shop orders and the standard hours which may be earned for each task is retained for computer matching with subsequent labor hour charges

2. Handwritten shop orders If for any reason there are exceptions to computerized shop order tasks, handwritten shop orders are prepared for computer input, showing the Production Department's estimate of what the labor standard for the task for which an exception is being made should be One copy is keypunched so the data can be put into the computer Another copy is distributed to M&S for approval of the standards

3 Added lines. Frequently tasks must be added to or deleted from computerized and handwritten shop orders by entering corrected data into transaction recorder devices located throughout the NARF. Data from the transaction recorders, including standards for all added tasks or lines, is subsequently put into the computer.

As each task or group of tasks is completed, expended hours are entered in the computer through the transaction recorders If the computer recognizes the job as complete, it credits the shop with earned hours equaling the standards previously recorded Reports are subsequently prepared, based on hours earned and expended, showing labor effectiveness by organizational segment and by product or group of products

Although Alameda's labor-effectiveness-measuring program appears conceptually sound, weaknesses in both the Production Department and M&S negate its usefulness.[1]

In the Production Department

--About 36 percent[2] of hours earned on handwritten shop orders for engine rework represented a second rework of earlier work for which standards had already been earned (This problem existed for all programs but could be measured accurately only for the engine program)

--M&S personnel could not visually confirm that all work for which they were asked to set or approve standards actually existed. This was partly due to the fact that over 13 percent of all earned hours resulted from added lines or handwritten shop orders input by production shops Since the computerized shop order already lists the various tasks normally performed in rework, the need for such a large number of exceptions to normal tasks required is questionable

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[1]Unless otherwise stated, the reported amounts are based on data reported for Alameda production shops during August, September, and October 1971

[2]Based on review of documents for 30 completed engines randomly selected

--Due to the high number of handwritten shop orders processed by the Production Department, about 30 percent[1] of revisions by M&S to standard hours shown on reviewed handwritten shop orders could not be reflected in reported efficiency because they were not keypunched in time. For example approximately 40 percent[2] of all standard hours entered on handwritten shop orders and 44 percent[3] of the standard hours entered directly by added lines received no M&S review This amounts to 5 6 percent of all standard hours earned during the period studied This is largely due to procedures at Alameda, which allow production personnel to issue, complete, and record handwritten shop orders before M&S personnel can intercept and correct invalid handwritten shop orders

--There was little control over the use of transaction recorders There was no assurance that all tasks deleted during initial inspection were appropriately "backed out" of the computerized shop orders through the transaction recorders or that those backed out were not reentered by workers

--About 7 percent of recorded expended hours represented corrections of previous errors These could not be related to the standard hours originally recorded as earned, and the class of standard under which they were expended was not identified

--Over 6 percent of additional earned and expended hours were recorded in such a manner that deviations in efficiency by product or task could not be detected and analyzed for improvement

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[1]Based on review of the 4,503 handwritten shop orders prepared at Alameda during a representative 3-day period ended September 2, 1971

[2]Based on review of the 4,503 handwritten shop orders written at Alameda during a representative 3-day period ended September 2, 1971.

[3]Based on review of the 9,068 standard hours entered by added lines during a representative 5-day period ended August 20, 1971

In M&S

--Thirty-two percent of all earned and expended hours could not be used to judge efficiency because (1) standard hours were not adjusted to reflect true work content, (2) actual hours were charged not by task or individual unit but by major product (such as an aircraft) because M&S had not developed standards for tasks or individual units, and (3) actual hours were charged when incurred though standard hours were not earned until the major product was completed Since standards for tasks and individual units had not been developed, there was no appropriate alternative method

The combined effect of all of these weaknesses on labor effectiveness measuring was so severe that management could not rely on the program for production planning, scheduling, and control or for measuring labor force effectiveness

EMPLOYEE ACTIVITY STUDY

We made a study to arrive at an independent quantitative estimate of the level of activity or productivity of Alameda direct employees, based on direct observation at random intervals Observations were made only during periods when personnel in the assigned areas were supposed to be actively working. They did not include periods within 10 minutes of the starting, break, lunch, or quitting times

The following summary is based on 4,894 observations of personnel present in direct labor shop areas during 3 months

Employee activity	Percent of total observed activity
Obviously not working	9 8
Talking	25 2
Working	65 0
Total	100 0

The category "not working" includes only extreme cases where the employees were engaged in some activity totally unrelated to assigned tasks, e g , reading newspaper, eating, etc The category "talking" includes all talking with no distinction between that which is related to work and that which is not.

Using NARF officials' estimate that 8 percent of total direct labor time is justified talking, we made the following analysis.

