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Observations For Improving Depot-Level Maintenance Construction In The Department Of Defense

DOD installations develop and submit maintenance construction requirements through various headquarters levels to the Congress without full consideration to alternative sources and valid supporting justification data. GAO has selected examples where better coordination and review by the services will improve maintenance construction requirements.

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

LOGISTICS AND COMMUNICATIONS
DIVISION

B-162839

The Honorable
The Secretary of Defense 5

Dear Mr. Secretary:

We have completed our survey of DOD plans and controls for modernizing depot-level maintenance facilities. We do not intend to pursue a detailed review at this time, but are bringing to your attention some survey observations which you may wish to consider when formulating future military construction programs. While our survey scope was admittedly limited, we believe the observations discussed are of a nature which would preclude their dismissal as mere isolated occurrences.

Enclosures I and II are case studies of the two projects--metal processing facility at Sacramento Army Depot and radar test facility at Sacramento Air Logistics Center--examined during our survey. These case studies provide details not included in the letter which may give additional insight into the observations we are presenting.

The Army, Navy, and Air Force issue regulations to guide their depot facilities on the procedures for identifying plant deficiencies and for initiating, documenting, and reviewing specific construction projects to overcome these deficiencies. Projects proposed by the depots are forwarded through appropriate command levels for review and, if they are approved, for inclusion in the annual defense construction program request.

We noted that this process may not be effective in preventing ultimate approval and funding of marginal projects because

- full consideration is not given to alternate solutions before initiating facility construction project requests,
- significant cost data and assumptions used in preparing project justifications are not always documented or supported,
- the depots' competing projects are not adequately updated nor priorities adjusted before submission for congressional approval and funding, and

--primary review of project requests occurs at the same level as the project initiation and documentation process and may not be fully objective.

Alternatives to new construction
should be fully explored

Office of Management and Budget Circular A-76 and various DOD and service regulations clearly establish that maximum practicable use should be made of existing commercial and Government resources before constructing new or improved organic facilities. The following observations indicate that these regulations are not being followed in all cases.

2 Metal processing facility at
Sacramento Army Depot

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As discussed in our letter to you (May 15, 1975, B-162839), the Sacramento Army Depot requested and received approval to construct a modern metal processing facility without seriously considering the use of available resources at the nearby Sacramento Air Logistics Center--an Air Force depot facility. A formal review of available commercial resources had not been made. Although a local monitor had been assigned for the Army Commercial and Industrial Activities Program--a program designed to insure compliance with the above regulations--only brief contacts were made with four potential commercial sources and the Air Force depot. It was concluded from these contacts that procuring the required services from other military or commercial sources would significantly delay or disrupt the depot's mission and would encumber the capability for mobilization readiness.

In response to our letter, DOD and the Army conducted a joint study to reassess the potential for greater reliance on the Air Force depot to satisfy the Army depot's needs. It was concluded on August 22, 1975, that the Army facility should be constructed since it was shown that after 4 years it would be the more cost effective alternative.

We evaluated the cost analysis which led to this conclusion and found it was based on costs which would be incurred by the Army under each alternative, rather than the incremental costs which would be borne by the Government as a whole. Adjusting for this factor showed that the Government, by electing the new construction alternative, could not reasonably expect to recover the difference in cost for about 25 years. (See enc. I, pp. 4 and 5 for details.)

3 Radar test facility at
Sacramento Air Logistics Center

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The Sacramento Air Logistics Center requested and received approval and fiscal year 1976 funding to construct a new radar test facility to replace several older buildings and consolidate the workload at one location. We reviewed the justification documents for this project and noted that no mention was made of efforts to identify other military or commercial resources which might have been used in lieu of new construction. Our further inquiries revealed:

- A Maintenance Interservice Support Office was established at the Air Force depot as an advocate for the use of depot capabilities for interservice support and to maintain cognizance over the expansion of such interservicing. This office, however, does not routinely review the depot requests for new construction and, in the radar test facility's case, did not provide any input for the building justification.
- A committee was established at the depot to administer and monitor the Air Force's Depot Plant Modernization Program. Although the committee met to discuss the radar test facility, a record of that meeting showed that the potential use of other military or commercial resources was not discussed.
- Documents describing the functions and responsibilities of the Maintenance Interservice Support Office and the Depot Plant Modernization Committee do not provide appropriate emphasis on the need to consider outside resources as an alternative to new construction and make no provision for coordinating the activities of the two groups.

Project justification should
be supported and documented

Each of the services' written procedures for justifying major construction projects stress the need to support and document all significant statements and cost data presented in the justifications. The following observations indicate these regulations may not be effective.

Air Force audit of justification

The Air Force Audit Agency reported in March 1975 on a review of the depot plant modernization program at each of the

five air logistics centers. The principal finding was that management responsibilities at the air logistics centers were not being accomplished to the extent necessary to insure effective management and the validity of depot plant modernization project reporting. After reviewing 95 project justification files, the audit concluded

--25 percent contained no documentation supporting the economic analyses;

--34 percent contained documentation to support only some of the costs and benefits shown on the economic analyses; and

--analyses did not include correct costs for items, such as contract maintenance and organic labor rates, resulting in an understatement or overstatement of expected project benefits.

Air Force regulation (AFLCR 78-3, dated February 14, 1975) was revised as a result of the above audit to provide more definitive instructions on the types of data to be obtained in support of project justifications and the period of time such documentation should be retained.

Our review of the Sacramento Air Logistics Center's radar test facility project indicated that the above corrective action may not have been adequate. This project was reviewed by the Center's plant modernization committee in June 1975, approximately 7 months after the Center was formally advised of the Air Force auditors' findings and 4 months after the Air Force's regulation was officially revised. Despite the committee's review for support and documentation, we found that significant cost factors--such as projected workload, anticipated productivity increases, and projected savings for turn-in of relocatable buildings and redundant equipment--included in the justification subsequently forwarded for higher level approval were inadequately or erroneously supported.

