Audit Report

OFFICE OF THE INSPECTOR GENERAL

EFFECTIVENESS OF THE AIR FORCE'S NEUTRON RADIOGRAPHY INSPECTION SYSTEMS

Report No. 92-015 November 22, 1991

Department of Defense

The following acronyms are used in this report.

PRAM.....Productivity, Reliability, Availability, and Maintainability Program

RDT&E.....Research, Development, Test and Evaluation

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884

November 22, 1991

MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY (FINANCIAL MANAGEMENT)
ASSISTANT SECRETARY OF THE AIR FORCE (FINANCIAL MANAGEMENT AND COMPTROLLER)

SUBJECT: Audit Report on the Effectiveness of the Air Force's Neutron Radiography Inspection Systems (Report No. 92-015)

We are providing this final report for your review and use. It addresses the use and funding of the Air Force's neutron radiography inspection systems.

DoD Directive 7650.3 requires that all audit recommendations be resolved promptly. Therefore, the Assistant Secretary of the Navy (Financial Management) and the Assistant Secretary of the Air Force (Financial Management and Comptroller) are requested to provide final comments on the unresolved recommendations and monetary benefits by January 21, 1992. See the "Status of Recommendations" section at the end of each finding for the unresolved recommendations and the specific requirements for your comments.

As required by DoD Directive 7650.3, the comments should indicate concurrence or nonconcurrence in the findings and each recommendation addressed to you. If you concur, describe the corrective actions taken, the estimated completion dates for actions already taken, and the estimated completion dates of planned actions. If you nonconcur, please state your specific reasons. If appropriate, you may propose alternative methods for accomplishing desired improvements.

If you nonconcur with the estimated monetary benefits or any part thereof, you must state the amount you nonconcur with and the basis for your nonconcurrence. Recommendations and potential monetary benefits are subject to resolution in accordance with DoD Directive 7650.3 in the event of nonconcurrence or failure to comment. We also ask that your comments indicate concurrence or nonconcurrence with the internal control weaknesses highlighted in Part I.

The courtesies extended to the audit staff are appreciated. If you have any questions on this audit, please contact Mr. Dennis Payne at (703) 614-6227 (DSN 224-6227) or Mr. James Kornides at (703) 614-6223 (DSN 224-6223). The planned distribution of this report is listed in Appendix D.

E. R. Jones

Edward R. Jones
Deputy Assistant Inspector General
for Auditing

Enclosure

cc:
Secretary of the Navy
Secretary of the Air Force
Assistant Secretary of Defense (Production and Logistics)

Office of the Inspector General, DoD

AUDIT REPORT NO. 92-015 **November 22, 1991**
(Project No. 1LB-0019)

EFFECTIVENESS OF THE AIR FORCE'S NEUTRON RADIOGRAPHY INSPECTION SYSTEMS

EXECUTIVE SUMMARY

Introduction. The Air Force maintains facilities at the Sacramento Air Logistics Center containing a Maneuverable Neutron Radiography Inspection System, procured to detect hidden corrosion without disassembly of aircraft, and a Stationary Neutron Radiography Inspection System, procured to detect hidden corrosion in components removed from aircraft. The Maneuverable system became operational in December 1989. The Stationary system became operational in April 1991. The cost to develop and construct the systems was $23.8 million.

Objectives. Our objective was to evaluate the effectiveness of the neutron radiography inspection systems' ability to reduce maintenance costs. Specifically, we determined if joint use by all Military Departments would reduce DoD's weapon system maintenance costs. We also evaluated compliance with laws and regulations and the effectiveness of applicable internal controls.

Audit Results. The neutron radiography inspection systems developed by the Air Force are capable of detecting hidden corrosion in aircraft. However, the plans to use the systems need to be reevaluated and funds used to procure the Stationary system need to be adjusted.

- o Expected work load for the Stationary Neutron Radiography Inspection System has diminished and the system will not be fully utilized. As a result, DoD will not obtain full value for its $16 million investment (Finding A).

- o The Maneuverable Neutron Radiography Inspection System has been used infrequently since becoming operational in December 1989, and it is causing unnecessary out of service time on aircraft that are inspected. As a result, the Air Force is not achieving economic or operational benefits from the Maneuverable system (Finding B).

- o The Air Force improperly obligated funds to acquire $10.9 million of equipment and other items needed to establish the Stationary Neutron Radiography Inspection System. As a result, the procurements were not in compliance with United States Code, title 31, section 1301, and DoD and Air Force regulations (Finding C).

Internal Controls. The audit revealed material internal control weaknesses, which are described in Finding C. Additional details are provided in the Internal Controls section of Part I of this report.

Potential Benefits of Audit. We estimated that potential monetary benefits over the 6-year Future Years Defense Program from implementing the report's recommendations are at least $15.6 million (see Appendix B).

Summary of Recommendations. We recommended that analyses be performed to determine the most cost-effective means for increasing the utilization of the Stationary Neutron Radiography Inspection System, that use of the Maneuverable Neutron Radiography Inspection System be discontinued, and that actions be taken to correct the improper funding of the Stationary Neutron Radiography Inspection System.

Management Comments. The Air Force agreed to take the recommended corrective actions on utilization of the Stationary Neutron Radiography Inspection System, disagreed with the recommendation to discontinue use of the Maneuverable Neutron Radiography Inspection System, and agreed that funds had been improperly used to develop the Stationary Neutron Radiography System but disagreed with the amount. The Navy did not provide comments.

Comments are required from the Assistant Secretary of the Navy (Financial Management) and additional comments are required from the Assistant Secretary of the Air Force (Financial Management and Comptroller) by January 21, 1992. Part II of this report includes a full discussion of the responsiveness of management to this report. Part IV contains a complete copy of management's comments.

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This report was prepared by the Logistics Support Directorate, Office of the Assistant Inspector General for Auditing, DoD. Copies of the report can be obtained from the Information Officer, Audit Planning and Technical Support Directorate, (703) 693-0340.

PART I - INTRODUCTION

Background

Corrosion, including hidden corrosion, costs the Air Force an estimated $718 million annually. It can also cause safety related accidents and can contribute to loss of aircraft. The Air Force has made detection of hidden and inaccessible corrosion its number one logistics research need.

X-ray technology has been the principle means to detect internal corrosion damage in aluminum honeycomb panels used on several types of military aircraft. Early stage corrosion within honeycomb panels is generally not visible through x-ray technology. Neutron radiography, because of its ability to detect small amounts of moisture within the panels that can lead to corrosion damage, has been seen as a means of overcoming this limitation.

