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# *Office of the Inspector General Inspection Report*

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*FAA Alleged Waste And Mismanagement of Air Route  
Traffic Control Centers Critical And Essential Power  
Systems Project*

*Report Number: E5-FA-7-003*

*Date: October 16, 1996*



INFORMATION: Report on FAA Alleged Waste and  
Mismanagement of ACEPS Project

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The Office of Inspector General (OIG) reviewed a complaint from Congressman Deal on behalf of a constituent. The constituent alleged waste and mismanagement occurred in the Federal Aviation Administration (FAA) Air Route Traffic Control Centers Critical and Essential Power Systems (ACEPS) Project. OIG condensed the complainant's concerns into the three allegations discussed in the attached report. Our review substantiated two of the allegations and partially substantiated the third.

We found FAA's review of technical specifications failed to identify both a power system wiring deficiency and a floor density problem, resulting in schedule delays and extra costs. In addition, unnecessary delays occurred because FAA officials approved deficient equipment testing, and they did not specify in the contract their requirements for detailed test procedure documentation. Finally, we partially substantiated a third allegation regarding unnecessary overtime and excessive warehouse costs. Because the ACEPS installation work is largely complete, we did not make any recommendations corresponding to these findings.

We appreciate the courtesies and cooperation extended by FAA personnel to our inspection team.

If I can answer any questions or be of further assistance, please feel free to contact me on x61959 or my Associate Deputy, Raymond J. DeCarli, on x61964.

Attachment

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The Honorable Nathan Deal  
U. S. House of Representatives  
Washington, D.C. 20515

Dear Congressman Deal:

Thank you for your January 4, 1996, letter on behalf of your constituent, Mr. William R. Cauthen, concerning alleged waste and mismanagement in the Federal Aviation Administration (FAA) Air Route Traffic Control Centers Critical and Essential Power Systems (ACEPS) Project. OIG condensed Mr. Cauthen's concerns into the three allegations discussed in the enclosed report. Our review substantiated two of the allegations and partially substantiated the third.

We found FAA's review of technical specifications failed to identify both a power system wiring deficiency and a floor density problem, resulting in schedule delays and extra costs. In addition, unnecessary delays occurred because FAA officials approved deficient equipment testing, and they did not specify in the contract their requirements for detailed test procedure documentation. Finally, we partially substantiated a third allegation regarding unnecessary overtime and excessive warehouse costs. Because the ACEPS installation work is largely complete, we did not make any recommendations corresponding to these findings.

If I can answer any questions or be of further assistance, please feel free to contact me on (202) 366-1959, or my Associate Deputy, Raymond D. DeCarli on (202) 366-1964.

Sincerely,

Joyce N. Fleischman  
Acting Inspector General

Enclosure



## *CONCLUSION*

This report responds to a complaint received by the Office of Inspector General (OIG), Department of Transportation, from Congressman Deal on behalf of a constituent. The constituent provided information and specific examples concerning problems on the first two Air Route Traffic Control Centers Critical and Essential Power Systems (ACEPS) installation sites: (1) the Seattle, Washington, Air Route Traffic Control Center (ARTCC); and (2) the Southern California (SoCAL) Terminal Radar Approach Control (TRACON) in San Diego. The constituent alleges FAA failed to provide adequate oversight of design specifications, test procedures, and overtime and warehouse costs, resulting in unnecessary delays and costs.

Our review substantiated two allegations and partially substantiated a third allegation regarding waste and mismanagement during the ACEPS project. We found FAA review of technical specifications failed to identify both a power system wiring deficiency and a floor density problem, resulting in schedule delays and extra costs. In addition, unnecessary delays occurred because FAA officials approved deficient equipment testing, and they did not specify in the contract their requirements for detailed test procedure documentation. Finally, we found the complainant was paid for work on equipment rewiring and retesting that resulted from deficient FAA oversight; but, we did not find warehouse rental costs excessive. Because the ACEPS installation work is largely complete, we did not make any recommendations corresponding to these findings.

