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BY THE U.S. GENERAL ACCOUNTING OFFICE

## Report To The Secretary Of The Navy

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# Management Of Naval Supply Center Labor Resources Can Be Improved

Opportunities exist for the Navy to better manage labor resources at the naval supply centers. The Navy needs to develop and implement effective work measurement and management information systems to help management identify ways to increase efficiency and to reduce costs. The Department of Defense agreed with GAO's recommendations on this matter and stated that the Navy had initiated a major project to improve operations and reduce costs at the supply centers.



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GAO/NSIAD-85-129  
AUGUST 9, 1985

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

NATIONAL SECURITY AND  
INTERNATIONAL AFFAIRS DIVISION

B-219204

The Honorable John F. Lehman  
The Secretary of the Navy

Dear Mr. Secretary:

We have reviewed the effectiveness of labor resource management at the seven naval supply centers. Our review showed that opportunities exist for the Navy to better manage labor resources at the centers. Between fiscal years 1980 and 1984, annual civilian labor costs of the supply centers increased from \$152 to \$259 million.

Naval Supply Systems Command (NAVSUP) instructions provide for the use of work measurement and management information systems to properly manage labor resources and control costs as well as to measure the operating efficiency of the supply centers. The key elements of these systems are (1) identifying the most efficient method of doing a specific task, (2) determining how much time each task should take, and (3) reporting actual labor hours and comparing them with the labor standards and workload produced.

In the late 1960s and early 1970s the naval supply centers and other Department of Defense (DOD) activities used work measurement techniques as part of a formal DOD program. The military services reported annual cost savings of \$121 million from this program. However, by 1974 the Navy had begun deemphasizing work measurement. For example, NAVSUP officials told us that the supply centers eliminated work measurement support staffs due to austere funding and other priorities.

We found that NAVSUP did not have an effective work measurement system for the supply centers, nor did it have an overall plan to develop and implement one. Instead, NAVSUP and the supply centers relied on a management information system that was not effective in evaluating the efficiency of the labor force. One problem was that the information system was not based on methods analysis (identifying the most efficient manner of performing the work) or on labor standards (how long it should take to do a task) and used productivity indicators that were too broad. Another problem was that the information system did not accumulate and report sufficient data to permit meaningful comparisons of work produced and the amount of labor used. Our findings are discussed in more detail in appendix I.

Effective work measurement and management information systems can help management identify ways to increase efficiency and to reduce costs, as evidenced by the savings reported when a system did exist. Some supply centers have individual ongoing projects to improve work measurement but they are limited in scope. While we agree with the thrust of these efforts, we believe more should be done on an across-the-board, systematic basis. Furthermore, implementation of an effective work measurement system at the supply centers would be in line with the Navy's overall efforts to determine personnel requirements for its shore establishment through the Shore Manpower Documents portion of the Navy Manpower Engineering Program.

Accordingly, we recommend you direct the Commander, Naval Supply Systems Command, to develop and implement effective work measurement and management information systems for the naval supply centers. We further recommend that these systems include the following elements:

- Identifying the most efficient way to do a specific task (methods analysis).
- Determining how much time each task should take (labor standards).
- Collecting accurate labor hour data to compare with the labor standards.
- Reporting and comparing workload production and labor usage data at the work center level.
- Using the above information to set productivity goals, analyze labor use, and determine labor resource requirements.

We recognize that developing and maintaining credible work measurement and management information systems can be expensive. Consequently, in deciding on the exact form of these systems, the Navy should consider whether the benefits would outweigh the costs. For example, if engineered labor standards based upon time and motion studies are not cost-effective, supply centers could collect and use historical labor-hour data as a less expensive (though less reliable) method for measuring efficiency.

On July 18, 1985, DOD provided official written comments on a draft of this report. (See app. II.) DOD agreed with our recommendations and outlined new Navy initiatives in this area. NAVSUP has initiated a major project called "Engineering the Workplace" to improve the effectiveness and efficiency of physical distribution operations and reduce costs at naval supply centers.