The Air Force has constructed facilities at the Sacramento Air Logistics Center that contain a Maneuverable Neutron Radiography Inspection System (Maneuverable system) and a Stationary Neutron Radiography Inspection System (Stationary system). The Maneuverable system was procured to detect hidden corrosion without disassembly of aircraft. The Stationary system was procured to detect hidden corrosion in components removed from the aircraft. The cost to develop and construct the neutron radiography inspection systems at the Sacramento Air Logistics Center was $23.8 million.

Objectives

Our objective was to evaluate the effectiveness of the neutron radiography inspection systems' ability to reduce maintenance costs. Specifically, we determined if joint use by all Military Departments would reduce DoD's weapon system maintenance costs. We also evaluated compliance with laws and regulations and the effectiveness of applicable internal controls.

Scope

Review of activities and records. The audit was performed at the Sacramento Air Logistics Center, McClellan Air Force Base, Sacramento, California. Military Department headquarters and selected field activities were also visited to obtain information related to corrosion damage detection and repair methodologies and problems. We also evaluated records on funding and development of the neutron radiography inspection systems, and records on use of the neutron radiography inspection systems by the Military Departments during FY 1990 and planned use of the facilities during FY 1991, 1992, and 1993.

Engineering specialists. Engineering specialists from the Office of the Inspector General, DoD, assisted the auditors in evaluating the capabilities of the neutron radiography inspection systems.

Auditing standards. This economy and efficiency audit was made from January through June 1991 in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD, and accordingly, included such tests of internal controls as were considered necessary. Activities visited or contacted are listed in Appendix C.

Internal Controls

Controls assessed. We evaluated the effectiveness of internal controls established by the Military Departments to comply with applicable laws and regulations during procurement and use of the neutron radiography inspection systems.

Internal control weaknesses. The audit identified material internal control weaknesses as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38. Controls were not effective to ensure that the Air Force used proper funds to procure the Stationary system. Recommendations C.1., C.2., and C.3. in this report, if implemented, will assist in correcting these weaknesses. As detailed in Finding C, $10.9 million of funds were improperly charged and need to be adjusted. A copy of the final report will be provided to the senior officials responsible for internal controls within the Air Force.

Prior Audits and Other Reviews

There has not been any coverage of this specific topic in the last 5 years.

PART II - FINDINGS AND RECOMMENDATIONS

A. UTILIZATION OF THE STATIONARY NEUTRON RADIOGRAPHY INSPECTION SYSTEM

The Stationary Neutron Radiography Inspection System will not be fully utilized. This condition exists because the F-111 aircraft, the primary aircraft the system was designed to inspect, is rapidly being phased out of the Air Force's inventory and expanded use of the Stationary system has not been adequately evaluated and planned. As a result, DoD will not obtain full value for its $16 million investment.

DISCUSSION OF DETAILS

Background

The Stationary system was justified and developed by the Air Force primarily to inspect components, which are routinely removed from F-111 aircraft, for internal corrosion. The Stationary system employs a nuclear reactor as the source of power for generating neutrons that detect moisture within the components that can lead to corrosion damage. The Stationary system was procured at a cost of $16 million, and it became operational in April 1991.

Utilization

Planned use. The Air Force justified the Stationary system based on an economic analysis. The economic analysis indicated that the Stationary system was needed to prevent loss of aircraft and to extend their service lives. The analysis indicated that the Stationary system would cost $10.6 million, and would be capable of inspecting at least 3,726 components (9,315 hours of work [2.5 hours per component]) annually. The system was expected to be operational in 1989 and was expected to save $13.5 million annually.

Cost overruns and delays. The Stationary system became operational in April 1991 and cost $16 million. The delay and cost growth were caused by unanticipated technical difficulties and unforeseen cost increases in the facility and equipment.

Work load diminished. The Sacramento Air Logistics Center's projected work load for the Stationary system in FY 1992 has diminished to 1,216 components (6,080 hours of work [5 hours per component]). The estimated 5 hours to inspect each component represents a doubling of the estimated 2.5 hours per component used in the economic analysis justifying the need for the Stationary system.

Causes. The reduction in work load is occurring primarily because the quantity of F-111 aircraft is being reduced, as older models are removed from the Air Force inventory. At the time of audit, there were 354 F-111 aircraft in the inventory. By FY 1992 there will be 283 F-111 aircraft and the inventory is expected to be reduced to 150 by FY 1994.

No support for budgeted work load. Despite the shrinking work load, Sacramento Air Logistics Center was budgeting (in the FY 1992 budget) 22,000 hours of work for the Stationary system, or 15,920 more hours than needed for the 1,216 components it expects to inspect. Data were not available to support the work load mix used in developing the 22,000 hours. Sacramento personnel indicated that in addition to work on F-111 aircraft components, work on the KC-135 aircraft and commercial work was anticipated. However, at the time of the audit, data supporting the claim that the Stationary system will be used for inspection of KC-135 aircraft and commercial airline components was not provided.

We concluded that data concerning future work load on KC-135 aircraft and commercial aircraft did not exist because of the structure of many of those aircraft. For example, the KC-135's airframe components are mostly sheets of metal and are not an aluminum honeycomb structure. Air Force correspondence indicated neutron radiography is ideally suited for inspecting aluminum honeycomb. The KC-135 aircraft includes only 22 small components made of aluminum honeycomb. Further, Air Force personnel indicated that the corrosion of sheets of metal is detectable through visual inspections and would not require inspections using neutron radiography.

Projected savings dimininished. As a result of the increase in the Stationary system's investment cost and the shrinking F-111 aircraft population, the projected savings that will accrue through use of the Stationary system have diminished and full benefits from the Stationary system will not occur unless additional work load is directed into the facility.

Potential work load. Other weapon systems in DoD that are candidates for use of the Stationary system include the Air Force's F-15 aircraft and the Navy's F-14 aircraft. Those aircraft have numerous components made with aluminum honeycomb. Also, according to Air Force and Navy engineering personnel, the repair process for the components of those aircraft closely resembles that used for the F-111 aircraft.

F-15 aircraft. The maintenance program for the F-15 aircraft has been classified by the Air Force as critical because of corrosion damage. Air Force maintenance records for the F-15 aircraft indicate that at least two aircraft components need continual inspection and repair due to corrosion caused by water entrapment--the horizontal stabilizers and the engine

ramps. In some cases, the presence of water entrapment and corrosion in these components has resulted in safety incidents. For example, the Air Force's FY 1991 Maintenance Requirements Review Board brochure for the F-15 aircraft indicated that water entrapment in the aircraft's horizontal stabilizer caused over 100 in-flight safety incidents.