Difficulty in documenting workload
and productivity increases

Projected workload and increased labor productivity levels can be major factors in determining if construction of new facilities will be cost effective. For example:

--The final cost analysis prepared for the Army's new metal processing facility shows that the \$1.3 million

computed annual costs to operate the facility would be offset by a \$870,000 annual savings resulting from a forecasted 7-percent improvement in labor productivity.

--All of the recurring annual savings computed for the Air Force's new radar test facility were related to a forecasted 10-percent improvement in labor productivity.

We found in each case that the anticipated rates of productivity increase were not based on methods engineering studies of the existing and proposed depot facilities. They were supported instead by reference to various engineering articles written about the possible impact of working conditions on productivity. In no case were the articles based on a study of conditions at military depot facilities.

The above estimated rates of productivity improvement were, like many other elements in the cost analyses, applied to estimated workload levels to ascertain their total annual impact. The estimated workloads, however, were also found to be poorly supported and apparently overstated.

The Army depot's forecast, for example, assumed there would be a 30-percent increase in workload over the fiscal year 1975 level attributed to a phasedown of the Lexington-Bluegrass Army Depot. We found, in contrast, that the official Army projection showed no overall increase in workload could be expected at the Sacramento depot since the work to be transferred in would offset an otherwise decreasing workload. Projected workload data contained in the Air Force depot's approved justification, while broken down in more detail, was also found to be overstated since it included work for some cost centers which would not be affected by construction of the proposed new facility.

It appears that DOD and the service headquarters should work more closely with the depots to predict future workloads for specific depots and to estimate, on the basis of historical experience at all depots, the level of productivity improvement which will most likely be realized from improved working conditions. Because of the large impact these factors can have on the cost analyses for new facilities, it may be advisable to require the higher management levels to provide the depots with the specific inputs to be used for these factors on each facility modernization proposal. Another alternative might be to require a formal acknowledgment by

appropriate headquarters groups indicating that the values assigned to these factors have been reviewed and found to be reasonable.

Project justifications should be updated and priorities adjusted before receiving final approval

Considerable time can pass between the date a construction project is originally conceived and the date it is finally approved for inclusion in the military construction program. The Air Force's radar test facility project, for example, was justified in 1967 as an electronic systems environmental test shop and was proposed for inclusion in the fiscal year 1970 construction program. Many factors can change during this period, causing the original project justifications to become inaccurate or otherwise misleading. Thus, there is a need to reexamine each project before its final approval to insure that it shows the most current data available and the proper priority relative to competing projects.

Procedures for updating justification data

Each of the services' regulations requires the depots to notify the appropriate authority when changes occur which have a material impact on submitted project justifications and economic analyses. These regulations, however, are not always effective. For example:

- The Air Force Audit Agency, based on its previously mentioned review, reported that 28 of 95 projects reviewed had not been properly updated when there were changes in workload, costs, or projected benefits.
- Although the Sacramento Air Logistics Center prepared and submitted an updated justification for its proposed radar test facility as late as March 1975--after becoming aware of the above review results--the submission contained some cost data drawn from a justification prepared in 1967 and not subsequently updated.
- Workload data included in the March 1975 submission for this radar test facility contained a considerable error--not subsequently corrected--due to a change in cost center designators which had occurred about 2 months earlier but had not been incorporated.

Procedures for ranking proposed
construction projects

Each service is responsible for ranking its own proposed projects. Priority rankings are initiated at the installation level, consolidated and adjusted at the major command level, and finalized as to ranking at the service headquarters.

The Air Force, for example, uses a system whereby projects are received from major commands in order of priority; however, they submit the projects to the Congress in an 80/20 percent grouping. Those projects in the top 80 percent are considered definite requirements. Projects in the bottom 20 percent can be funded at the discretion of the Congress. If the Congress does not fund all projects in the 80-percent category, the service also leaves it up to them to decide which projects to fund.

The service headquarters accept project justifications without any detailed backup data other than an economic analysis and submit projects to the Congress in the grouping described above. If the information submitted by the installation is not current or accurate, it could depict a distorted picture at successive review levels and influence relative rankings of projects.

We reviewed the economic analysis for the radar test facility at the Sacramento Air Logistics Center. We found that the supporting data did not meet the savings to investment ratio criterion stipulated in the DOD and Air Force Logistics Command directives. However, this project was reviewed at all levels, approved, and funded. Thus, decisions were made on the basis of faulty data which, if detected, could have affected priority rankings at review levels.

Project requests should be
independently reviewed

The services' regulations provide the individual depots with rather specific guidance on the requirements and procedures for identifying plant deficiencies and for initiating and documenting construction project proposals to overcome these deficiencies. Indeed, had the regulations been objectively followed, most of the weaknesses which we and the Air Force Audit Agency (see pp. 3 and 4) observed would not have occurred. The fact they did occur and even persisted after we expressed concern over the justification for one project and

after a regulation was revised to correct the Air Force's audit disclosures, indicates that the project review process is not functioning properly.

The regulations assign construction project review and approval responsibility at various levels, from the initiating installation up to and including the department level. The regulations, however, are not very specific as to how these reviews should be conducted. From our limited survey we have found that the normal process appears to work as follows.

- Two or more organizations at the installation level-- such as the maintenance, base engineering, and comptroller organizations--combine their resources to create the required project justification documents and supporting data files. These organizations may also review their work for completeness and mathematical accuracy but can not effectively judge the degree of objectivity which they have exercised in preparing the justification documents and supporting data files.
- The justification documents, without the supporting data files, may then be submitted for review by one or more installation level or local area special interest groups. These groups review the documents for such matters as environmental or energy impact, opportunities for intraservice or interservice consolidation, and reasonableness and/or completeness of the stated project requirement and justification. Although these groups may ask for and receive further oral or written justification for specific line item entries, they seldom ask for nor review the objectivity or completeness of the supporting data files.
- Having received local approval, the project justification documents, without the supporting data files, are forwarded through the chain of command to the department level. The separate command levels may request additional supporting data for specific line items in the justifications and, at their option, may visit the requesting installation to become more familiar with the requirement or justification for the project. These special requests for data and on-site visits can, but apparently seldom do, lead to a complete comparison or audit of the justifications back to the supporting data files and source documents.