The project includes (1) an industrial engineering survey to determine the most efficient material flow, material location, and work processes, (2) development and application of new

measures, standards, and goals to control the movement of materials, and (3) tracking the work processes. This project will be prototyped in October 1985 at a new naval supply center to be established at Pensacola, Florida. After successful implementation, the project will be phased into all naval supply centers.

NAVSUP also has another major initiative to improve the management of labor resources at the supply centers. This initiative, called the "Physical Distribution Resourcing Plan," is based on determining the actual cost to do the physical distribution work at a supply center, projecting workload and determining an actual rate (labor hours) to accomplish the workload, and measuring performance against this baseline. The Navy plans to begin expanding the use of the rate system to other functions at the supply centers and to other facilities beginning in October 1985.

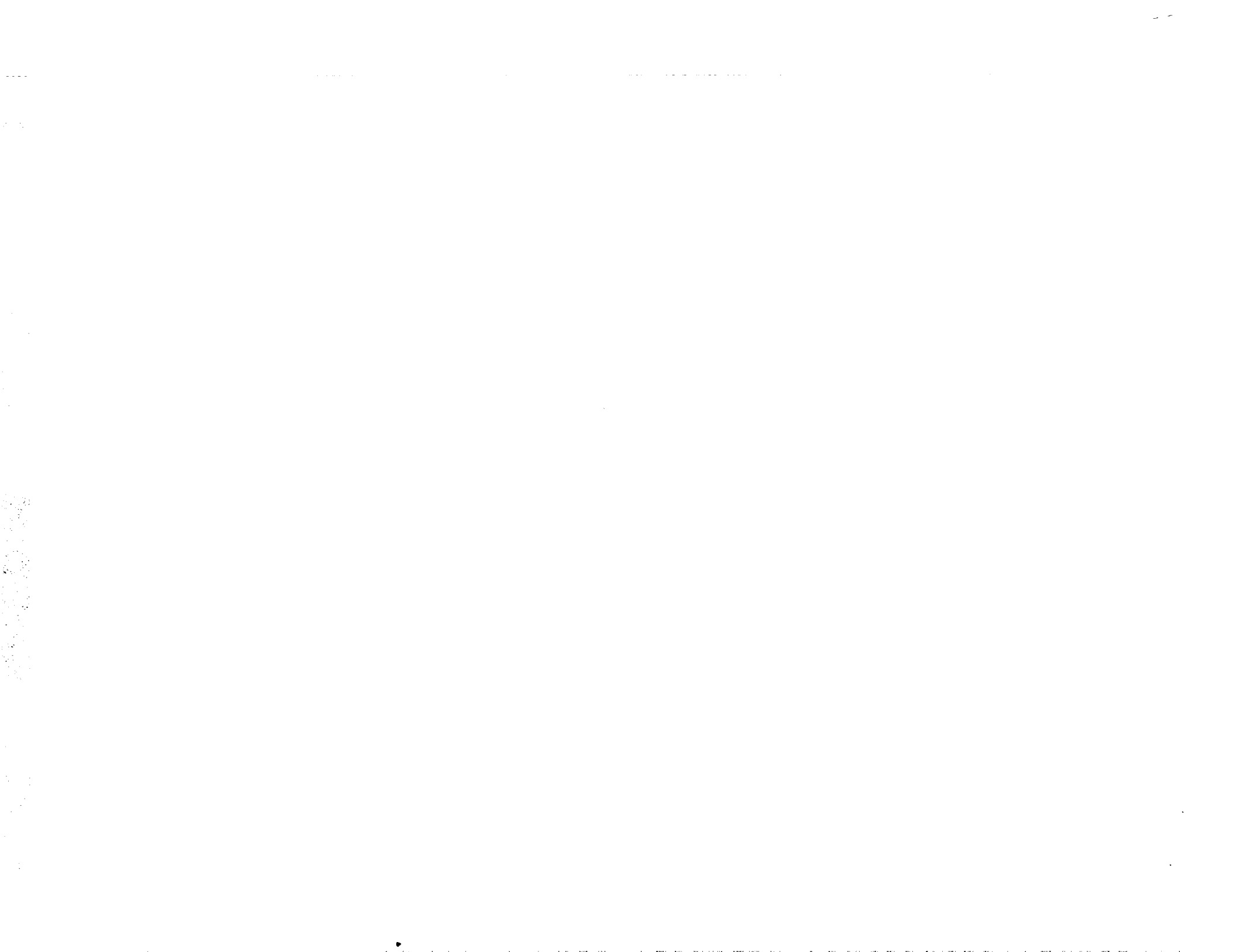
As you know, 31 U.S.C. §720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House 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 Chairmen of the above committees; the Chairmen, Senate and House Committees on Armed Services; the Secretary of Defense; and the Director, Office of Management and Budget.