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## **BACKGROUND**

In late 1989, FAA signed an Interagency Reimbursable Agreement <sup>1</sup> with the United States Air Force (USAF) to obtain electrical power equipment from Exide Electronics at 25 FAA Air Traffic Control facilities across the country. The ACEPS equipment was to provide primary and backup electrical power for TRACONs and ARTCCs. According to the agreement, "the USAF contract provides FAA with a unique opportunity to obtain well tested equipment at a competitive price without the risks and costs associated with a separate procurement for the same equipment." The first two facilities scheduled for construction were in Seattle and San Diego, where ACEPS installation started in 1992 and was completed in 1994. ACEPS installation has also been completed at 19 other FAA facilities, with installation still in process at four ARTCCs--Los Angeles, California; Miami, Florida; Memphis, Tennessee; and Jacksonville, Florida. Overall completion of the ACEPS project is scheduled for mid-1997.

Both USAF and FAA have ACEPS responsibilities. USAF is responsible for contract management in accordance with the Interagency Agreement and the Federal Acquisition Regulation (FAR). <sup>2</sup> USAF responsibilities, related to the complainant concerns, include requesting installation drawings, involving FAA in technical and cost issues, and providing all necessary contract management to meet FAA delivery schedules. FAA responsibilities include ordering and funding necessary engineering, equipment, and services; and providing necessary technical and engineering support. According to the USAF ACEPS Program Manager, FAA met its responsibilities under the agreement by providing personnel to support the ACEPS project, including a national engineering consultant, a national test director, a resident engineer on site to oversee installation, an on-site test director, and expert systems power engineers to validate system operation.

Depending on the circumstances, either Exide Electronics or FAA was responsible for unplanned contract costs. The contractor is required by FAR to inform the Government if the project can be completed within the original cost estimate for materials, labor, overhead and profit, etc. If the project cannot be completed within the cost estimate, the contractor and the Government negotiate the additional costs. If the contractor has valid reasons for cost increases, for example to meet increasing Government technical requirements, then the Government pays. However, if rework is necessary because of poor contractor workmanship, then the contractor normally has to absorb the cost.

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<sup>1</sup> Interagency Reimbursable Agreement, DTFAO1-90-Z-02014, December 1, 1989.

<sup>2</sup> The Federal Acquisition Regulation, 48 Code of Federal Regulations, Chapter 1.

Oversight of the USAF contract management occurs via the Defense Contract Audit Agency (DCAA), which audits contract costs, and the Defense Contract Audit Service, the administrative office for the ACEPS contract. DCAA is currently auditing costs for 1992 and 1993, with plans to audit each year of the ACEPS contract through project completion in 1997. DCAA did not identify for us any problems found to date at the Seattle or SoCAL sites related to the complainant allegations. In a separate OIG review, FAA acquisition of power systems, including ACEPS, is being audited.

### ***SCOPE AND METHODOLOGY***

As a part of this review, we interviewed the complainant; an Exide Electronics employee; and officials from FAA, USAF, and DCAA (see appendix A for a list of organizations contacted during our review). We also reviewed documentation provided by the complainant, FAA, USAF, and DCAA relating to the allegations. This review was conducted in accordance with the President's Council on Integrity and Efficiency's Quality Standards for Inspections.

### ***ALLEGATIONS AND OIG FINDINGS***

***Allegation 1: FAA mismanagement of the project design specifications created schedule delays, unnecessary equipment replacement, and cost increases.***

***OIG Finding: Substantiated.***

The complainant alleges FAA mismanaged the project by failing to agree on ACEPS specifications and technical drawings prior to the start of construction. FAA indecision resulted in unnecessary equipment rebuilding and rewiring at Seattle and SoCAL, and in unnecessary rebuilding of the SoCAL battery installation. We found FAA review of technical specifications did not identify both a power system wiring deficiency and a floor density problem, resulting in schedule delays and extra costs.