From time to time, formal audits of any phase of the project justification process may be conducted by the services' internal audit organizations or by other groups specially constituted for that purpose. These audits would normally be designed to test the effectiveness of the process being reviewed, rather than to identify specific proposed projects which have been inappropriately approved.

The above process, while it provides ample opportunity for review of project justifications, does not insure that an objective audit will be made of each project justification, its supporting data files, and source reference documents before its final approval and submission for congressional funding.

We believe that our survey, though limited, indicates a need for greater attention during the preparation and review of proposed construction projects to assure that only the most qualified projects receive approval.

We are not at this time recommending specific measures which should be taken to insure that all final approved construction projects meet this high ideal. We suggest, however, there are a number of alternatives which, either individually or combined, could be considered in formulating a plan of action.

As examples:

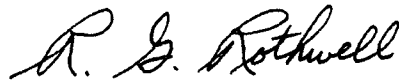
- Strong central management of the military construction program could help to insure that total defense needs are considered by the individual services.
- Publication of a tentative "next year" construction projects list at the same time as the annual program is finalized for presentation to the Congress would help to focus attention on projects most likely to be approved.
- Frequent internal reviews of the project proposal process should, in time, lead to greater compliance with existing regulations and higher quality proposals.
- Activities, such as Maintenance Interservice Support Management Offices at major headquarters and Maintenance Inter-service Support Offices at centers and installations, could assure that total defense needs

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are met and that questionable service projects are challenged. These offices could also be an effective force to coordinate all regional military requirements with existing military and commercial resources.

We shall appreciate receiving your comments on our observations and being informed of the actions you plan in this area.

Sincerely yours,



for Fred J. Shafer
Director

Enclosures - 2

CASE STUDY OF THE INDUSTRIAL
PLATING FACILITY PROJECT--
SACRAMENTO ARMY DEPOT

BACKGROUND

This project for constructing a metal processing facility at the Sacramento Army Depot had been included in the Military Construction Program since 1971. We selected this project for review because of its similarity to another project being requested for the nearby Sacramento Air Logistics Center and because we believed there might be some potential for consolidating the two sets of requirements into one joint-use facility.

Our initial discussion with appropriate depot and Center personnel and review of congressional testimony concerning both projects led us to conclude that there was a real potential for constructing a joint-use facility and that full consideration had not been given to this potential before DOD approval of the separate projects. A letter was sent to the Secretary of Defense in May 1975 telling him of our preliminary observations and requesting that both projects be delayed until the matter could be reevaluated.

The Secretary of Defense in late August 1975 replied to our letter, stating that a contract had been awarded to construct the Air Force facility and that a contract would also be awarded for a separate Army facility since a reevaluation had shown this to be the best alternative. The Army facility contract was awarded in September 1975 for about \$2.6 million.

This summary discusses our subsequent review of the staff study which was provided to us as the basis and support for the Secretary of Defense's decision to proceed with constructing a separate Army metal processing facility.

Project justification

The approved project justification document (DD Form 1391) stated that a new metal processing facility was required at the depot to meet current health and sanitary regulations. It indicated that the existing facility had inadequate equipment and could not arrange its workflow to

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meet modern methods of metal conditioning. It further stated that if the project was not approved, it would be necessary to continue operating with environmental deficiencies in ventilation and noise levels, as well as with substandard equipment and crowded conditions.

The staff study made as a result of our letter to the Secretary of Defense did not alter the above basic project justification. Instead, it outlined the following five alternatives to the status quo.

- Construct a new facility at the depot.
- Upgrade the present depot facility.
- Effect a cross-service agreement with the Air Logistics Center to accomplish only the plating portion of the workload.
- Effect a cross-service agreement with the Center to accomplish the entire metal processing workload.
- Effect a cross-service agreement with the Center to accomplish all metal processing rework except vans and shelters.

The study concluded, on the basis of a comparison of annual operating costs and onetime costs, that the new construction alternative would be most cost effective after 4 years.

REVIEW OF THE STAFF STUDY AND SUPPORTING DOCUMENTATION

Early in our review it became apparent that only two of the alternatives would be feasible--construct the new facility or perform all of the metal processing work at the Air Logistics Center.

Our evaluation of the staff study data concerning these two alternatives showed the following.

- The method used to cost the new construction alternative included only selected overhead items, while the other alternative was priced on the basis of all overhead costs, thus making the two sets of costs inconsistent and incomparable. (See p. 3.)

- The Army depot's 1977 workload projection was inconsistent with overall Army workload data furnished to us during an earlier review. As a result, the depot's metal processing workload could be overstated by as much as 18,000 hours, or 23 percent. (See p. 7.)
- Efficiency savings projected to result from better working conditions and shop alignment were inadequately supported and were at best estimates. (See p. 7.)
- Personnel separation costs were inappropriately included in the onetime costs projected for sending the metal processing work to the centers. (See p. 8.)
- The Army depots contention that end-item processing time would be increased by 2 days if the metal processing workload was shifted to the Center does not appear to be realistic. (See p. 8.)
- The Air Logistics Center can accept all the Army depot's metal processing work, including vans, shelters, and trailers. (See pp. 10 and 11.)
- Transportation costs associated with interservicing the metal processing workload were computed on the basis of total estimated costs rather than incremental costs to the Government. No consideration was given to available transportation capabilities already existing at the depot. (See p. 11.)

Inconsistent treatment
of overhead cost

The staff study computed the Army depot's costs by applying the depot's direct labor rate to the anticipated workload hours and adding in selected overhead costs. Costs for sending the work to the Center, however, were computed by applying the Center's industrial funding rate to the workload hours and adding to this other depot costs which would be incurred as a result of electing this alternative.

