AD-A120 572 COST OVERRUN ON THE AEROPROPULSION SYSTEMS TEST FACILITY(U) GENERAL ACCOUNTING OFFICE WASHINGTON DC PROCUREMENT LOGISTICS AND READINESS DIV 30 SEP 82 1/1

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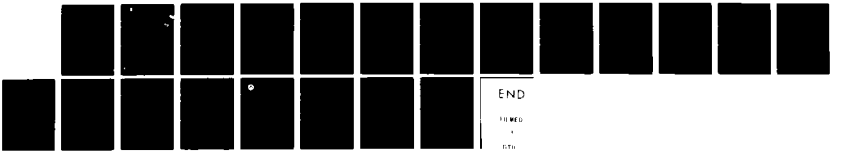

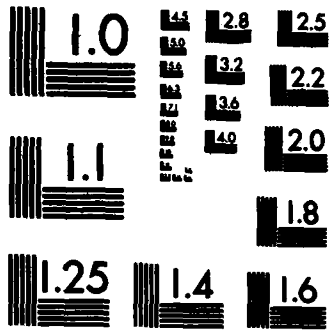

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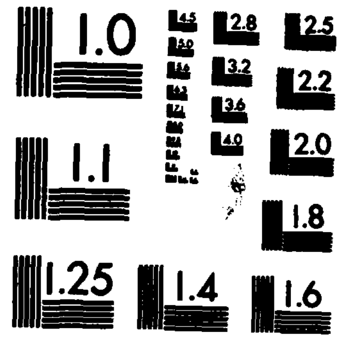

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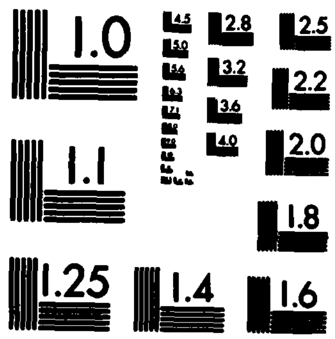

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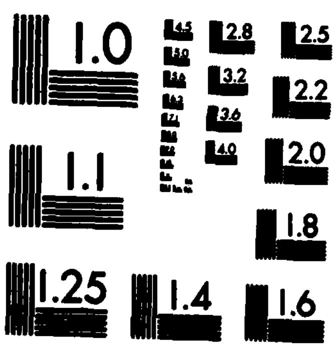

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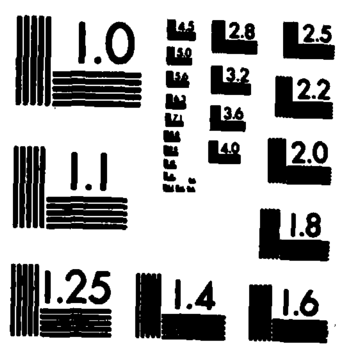

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

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September 30, 1982

B-207696

The Honorable Jim Sasser
United States Senate

Dear Senator Sasser:

Subject: Cost Overrun on the Aeropropulsion Systems Test Facility (GAO/PLRD-82-123)

In your August 13, 1981, letter, you stated that construction problems of the Aeropropulsion Systems Test Facility (ASTF), located at the Arnold Engineering Development Center, Tennessee, have resulted in a $138 million cost overrun. You expressed concern about the Department of Defense (DOD) policy which permits the use of Government-furnished equipment on military construction projects and allows split responsibility for design and construction of military construction projects between the Army Corps of Engineers and another military branch or department.

As agreed with your Office, we reviewed the reasons for the cost overrun on the ASTF construction project. We also discussed the construction of the Space Transportation System (STS) support facilities with Air Force and Corps officials to determine if design responsibilities for these facilities were split between the Air Force and the Corps, similar to ways responsibilities were split on ASTF.

ASTF

ASTF was supposedly fully funded at $437 million in fiscal year 1977, but since then has experienced a significant cost overrun estimated at $138.4 million. The Air Force now estimates that ASTF will cost $575.4 million.

The ASTF design was completed in February 1977 and the construction contract was awarded in August 1977. The Air Force entered into the construction contract with a design that was not well suited to its revised procurement plan. Originally, the Air Force expected the project to be funded on an incremental basis. The design was divided into seven

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packages, which were planned for sequential construction as funds became available. However, the Air Force received a single appropriation for the project in fiscal year 1977 and decided to consolidate the seven packages into two concurrent procurements. One procurement covered the construction and the other covered the acquisition of equipment, using 18 contracts.