Sincerely yours,



Frank C. Conahan  
Director



centers. Charleston was selected because it was the only supply center using engineered labor standards, albeit to a limited extent. At each location we obtained data concerning the work measurement, cost accounting, and budgeting systems. Using NAVSUP uniform management reports, we statistically analyzed the relationship between work units produced and labor hours used at six of the supply centers.

At Norfolk and Oakland, we tested the accuracy of reported labor and production reports in the warehousing operations area. To perform these reliability tests, we selected three major cost accounts--packing, shipping, and bulk issue. We chose these accounts because they represented direct mission activities and accounted for some of the largest labor resource use and workload volume. Since Charleston was the only supply center using engineered labor standards, we reviewed its use of these standards for work measurement and budgeting purposes.

We performed our review in accordance with generally accepted government auditing standards.

#### EARLIER WORK MEASUREMENT SYSTEM DISCONTINUED

In the late 1960s and early 1970s the naval supply centers and other DOD activities used formalized work measurement techniques as part of the Defense Integrated Management Engineering System (DIMES). Although the full potential of DIMES was not realized, the value and benefits of this system were recognized. For example, the military services reported annual cost savings of \$121 million from improved work methods in fiscal year 1974, the last year reported data was readily available. In 1975, DOD terminated DIMES and incorporated work measurement concepts and other productivity efforts into a broader productivity program.

By 1974 the Navy had begun decreasing its emphasis on work measurement. For example, the Naval Material Command reduced management engineering support personnel by 25 percent. Similarly, NAVSUP officials told us that the supply centers eliminated work measurement support staffs due to austere funding and the priority given to the centers' primary mission of providing logistical support to the Navy.

Currently, NAVSUP does not have an overall plan to develop and implement a work measurement system for the supply centers. Charleston is the only supply center still using work measurement techniques, and this is done to only a limited extent. In addition, some of the supply centers have individual ongoing projects but they also are limited in scope. For example, Norfolk has a project to develop engineered labor standards for some of the 70 employees involved in the dry grocery and perishable food operation.

MANAGEMENT OF NAVAL SUPPLY CENTERLABOR RESOURCES CAN BE IMPROVED

NAVSUP provides Navy-wide supply management policies and methods and is responsible for the use of resources and operating efficiency of activities under its command. These activities include seven naval supply centers. The principal mission of the supply centers is to receive, store, and issue material to Navy activities, including ships, shore installations, and overseas bases. Between fiscal years 1980 and 1984, civilian labor costs of the supply centers increased 70 percent, from \$152 million to \$259 million.

NAVSUP instructions provide for the use of work measurement and management information systems to properly manage labor resources and control costs, as well as to measure the operating efficiency of the supply centers. Work measurement consists of identifying the most efficient method for doing a specific task and then determining how much time should be allowed to do it. The following are the key elements of good work measurement and management information systems:

- Determining the most efficient manner of performing a process or operation through a logical sequence of tasks and jobs. This element is called methods analysis.
- Determining the time required for an experienced person to complete a task or job at a normal pace in the sequence established by the methods analysis. The resultant labor standards can be engineered or estimated. Engineered standards are based on industrial engineering techniques, such as time and motion studies. Estimated standards are based on historical experience or technical estimates.
- Establishing a management information system that reports current and projected workload and labor actually used. The actual data is compared with the labor standards for variance analysis.