Obstacles to Use of System on F-15 Aircraft. One of the primary obstacles to using the Stationary system on F-15 aircraft components is transportation of F-15 aircraft components to Sacramento for inspection. The F-15 aircraft components are presently X-rayed and repaired at Warner Robins Air Logistics Center, Macon, Georgia. Personnel at Warner Robins have expressed interest in the Stationary system. However, they do not feel it is economically feasible to transport aircraft components long distances to identify corrosion.

Potential Savings Outweigh Obstacles. We estimated that transportation of all the horizontal stabilizers and engine ramps, that were repaired at Warner Robins in FY 1990, to Sacramento for inspection with neutron radiography and return to Warner Robins would cost $600,000 annually. The Air Force has estimated that 20 percent of its corrosion costs are avoidable if the corrosion is detected early. Cost to repair corroded stabilizers and engine ramps was $12.2 million in FY 1990. Assuming 20 percent or $2.4 million of the $12.2 million in costs could be avoided through early detection, a net savings of $1.8 million annually could be realized by inspecting the components at Sacramento and returning them to Warner Robins for repair.

Serious Defects Missed. The Air Force may be missing serious corrosion defects using X-ray examinations of F-15 aircraft components during Program Depot Maintenance. For example, we randomly selected an F-15 aircraft aileron that was in the Air Force supply system as a ready for issue item. The aileron was inspected using neutron radiography and was found to possess such a large amount of corrosion that F-15 aircraft engineering personnel returned the component to Warner Robins Air Logistics Center for rework. Air Force personnel indicated that in-flight loss of the component could have caused catastrophic failure of an F-15 aircraft.

F-14 aircraft. The Navy has been investigating uses of the Stationary system to detect corrosion of F-14 aircraft components. The F-14 engine access doors and the engine inlet ducts have been identified by the Navy as the most corrosion prone F-14 parts. As of October 26, 1990, the Navy had 63 F-14 aircraft sitting on deck because of engine inlet corrosion problems.

Tests Conducted. In FY 1991, Navy engineering personnel ordered engine access doors to be sent to Sacramento for neutron radiography inspection to determine the capability of

the system to detect corrosion. However, Navy supply system personnel instead sent three other F-14 components (that Navy engineering personnel also wanted inspected), an auxiliary flap, a rudder, and a vertical fin. Navy depot personnel indicated that at the time the components were to be sent, the engine access doors were in short supply and none could be submitted for inspection.

By using the Stationary system, Sacramento Air Logistics Center personnel determined that the Navy's components hosted corrosion and moisture levels. They further indicated that due to the similarity of design between the F-14 aircraft and the F-111 aircraft (for which the Stationary system was designed), component fixtures and positioning of the components for neutron radiography inspection was accomplished with little modification. At the time of the audit, the Navy was evaluating the results of the inspections. No decision had been made concerning further use of the Air Force's Stationary system.

Potential Savings. We examined the feasibility of transporting the two Navy corrosion prone F-14 aircraft components (an estimated 152 engine access doors and 28 engine inlet ducts annually) to Sacramento for inspection. The estimated cost to transport and inspect the F-14 components using the Stationary system is $100,000.

Although transportation and inspection of the components at Sacramento would require additional funding, the economic benefits of using the Stationary system would outweigh those costs. For example, the FY 1990 corrosion repair cost for engine access doors and engine inlet ducts was $2.5 million. Using the Air Force's estimate that 20 percent of corrosion costs are avoidable if detected early, we estimated that $500,000 of the corrosion repair costs are avoidable. The Navy could reduce its annual corrosion repair costs of $2.5 million for these two components by $400,000 annually ($500,000 in reduced repair costs less $100,000 in transportation and inspection costs) by sending the engine access doors and engine inlet ducts to Sacramento for inspection as part of its depot level maintenance inspection procedure. These savings would accrue chiefly through early detection of corrosion before it developed into a major repair. Also, the need to ground aircraft could be reduced by detecting problems early.

Conclusions

The work load that the Air Force used to justify the Stationary system has diminished and the Air Force does not have support for the hours of work it is budgeting for the Stationary system. Other Air Force aircraft components, such as F-15 components, are not being considered as part of the future work load for the Stationary system despite the Stationary system's potential for identifying corrosion. Other DoD aircraft components, such as

the Navy's F-14 components, have been tested, but the Navy has not finalized its conclusions about the results. At the time of audit, there was no plan to integrate the system into the overall maintenance scheme for the F-14 aircraft.

RECOMMENDATIONS, MANAGEMENT COMMENTS, AND AUDIT RESPONSE

1. We recommend that the Commander, Sacramento Air Logistics Center, perform and document a thorough examination of the work load projected for the Stationary Neutron Radiography Inspection System by December 31, 1991; and determine, based on the projected work load, the correct number of hours that should be budgeted for the Stationary system, adjust the budget to reflect the actual hours that will be needed, and determine if it is still cost-effective to operate the Stationary system.

Air Force comments. The Air Force Deputy Chief of Staff (Logistics) concurred with the recommendation. The complete text of the Air Force's comments is in Part IV.

Audit response. The Air Force's comments are responsive. However, additional comments are required concerning the potential monetary benefits identified in Appendix B.

2. We recommend that the Commander, Warner Robins Air Logistics Center, identify corrosion prone F-15 aircraft components, submit samples to Sacramento for inspection, determine the cost-effectiveness of the Stationary Neutron Radiography Inspection System at preventing premature failure of components, and inform the Commander, Sacramento Air Logistics Center, of plans to use the system by November 30, 1991.

Air Force comments. The Air Force Deputy Chief of Staff (Logistics) concurred with the recommendation. The Air Force also scheduled a meeting for representatives from the Headquarters, Air Force Logistics Command; Warner Robins Air Logistics Center; Sacramento Air Logistics Center; and San Antonio Air Logistics Center to discuss uses for the Neutron Radiography Inspection System.

Audit response. The Air Force's comments are responsive. However, additional comments are required addressing the Air Force's position on the estimated monetary benefits identified in Appendix B. The actions being taken to coordinate use of the Stationary system within the Air Force should identify any additional work loads within the Air Force that would benefit cost-effectively from use of the Stationary system. We therefore request that the Air Force provide comments detailing any additional work loads identified and the economic benefits it expects to achieve.

3. We recommend that the Commander, Naval Air Systems Command, after evaluating the results of the inspections of F-14 aircraft components, determine the cost-effectiveness of the Stationary

Neutron Radiography Inspection System at preventing premature failure of components, and inform the Commander, Sacramento Air Logistics Center, of possible plans to use the system by November 30, 1991.

Navy comments. Management comments were requested from the Assistant Secretary of the Navy (Financial Management) on August 27, 1991. As of November 13, 1991, no comments had been received.