The design did not consider the concurrent procurements since the interface requirements between the facility and GFE were based on hypothetical equipment from anticipated manufacturers. Some of the equipment actually procured came from successful bidders other than those originally anticipated and created facility interface problems requiring modification of the original design. Air Force officials realized the design might have to be modified, depending upon GFE actually procured, but anticipated firming up interface requirements during the sequentially phased procurement originally planned. The subsequent decision to consolidate the procurements, however, precluded timely modification of the design and resulted in GFE and facility interface problems.

The Air Force decision to proceed with concurrent GFE and construction contract procurement resulted in numerous design omissions and incomplete equipment interface configuration. The Air Force did not take sufficient time to consolidate the design packages and identify equipment and construction facility interface requirements.

The Air Force, as design agent, had responsibility for determining the adequacy of the design. However, the Air Force did not establish a large enough team with the necessary expertise to review the large number of ASTF design drawings. While the Corps, as construction agent, performed a constructibility review, it was not funded to perform a design review. Both the Air Force and the Corps recognized that the design lacked adequate GFE interface requirements, but the Air Force elected to proceed. Extensive redesign and modification were required to accommodate the equipment eventually procured for ASTF.

Inadequate management contributed to the $138.4 million overrun. Headquarters groups were lax in monitoring project progress. This laxity delayed recognition of the extent of the equipment interface problem and its effect on project costs and completion time frame.

In March 1982, the Air Force informed the House and Senate Committees on Appropriations of policy and management changes that would prevent a recurrence of such problems. Among the management initiatives identified for improvement were

--Procuring GFE in a timely fashion so that interfaces can be matched to the construction in a timely fashion.

--Revising regulations to provide that adequately staffed project offices with the proper mix of skills are provided at the beginning of large, complex construction projects.

--Revising regulations to require construction management plans that clearly designate organizations, responsibilities and relationships.

--Reviewing viable contracting methods, including construction management procedures involving phased construction and multiple contracts, to ensure maximum cost control through construction completion.

If properly implemented, these efforts should enable the Air Force to better control large, complex projects, such as ASTF.

Details on the results of our review of the reasons for the ASTF cost overrun are included in enclosure I.

STS

We discussed the construction of the STS support facilities with Air Force and Corps officials. As agreed with your Office, we limited our inquiry to determining if the Air Force and the Corps shared design responsibilities for these facilities. We found that the Air Force and the Corps did share design responsibilities and that similarities existed in the management of the design of the ASTF and STS projects.

The management of the design of the ASTF and the STS facilities projects is similar in that for both the

--Air Force Systems Command has design r[illegible]ibility.

--Air Force Systems Command acts as the Air Force Regional Civil Engineer (AFRCE). 1/

--Corps was involved in preparing and reviewing final design documents, and in determining bid packages, constructibility, and cost estimates.

1/AFRCE offices are field extensions of the headquarters engineering directorate and assist in managing the design and contract award phases of the Air Force construction program.

Unlike ASTF, however, the STS support facilities do not have GFE. The construction contractor, rather than the Government, is responsible for obtaining the required equipment. Therefore, design problems due to GFE interface requirements, which contributed to the cost overrun on the ASTF project, will not occur on the STS project.

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In its comments, DOD said our report is a factual and fair assessment of the ASTF Project. (See p. 12 for details.)

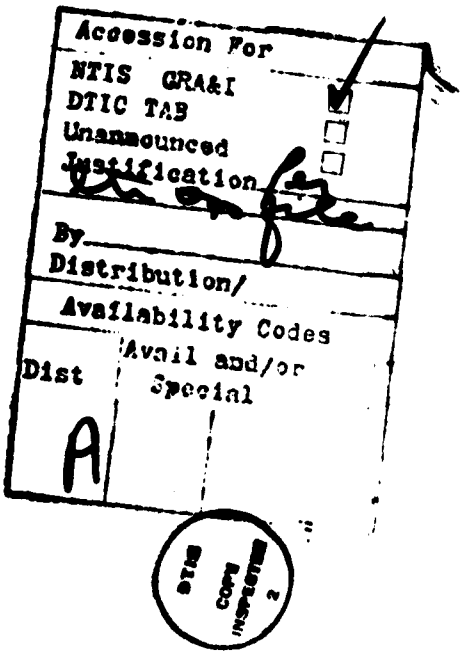
We will send copies of this report to the Chairmen, Senate and House Committees on Appropriations and on Armed Services; the Director, Office of Management and Budget; and the Secretaries of Defense and the Air Force. Copies will also be made available to other interested parties upon request.