OBJECTIVE, SCOPE, AND METHODOLOGY

Our principal objective was to assess the effectiveness of labor resource management at naval supply centers. Specifically, we reviewed the centers' systems for developing and applying work methods analyses and labor standards and for accumulating and reporting production and labor cost data. Also, we examined how NAVSUP and the supply centers used this information to manage and control labor resources.

Between April and December 1984, we worked at NAVSUP headquarters and the Norfolk, Oakland, and Charleston Naval Supply Centers. Norfolk and Oakland were selected because they accounted for the majority of labor resources used by the seven supply



management. The production rates of the division's operating units are not visible. Using supply center data, we developed rates for five of the operating units and found that the rates ranged from 6.3 to 35.0 cubic feet of material packed per person per hour.

<u>Operating unit</u>	<u>Production rate</u>
Flat and round metal	6.3
Hot line	7.4
Tilt tray	8.5
Heavy pack	27.3
Ocean freight	35.0

The productivity range between operating units is due to the types of work performed. For example, the flat and round metal unit constructs wooden crates to pack large metal sheets or long metal rods, whereas the ocean freight unit places a sheet of plastic over material already packed in cardboard boxes and sends it through a machine that shrinks the plastic around the boxes. In the flat and round metal unit, five people take 1 hour to pack 31.5 cubic feet of material. In the ocean freight unit, one person packs 35 cubic feet of material in 1 hour.

Therefore, the packing division rate of 16.1 cubic feet per person per hour is not a good reflection of the efficiency of the operating units. Nevertheless, the supply centers use these summary indicators to identify productivity trends. These trends could be the result of changes in work mix rather than in worker efficiency. Even if a change in the productivity indicator was due to a change in labor efficiency, a supply center could not tell which operating unit was responsible for the change. Consequently, supply managers are not in a position to identify inefficient operations or nonproductive workers.

#### Operating unit performance criteria

In the absence of a formal work measurement system, operating units use various subjective criteria for measuring the performance of workers. At Oakland, one supervisor did the task (packing) himself, divided the number of packs completed by two, and used the result as the criteria. Another unit used 80 percent of the prior year's production rate in bin operations to measure performance. Norfolk supervisors used historical data and personal experience in setting the criteria. Charleston supervisors generally used engineered labor standards as the criteria for measuring performance. However, many of these labor standards were outdated because the staff of the office responsible for preparing the standards had been reduced and those remaining were assigned additional tasks.

#### Production and labor data

Another problem with the existing management information system is that it does not contain sufficient production and labor data to allow meaningful comparisons and trend analyses.

Implementation of an effective work measurement system at the supply centers would be in line with the Navy's overall efforts to determine personnel requirements. The Navy has established the Navy Manpower Engineering Program to determine personnel requirements for the Navy. The Shore Manpower Documents portion of the program will do this for the shore establishment.

However, in our 1985 report entitled Navy Manpower Management: Continuing Problems Impair the Credibility of Shore Establishment Requirements (GAO/NSIAD-85-43, Mar. 7, 1985), we stated that the Shore Manpower Documents program had potential problems, but concluded that it was needed and ought to be improved rather than abandoned. We believe that instituting work methods analyses and labor standards at the supply centers, which are part of the shore establishment, is the type of improvement that should be made.

#### PRESENT MANAGEMENT INFORMATION SYSTEM NOT EFFECTIVE

Naval supply centers need effective work measurement and management information systems to monitor activities and identify opportunities to increase efficiency and to reduce costs. Instead of these systems, supply managers rely on a more general management information system that is not effective. Consequently, supply managers do not have a solid basis for evaluating and monitoring activity budgets, establishing productivity goals, or identifying areas of inefficient labor use.