FAA officials, including the ACEPS Program Manager in Washington, D.C., and FAA electrical engineers in Seattle and SoCAL, noted that they reviewed design specifications for both facilities in advance of construction.<sup>3</sup> The USAF ACEPS Program Manager also stated FAA Headquarters fully met its commitment to review and approve "equipment drawings, installation drawings, and interconnection wire charts" prior to installation. However, FAA review of facility design specifications did not prevent subsequent construction changes as problems occurred during the ACEPS equipment installation. As a result, Exide Electronics, in coordination with FAA and USAF, had to undertake several major corrections, including: (1) rebuilding and rewiring the power system at both facilities, and (2) rebuilding the SoCAL battery installation.

Rebuilding and Rewiring Power System. Under original design specifications, the ACEPS power system did not provide enough voltage, resulting in electrical grounding problems. Exide Electronics discovered this problem at its Raleigh (North Carolina) Test Center after ACEPS equipment was installed in Seattle and SoCAL. To correct this deficiency, Exide Electronics recommended either rewiring the ACEPS equipment or adding equipment to the system. According to the ACEPS Project Manager, FAA elected to do a combination of both. FAA purchased additional equipment which needed to be rebuilt to make it compatible with the ACEPS system, resulting in a 2-week delay. In addition, the SoCAL TRACON Resident Engineer indicated Exide Electronics rewired internal parts of the ACEPS equipment to provide additional voltage.

A Seattle FAA electrical engineer told us he did not foresee any electrical problem when he reviewed ACEPS design specifications in advance of construction. In addition, the SoCAL Resident Engineer noted that Exide Electronics employees did not initially know enough about ACEPS equipment performance and system compatibility, resulting in the need for Exide Electronics to rewire and rebuild the equipment. However, because FAA had previously accepted the technical specifications for the initial installation, FAA was responsible to pay for the change. Since USAF did not track the costs associated with rewiring, we cannot assess whether they were excessive. However, all costs charged to the contract are subject to review by DCAA.

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<sup>3</sup> ACEPS work started at Seattle on June 4, 1992, and at SoCAL on October 26, 1992.

Rebuilding Battery Installation. The complainant contends FAA did not adequately design the SoCAL TRACON for seismic conditions, resulting in delays and increased costs. Unlike the existing facilities receiving ACEPS equipment, the SoCAL TRACON was a new building built between October 1991 and August 1993 under a contract with the United States Navy. According to the SoCAL Resident Engineer, the Navy contractors designed and built the new building with a 4-inch thick concrete slanted floor to capture any electrolyte from a flooding battery cell. After an electrical engineer and a civil engineer from FAA Facilities and Equipment had already reviewed and approved the design specifications for the SoCAL installation, and Exide Electronics was in the process of installing the battery rack,<sup>4</sup> the FAA civil engineer cautioned Exide Electronics to ensure conformance with California seismic code.<sup>5</sup> In response, Exide Electronics contracted with an architectural engineering firm from Southern California that concluded California code required the floor to be strengthened. Exide Electronics subsequently had to remove partially installed battery racks and pour concrete to achieve an overall floor thickness of approximately 12 inches. Again, FAA was responsible for the changes costing approximately \$20,000, because FAA had previously approved the original design specifications showing the standard 4-inch thick concrete floor. The SoCAL civil engineer could not explain how he failed to discover the floor deficiency when he earlier reviewed the design specifications.

In both cases, FAA review of design specifications failed to identify problems that later caused delays and additional costs in Seattle and SoCAL. An effective technical review should have identified problems before installation and avoided subsequent delays and costs. Although FAA review of ACEPS technical drawings and specifications should have been more effective, we offer no recommendations because, as of the date of this report, ACEPS installation is already in process at the remaining four sites.

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<sup>4</sup> ACEPS batteries are low maintenance, sealed, valve regulated lead acid batteries, constructed by layering an absorbent glass mat soaked with electrolyte between the battery plates.

<sup>5</sup> The California code provides specifications to ensure construction and installation of equipment incorporates the necessary precautions for earthquakes or earth tremors.