The industrial fund rate essentially represents the rate at which each direct labor hour must be charged to recover all costs incurred at the facility including indirect costs, such as supplies, computer support, guard service, personnel office costs, and comptroller office costs.

The following schedule shows the costs computed on this basis.

	<u>Construct new depot facility</u>	<u>Send all metal processing to the Center</u>
Labor costs:		
111,292, hours at \$9.06 (the depot direct labor rate)	\$1,008,400	
97,000 hours at \$16.48 (the Center's total industrial fund rate)		\$1,598,600
Residual work to remain at depot--paint touch up (10,273 hours at \$9.06)		<u>93,100</u>
	<u>1,008,400</u>	<u>1,691,700</u>
Other costs to be incurred by the depot:		
Heating	30,100	3,500
Housekeeping	64,100	48,100
Building maintenance	2,400	1,700
Equipment maintenance	15,800	15,800
Water, sewage, and waste disposal	37,800	-
Transportation to the Center	-	134,000
Quality assurance	32,000	48,000
Lost time--heating	1,800	1,400
Electricity and steam	47,300	2,300
Materials	88,400	8,000
Administrative overhead	-	<u>64,100</u>
Gross cost	1,328,100	2,018,600
Less projected effi- ciency savings	<u>870,000</u>	<u>870,000</u>
Net annual recurring cost	<u>\$ 458,100</u>	<u>\$1,148,600</u>

The first alternative is charged for only a part of the depot's indirect costs, whereas the second alternative is charged--

through use of the industrial fund rate--for a share of all direct and indirect costs incurred at the Center, plus some of the depot's indirect costs.

To make a more consistent comparison, we recomputed the costs for each alternative using the applicable industrial funding rates for each installation. This amount was then adjusted for the impact of those cost elements which would change as a result of leaving the status quo.

The Army depot computes its workload on an actual hour basis while the Center computes its workload on a standard hour basis. Our computation includes an adjustment for this factor to make the workload hours and industrial rates compatible.

The following schedule compares the original staff study costs and our adjusted costs.

	<u>Construct new depot facility</u>	<u>Send all metal processing to the Center</u>	<u>Difference</u>
(000 omitted)			
DOD-OSD staff study analysis:			
Onetime costs	\$2,599	\$ 145	\$2,454
Net annual re- curring costs	458	1,149	691
Years to recover investment			3.6
GAO analysis:			
Onetime costs	\$2,599	\$ 63	\$2,536
Net annual re- curring costs	834	935	101
Years to recover investment			25.0

The projected depot workload was inconsistent with other Army data and could be overstated

The staff study developed the depot's projected fiscal year 1977 workload by increasing the fiscal year 1975 workload of 1,442,000 direct labor hours by 30 percent. The increase was based on a projection of work to be transferred to the Sacramento Army Depot as a result of a Lexington-Bluegrass Army Depot phasedown.

Information obtained from the Army during our review of the Lexington-Bluegrass phasedown (B-153177) shows that the Sacramento Army Depot's workload was expected to decrease substantially in fiscal year 1976 and the transfer of the workload from Lexington would cause it to stabilize at about the fiscal year 1975 level. This is shown in the following table.

Workload Distribution (Staff-years)

<u>Army depot</u>	1975 direct labor personnel	1976 workload	1976 Lexington workload distribution	1976 adjusted workload
Lexington	1,196	1,322	-	-
Sacramento	831	339	492	831
Tobyhanna	<u>1,123</u>	<u>670</u>	<u>830</u>	<u>1,500</u>
Total	<u>3,150</u>	<u>2,331</u>	<u>1,322</u>	<u>2,331</u>

The Sacramento depot's workload was not increased as a result of the Lexington phasedown; however, Tobyhanna Army Depot's workload was. Tobyhanna was given the additional workload because it was considered to be the lowest cost depot. According to the study the total Army workload is expected to stabilize at about 2,500 staff-years beginning in fiscal year 1978.

We contacted the responsible Army Materiel Command official and were told that the information contained in our Lexington-Bluegrass study represents the official Army position. He added, however, that the latest fiscal year 1976 projection for the Sacramento Army Depot is 1,525,000 direct labor hours--an increase of about 5 percent over the fiscal year 1975 workload.

Based on this latest Army projection and the fact that the total Army workload is expected to stabilize in fiscal year 1978, it appears that the annual metal processing workload at the Sacramento depot should amount to about 79,000 direct labor hours as opposed to the 97,000 hour figure used in the staff study.

Projected efficiency savings were inadequately supported

The staff study shows that both of the alternatives will result in efficiency savings of about \$870,000 a year.

The study indicates that about 800 metal processing personnel are adversely affected by unusual noise, excessive dirt, temperature extremes, and less than optimum shop alignment caused by the physical presence of the existing metal processing function. According to the study, if the existing metal processing function is removed from the building, the efficiency of the remaining 800 employees would increase by 7.1 percent--1.3 percent for temperature stabilization, 1.3 percent for noise reduction, 4.0 percent for shop alignment, and 0.5 percent for decreased sick leave.

The Army depot based its statistics on efficiency improvements relating to temperature, noise, and sick leave on an article in an engineering magazine. No support was available for the claimed efficiency resulting from improved shop alignment. Further, the engineering article may not be completely applicable to the situation at the depot. We readily located another article which tends to refute some of the data contained in the depot's article especially with respect to the impact of noise on worker efficiency. Nevertheless, since neither article was based on a study of actual conditions at the depot, extreme caution should be used when forecasting savings based on their conclusions.

Since the projected efficiency savings affect both alternatives equally, we did not adjust the staff study cost analysis for the fact that they were inadequately supported.

Personnel separation costs were inappropriately included in the onetime costs

The staff study showed that personnel separation costs of about \$82,000 would be incurred if the depot's workload was shifted to the Center. The amount was computed on the

basis of an assumption that 21 persons would be separated and be entitled to severance pay.