The existing management information system has two major weaknesses that seriously inhibit effective determinations of labor force efficiency and requirements. First, the information system is not based on methods analysis or on labor standards and uses productivity indicators that are too broad. Second, the production and labor data reported often are not sufficient to allow meaningful comparisons between the amount of work produced and the amount of labor used.

#### Productivity indicators

NAVSUP and the supply centers use historical productivity trends for broad categories of work to judge the efficiency of operations. However, these categories often include such a diverse mixture of work that historical productivity rates have little meaning in identifying labor force efficiency. In fact, the mixture problem is so extensive that reports attempting to explain variances from historical trends have been discontinued.

The productivity rate for the packing function illustrates the problem of using a performance indicator that includes diverse mixes of easy and difficult work. At Norfolk, the packing division's productivity rate in September 1984 was 16.1 cubic feet per person per hour. The division rate is the lowest rate visible to



## THE ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

~~MANPOWER~~  
~~PRODUCTIONS~~  
~~AND PARTS~~

18 JUL 1985

Force Management  
and Personnel

Mr. Frank C. Conahan  
Director  
National Security And International  
Affairs Division  
General Accounting Office  
Washington, D.C. 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report entitled "Management of Naval Supply Center Labor Resources Can Be Improved," dated May 28, 1985 (GAO Code 394045, OSD Case #6763).

The DoD concurs with the recommendation that the Navy should develop and implement effective work measurement and management information systems for the naval supply centers.

Detailed comments on the findings and recommendations contained in the report are enclosed.

Sincerely,

A handwritten signature in black ink, appearing to read "Jerry L. Calhoun".

Jerry L. Calhoun  
Principal Deputy Assistant Secretary of Defense  
(Force Management and Personnel)

Enclosure

GAO note: Page references have been changed to correspond to pages in the final report.

Using a regression analysis--a statistical technique that is used to analyze the relationship between two variables or sets of numbers--we attempted to analyze the relationship between (1) the number of work units produced and (2) the number of labor hours required to produce these work units. For six of the seven supply centers, we analyzed 24 major physical distribution cost accounts in the management information system for fiscal years 1980 to 1983. We found that no statistical relationship existed between the number of work units produced and the number of labor hours used for 64 percent of the cost accounts. As shown below, this lack of a relationship ranged on average from a high of 77 percent at Puget Sound to a low of 40 percent at Charleston.

Percent of Cost Accounts That Did Not Show Any  
Relationship Between the Work Units Produced  
and the Amount of Labor Used

Supply center	Fiscal year				4-year average
	1980	1981	1982	1983	
Norfolk	37	70	74	61	61
Oakland	71	79	68	78	74
San Diego	67	50	72	58	62
Charleston	36	29	53	42	40
Pearl Harbor	53	77	77	77	71
Puget Sound	88	75	75	69	77
Average	59	63	70	64	64

The data for the shipping function at Oakland illustrate the lack of a relationship between the number of work units produced and the number of labor hours used. In December 1982, Oakland used 4,312 labor hours to ship 12,361 tons of material. In January 1983, the labor hours increased to 4,859 but the tons shipped decreased to 9,390. In February 1983, the opposite situation occurred--the labor hours decreased to 3,215 but the tons shipped increased to 9,761.

The lack of a relationship also was evident for other functions at Oakland. For example, between August and September 1983, the tons of material moved from one area of a warehouse to another (rewarehoused) decreased from 131 to 101, but the labor hours used for rewarehousing increased from 4,485 to 6,195.