STATUS OF RECOMMENDATIONS

		Response Should Cover:			
Number	Addressee	Concur/ Nonconcur	Proposed Action	Completion Date	Related Issues*
1.	Air Force				M
2.	Air Force		X		M
3.	Navy	X	X	X	M

* M = monetary benefits

B. UTILIZATION OF THE MANEUVERABLE NEUTRON RADIOGRAPHY INSPECTION SYSTEM

The Maneuverable Neutron Radiography Inspection System has been used infrequently since becoming operational in December 1989, and it is causing unnecessary out of service time on aircraft that are inspected. Additionally, there is uncertainty about how the Maneuverable system will assist in the maintenance of aircraft. These conditions exist because the Maneuverable system does not efficiently meet its operational requirements. As a result, the Air Force is not achieving economic or operational benefits from the Maneuverable system.

DISCUSSION OF DETAILS

Background

The Maneuverable system was constructed to provide the Sacramento Air Logistics Center with the capability to test for corrosion damage in aircraft components that remain on the aircraft. The system was designed primarily to inspect the F-111 aircraft that are repaired at the Sacramento Air Logistics Center. The Maneuverable system was procured at a cost of $7.8 million, and it became operational in November 1989.

Utilization

Infrequent use. The Maneuverable system has been used infrequently since it became operational. From November 1989 to April 1991, the major use of the Maneuverable system was to program the robotic arm to inspect F-111 and F-15 aircraft components. The total time required to program the Maneuverable system on both aircraft was 119 (34 percent) of the 346 days the Maneuverable system was available.

The Maneuverable system was also used to inspect the wings and tail components of eight F-15 aircraft. The inspections of the F-15s consumed only 24 (7 percent) of the 346 days that the Maneuverable system was available. Five days were also used testing a KC-135 aircraft and an Australian aircraft. For the remaining 198 days (57 percent), the system was idle.

Reasons for low usage. The Maneuverable system was justified based on inspecting intact aircraft rather than incurring the expense of removing components for inspection. One of the primary reasons the Maneuverable system has been underused is that the system's planners did not consider that many of the components the system can inspect must be removed from the aircraft during programmed depot maintenance for other inspections. Both the F-111 and the F-15 aircraft illustrate this problem.

F-111 aircraft. The maintenance personnel for the F-111 aircraft were uncertain about how the Maneuverable system would assist in the maintenance process. The uncertainty delayed development of the utilization plan until October 1990.

Wing and Tail Inspection. The engineering personnel at Sacramento indicated that the F-111's wing and tail sections were not included in the utilization plan because the components are removed from the aircraft during programmed depot maintenance for other safety critical inspections. If radiography inspection is needed, the components can be inspected using the Stationary system without any additional out of service time for the aircraft. The engineering personnel indicated, however, that corrosion in the wing and tail section was not a significant problem on the F-111 aircraft.

Despite the conclusion that the wing and tail section do not need to be inspected using the Maneuverable system, the Air Force, at the time of the audit, was budgeting to inspect the wing and tail sections of eight F-111 aircraft in FY 1992. We estimated that these unnecessary inspections will cost $100,000 (eight aircraft at $12,500 per aircraft). It is also questionable whether any benefits would be obtained from using the Stationary system to inspect wing and tail sections.

Fuselage Components. The utilization plan included a prioritized list of 28 candidate fuselage components. After assessing the plan for the fuselage components, the Maneuverable system's operators determined that the system could inspect only 17 (61 percent) of the 28 fuselage components that the F-111 aircraft engineering personnel wanted inspected. The remaining components (11 of 28) cannot be accessed by the Maneuverable system's robotic arm.

Out of Service Time. The assessment also indicated that it would take the Maneuverable system long periods to inspect the 17 fuselage components that it can reach. The operators of the Maneuverable system stated that the flow time (time required to complete the inspection) for inspecting the 17 components that were doable on each aircraft was estimated at 4.5 weeks.

The programmed depot maintenance cycle on the F-111 aircraft is 24 weeks. The additional 4.5 weeks of out of service time was not considered acceptable by the F-111 aircraft system program office. The additional month would jeopardize the number of aircraft that could be processed through the depot each year.

In July 1991, the Sacramento Air Logistics Center decided that 2 of the 28 fuselage components would be inspected using the Maneuverable system. The two components had no history of corrosion problems, however, the inspection of the two components will require the aircraft to be out of service for only 5 additional days.

Analytical condition inspection. As an alternative to use of the Maneuverable system during programmed depot maintenance, Sacramento Air Logistics Center personnel proposed the use of the Maneuverable system during analytical condition inspections of F-111 aircraft. The analytical condition inspection is performed annually on 11 F-111 aircraft. That inspection is used to investigate areas that are not inspected during program depot maintenance to assess the need for changes in program depot maintenance requirements.

We examined the F-111 aircraft components that are inspected during an analytical condition inspection, and the 28 components that were proposed to be included in the analytical condition inspection on the F-111 aircraft (this included the 11 components that were later determined not to be accessible by the Maneuverable system's robotic arm). We concluded that the proposed inspections would create unnecessary additional work load. Most of the components (86 percent) are not currently included in the F-111's analytical condition inspection. Further, some of the fuselage panel components were previously inspected during analytical condition inspections, but a decision was made to discontinue these inspections. The Air Force was unable to demonstrate that this added work load will either reduce maintenance costs or increase safety.

F-15 aircraft. Similar conditions exist on the F-15 aircraft. The Sacramento Air Logistics Center performs program depot maintenance on 12 F-15 aircraft annually. As of the date of the audit, the Air Force had inspected the wing and tail sections on eight F-15s using the Maneuverable system (prior to their programmed depot maintenance). However, the components on the eight F-15 aircraft were later removed from the aircraft. This occurred because the components required other structural inspections during programmed depot maintenance. Here again, if radiography inspection is needed, the components can be inspected using the Stationary system without any additional out of service time for the aircraft.

As a result, the Air Force spent $100,000 inspecting F-15 aircraft with the Maneuverable system but did not achieve the desired economic benefit because the system did not prevent removal of the components. Also, the inspections performed on the eight F-15 aircraft caused each aircraft to be out of service for an additional 187 hours.

At the time of the audit, the Air Force was budgeting to inspect the wing and tail sections of 24 additional F-15 aircraft in FY 1992 with the Maneuverable system. We estimated that these unnecessary inspections will cost $300,000 (24 aircraft at $12,500 per aircraft). The cost of performing radiography inspections with the Stationary system, if required, may partially offset these savings.