We found that the number of persons to be separated (21) was arrived at by computing the number of personnel equivalents relating to the projected workload, which was increased by 30 percent for work expected to come from Lexington. (See p. 6.) Using this approach, the staff study estimate of 21 personnel, in effect, includes some persons not even employed at the depot--a portion of those which would be hired to perform the 30-percent increase in workload.

Our review of the Federal Personnel Manual indicates that the depot employees may not be entitled to severance pay. If they are asked to transfer to the Center along with the workload--and this is not unlikely--the movement would represent a transfer-of-function within the same commute area and severance pay would probably not be allowed.

In our opinion, the Center and the depot could work together to insure an orderly transfer of the metal processing function and to insure that personnel separation costs are minimized. Accordingly, we did not include personnel separation costs in our computation of the onetime costs for exercising this alternative.

Army's contention that end-item processing time would be increased an average of 2 days appears to be unrealistic

The staff study stressed the point that sending the metal processing work to the Air Logistics Center would unreasonably increase the end-item processing time by about 2 days.

To assess the reasonableness of this contention we attempted to determine if summary management information was available which would identify the historical and projected priorities of the metal plating workload and show how the shop has performed relative to those priorities. We also attempted to find out if information was available to show the actual number of days that were required to process specific end items and at what point in the repair cycle the metal processing work took place.

Depot officials could not show us how the metal plating shop has performed nor could they identify the priorities

associated with such work. They told us that the metal processing shops are nonaccountable cost centers, and, as such, records are not kept to show when items are inducted or if they are completed by their required due dates. We were told that items requiring metal processing are routed into the shops with tags which are dated to show when the items left an accountable cost center and when they are due back. Upon completion of metal processing, the routing tags are destroyed.

Depot officials could not furnish us with summary information which would identify specific end items and show whether they were processed within the required number of days. They said the System-wide Project for Electronic Equipment at Depots Extended System shows how many specific end items are required to be inducted into the repair process and how many are required to be shipped out at the end of a 30-day period. However, individual items are not tracked by the system and therefore it cannot show if the first item inducted is the first item to be completed.

During a tour of the depot plating facility we noted several items which were waiting to be inducted into the shop. Some of the items' required completion dates had already passed. We asked a responsible official to find out why one of the items was already 3 weeks overdue and had not yet been inducted into the plating shop. He later told us that the item was sent by the shelter repair shop to the machine shop for fabrication, and from there it was supposed to go to the plating shop. As it turned out the machine shop had higher priority work and couldn't process the item in time to meet the due date. When the item finally underwent fabrication and was forwarded to the plating shop, it was already about 3 weeks past due. He told us that when we spotted the item, it had only been in the plating shop for about 24 hours. The official's statements were based on his discussions with shop personnel and were not otherwise supported or documented.

We also contacted officials of the plating facility at the Air Logistics Center to get an estimate of the turnaround time that could be expected for the Army depot work. We were told that the turnaround time would naturally depend on the priority of the work. They said the depot work would be handled by priority and would be processed in the same manner as the Center's work. There would be no preference given to the Center's work.

The Center officials told us that the plating shop currently operates two shifts--a full-day shift and a partial-swing shift. They said if they were given the depot metal plating workload and the associated manpower authorizations, they could perform the depot's work and provide a satisfactory turnaround time.

Since the Air Logistics Center operates a partial swing shift it seems reasonable that the Center could, for higher priority work, provide the depot with at least as good a turnaround time as is currently enjoyed in the existing facility. For example, the depot currently operates its plating facility on a one shift basis and work that is generated at the end of the day has to wait until the following day for metal processing. If sent to the Center, depot work generated late in the day could be inducted at the beginning of the Center's swing shift and possibly be ready for return the first thing the next day.

Since the depot does not have data to show if specific end items are currently being repaired within the required number of days or to identify the priorities associated with such work, there is no reasonable means to accurately determine what impact would result from a 2-day delay in metal processing.

Because the Center has the capability to provide a satisfactory turnaround rate plus the fact that five round trips a day are scheduled for the Center in addition to the six or more trips a day that have capacity for returning completed work (see p. 11), we feel that the predicted 2-day increase due to metal processing delays is unrealistic.

The Air Logistics Center can accept the depot's van, shelter, and trailer metal processing work

The staff study indicates that the Air Logistics Center did not want the depot's van, shelter, and trailer metal processing work.

We discussed this with Center officials and they told us they had not refused the depot's work. However, they stated that the Center does have the facilities, equipment, and appropriate skill base needed to accomplish the Army depot's van, shelter, and trailer workload. They said the only constraint would be the number of persons required for the work--

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if they are authorized to increase their personnel authorization they could readily do the Army depot's metal processing work.

No consideration given to available depot resources when developing transportation costs

The staff study includes a \$132,169 recurring cost for two trucks and drivers, material handlers, and other equipment and personnel which would be required for five daily round trips to the Center, if that alternative were selected. These costs were developed as though the Army depot would have to procure two additional trucks, hire two drivers, and pay for the use of additional material handling equipment. No consideration was given to the potential use of existing resources available at the depot.

The depot official responsible for dispatching vehicles told us that the depot currently schedules six to eight trips a day to the Air Logistics Center. Most of the trips are made to transport salvage material to a General Services Administration disposal site at the Center. He further said that these trucks are generally full when they leave the depot but normally return empty.

The official told us the depot has one covered 2-1/2 ton truck that is not used for hauling salvage material and could be used for transporting other materials to the Center. However, he said he would need more drivers if there would be five additional trips a day.

It appears that the transportation costs shown in the staff study do not represent the incremental cost for the Government to provide the needed transportation capability and may be overstated.

CONCLUSION

We believe that the proposed construction of a second new metal processing facility in the Sacramento area is not adequately supported by the staff study and may not be cost effective to the Government.

Our review of this project demonstrates that the facility modernization justification and review process can be ineffective and can result in approval of marginal projects. This project further demonstrates how workload projections and

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claimed efficiency savings, even though they are largely subjective and deal with uncertain future events, can greatly influence the final outcome of an economic analysis.