Sincerely yours,

Donald J. Horan

Donald J. Horan
Director

Enclosures - 2



ENCLOSURE I

COST OVERRUN ON THE AEROPROPULSION SYSTEMS TEST FACILITY

BACKGROUND

The Arnold Engineering Development Center (AEDC), located at Arnold Air Force Station, Tennessee, is one of four test and evaluation centers in the Air Force Systems Command. The Air Force identifies AEDC as the most comprehensive aerospace ground-testing facility in the world. AEDC conducts aerospace testing for the Department of Defense, the National Aeronautics and Space Administration, other Federal agencies, and civilian educational institutions involved in aerospace research and evaluation. Tests conducted in AEDC's wind tunnels, space chambers, ballistic ranges, and jet rocket test cells evaluate flight systems and components before they are flown. According to the Air Force, these tests help reduce time, costs, and hazards in developing flight systems.

During the late 1960s and early 1970s, the Air Force developed a program to provide the Nation with the technical facilities it considered were needed to develop superior new aircraft and other aeronautical systems. The Air Force considered AEDC as marginally adequate in meeting future engine test requirements. It determined that new testing techniques and advanced technology required airflows that were not only longer and larger but also more rapidly changing to test engine performance, including testing in a freejet mode. To provide this capability, the Air Force planned ASTF. ASTF would provide airflow conditions that duplicate the flight envelope and flight mission for future developmental air breathing propulsion systems. It would also provide transient testing of aircraft engines, permitting simulation of changes in engine power, aircraft altitude, and speed. Freejet testing would provide observations on engine operation.

The Air Force recognized that providing ASTF would be a large one-time commitment of funds and initially considered that incremental funding over a 2 or 3 year period would be a realistic approach. However, the Office of the Secretary of Defense and the Office of Management and Budget elected to request full funding in fiscal year 1977. Therefore, in its budget request for fiscal year 1977, the Air Force included $437 million for construction of ASTF. During congressional hearings on its budget request, Air Force officials testified that full funding was being requested because incremental funding would increase the risk of cost overrun due to potential delays. Also, full funding would provide the contractor with scheduling and costing advantages.

ENCLOSURE I

The construction contract was awarded in August 1977 at $261 million. Eighteen contracts for GFE, totaling $68 million, were awarded from August 1977 through 1979. In 1979 the Air Force realized the potential for a cost overrun on the ASTF project. After special project reviews by the Army Corps of Engineers and the Air Force, the Air Force estimated ASTF would eventually cost $575.4 million, which includes a cost overrun of $138.4 million.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objective was to determine the reasons for the cost overrun on the ASTF military construction project.

We interviewed responsible officials at Headquarters, Air Force; Headquarters, Army Corps of Engineers; the Mobile District Office of the Corps of Engineers; and the ASTF Project Management Office. We reviewed their pertinent records, correspondence, and management reports and discussed the management of the ASTF project and the causes for the cost overrun. We toured the ASTF site and reviewed selected change orders and/or modifications valued at $200,000 or more to establish reasons for the increased costs.

ASTF DESIGN DID NOT SUPPORT CONCURRENT AWARD OF GFE AND CONSTRUCTION CONTRACTS

The ASTF construction contract was awarded based on an inadequate design. The procurement plan originally provided for a seven-package procurement scheme, whereby each package would be procured sequentially. When the ASTF project received full funding in 1977, the Air Force consolidated the seven-package sequential procurement package into two--essentially concurrent procurements, one for construction and one for GFE to be included in the facility. The design did not support concurrent contracts in that interface requirements between the facility and GFE were unknown because the design of the facility was based on hypothetical equipment from anticipated suppliers. The Air Force awarded the construction contract even though extensive changes in the design of the facility might be required.