Percent of total frequency of talking and not working		35
Less work-related talk	8	
Less allowance for nonwork	10	18
Percent of remaining nonwork		17

We estimate, on the basis of direct labor costs, that the cost effectiveness of personnel activity can be increased by $7 4 million per year

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D C 20301

INSTALLATIONS AND LOGISTICS

26 SEP 1972

Mr F P Chemery
Associate Director
Procurement and Systems Acquisition Division
U S General Accounting Office
Washington, D C 20548

Dear Mr Chemery

Following receipt of your draft report, "Industrial Management Review of the Naval Air Rework Facility at Alameda, California (Code 75502)" (OSD Case 3486), we were happy to be able to arrange for the presentation to top level Defense officials within ten days, as you requested On the other hand, we were sorry that we could not comply with your request for a short response

The draft report, as it applies to Alameda, has been studied carefully by the Department of the Navy and a copy of their reply, which should be useful to you, is enclosed I am impressed by the fact that Navy staff were able to prepare so comprehensive and professional a response in such a short period Much of this is due to the fact that two internal audits by the Navy Audit Services were completed by December 1971 In addition, Navy management has been developing a series of programs to improve the Naval Air Rework Facilities--WIPICS (Work in Process Inventory Control System), WISS (Weekly Induction Scheduling System), and PEMA (Plant Equipment Management Application) The titles of these programs represent classic problems to industry, and the efforts of the Navy to resolve them are commendable These, and other systems, are in various stages of implementation and test by Navy management As they have noted, computer equipment is one delaying factor In any case, many improvements at Alameda have already taken place Navy is highly motivated to improve management at all NARFs since these facilities affect military and naval operations

I am concerned that the turn-around-time, and standards for such, at Naval Air Rework Facilities are not fully understood Reduction in such time is important since it does release operational equipment of considerable value for fleet operation However, it does not reduce the requirement of fleet operation for equipment Rather, in general, it

increases the "operational readiness" posture to the level that should exist The procurement requirement will be affected when the average turn-around-time for all facilities is reduced below the standard used in computing aircraft procurement The Navy internal audit reports referred to are available to you at any time

As you suggested, we are exploring the feasibility of utilizing reviews of this type for "commercial type organizations" throughout the Department of Defense However, many reviews are conducted by the internal auditing services of the DoD Components as well as OSD

The term, "other type commercial organizations," could apply to several thousand activities Accordingly, we are assuming you mean "industrial type " This alone may cover almost 200 activities

Before making any judgment to extend the application of this form of review further, we wish to study certain information First, we would like to receive and have reviewed by the Army and the Air Force, respectively, the "Draft Reports" of the facilities at Corpus Christi and San Antonio which were mentioned in your presentation Second, we are requesting each Service and DSA to list any facilities falling within these categories of "industrial type activity," and to identify any internal audit reports on them which have been completed during the past two years or are expected to be conducted during the next year In addition, the Services will be asked to identify any Inspector General reports or functional management reports also applicable to these facilities

We do believe that the above action will indicate clearly that the type of study you have conducted at Alameda is, in fact, being accomplished at other facilities I am sure neither you nor the Department of Defense Components wish these to be duplicated However, we do have an opportunity each year to indicate to the internal audit services types of studies which we feel should be given priority, and, as a consequence, any lack of appropriate activity can be remedied

Certain programs of the DoD affecting industrial management do cut across the board DIMES (Defense Industrial Management Engineering Systems), Performance Evaluation, and Value Engineering are but a few examples

I hope the above is of assistance to you Further action will not be taken until copies of the draft review for Corpus Christi and San Antonio are received

Sincerely yours,

BARRY J SHILLITO
Assistant Secretary of Defense
(Installations and Logistics)

Enclosure

GAO note The enclosure has been omitted due to its length, but principal Navy comments have been incorporated in this report

27 March 1972

Mr J J Marks
General Accounting Office
Room 6079
441 G Street, N W
Washington, D C 20548

Dear Mr. Marks

We deeply appreciated your debrief of the GAO Industrial Management Review of Maintenance and Repair of Aircraft and Components Subsequent to your briefing I have met with the Commanding Officers of the remaining Naval Air Rework Facilities and have requested that they take steps to correct any deficiencies they may have in the several areas you have found in your investigation

We sincerely appreciate the spirit in which your recommendations were offered and assure you that information of this type will always be welcomed Our primary aim in life is to serve the Fleet in the most efficient manner possible

Thank you again for your assistance

Sincerely,

E. L. Feightner

E. L. FEIGHTNER
Rear Admiral, USN

APPENDIX VII

PRINCIPAL OFFICIALS OF THE DEPARTMENTS OF DEFENSE AND THE NAVY RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE		
William P Clements (acting)	Apr. 1973	Present
Elliot L. Richardson	Jan. 1973	Apr 1973
Melvin R. Laird	Jan. 1969	Jan. 1973
ASSISTANT SECRETARY OF DEFENSE (INSTALLATIONS AND LOGISTICS)		
Hugh McCullough (acting)	Feb. 1973	Present
Barry J Shillito	Jan. 1969	Jan. 1973
DEPARTMENT OF THE NAVY		
SECRETARY OF THE NAVY		
John W Warner	May 1972	Present
John H Chafee	Jan 1969	May 1972
ASSISTANT SECRETARY OF THE NAVY (INSTALLATIONS AND LOGISTICS)		
Charles L. Ill	July 1971	Present
Frank Sanders	Feb. 1969	July 1971