Use by the Navy. In August 1990, Navy engineering personnel visited the Sacramento Air Logistics Center to investigate possible uses of the neutron radiography inspection systems. They concluded that the systems showed potential for corrosion detection and inspection of aluminum honeycomb construction. They indicated that a detailed inspection of an A-6 or F-14 aircraft in the Maneuverable system would be necessary to determine the extent that the aircraft can be inspected and the quality of the information that can be obtained. As of the date of our audit, because of funding difficulties, the Navy had not provided an aircraft for inspection using the Maneuverable system. Based on the Air Force's experience, we do not believe that use of the Maneuverable system would prove to be cost-effective.

Verification of Benefits Required

The Maneuverable system has been fully operational for 18 months but has not produced the savings that were cited in its economic analysis. The Air Force stated that it could not verify the Maneuverable system's ability to generate the claimed savings because the Maneuverable system had not been used enough to prove its potential. Verification of benefits is required by Air Force Logistics Command Regulation 66-22, table 1., "Validation and Verification Requirements," 12 to 18 months after a system becomes operational. Future work load does not appear to be adequate to justify the continued use of the Maneuverable system.

RECOMMENDATION, MANAGEMENT COMMENTS, AND AUDIT RESPONSE

We recommend that the Commander, Sacramento Air Logistics Center, discontinue using the Maneuverable Neutron Radiography Inspection System on the F-111 and F-15 aircraft, and establish a plan for the disposition of the system that will maximize the recovery of expenditures made for it.

Air Force comments. The Air Force Deputy Chief of Staff (Logistics) nonconcurred with the recommendation. He stated that Air Force weapon system engineers had evaluated how best to apply the Maneuverable system by selecting panels that are not designed to be removed from the aircraft and have a history of failure due to corrosion. He stated that the current work load for the Maneuverable system included 26 F-111 aircraft and 24 F-15 aircraft. He also stated that there is no system worldwide that duplicates the capabilities of the Maneuverable system, and "a decision to dismantle it at this time would be premature." The complete text of the Air Force's comments is in Part IV.

Audit response. We performed a detailed review during the audit of the Air Force's plan to use the Maneuverable system to inspect F-111 fuselage panel components. No records supporting the position that these panel components had a history of failure due to corrosion were furnished. As stated in this report, the Air Force was unable to demonstrate that using the Maneuverable

system to inspect these panel components will either reduce maintenance costs or increase safety. We still conclude that this use of the Maneuverable system would create an unnecessary additional work load and would create unnecessary out of service time for aircraft that are inspected.

After more than 18 months of operation, the Air Force has not identified a viable work load for the Maneuverable system that will either reduce maintenance costs or significantly increase safety, therefore, we believe it would be imprudent to further retain the Maneuverable system. We request that the Air Force reconsider its position on retention of the Maneuverable system in its response to the final report.

The Air Force's comments did not address the estimated savings of $2.4 million (see Appendix B) of depot maintenance costs over the 6-year Future Years Defense Program that we estimated could be obtained from not using the Maneuverable system to examine wing and tail components that are removed from F-111 and F-15 aircraft during programmed depot maintenance. This includes $600,000 for the F-111 aircraft ($100,000 annually) and $1.8 million ($300,000 annually) for the F-15 aircraft. We also request that the Air Force provide comments on the estimated monetary benefits.

C. FUNDING THE AIR FORCE'S STATIONARY NEUTRON RADIOGRAPHY INSPECTION SYSTEM

The Air Force improperly obligated funds from its industrial fund and aircraft procurement appropriations to acquire $10.9 million of equipment and other items needed to establish a prototype Stationary Neutron Radiography Inspection System. This occurred because internal controls were not sufficient to ensure compliance with public law and regulations. As a result, these procurements were not in compliance with United States Code, title 31, section 1301, and DoD and Air Force regulations.

DISCUSSION OF DETAILS

Background

Approved funding source. The Stationary system was approved for inclusion in the Air Force's Productivity, Reliability, Availability, and Maintainability (PRAM) program in June 1986 by the PRAM program's General Officer Steering Group. The PRAM program's charter authorizes investment in prototype projects that are expected to reduce the support costs of in-service weapon systems and equipment. Funding for PRAM projects is provided from the Research, Development, Test and Evaluation (RDT&E) appropriation. The PRAM program office indicated that the Stationary system was to be incrementally funded, beginning in FY 1987, and was expected to require $10.6 million of RDT&E funds to complete.

Congressional notification. In February 1987, the Air Force informed Congress of plans to construct the Stationary system. The Air Force told Congress that the project was a prototype and would be funded using RDT&E appropriations. The project was approved in March 1987, and a contract was awarded by the Sacramento Air Logistics Center to procure the Stationary system.

Public law and regulations. United States Code, title 31, section 1301 requires that funds be used only for the purposes for which they were appropriated. DoD Directive 5010.38, "Internal Management Control Program," April 14, 1987, requires that each DoD Component implement an internal management control program to ensure that obligations comply with applicable law. Air Force Regulation 177-16, "Administrative Control of Appropriations," November 30, 1988, section A, paragraph 40.a., states that the Accounting and Finance Office and individuals authorized to certify fund availability are responsible to ensure that proper funds are used. When an obligation is charged to the wrong account, corrections must be made to charge the proper appropriation or fund.

DoD Budget Guidance Manual 7110-1-M, section 5, "Research, Development, Test and Evaluation (RDT&E)," chapter 251.3, states that it is DoD policy that all effort related to RDT&E should be funded in the RDT&E appropriations, so that all such programs can

be assessed from a priority standpoint. When there is doubt as to the proper assignment of costs between appropriations, the issue should be resolved in favor of using RDT&E funding.

Funding of the Stationary Neutron Radiography Inspection System

Noncompliance. The Air Force Logistics Command Headquarters and the Sacramento Air Logistics Center did not comply with United States Code, title 31, section 1301, and DoD and Air Force regulations governing the use of appropriations during the procurement of the Stationary system. They made up for shortfalls in RDT&E funding for the Stationary system by improperly using $10.9 million of industrial fund and aircraft procurement appropriations. We attributed this to the lack of sufficient internal controls to ensure compliance with the public law and DoD and Air Force regulations.

Funding sources. As detailed in Appendix A, the Air Force obligated through August 1990, $16,026,983 of funds to construct the Stationary system. This included only $5,170,222 of RDT&E funding. The remaining $10,856,761 was improperly obligated from industrial fund and aircraft procurement appropriations.

Documentation of funding decisions. The Sacramento Air Logistics Center did not maintain an audit trail documenting its decision to use the industrial funds or aircraft procurement appropriations on the contract. However, in a memo to the Air Force Logistics Command Headquarters in May 1988, the Sacramento Air Logistics Center stated that it had funded a PRAM shortfall in FY 1987 of more than $3 million.

Additional RDT&E funding shortfalls occurred in FY 1988 and FY 1989 because of the decision by the PRAM program office in April 1988 to terminate its financial sponsorship of several high dollar projects, including the Stationary system. This resulted in the loss of $3,320,000 in RDT&E funding for the Stationary system. These terminations were caused by the PRAM program office not receiving an expected increase in its budget authority.