ASTF design found lacking

In February 1972 the Deputy Assistant Secretary of Defense designated the Air Force as design agent for ASTF and the Corps as construction agent. The ASTF is a sophisticated facility with a large quantity of state-of-the-art equipment. The Air Force was given the responsibility for the design effort because of its expertise in engine testing facilities. The Air Force managed the design effort through its civil

engineers office at AEDC. A program office was established at AEDC with seven individuals assigned to the Project Management Staff.

The initial ASTF design was performed in four phases, from 1972 through 1977 at a cost of $12.8 million. A separate contract with the architect-engineer (A/E) was used for each phase. The phases were consecutive but time lapses between phases caused the A/E to disband and establish a team for each subsequent phase. Air Force officials reported that the discontinuity caused a redundant effort and increased design cost.

The design was prepared so that construction of the ASTF could be done in phases, based on incremental funding. Air Force officials told us they initially did not believe the ASTF project would be fully funded and requested the A/E to design several packages for accomplishing the ASTF construction. The A/E noted multiple contracts awarded during succeeding years would allow matching expenditures with available construction funds and integrating equipment with the facility. To permit flexibility in procurement which would allow the Government to assemble and advertise increments within the expected available funds, the design was broken down into seven packages as listed below.

--Government-furnished equipment.

--Site preparation and utilities.

--Buildings.

--Piping and equipment installation.

--Test cells and ducting.

--Plant instrumentation and controls.

--Test instrumentation system.

During fiscal year 1977, before the seven-package design was completed, the decision was made not to construct the ASTF in increments. The Air Force planned two essentially concurrent procurements, one for major equipment (package 1) and the second for construction, which consolidated packages 2 through 6. The Air Force planned to award the package 7 test instrumentation system contract as required to meet the activation schedule. The concurrent procurements created design problems because GFE interface requirements were based on hypothetical equipment rather than GFE subsequently procured. We were informed that AEDC recognized in 1977 the need to extend the design completion date to permit a proper interface between facility design and GFE to be procured. AEDC officials told us it needed

additional time to adjust the design for concurrent procurements, and verbally requested Air Force Headquarters to grant a time extension. We could not document AEDC's time extension requests for completing the design. Air Force Headquarters officials told us they could not recall AEDC making requests for additional time.

We were told that ASTF design received several reviews by an AEDC review team during each design phase and that the AEDC team periodically reviewed drawings during and at the end of each phase. The AEDC technical director stated the review team lacked sufficient personnel and variety of engineering specialties to adequately review the drawings. He stated that requests for additional staff were not satisfied because the Air Force Systems Command did not expect ASTF to be fully funded. The technical director also said the Air Force review team concentrated on assuring that the facility would meet the user's needs rather than constructibility of the design. A Corps official also stated the Air Force did not perform an adequate design review because Air Force civil engineers with design review skills were not involved in the review.

The Corps assigned a representative to the ASTF project to monitor design progress. According to the Air Force, the Corps representative participated in all reviews with the A/E between 1972 and 1977. The AEDC technical director said the Corps representative was not significantly involved in the design reviews. However, the Air Force recognized the Corps role was limited to monitoring since the Air Force, as design agent, did not fund a Corps design review. The Corps did perform a constructibility review of the project, which is not as detailed as a design review according to Corps officials. A design review involves the technical characteristics of design whereas a constructibility review involves the ability to build a project. Design changes during the bidding period were made based on the Corps' review.

The Air Force reported that it accepted the design as complete in 1977 although GFE interface requirements were based on hypothetical equipment. The specialized GFE was defined only by performance specifications as configuration of these one-of-a-kind equipment items could not be provided until the manufacturer started to design and build the equipment. The Air Force realized that with concurrent procurement contracts the construction contract might require extensive changes, depending on GFE procured. The Air Force said that it proceeded with the concurrent contracts because of perceived congressional pressures to obligate military construction funds the year they are authorized. They also said that construction delays would increase the impact of inflation on costs.

We could not document responsibility for the concurrent procurement decision, just as we were not able to document AEDC's efforts to extend the design completion date. However, in fiscal year 1977 DOD set a goal of obligating 75 percent of military construction funds appropriated that year. Officials at AEDC informed us that there was a perceived pressure to obligate such funds lest unobligated monies be reprogramed to competing projects.

COMPRESSED PROCUREMENT SCHEDULE RESULTED IN EXTENSIVE REDESIGN CHANGE ORDERS

As of February 1982, a total of 534 construction contract changes have been issued. The Air Force attributes a majority of these changes to GFE interface and to design errors and omissions.