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CASE STUDY OF THE DEPOT RADAR SYSTEMS

OVERHAUL AND TEST FACILITY PROJECT--

SACRAMENTO AIR LOGISTICS CENTER

BACKGROUND

The depot radar electronic systems overhaul and test facility project was initiated during the 1960s and was included in the Air Logistics Center's fiscal year 1970 military construction program at an estimated cost of \$1.888 million. The project was recently submitted for congressional approval in the fiscal year 1976 program and was subsequently funded for \$2.580 million.

We wanted to test the adequacy of the Air Force's procedures for initiating and reviewing depot-level maintenance facility project requirements. This specific project was selected because it fell within the Air Force's depot plant modernization program, its construction costs were projected to be over \$1 million, and it was in its final stages of processing for approval.

The project was primarily justified by an economic analysis which showed that operations in the new facility would result in annual savings of about \$296,000. The new facility was expected to pay for itself in 8.2 years and demonstrate a savings to investment ratio slightly greater than one. Air Force regulations require that a modernization project must pay for itself in less than 10 years and show a savings to investment ratio greater than one to qualify for inclusion in the Military Construction Program.

Project justification

The Military Construction Project Data (DD Form 1391) shows that the repair of radar systems is currently being done in deficient facilities which do not provide sufficient work space or environmental controls. Work done outdoors is subject to inclement weather and results in work delays, multiple setups, high overhead costs, and ineffective operations. It was also stated that radar testing procedures are adversely affected by the present working conditions.

The proposed facility is expected to provide an isolated testing range which will consolidate processing and certification of radar systems. Specific functions planned for the new facility are: (1) dismantling of systems, (2) storage of components not requiring repair and those awaiting reassembly, (3) routing of items requiring repair, (4) minor repair of radar antennas and vehicle equipment, (5) testing of repaired systems in environmentally controlled mock-up rooms, (6)

reassembly, (7) preliminary systems alignment and check, and (8) final full-power check and certification of systems. Final inventory inspection and preparation for shipment will also be completed in the planned facility.

REVIEW OF PROJECT JUSTIFICATION
AND SUPPORTING DOCUMENTATION

Our review consisted of (1) auditing the project justification and supporting documents which the Center submitted for approval and (2) auditing subsequent justification documents Center officials prepared and provided to us after our initial review showed that the project would not be cost effective.

Data supporting the project--as
initially justified and approved

Primary emphasis was given to auditing the 1391 form, the economic analysis, and the supporting documentation which was submitted to the Air Force Logistics Command for approval and subsequent funding. We examined the major elements which had the greatest impact on the overall cost effectiveness of the project--projected workload, projected productivity increases, and projected onetime savings--and found that:

- Projected workload was not supported. (See p. 15.)
- Productivity increases were not adequately supported and were at best estimates. (See p. 15.)
- Onetime savings resulting from the turn-in of relocatable buildings were questionable. (See p. 17.)
- Projected savings resulting from the turn-in of redundant equipment were not adequately supported. (See p. 17.)

Projected workload was not supported

The economic analysis showed that the projected fiscal year 1978 workload scheduled for the new facility would be 296,940 standard hours. Support for this workload projection was derived from the January 1975 Directorate of Maintenance's Planned Labor Application Summary.

Our analysis of this projected workload revealed that it was based on the use of incorrect cost centers. Maintenance officials stated that the correct cost center designators were provided to the Facilities Support Section (the group which prepared the economic analysis) in December 1974. However,

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there was a change in cost center designators and the Facilities Support Section mistakenly continued to use the old designators when it subsequently updated the facility's projected workload.

We recomputed the projected workload using the correct designators and found it amounted to 251,256 standard hours or about 46,000 standard hours less than shown in the project justification.

Productivity increases were not adequately supported

The justification documents claimed the new facility would combine systems test stations which are currently dispersed and would consolidate the teardown, routing, assembly, checking, certification, and packaging of radar systems. As a result, end-item processing times were expected to be shortened and would cause end-item standards to be decreased by 10 percent. Based on this assumption, \$303,339--or approximately 18 personnel equivalents--was projected to be saved annually once the facility was operational.

Our review of the supporting documentation showed that the productivity increases were based on flow process charts, operations studies, and statements from engineering publications.

We evaluated the flow process charts and found that they did not support a 10-percent reduction in end-item standards. Rather, they merely illustrated the effect a 10-percent reduction in standard hours would have when applied to specific functions planned for the facility. We informed officials of the Facilities Support Section of our observations, and they agreed with us.

We subsequently met with the maintenance officials who originally requested the project, and they told us the 10-percent reduction in standard hours was supported by eight or nine operations studies as well as engineering articles showing that productivity increases result from better working conditions. The maintenance officials were only able to locate four of the studies plus two quotes from engineering publications.

Our review of the operations studies showed they were outdated and not representative of the current situation in the existing facility. For example, one study showed how much time a repairman could save if he did not have to uncrate items before repair. The study showed that repairmen currently do the uncrating function but would be relieved of that function in the new facility. The study concluded that a repairman would be

able to increase his productivity by 3 percent if he did not have to uncrate.

We learned that uncrating duties were later delegated to nonrepairmen in the existing facility. It appears that the projected savings shown in the study are already being realized and should not be attributable to constructing a new facility.

Another operations study, conducted in 1968 and 1969, attempted to show the time that would be saved unpacking ground communications approach systems in the proposed new facility versus the present facility. In making the comparison however, the study inconsistently used one set of box dimensions to evaluate the old facility and another set to evaluate the new facility.

Concerning the cited engineering publications, the project monitor gave us a document that was intended to support the productivity increases due to better working conditions. The following quote is from the document and represents the only available support for the increase.

"The American Institute of Architectural Engineering suggest a 4 percent to 8 percent increase in productivity by just bringing the lighting up to standard in a work area."