Sacramento Air Logistics Center personnel indicated that the industrial funds and aircraft procurement appropriations had been budgeted for other lower priority projects. Because of the PRAM shortfall, they decided to use other available funds for the Stationary system rather than slow down or discontinue work. Such decisions were not documented, and Congress was not informed of the fund transfers.

Reprogramming requirements. Congress authorizes and appropriates funds to be used for programs that are either specifically stated in statutory language or discussed in the committee reports that cover the intent of Congress and accompany authorization and appropriation Acts. Congress also recognizes that unforeseen requirements develop after passage of

appropriation Acts, during the execution phase of a budget. In response, Congress has established reprogramming procedures and thresholds. Reprogramming is the generic term for transfers between appropriations as well as movement of funds between programs within the same appropriation. A reprogramming must have the prior approval of Congress if it involves the transfer of funds between appropriation accounts. In addition, Congress must be notified before implementing any reprogramming that will result in a cumulative increase of $4 million in an RDT&E program. Air Force Regulation 172-1, "USAF Budget Policies and Procedures," volume I, chapter 2, paragraph 2-5, provides policy and guidance on reprogramming.

Reprogramming approval. There was no evidence that any actions had been taken by the Air Force to obtain congressional approval for the reprogramming of $6,212,161 from the industrial fund appropriation and $4,454,600 from the aircraft procurement appropriation to finance the Stationary system.

Although the $190,000 of minor construction funds from the industrial fund appropriations expended for providing access for the Stationary system did not require congressional approval (United States Code, title 10, section 2805), Air Force regulations indicate that the expenditure was properly chargeable to the RDT&E appropriation, not the industrial fund appropriation. Air Force Regulation 172-1, paragraph 13-6.d(1)e states that the types of costs to be financed by the RDT&E appropriation include the installation (including access) of equipment or instrumentation required for RDT&E. Since access was included as a part of the RDT&E system that was approved by Congress, it should have been funded from the RDT&E appropriation.

RECOMMENDATIONS, MANAGEMENT COMMENTS, AND AUDIT RESPONSE

We recommend that the Commander, Sacramento Air Logistics Center, and the Commander, Air Force Logistics Command, in conjunction with the Assistant Secretary of the Air Force (Financial Management and Comptroller):

1. Determine and make the appropriate accounting adjustments to reimburse the $10,856,761 of aircraft procurement, industrial fund, and military construction appropriations that were improperly used to procure the Stationary Neutron Radiography Inspection System.

Air Force comments. The Air Force Deputy Chief of Staff (Logistics) partially concurred with the recommendation stating that $3,304,089 of aircraft procurement and industrial fund appropriations had been improperly obligated. The Air Force stated that the remaining $7,552,672 had been charged to the correct appropriations.

The $7,552,672 included $1,299,500 of aircraft procurement funds and $6,063,172 of industrial funds that the Air Force claimed had been properly used to procure parts for the Stationary system that the Air Force considered to be a lay-in of depot level support equipment. The Air Force stated that Air Force Regulation 172-1, Volume IV, October 1987, and SAF/ACMB Message 251800Z, May 1989, allowed the Air Force to properly charge aircraft procurement and industrial fund appropriations for depot level support equipment.

The Air Force also stated that the $190,000 of military construction appropriations cited in the draft report were from minor construction industrial fund appropriations, and that Air Force Regulation 172-1, Volume IV, October 1987, provides for charging minor construction funding to the industrial fund. The full text of the Air Force's comments is in Part IV.

Audit response. We disagree with the Air Force's position that $7,552,672 of aircraft procurement and industrial fund appropriations were properly used to develop the prototype Stationary system. We have clarified in this final report that the $190,000 of construction funding cited in the draft report were minor construction funds obtained from the industrial fund appropriations.

Although we agree that aircraft procurement and industrial fund appropriations can be used to procure depot level support equipment, the items procured for the prototype Stationary system with those appropriations were not depot level support equipment items. They were an integral part of the prototype Stationary system. The minor construction funding was also used to develop the prototype Stationary system.

From inception, the Air Force justified and categorized the development of the prototype Stationary system as being a RDT&E project and all correspondence, including that provided to Congress, indicated that development of the prototype Stationary system would be funded entirely from RDT&E appropriations. Our detailed review showed that all $10,856,761 of funding cited in this finding were directly related to the development of the prototype Stationary system. We request that the Air Force reconsider its position and provide full concurrence in its response to the final report.

2. Monitor actions to implement Recommendation 1. to determine if they cause an overobligation in the appropriation accounts. If overobligations occur, follow Air Force Regulation 177-16, "Administrative Control of Appropriations," paragraph 49, which provides procedures for reporting alleged antideficiency violations and paragraph 55, which outlines recommended disciplinary action for those officials who authorized the improper use of funds.

Air Force comments. The Air Force Deputy Chief of Staff (Logistics) partially concurred with the recommendation stating that if current budgetary guidance for program adjustments allows, actions to implement applicable corrections will be made. The Air Force disagreed with taking any disciplinary actions against those officials who authorized the improper use of funds.

Audit response. The Air Force is required by Air Force Regulation 177-16 to make corrections to charge the proper appropriations when errors are discovered and to take disciplinary actions against the responsible officials in the event of anti-deficiency violations. We know of no current budgetary guidance that allows the Air Force flexibility to dismiss these requirements. We request that the Air Force reconsider its position and provide full concurrence in its response to the final report.

3. Report and track the material weaknesses related to compliance with the requirements of United States Code, title 31, section 1301; DoD Budget Guidance Manual 7110-1-M; and Air Force Regulations 172-1 and 177-16, as required by DoD Directive 5010.38, "Internal Management Control Program."

Air Force comments. The Air Force Deputy Chief of Staff (Logistics) nonconcurred with the recommendation stating that current funding policy and management practices for the Air Force industrial fund ensure compliance with public law and regulations.

Audit response. We agree that policy exists that provides for compliance with public law and regulations. However, the implementation of this policy has not been fully effective, as evidenced by the Air Force's agreement that at least $3.3 million of funds had been improperly obligated. The improper obligations were undetected and unchallenged until this audit was performed. DoD Directive 5010.38 requires that such material weaknesses be reported and tracked. We request that the Air Force reconsider its position in its response to the final report.