***Allegation 2: FAA: (1) required unnecessary equipment tests at the SoCAL TRACON, and (2) failed to develop test procedures at the Seattle ARTCC, resulting in delays and excessive costs.***

***OIG Finding: Substantiated.***

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The complainant contends FAA caused ACEPS delays when it: (1) performed unnecessary equipment retesting at the SoCAL TRACON, and (2) failed to develop test procedures at Seattle. We found delays occurred because an inexperienced FAA Facilities and Equipment engineer initially approved unacceptable equipment tests, and FAA failed to specify its requirements for test procedures.

Retesting at SoCAL. Under the Interagency Agreement with USAF, FAA has a responsibility to approve an Exide Electronics test plan and witness ACEPS tests. Based on successful completion of over 300 planned equipment tests at each facility, FAA would then accept the completed ACEPS project and authorize final payment to Exide Electronics. FAA officials stated FAA had met its responsibility. The tests were performed by Exide Electronics employees and FAA technicians--who were trained at the Exide Electronics Raleigh Test Center--and approved by an FAA Facilities and Equipment engineer. Although unable to specify how many ACEPS tests FAA witnessed, the SoCAL TRACON manager noted that ACEPS test results and FAA evaluations of these tests were extensive.

Many ACEPS equipment tests at SoCAL had to be redone. The complainant alleged that 95 percent of planned tests at SoCAL were already completed and approved by local FAA officials, when the FAA National Test Director ordered many tests to be redone at a cost of several thousand dollars. When the National Test Director reviewed test results 2 weeks prior to the contractor acceptance inspection,<sup>6</sup> he could not accept the high number of "incomplete" test procedures. The National Test Director noted an experienced FAA Engineering Technician designated to witness the testing was not at the TRACON but was in training for 7 weeks at the Exide Electronics Raleigh Test Center. In his place, TRACON management substituted an inexperienced Facilities and Equipment engineer who was untrained on

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<sup>6</sup> A procedure to accept completed contractor work.

the ACEPS equipment. The National Test Director was concerned Exide had completed test procedures that FAA failed to witness, and records were not kept of completed tests. We reviewed FAA documentation showing problems with a total of 58 test procedures at SoCAL, including 29 "incomplete" tests, 21 tests "not done," 4 tests to "redo," and 4 tests with "no FAA signature." Although acknowledging the National Test Director was in charge, the SoCAL TRACON manager was not convinced that all the retesting was necessary. However, the Exide Electronics Test Engineering Manager agreed that certain testing was inadequate or invalid, and other testing was performed on ACEPS equipment before all engineering modifications were made. The Facilities and Equipment engineer estimated that FAA had to repeat 20 equipment tests, while the National Test Director indicated that a larger, although unspecified, number of tests had to be repeated. Neither FAA nor USAF could provide specific information on costs associated with equipment retesting, although the SoCAL TRACON Manger estimated retesting delayed use of ACEPS equipment by 3 months.

Test Procedures at Seattle. Separate from acceptance testing, Exide Electronics was also required under the contract and the Interagency Reimbursable Agreement to provide FAA with "test procedures." FAA technicians use test procedures, after contract acceptance, to troubleshoot and maintain the ACEPS equipment without Exide Electronics assistance. We found Exide Electronics initially provided FAA, shortly after Exide Electronics started work on the Seattle installation, with test procedures already developed for, and accepted by, USAF customers.

According to the Seattle National Airspace System (NAS) Coordinator, FAA was not satisfied with the level of technical detail in these procedures. Based on the critical nature of its air traffic operations and the availability of maintenance technicians on site 24 hours a day, FAA required more detailed test procedures, so equipment can immediately be returned to service without maintenance support from Exide Electronics. FAA officials specified their additional test procedure requirements by "red-lining" the test procedures throughout the Seattle installation period. FAA required test procedure revisions in three areas: (1) to make the procedure language more understandable for an FAA technician, (2) to insert missing steps, and (3) to expand underdeveloped test procedures. For example, Exide Electronics initially prepared standard test procedures that did not provide the

circuitry information FAA technicians needed to maintain the internal circuit board in the uninterruptable power supply module. Although it is standard practice to perfect test procedures during the installation, the Seattle NAS Coordinator noted the ACEPS test procedures had "a lot of problems." He attributed these problems, in part, to the "last minute" ACEPS contract with USAF that did not specify more rigorous FAA requirements for test procedures.