* * * * *

"Articles published in Industrial Engineering periodicals indicate an average 9 percent increase in productivity has been indicated in industrial plants where temperature and humidity controlled systems have been installed in the production areas."

Through a discussion with maintenance officials we learned that the articles referred to, and on which the 10-percent increased productivity was partially based, were not retained. These officials also stated that the old facility lacked proper lighting and humidity conditions, but they could provide no further support for the claimed productivity increase due to better working conditions.

Based on the above review of flow process charts, operation studies, and engineering publications provided by maintenance officials, we conclude that the projected reduction in end-item standards due to increased productivity is highly questionable.

Onetime savings resulting from the
turn-in of relocatable buildings were
questionable

The justification documents indicated that upon constructing the proposed facility, two relocatable buildings would be dismantled and returned to supply for a onetime savings of \$22,604. The savings were computed by escalating the buildings' acquisition cost at an inflation rate of 7 percent a year and then subtracting from this amount the cost of disassembly and repacking the materials.

Through discussions with Facility Support Section personnel, we learned that depreciation of the facilities was not considered. We contacted the inventory item manager for this type of building and learned that there had been no recent demand for such facilities. The item manager estimated that demand for such facilities would continue to remain small since the Air Force had converted to masonry-type structures.

Although the demand in the supply system appears small, we recognize these buildings could later be used at the Center for other purposes. Therefore, we recomputed the value of the facilities (considering depreciation) and concluded there would be a onetime savings of \$7,272 or about \$15,300 less than shown in the justification.

We met with maintenance officials and showed them our computations and they generally agreed with our methodology.

Projected savings resulting from
the turn-in of redundant equipment
were not adequately supported

The project justification documents indicated that the consolidation of six test areas and four mockup sites would result in a surplus of duplicate equipment. A onetime savings of \$60,642 was projected for the turn-in of this equipment, and an annual savings of \$8,583 was expected to result from the reduced equipment maintenance requirement.

Center officials told us that there are currently no supporting documents for the projected savings. We were told by the project monitor that the redundant equipment data, as presented on the justification documents, has not been updated since 1967.

Because the equipment data could not be supported and has not been updated, we concluded that the projected onetime and annual savings are probably unrealistic. It was not, however, practical for us to compute the true value which should be assigned for this line item. Therefore, we did not change the claimed savings used in the justification.

We recomputed the savings to investment ratio and the payback period to show our adjustments to projected workload and onetime savings for turn-in of relocatable buildings. We did not make adjustments for the questionable productivity increases or the savings due to the turn-in of redundant equipment because of the subjective nature of the items. Following is a comparison of the computation shown in the project justification documents and our adjusted computation.

<u>Projected savings</u>	<u>Air Logistics Center computation</u>	<u>Our adjusted computation</u>
Annual:		
Civilian personnel	\$ 303,339	\$ 256,650
Materials	112	112
Utilities	<u>a/ (10,203)</u>	<u>a/ (10,203)</u>
Maintenance/repair	<u>a/ (5,586)</u>	<u>a/ (5,586)</u>
Maintenance of surplus equipment	<u>8,583</u>	<u>8,583</u>
Total	<u>\$ 296,245</u>	<u>\$ 249,556</u>
Onetime savings:		
Turn-in surplus equipment	\$ 60,642	\$ 60,642
Turn-in of relocatable buildings	<u>22,604</u>	<u>7,272</u>
Total	<u>\$ 83,246</u>	<u>\$ 67,914</u>
Present value of benefits from the beneficial occupancy date (using 10 percent discount rate):		
Annual savings	\$2,821,437	\$2,376,743
Onetime savings	<u>108,706</u>	<u>94,079</u>
Total present value of benefits	<u>\$2,930,143</u>	<u>\$2,470,822</u>
Total present value of ben- efits (computed as of the program or base year)	<u>\$2,308,953</u>	<u>\$1,947,008</u>
Savings to investment ratio (note b)	1.11	.936
Years to amortize (note b)	8.2	9.76

a/Cost increase with new facility.

b/The Air Force Logistics Command requires the ratio to be greater than one and the project pay for itself in less than 10 years to be included in the modernization program.

The adjusted workload data and the reduction in the savings due to the turn-in of relocatable buildings makes the project, according to existing Air Force criteria, not cost effective to the Government. Coupled with the fact that the productivity increases and the savings due to the turn-in of redundant equipment were inadequately supported, we concluded that the project was not adequately justified and should not have been approved and funded without additional support and justification.

Data Supporting Project--As
Subsequently Justified

We told the Center officials that data contained in the original justification documents did not adequately support the project. They subsequently prepared and provided us with information showing revised workload data and additional support for the claimed productivity increases. They agreed with our adjustment to the onetime savings claimed for turn-in of relocatable buildings.

Workload adjustment

Maintenance officials developed an updated fiscal year 1978 workload for us in September 1975 and another one in January 1976 when we informed them that the September update did not contain enough hours to justify the project. Both of the updates were developed through inputs from maintenance and material management activities.

The September 1975 workload projection amounted to about 324,400 standard hours, about 27,000 hours more than projected in the original justification documents. Maintenance officials told us this workload data was more accurate than the data contained in the 1391 form because the planned labor application document often fails to show current information.

We evaluated this workload data and found that:

- The workload was overstated by about 41,600 standard hours because of an error in estimating the number of TSQ-96 radar systems to be received for repair.
- The workload was overstated by 2,584 standard hours because of a transposition error.
- Over 57,600 standard hours were included for TPN-19 radar system repair even though this work was being done under contract and there were no definite plans for it to be redesignated for organic repair.

--The workload was understated by 3,353 standard hours because some early warning radar system workload had been omitted.

We adjusted the 324,400 standard hour workload considering the above items and concluded that the projected fiscal year 1978 workload would amount to about 226,000 standard hours.