Such wide and apparent inconsistent fluctuations cannot be explained using existing data in the management information system. More detail (for example, types of materials shipped or rewarehoused) is needed before meaningful comparisons can be made. Since the current system does not provide such information, it is not an effective management tool for evaluating labor force efficiency or determining labor resource requirements.

because these categories include such a diverse mixture of work, historical productivity rates have little meaning in identifying labor force efficiency. To illustrate, GAO presented an example drawn from NSC Norfolk. Using the Packing Division with a productivity rate of 16.1 cubic feet of material packed per person per hour (the lowest rate visible to management), GAO constructed production rates for the five operating units in the Division. According to GAO, the operating unit rates ranged from 6.3 to 35.0 cubic feet packed per person per hour. GAO concluded that the large difference in rates was due to the types of work involved, and trends in productivity could be the result of changes in the work mix rather than changes in efficiency. In fact, GAO found the mixture problem to be so extensive that reports attempting to explain variances from historical trends have been discontinued. GAO further concluded that even if a change in the productivity indicator was due to a change in labor efficiency, supply centers could not tell which operating unit was responsible for the change. GAO finally concluded that supply managers, therefore, are not in a position to identify inefficient operations or nonproductive workers. [See pp. 6 and 7.]

Concur. See DoD response to recommendations 1 and 2.

FINDING D: Existing Management Information System Contain Insufficient Production and Labor Data. GAO analyzed 24 major physical distribution cost accounts at 6 of 7 supply centers for FY 1980 through FY 1983. GAO found that for 64 percent of the cost accounts, no statistical relationship existed between the number of work units produced and the number of labor hours used. GAO provided an illustration of the lack of relationship between work units produced and the labor hours used in the following data:

	Hours	Work Units
DEC 1982	4312	12361
JAN 1983	4859	9390
FEB 1983	3215	9761

Noting the changes in hours and work units, GAO concluded that such wide and apparently inconsistent fluctuations cannot be explained using existing data in the management information system. GAO further concluded that more detail is needed before meaningful comparisons can be made between the amount of work produced and the amount of labor used. Since the current system does not provide such information, GAO concluded that it is not an effective management tool for evaluating labor force efficiency or determining labor resource requirements. [See pp. 7 and 8.]

Concur. See DoD response to recommendations 1 and 2.

#### RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommended that the Secretary of the Navy direct the Commander, Naval Supply Systems Command, to develop and implement effective work measurement and management information systems for the naval supply centers. [See p. 2.]

RECOMMENDATION 2: GAO further recommended that these systems should:

GAO DRAFT REPORT - DATED MAY 28, 1985  
(GAO CODE 394045) - OSD CASE 6763

"MANAGEMENT OF NAVAL SUPPLY CENTER LABOR RESOURCES CAN BE IMPROVED"

FINDINGS AND RECOMMENDATIONS TO BE ADDRESSED IN THE DOD  
RESPONSE TO THE GAO DRAFT REPORT  
FINDINGS

**FINDING A: Earlier Work Measurement Systems Discontinued:**  
**Current Status.** GAO reported that in the late 1960s and early 1970s, the Naval Supply Centers and other Defense activities used formal work measurement technology as a part of the Defense Integrated Management Engineering Systems (DIMES). Although the full potential of DIMES was not realized, GAO noted the value and benefits of this system was recognized with the Military Services reporting an annual cost savings of \$121 million in fiscal year 1974 (the last year reported saving were readily available). GAO noted that by 1975, DOD terminated DIMES and incorporated work measurement concepts and other efforts into a broader productivity program. (The Navy had begun decreasing its emphasis on work measurement by the end of 1974, actually eliminating some work measurement staffs due to austere funding.) GAO found that currently, outside of a few limited individual projects, Charleston is the only Naval Supply Center still using work measurement techniques and this is done only to a limited extent. GAO also found that the Naval Supply Systems Command (NAVSUP) does not have an overall plan to develop and implement a work measurement system for the supply centers. GAO concluded that implementation of an effective work measurement system at the supply centers would be in line with the Navy's overall efforts to determine personnel requirements. [See pp. 1, 2, 5, and 6.]

Concur. See Department of Defense (DoD) response to recommendations 1 and 2.