The construction contract, awarded in August 1977, was for $261 million. The Air Force also awarded 18 contracts to procure 10 major GFE items for $68.9 million and a contract for the test instrumentation system for $32.2 million. The GFE and test instrumentation system contracts were awarded during the period August 1977 through November 1979.

As noted earlier the Air Force had established GFE performance specifications and design criteria for the designer's use. The Air Force reported that the designer used this criteria to query industry and design the ASTF around anticipated vendors' equipment. The Air Force noted that actual GFE configuration specifications were not established, therefore when GFE contracts were awarded to vendors other than those originally anticipated, serious interface problems became apparent, necessitating facility redesign change orders.

As an example, the procurement package for piping and equipment installation, designed around hypothetical equipment, presented many interface problems. Also, according to the Air Force, the complexity of the plant control system relating to construction and integration with other systems was affected by design changes. The Air Force reported that the plant control system is critical to project completion and is the major cause for extending the completion date from August 1981 to July 1984.

The original ASTF design divided the project into seven packages with a phased, sequential construction approach. Air Force officials reported that this approach recognized that GFE configurations in the design package were inadequate but that this information would be updated during the phased construction. However, these officials felt the decision to compress the procurement schedule into two essentially concurrent packages precluded timely design update.

ENCLOSURE I

The Corps performed a constructibility review of the design in 1977 and its comments and suggestions were used to modify the construction contract invitation for bids. However, Corps officials noted that GFE configurations were not known at the time of their review, thus preventing a proper review of design in those areas involving GFE. In this connection, Corps officials said that GFE contracts can be so written as to require the contractor to

--furnish interface requirements early during construction, and

--not deviate from the requirements while completing the equipment.

They believed this would help to preclude construction delays while awaiting GFE delivery. Corps officials stated that the Air Force did not meet all GFE delivery schedules as stated in the construction contract. However, they stated that the delivery of GFE did meet the actual construction contractor schedule. Equipment configuration data was delivered on time so that major tear-outs of completed construction did not occur. However, Corps officials also stated that GFE and facility interface is a source of claims for the construction contractor because the contract states that GFE interface requirements are contained in the design drawings.

Some Air Force officials have cited the unexpected successful bidding on the GFE by foreign bidders which required contract changes to interface the GFE and the ASTF as a factor for the cost overrun. However, the Air Force has since indicated the source of equipment had little effect on the outcome of changes required. Actual interface requirements were not firmly identified when the construction contract was awarded. Therefore, the unknown configuration associated with any specific design would cause interface problems regardless of who provided the GFE.

As of February 1982, 405 of the 534 construction contract changes had been negotiated as contract modifications while 129 remained unnegotiated. According to Air Force records, the source and distribution of the changes follows.

ENCLOSURE I

Source	Negotiated changes	Cost (millions)	Unnegotiated changes	Estimated cost (millions)
Design errors, omissions, and conflicts	296	$ 9.7	89	$ 8.7
Design criteria changes	24	2.4	7	1.7
Field changes and other	45	.5	10	.2
GFE interface	40	13.6	23	14.7
Total	405	$26.2	129	$25.3

There were 19 negotiated changes and 19 unnegotiated change orders costing at least $200,000. We reviewed 10 negotiated changes and 5 unnegotiated change orders estimated to cost between $200,000 and $4 million to test the Air Force's classifications of the causes of the changes. We found that most of the changes were caused by design error/omission or GFE interface problems. We identified six changes that had design problems and nine changes to correct GFE interface problems. Two of these changes were to correct both design and GFE problems.

One change was used to reimburse the construction contractor for Tennessee use taxes paid on equipment. The construction contract contains provisions that state the construction contractor would be reimbursed for these tax payments. Another change was to correct problems caused by incomplete design criteria incorporated into the original ASTF drawings.

Four changes, ranging from $1.5 million to $4 million, were settled as partial modifications and are subject to additional revisions and settlements.

We also looked at a proposed change order for the bulkhead hardware necessary to perform freejet testing. We discussed this ASTF freejet capability with Air Force officials. The Air Force testified during congressional hearings that ASTF was being designed to provide airflows required for a freejet testing capability. The design, however, did not include the necessary bulkhead hardware required for engine attachment during testing. The design of a freejet nozzle was not completely defined at the time of the construction contract award. After the expected nozzle configuration was known, a freejet bulkhead to attach a freejet nozzle was designed. The estimated cost of this bulkhead change is $5 million.