STATUS OF RECOMMENDATIONS

		Response Should Cover:			
Number	Addressee	Concur/ Nonconcur	Proposed Action	Completion Date	Related Issues*
1.	Air Force	X	X	X	IC
2.	Air Force	X	X	X	IC
3.	Air Force	X	X	X	IC

* IC = internal controls

PART III - ADDITIONAL INFORMATION

APPENDIX A - Appropriations Used to Fund Procurement of the Stationary Neutron Radiography Inspection System

APPENDIX B - Summary of Potential Monetary and Other Benefits Resulting from Audit

APPENDIX C - Activities Visited or Contacted

APPENDIX D - Report Distribution

APPENDIX A: APPROPRIATIONS USED TO FUND PROCUREMENT OF THE STATIONARY NEUTRON RADIOGRAPHY INSPECTION SYSTEM

Date Funds Obligated	TYPE OF FUNDS RDT&E	Industrial Fund Investment	Industrial Fund Expense	Aircraft Procurement	Use of Funds */
Mar 87	$2,950,000	$	$	$	1
Mar 87			190,000		2
Jun 87		3,155,087			3
Sep 87		148,989			4
Dec 87				155,100	5
Apr 88	1,900,000				6
Jul 88	290,000				6
Sep 88	30,222				6
Sep 88		402,618			7
Sep 88		10,000			8
Sep 88			69,572		9
Sep 88				3,000,000	10
Apr 89		473,017			11
May 89		38,000			12
May 89		52,000			12
May 89		26,050			12
Sep 89			878,956		13
May 90				1,299,500	14
Aug 90		90,000			15
Aug 90		50,465			15
Aug 90			817,407		16
TOTAL	$5,170,222	$4,446,226	$1,955,935	$4,454,600	

*/ Use of funds explanation

1. Engineer, construct, and install shield and containment for nuclear reactor
2. Construct and install access, passageway, and security fence
3. $3,019,778: Fabricate and install component positioning system, neutron imaging system, and imaging interpretation system
   $135,309: Fabricate and install component inspection system
4. Training for reactor operators
5. Design, manufacture, test and install single pulse rod system, pneumatic transfer system and provide a notch in the reactor tank
6. Engineer, construct, and install shield and containment for nuclear reactor
7. Design, manufacture, test, and install equipment, shield, and containment for nuclear reactor changes
8. Compensate the contractor for flood damages during the month of October 1987
9. Design, manufacture, test, and install equipment changes

APPENDIX A: APPROPRIATIONS USED TO FUND PROCUREMENT OF THE STATIONARY NEUTRON RADIOGRAPHY INSPECTION SYSTEM (cont'd)

10. $1,891,169: Engineer, construct, and install shield and containment for nuclear reactor
    $1,108,831: Design, manufacture, test, and install Beam Bay No. 3 inspection equipment
11. Install passageway and surfaces, and obtain general documentation
12. Install security system
13. $347,721: Perform acceptance tests for parts, provide manuals, and perform analysis
    $450,000: Provide design and engineering manuals and spare parts documentation
    $81,235: Provide component inspection system and minutes of formal reviews
14. Design, manufacture, test, and install Beam Bay No. 3 equipment
15 Manufacture, test, and install equipment changes
16. Provide spare parts

APPENDIX B: SUMMARY OF POTENTIAL MONETARY AND OTHER BENEFITS RESULTING FROM AUDIT

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
A.1.	Program Results. The budget for the Stationary system's work load may be reduced based on a thorough examination of the projected work.	Funds Put to Better Use. The actual amount of the reduction cannot be determined until the budgeted work-load figures are reexamined and adjusted.
A.2.	Economy and Efficiency. Expanded use of the Stationary system to include inspection of F-15 aircraft components that have a history of corrosion problems would enable the Air Force to reduce the amount of corrosion repair costs on the F-15 aircraft.	Funds Put to Better Use. The Air Force could save $10.8 million of depot maintenance costs over the 6-year Future Years Defense Program ($1.8 million annually).
A.3.	Economy and Efficiency. Expanded use of the Stationary system to include inspection of F-14 aircraft components that have a history of corrosion problems would enable the Navy to reduce the amount of corrosion repair costs on the F-14 aircraft.	Funds Put to Better Use. The Navy could save $2.4 million of depot maintenance costs over the 6-year Future Years Defense Program ($400,000 annually).

APPENDIX B: SUMMARY OF POTENTIAL MONETARY AND OTHER BENEFITS RESULTING FROM AUDIT (cont'd)

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
B.	Economy and Efficiency. The Air Force could reduce costs and the out of service time on the F-111 and F-15 aircraft by not using the Maneuverable system to examine wing and tail components that are removed from the aircraft during programmed depot maintenance.	Funds Put to Better Use. The Air Force could save $2.4 million of depot maintenance costs over the 6-year Future Years Defense Program ($400,000 annually).
C.1.	Compliance with Regulations and Laws. Proper funds will be used to procure the Stationary system.	Nonmonetary.
C.2.	Compliance with Regulations and Laws. Helps ensure implementation of Recommendation C.1.	Nonmonetary.
C.3.	Compliance with Regulations and Laws. Helps ensure implementation of Recommendations C.1. and C.2.	Nonmonetary.

APPENDIX C: ACTIVITIES VISITED OR CONTACTED

Office of the Secretary of Defense

Deputy Assistant Secretary of Defense (Logistics), Office of the Assistant Secretary of Defense (Production and Logistics), Washington, DC

Department of the Army

Chief of Staff for Logistics, Office of the Deputy Chief of Staff for Logistics, Washington, DC

Department of the Navy

Chief of Naval Operations, Washington, DC
Headquarters, Naval Air Systems Command, Arlington, VA
Naval Aviation Maintenance Office, Patuxent River, MD
Naval Aviation Depot, Alameda, CA
Naval Aviation Depot, Norfolk, VA

Department of the Air Force

Deputy Chief of Staff (Logistics and Engineering), Washington, DC
Air Force Logistics Command, Wright-Patterson Air Force Base, OH
Wright Laboratories, Wright-Patterson Air Force Base, OH
Sacramento Air Logistics Center, McClellan Air Force Base, CA
Warner Robins Air Logistics Center, Robins Air Force Base, GA
San Antonio Air Logistics Center, Kelly Air Force Base, TX

APPENDIX D: REPORT DISTRIBUTION

Office of the Secretary of Defense

Assistant Secretary of Defense (Production and Logistics)
Assistant Secretary of Defense (Public Affairs)
Comptroller of the Department of Defense

Department of the Navy

Secretary of the Navy
Assistant Secretary of the Navy (Financial Management)
Chief of Naval Operations
Headquarters, Naval Air Systems Command
Auditor General, Naval Audit Service

Department of the Air Force

Secretary of the Air Force
Assistant Secretary of the Air Force (Financial Management and Comptroller)
Deputy Chief of Staff (Logistics and Management)
Headquarters, Air Force Logistics Command
Sacramento Air Logistics Center
Warner Robins Air Logistics Center
Air Force Audit Agency