**FINDING B: Methods Analysis and Labor Standards Are Not Used By The Productivity Measuring Management Information System.** GAO found that the more general management information system used by supply managers to determine labor force efficiency and requirements is not based on methods analysis or labor standards. In the absence of a formal work measurement system, GAO found that the supply center operating units use various subjective criteria for measuring the performance of workers. GAO also found that while NSC Charleston generally uses labor standards, many are outdated due to work measurement staff reductions. GAO concluded that supply managers do not have a solid basis for evaluating and monitoring activity budgets, establishing productivity goals, or identifying areas of inefficient labor use. [See pp. 4, 6, and 7.]

Concur. See DoD response to recommendations 1 and 2.

**FINDING C: Historical Productivity Trends Have Little Meaning In Identifying Labor Force Efficiency.** GAO found that the Naval Supply Command (NAVSUP) and the supply centers use historical productivity trends for broad categories of work to judge the efficiency of operations. GAO concluded that

"Engineering the Workplace" will be prototyped at NSC Pensacola beginning in October 1985. Initial major deliverables are expected in early 1986. Deliverables will be provided to the Naval Supply Centers as they become available and are validated. The Statistical Process Control subset is under development as a Research and Development Project. A more definitive plan of action should be available by October 1985.

Another major initiative we believe has improved management of labor resources at supply centers is the Physical Distribution Resourcing Plan. The concept is based on determining the actual cost to do basic business (receive, issue, store) at a supply center; projecting workload and determining an actual rate to accomplish this workload; and then measuring performance against these baselines. This project was implemented in October 1984 and has been very successful in reducing cost, improving efficiency, and allowing several supply centers to accommodate unbudgeted growth.

Beginning in October 1985, the rate system will be expanded to other functions at supply centers as well as Inventory Control Points, Naval Regional Contracting Centers and the Naval Publications and Forms Center. By resourcing field activities on the basis of actual work performed vice the fixed workyear/cost funding methodology, NAVSUP expects to achieve substantial gains in workforce productivity and economy of operation through use of a more flexible workforce, performance based incentive systems, specially defined performance goals and management of overhead costs. An improved algorithm to more accurately resource productive units will be developed by the end of 1986 with implementation of a weighted unit resourcing system expected by the end of 1987.