ENCLOSURE I

Current cost estimate to complete ASTF

The Air Force has attributed most of the cost overrun to the problems of equipment interface and design error. The Air Force reported that building structural, mechanical, electrical, and instrument/control interfaces assumed in the construction plans had to be revised and these revisions resulted in changes that caused the cost growth. The Air Force originally estimated it would cost $437 million to construct ASTF as shown below.

Originally Estimated ASTF Construction Costs

Construction	(millions)
Original contracts	$250.4
Changes and claims	12.5
Corps of Engineers	12.5
Total	275.4
Facility integration	
GFE, test instrumentation systems	135.5
Technical support	6.8
Systems integration equipment	12.5
Tennessee use tax (note a)	-
Management reserve	6.8
Total	161.6
Total	$437.0

a/According to the ASTF Project Manager, this applies only to Air Force-installed equipment. The tax reimbursements for GFE are included in changes and claims.

The Air Force now estimates it will cost $575.4 million, which includes an additional $138.4 million, to complete ASTF.

As shown above, the Air Force had originally estimated that the GFE and test instrumentation systems would cost $135.5 million ($121.5 million for GFE and $14 million for instrumentation systems). The Air Force was able to procure the GFE for $68.9 million later. The Air Force also awarded a $32-million contract for the test instrumentation system. Thus, the Air Force originally overestimated GFE costs and underestimated instrumentation costs. The Air Force currently estimates the GFE and instrumentation systems costs, including funds for the Automatic Test Control System, to be less than the original estimate of $135.5 million.

ENCLOSURE I

A contract for the Automatic Test Control System had not been awarded as of July 1982.

Air Force officials do not expect the cost overrun to exceed $138.4 million.

INADEQUATE MONITORING BY MANAGEMENT

The ASTF project was not monitored adequately although the Air Force established reporting requirements for monitoring project progress. GFE interface problems were identified in the early stages of the project, but officials stated the extent of the cost overrun problem was not identified until 1979.

The Air Force Directorate of Engineering and Services includes several AFRCE offices which act as field extensions for the directorate. AFRCE offices are organized primarily to assist in managing the design and contract award phases of the Air Force construction program. For design and/or construction of specific special facilities, major commands may be delegated AFRCE responsibilities. In such instances, direct communication between the designated command and engineering directorate is authorized. For the ASTF project, AFRCE responsibilities were delegated to the Air Force Systems Command and redelegated to AEDC.

On July 6, 1977, the Commander, AEDC, requested a formal headquarters review of the ASTF project. As a result, Headquarters, Air Force Systems Command, formed a Program Management Assistance Group to

--assist the ASTF Project Manager in identifying existing and potential problem areas and

--focus Systems Command Headquarters attention on issues requiring action beyond the control of the Project Manager.

The Program Management Assistance Group performed its study in 1977. It reviewed project management and technical areas, such as interface and integration control. It identified numerous problems in these areas and recommended actions to improve and/or correct deficiencies. The Group cited the concurrent award of the GFE and construction contracts as the root cause of the equipment integration problems and recommended that $20 million be set aside for interface and integration. As of January 1978 the ASTF project had approximately $50 million of unobligated funds and the Project Office identified a $20 million requirement for GFE interface and integration.

ENCLOSURE I

In January 1977 the ASTF Project Manager started regular briefings on the ASTF to the Secretary of the Air Force. The Secretary program reviews provided status reports on contracting, procurement, and construction. Air Force and Corps staff assigned to the ASTF also conducted a quarterly review of the project beginning in November 1980.

In spite of these monitoring efforts, the Air Force did not become aware of the possible extent of the cost overrun until mid-1979. In June 1980 the Air Force requested the Corps to make a detailed project review of cost and schedule to completion in light of the impacts of labor strikes, weather, and contract changes. The Air Force reviewed activation planning, the test instrumentation system, and other potential changes. The review was completed in October 1980 and was presented to senior Air Force and Corps officials in November 1980. The results of the review showed the ASTF project would experience, as a minimum, a $65 million cost overrun.