In a resulting team effort between FAA and Exide Electronics, test procedures were rewritten to provide the necessary information. Although there was no additional cost involved in rewriting the test procedures, the rewrite took approximately 4 months. However, the Seattle NAS Coordinator described the overall impact as "negligible." As of August 1996, Seattle was still "fine tuning" its test procedures, which are the same in all ARTCCs receiving ACEPS equipment.

Based on our review, FAA appropriately required retesting and rewritten test procedures to ensure ACEPS equipment functioned correctly and could be adequately maintained. However, unnecessary delays occurred because FAA officials: (1) initially approved deficient equipment testing, and (2) did not specify in the contract their requirements for detailed test procedure documentation. To avoid any unnecessary test repetition, and associated delays, in the remaining four ACEPS installations, the FAA National Test Director and on-site FAA managers need to ensure adequate oversight of remaining ACEPS equipment tests.

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**Allegation 3: The FAA poor management resulted in excessive overtime earnings and warehouse rental costs at the SoCAL TRACON and Seattle ARTCC.**

***OIG Finding: Partially substantiated.***

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The complainant alleges earning almost \$40,000 for overtime required by the changes and schedule delays caused by FAA poor management. He also alleges poor FAA planning resulted in unnecessary warehouse rental for storage of ACEPS equipment awaiting installation. We found the complainant was paid for work on equipment rewiring and retesting

that resulted from deficient FAA oversight discussed in allegations 2 and 3, but we did not find warehouse rental costs excessive.

Overtime Earnings. According to the USAF Program Manager, the complainant charged 2,792.5 hours during the period November 12, 1992, through December 15, 1993. This period included the complainant's work on both the SoCAL TRACON and Seattle ARTCC ACEPS projects. The complainant stated his overtime work involved both equipment rewiring and retesting. We reviewed the data provided by USAF and the complainant and determined the project was billed an average of 11 overtime hours per week during the 13-month period. According to the USAF Program Manager, it is not unusual for an employee in the program to work 11 overtime hours per week. Although all labor charges and overtime costs are subject to audit by DCAA, as discussed previously, some labor costs could have been avoided by FAA.

Warehouse Rental. We determined FAA shipped equipment to a warehouse near each job site. FAA chose to store the equipment at each job site instead of at manufacturer facilities in order to facilitate installation and meet project milestones. FAA would have incurred comparable warehouse rental costs in either event. This issue was addressed in our prior report (Number E5-FA-5-001), and we continue to find the FAA warehouse approach reasonable.

**APPENDIX A**

**ORGANIZATIONS CONTACTED**

FAA Headquarters, Washington, D.C.

Seattle ARTCC, Seattle, WA

SoCAL TRACON, San Diego, CA

USAF, McClellan Air Force Base, CA

DCAA Eastern Region, Chapel Hill Sub Office, Chapel Hill, NC

**APPENDIX B**

**ACRONYMS**

ACEPS ARTCC Critical and Essential Power Systems

ARTCC Air Route Traffic Control Center

DCAA Defense Contract Audit Agency

FAA Federal Aviation Administration

FAR Federal Acquisition Regulation

NAS National Airspace System

OIG Office of Inspector General

SoCAL Southern California

TRACON Terminal Radar Approach Control

USAF United States Air Force

***APPENDIX C***

***INSPECTION TEAM MEMBERS***

Mark E. Peters	Regional Inspections Manager
Catherine P. Pyles	Senior Technical Analyst
Larry K. Herdzina	Project Manager
Karen A. Higgs	Analyst