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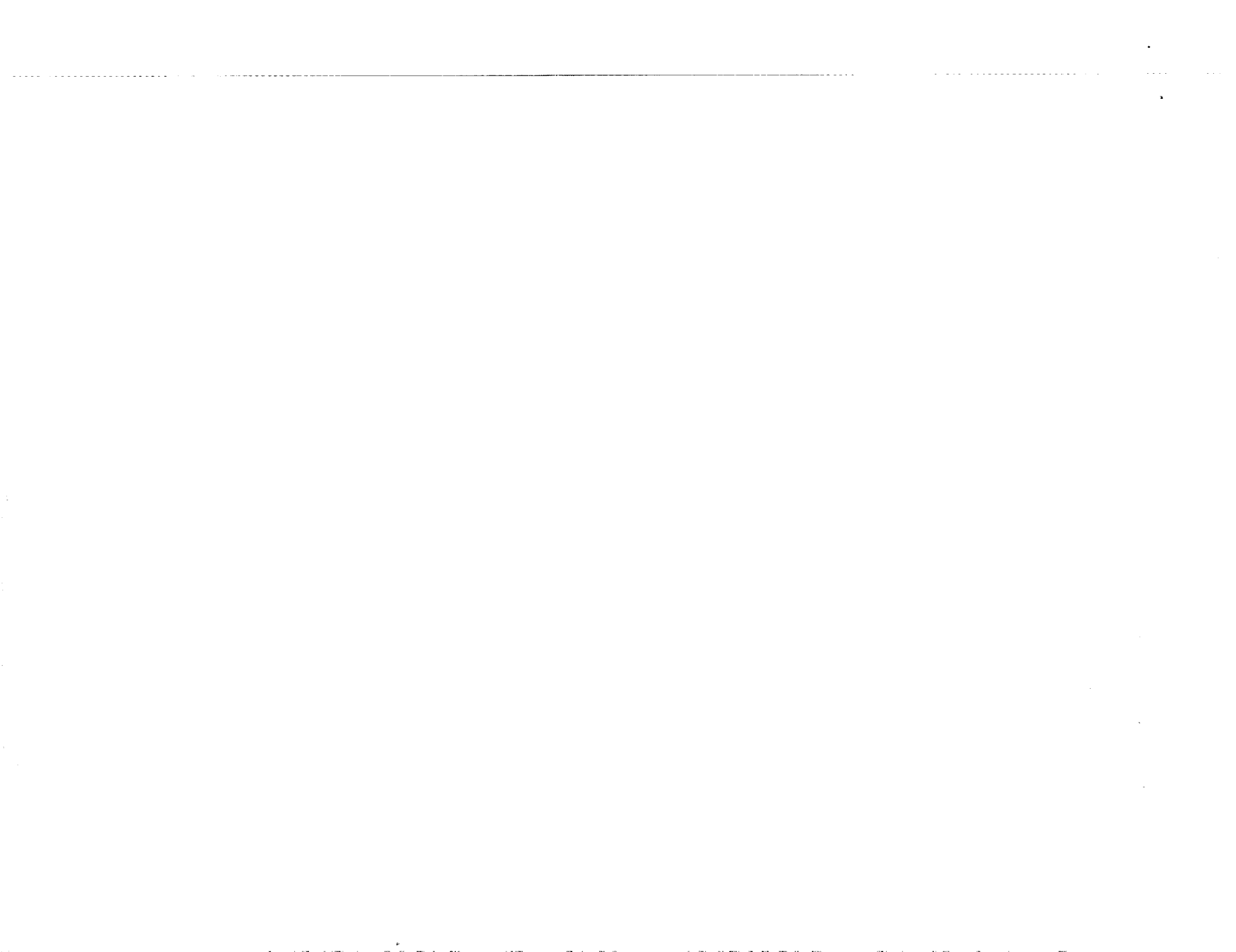
- Identify the most efficient way to do a specific task (methods analysis):
- Determine how much time each task should take (labor standards);
- Collect accurate labor hour data to compare with the labor standards;
- Report and compare workload production and labor usage data at the work center level; and
- Using the above information to set productivity goals, analyze labor use, and determine labor resource requirement. [See p. 2.]

DoD Response: Concur. The Naval Supply Systems Command has initiated a major project called "Engineering the Workplace" to improve the effectiveness and efficiency of physical distribution operations at Naval Supply Centers, while reducing the cost of operations. The project includes in-depth industrial engineering analysis to determine the most efficient material flow, material location and work processes. It will also include the application of Statistical Process Control (SPC) to the smoothed processes. It will then track the work processes in order to determine if it is within or out of control. Inherent in this project is a work measurement and management information system.

The project is divided into four phases:

- a. Material Flows Study will conduct an industrial engineering survey of the flow of material and documentation for each supply center. The objective is to improve quality, quantity, and timeliness of work by optimizing and smoothing the movement of materials and documentation and minimizing associated wait and travel time.
- b. Statistical Process Control will develop and apply new measures, standards and goals to control the smoothed functions from the Material Flows Study.
- c. Work Scheduling and Control will be established after completion of the Material Flows Study and application of the SPC. It will obtain the best utilization of resources at the least cost, while obtaining the best mix of quality, quantity and timeliness in accordance with established SPC standards, objectives and goals.
- d. Productivity and Performance Decision Support System will be established after phase 1 through 3. It will include requirements for work measurement, evaluation, planning and budgeting using the outputs from SPC. Resource utilization and costs will be applied to productivity to permit performance evaluation and to accomplish resource planning/allocation and budgeting decision processing.





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