Immediately following the November 1980 briefing, the Commander, AEDC, requested a special review by a management action team of the ASTF project. Air Force officials realized there would be a significant cost overrun on ASTF, but did not know the full extent of the overrun. Objectives of the review were to

--assess the cost and schedule to completion,

--consider descoping alternatives to reduce costs,

--recommend management improvements, and

--identify lessons learned which could be applied to future projects.

The review was completed by the team in March 1981. In October 1981 the Air Force issued a summary report that estimated the cost overrun between $65 million and $136 million depending on the risks taken. The report also noted that higher headquarters involvement within the Air Force and Corps was not adequate and that AEDC did not have a properly organized and adequately staffed program office.

We discussed monitoring the ASTF project with Air Force officials assigned to the headquarters Directorate of Engineering and Services. They stated that when they delegate AFRCE responsibilities, all responsibilities are delegated to the receiving group. The Directorate delegated AFRCE responsibility to AFSC for the ASTF project. The ASTF Project Office is required to provide the Directorate with quarterly briefings on ASTF. However, one official assigned to the Directorate stated that except for the quarterly briefings, the Directorate did not significantly monitor ASTF.

The Air Force still conducts the Secretary program reviews. The Air Force and Corps still conduct quarterly reviews for headquarters officials. Air Force and Corps staff assigned to the ASTF project also have started conducting monthly reviews, placing greater emphasis on the reviews to identify potential problem areas.

Air Force plans actions to avoid problems on complex construction projects

As directed, in March 1982, the Air Force reported to the House and Senate Committees on Appropriations improvements in policy and management it will implement to prevent problems which occurred during ASTF design and construction. The potential improvements identified by the Air Force include

--The prompt procurement of GFE so that interfaces can be quickly matched to construction.

--Revising regulations to require resident AFRCE/project offices to be adequately staffed with the proper mix of skills at the beginning of large, complex construction projects.

--Revising regulations to require construction management plans that clearly designate organizational responsibilities and relationships.

--Considering several contracting methods. As directed in the yearly appropriation bill, military construction contracts are firm fixed price unless otherwise approved by the Secretary of Defense. On future contracts, the Air Force plans to review viable contracting methods, including phased construction and multiple contracts, to ensure maximum cost control through construction completion.

The Air Force also plans to increase headquarters participation on highly technical projects in their early stages. Initial memorandums of understanding defining and fixing responsibilities for design and construction agents will be developed at the headquarters level. These memorandums of understanding can later be expanded at the field level as necessary.

Establishing properly staffed project management offices and identifying organizational responsibilities and relationships should improve the management of such complex projects as ASTF. Also, considering various contracting methods should allow the services to identify the contract that would be most suitable and flexible for effective management of large projects. Timely procurement of GFE would facilitate equipment and facility integration.

AGENCY COMMENTS

DOD said that our report is a factual and fair assessment of the ASTF project. (See enc. II.) DOD also said that it is committed to improving the management of its entire military construction program, especially the large, complex projects such as ASTF.

DOD said that the Air Force and Corps recognized the potential major impact of design changes on the construction cost and schedule. However, the impact could not be predicted with any degree of confidence until details of the design changes became available. DOD stated that upon receipt of this information, beginning in the fall of 1980, revised estimates culminating with the April 1981 baseline of $138.4 million were developed. Further, that it was doubtful that given the status of design and construction an accurate cost of completion could have been developed much earlier.

We did not suggest that in the very early stages of the project it should have been known that the overrun would be as great as it is. It seems clear, however, that better management, including concern over the possible number of change orders and potential magnitude of the dollars involved, was needed. The construction contract was awarded although the Air Force was aware that extensive changes in the facility design might be required, depending on the GFE procured. As early as mid-1977, the Commander, AEDC, requested a formal headquarters review of the project. In early 1978 the Program Management Assistance Group noted that formal internal mechanisms did not exist for controlling and tracking GFE changes as they might affect the funding for the changes and the construction schedule. In 1980 the Management Action Team determined the Air Force still lacked the necessary tools to accurately track design changes and determine the impact on the construction cost and schedule. This hampered the capability to project timely estimates to completion early during the construction phase.