Before our exit conference at the Air Logistics Center, we met with Center officials to discuss this adjustment. They generally agreed with the workload adjustment; however, they stated other work had since been identified and should be added to the data supplied to us in September 1975. They subsequently provided us with a January 1976 updated fiscal year 1978 workload projection which included the newly identified workload. Following is the September 1975 and the January 1976 workload projection showing our adjustments.

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Type of radar system	FY 1978 workload computed by Center officials in Sept. 1975		Our adjusted 1975 workload data		FY 1978 workload computed by Center officials in January 1976	
	Number of units	Standard hours	Number of units	Standard hours	Number of units	Standard hours
MSQ-2	3	5,947	3	5,947	4	7,928
MSQ-10	-	-	-	-	6	3,120
MSQ-39/46	4	8,116	4	8,116	2	4,058
MSQ-77	3	10,665	3	10,665	2	7,110
TSQ-96	5	52,000	1	10,400	1	10,400
FPS-90	9	22,905	9	22,905	9	22,905
FPS-20	1	4,527	1	4,527	1	4,527
MPS-9	3	3,024	3	3,024	2	2,016
MRC-113	3	9,456	3	9,456	8	25,216
MRC-98	2	6,304	2	6,304	2	6,304
MPN-13	11	41,943	11	28,424	9	23,256
MPN-14	9	23,256	9	34,317	11	41,943
FPN-16	1	1,806	1	1,806	1	1,806
TPN-19	10	57,620	-	-	2	11,524
CPN-4 (NAW)	-	-	-	-	2	5,168
TPS-43	3	8,907	3	8,907	2	5,938
TPS-44	-	-	-	-	1	2,969
TSA-34	-	-	-	-	4	2,648
EW Radar	33	67,947	33	71,340	33	67,947
MRN-21	-	-	-	-	1	1,806
GPN-XX	-	-	-	-	2	4,000
Total	<u>100</u>	<u>324,423</u>	<u>86</u>	<u>226,138</u>	<u>108</u>	<u>279,875</u>

Because of time constraints, we did not make a full audit of the Center's latest (January 1976) projection of the fiscal year 1978 workload. We did, however, note the following.

- The projected workload for the TPN-19 radar system was, based on our prior knowledge, overstated by about 17,000 standard hours.
- Manpower limitations have recently been placed upon the five logistics centers and one official stated that the Sacramento Air Logistics Center's authorized strength must be reduced approximately 600 positions by June 1976. This reduction is expected to affect both material and maintenance activities and may result in a shifting of workload from organic to contractor repair and, as a result, reduce the above projected workload for fiscal year 1978.
- In 1973 the Air Force implemented a plan for replacing the current GCA instrument landing systems listed above with solid state systems which, we were told, will have a much longer life between repairs (5 years vs. 10 years).

Center officials agree that the TPN-19 workload was overstated by about 17,000 standard hours. They did not disagree that the pending manpower reduction could have an impact on their projected fiscal year 1978 workload nor did they disagree that the shift to solid state instrument landing systems could have an impact on the projected workload. However, they did not agree that the total impact of these actions would result in a considerable reduction in their projected workload for fiscal year 1978.

Additional support provided for
claimed productivity increases

In January 1976 after we told Center officials that their claimed productivity increases were not supported, they provided us with excerpts from several studies showing that productivity increases can result from better lighting, air conditioning, and noise reduction. They concluded that the new facility will provide a better working environment which will increase productivity by at least 10 percent. We agree that productivity increases can result from the above factors. Without a time consuming detailed engineering study, however, it is impossible for us or the Center officials to accurately estimate the degree of productivity improvement which will be realized.

We again concluded that the claimed productivity increase is subjective and inadequately supported. However, we did not

adjust the economic analysis because we believe some increases will occur but have no basis for estimating its magnitude.

We adjusted the revised workload data provided to us in September 1975 and January 1976 and recomputed the savings to investment ratio and payback period for the project as follows.

<u>Projected savings</u>	<u>Our adjusted workload data as of</u>	
	<u>Sept. 1975</u>	<u>Jan. 1976</u>
Annual:		
Civilian personnel	\$ 230,993	\$ 284,660
Materials	112	112
Utilities	<u>a/ (10,203)</u>	<u>a/ (10,203)</u>
Maintenance/repair	<u>a/ (5,586)</u>	<u>a/ (5,586)</u>
Maintenance of surplus equipment	<u>8,583</u>	<u>8,583</u>
Total	<u>\$ 223,899</u>	<u>\$ 277,566</u>
Onetime savings:		
Turn-in of surplus equipment	\$ 60,642	\$ 60,642
Turn-in of relocatable bldgs.	<u>7,272</u>	<u>7,272</u>
Total	<u>\$ 67,914</u>	<u>\$ 67,914</u>
Present value of benefits from the beneficial occupancy date (using 10 percent discount rate):		
Annual savings	\$2,132,424	\$2,643,539
Onetime savings	<u>94,079</u>	<u>94,079</u>
Total present value of benefits	<u>\$2,226,493</u>	<u>\$2,737,618</u>
Total present value of benefits (computed as of the program or base year)	<u>\$1,754,476</u>	<u>\$2,157,243</u>
Savings to investment ratio	.844	1.037
Years to amortize	10.87	8.77

a/Cost increase with new facility.

The savings to investment ratio using the September 1975 data was less than one which by Air Force criteria means the project should not be approved. The ratio based on the January 1976 data is slightly higher than one. It should be recognized, however, that we did not make a full review of this data and have not adjusted the projected workload for the impact of the potential manpower reductions noted and the noted shift to solid state instrument landing systems.

CONCLUSION

This project demonstrated the review process, at least in the above case, was ineffective and resulted in the submission and congressional approval of a project that was not adequately justified. It further illustrates that workload projections and claimed productivity increases are predominant factors influencing the outcome of an economic analysis, even though these two elements are largely subjective and deal with uncertain future events which can not easily be supported nor disputed.

Based on low savings to investment ratio finally computed for this project and the uncertainty of the workload and productivity increase projections, we believe the need for this project is at best marginal.