ENCLOSURE II

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

MANPOWER
RESERVE AFFAIRS
AND LOGISTICS

18 SEP 1982

Mr. Donald J. Horan
Director
Procurement, Logistics and Readiness Division
U.S. General Accounting Office
Washington, D.C. 20540

Dear Mr. Horan:

Reference your July 22, 1982 letter to the Secretary of Defense transmitting a draft report on the "Cost Overrun on the Aeropropulsion Systems Test Facility, Code 94 5608 (OSD Case #6025). The GAO report has been reviewed and comments are attached. The information provided in the report (when the attached comments are incorporated) is factual and the report itself is a fair assessment of the situation as it occurred.

The Department of Defense is committed to improving the management of its entire Military Construction Program, especially the large, complex projects such as the subject of this audit.

Sincerely,

James N. Juliana

James N. Juliana
Principal Deputy Assistant Secretary of Defense
(Manpower, Reserve Affairs & Logistics)

Attachment

ENCLOSURE II

DOD COMMENTS
ON
DRAFT GAO REPORT
COST OVERRUN ON THE AEROPROPULSION
SYSTEMS TEST FACILITY

1. Draft letter to Senator Sasser, Page 4, lines 20-22:

STATEMENT: The Corps of Engineers (COE) was involved in the preparation and review of final design documents, and in the determination of bid packages, constructibility and cost estimates.

COMMENT: This statement implies a greater involvement by the COE than actually existed for the design of the ASTF and STS launch complex projects. As explained in pages 6 and 7 of the report, the COE role in designing the ASTF and determining bid packages and cost estimates was limited because the Air Force was the design agent. The Air Force was also the design agent for the STS launch complex. The COE was the design agent for the remaining STS facilities at Vandenberg.

2. Report Page 11, last paragraph, lines 1-4:

STATEMENT: One change was used to reimburse GFE vendors for Tennessee use taxes paid on equipment. GFE contracts contain provisions that stated the vendors would be reimbursed for these tax payments.

COMMENT: The statement is incorrect as written and should read:

"One change was used to reimburse the construction contractor for Tennessee use taxes assessed on GFE. The construction contract contains provisions that state the construction contractor would be reimbursed for these tax payments."

3. Report Page 17-18:

The report states that the Air Force intends to initiate various management actions to prevent such future occurrences. Following is an update of the status of actions taken to date:

- The Air Force Engineering Staff is minimizing the use of government furnished equipment (GFE). Where it is necessary to provide GFE to a project, the early procurement and integration of the equipment is emphasized during all phases of design and construction.

- In highly technical facilities, resident offices have been established during the early stages of the project and manned commensurate with the project development. This provides on-site continuity throughout the design and construction of the facility.

ENCLOSURE II

- In recent R&D projects, the Air Force Engineering staff in conjunction with the COE has examined the feasibility of using variations on Firm-Fixed-Price contracts or other types of contracts to customize the procurement to fit the project.

- Recently, a panel of senior Air Force Civil Engineers developed a proposed Memorandum of Understanding to be signed with the design/construction agents to define and fix responsibilities and authority to the maximum practical extent when initiating highly technical projects.

4. Report Page 19, lines 16-18:

STATEMENT: Inadequate management contributed significantly to the $138.4 million overrun. Headquarters groups were lax in monitoring project progress. This laxity delayed recognition of the extent of the interface problem and its effect on project costs and completion time frame.

COMMENT: The report indicates that as early as January 1978 an additional funds requirement for GFE interface and integration was recognized. However, the split responsibility for design and construction, with the execution of design changes being performed by the Architect Engineer in California, placed both organizational and geographical barriers to early identification of the full effect of developing major designs changes. Sufficient information was simply not available for a construction impact analysis. Beginning in January 1980 the Air Force undertook major redesign of project elements related to GFE interface, instrumentation and controls and correction of underdesign of the extensive cable trays and conduits. This design information on the cable tray and conduits was not made available to the COE until June 1980. Package 6 - "Plant Instrumentation and Controls" and Package 4 - "Piping and Equipment Installation" was provided in May and July 1981 respectively. Thus, although both the Air Force and the Corps recognized the potential major impact on both construction cost and schedule, the Corps was unable to predict the impact with any degree of confidence until the details of the design changes were available. Upon receipt of this information beginning in the Fall of 1980 revised estimates culminating with the April 1981 baseline of $138.4 million were developed. It's doubtful that given the status of design and construction an accurate cost of completion could have been developed much earlier.

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