Defense Agencies

Director, Defense Contract Audit Agency
Director, Defense Logistics Agency
Director, Defense Logistics Studies Information Exchange

Non-DoD Activities

Office of Management and Budget
  National Security Division, Special Projects Branch
U.S. General Accounting Office
  NSIAD Technical Information Center

Congressional Committees:

  Senate Subcommittee on Defense, Committee on Appropriations
  Senate Committee on Armed Services
  Senate Committee on Government Affairs
  Senate Ranking Minority Member, Committee on Armed Services
  House Committee on Appropriations
  House Subcommittee on Defense, Committee on Appropriations
  House Ranking Minority Member, Committee on Appropriations
  House Committee on Armed Services
  House Committee on Government Operations
  House Subcommittee on Legislation and National Security, Committee on Government Operations

PART IV - MANAGEMENT COMMENTS

Department of the Air Force

COMMENTS OF THE DEPUTY CHIEF OF STAFF OF THE AIR FORCE (LOGISTICS)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC 20330-5130

28 OCT 1991

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING
OFFICE OF THE INSPECTOR GENERAL
DEPARTMENT OF DEFENSE

SUBJECT: DOD(IG) Draft Report, "Effectiveness of the Air Force's Neutron Radiography Inspection Systems," Project No. 1LB-0019 - INFORMATION MEMORANDUM

This is in reply to your memorandum for the Assistant Secretary of the Air Force (Financial Management and Comptroller) requesting comments on the findings and recommendations made in subject report. The Air Force concurs with your findings on the utilization of the Stationary Neutron Radiography Inspection System (SNRS).

The Air Force nonconcurs with your recommendation as to the disposal of the Maneuverable Neutron Radiography System (MNRS). Additional workload which has generated for this system, along with its state-of-the-art, one of a kind technology, do not support elimination of the MNRS.

The Air Force partially concurs with your findings relative to the funding for the SNRS. However, we do not concur with the amount of funds which were deemed to be inappropriately obligated, nor do we concur with recommendations concerning adverse actions toward individuals involved in the management of this system.

The attached summary of DOD(IG) recommendations and Air Force management comments contains more detailed information about our position on the above topics.

Signed
TREVOR A. HAMMOND, Lt Gen, USAF
DCS/Logistics

1 Atch
DOD(IG) Recommendations and
Air Force Management Comments

A. UTILIZATION OF THE STATIONARY NEUTRON RADIOGRAPHY INSPECTION SYSTEM (SNRS)

RECOMMENDATION A-1. We recommend that the Commander, Sacramento Air Logistics Center (SM-ALC), perform and document a thorough examination of the workload projected for the Stationary Neutron Radiography Inspection System by 31 Dec 91; and determine, based on the projected workload, the correct number of hours that should be budgeted for the Stationary system, adjust the budget to reflect the actual hours that will be needed, and determine if it is still cost-effective to operate the Stationary system.

MANAGEMENT COMMENTS. Concur. Projected workload has been reevaluated by SM-ALC and revised. Current workload projected is 8,065 hours. This calculation was not available during the recent FY92/93 budget update. Therefore, SM-ALC will be required, on a monthly basis, to justify the deviation from actual versus projected workload.

RECOMMENDATION A-2. We recommend the Commander, Warner Robins Air Logistics Center (WR-ALC), identify corrosion prone F-15 aircraft components, submit samples to Sacramento for inspection, determine the cost-effectiveness of the Stationary Neutron Radiography Inspection System at preventing premature failure of components, and inform the Commander, SM-ALC, of plans to use the system by 30 Nov 91.

MANAGEMENT COMMENTS. Concur. HQ AFLC/EN will sponsor a meeting, 29 Oct 91, to discuss the future use of the Stationary and Maneuverable Neutron Radiography systems. In attendance will be representatives from HQ AFLC, WR-ALC, SM-ALC and SA-ALC. The discussion will review the technology of both systems and determine its applicability to AF Nondestructive Inspection Programs.

RECOMMENDATION A-3. We recommend that the Commander, Naval Air Systems Command, upon completion of the evaluation of the results of the inspections of F-14 aircraft components, determine the cost-effectiveness of the Stationary Neutron Radiography Inspection System at preventing premature failure of components, and inform the Commander, SM-ALC, of possible plans to use the system by 30 Nov 91.

MANAGEMENT COMMENTS. Concur, however, we defer to the US Navy for specific comments on this recommendation.

a. The SNRS is a one of a kind piece of support equipment with a national stock number. It consists of several complex components which are nonfunctional as stand-alone units.

b. SNRS was the first real time radiography system in the world; however, this project was considered low risk because neutron imaging technology had been developed for other applications (i.e., medical). This was the first application of this technology for inspecting aircraft components, therefore, a substantial amount of engineering and adaptation of commercial equipment was required. Consequently, R&D funds were appropriately requested for the up front design and integration.

c. Documentation supporting the SNRS project was submitted to HQ USAF/ACBI/RDPT by HQ AFLC/DE on 12 Jan 87 (Project #PRJY 879351). Proposed funding of the project was to be from RDT&E and DMS, AFIF funds. After Congressional approval, HQ USAF/RDF approved the project in a letter, 16 Mar 87.

d. Over the lifetime of the project, $6,063,172 of DMS, AFIF funds were used to support this project. The use of these funds was consistent with AFR 172-1, Vol IV, 1 Oct 87, which stated that initial lay-in of depot level support equipment was a proper charge to the industrial fund.

e. The audit claims there was $190,000 of Military Construction (MILCON) appropriation used on this project. The $190,000 in question was not from the MILCON appropriation. It was from the Minor Construction funding of the DMS, AFIF. Per AFR 172-1, Vol IV, 1 Oct 87, this is an appropriate charge to the industrial fund. In addition, the Congressional RD-4 report identified use of $190,000 of minor construction (DMS, AFIF), not MILCON funding.

f. In Sep 87, $148,989 of DMS, AFIF funds were used for certification training of neutron radiographic/robotic operators. As training is the responsibility of the Air Training Command, per AFR 50-9, this should have been funded from the O&M appropriation.

g. In Dec 87, $155,100 of 3010, BP 12 (Aircraft Procurement, Aeronautical Ground Support Equipment) was used to purchase a piece of support equipment (single pulse rod, pneumatic transfer and notch tank). Based on AFR 172-1, Vol IV, 1 Oct 87, this procurement should have been funded from the DMS, AFIF.

h. In Apr 88, SM-ALC/MA was notified that the PRAM office was terminating funding of the project and would not be able to provide $3,000,000 necessary to fund additional nuclear reactor safety requirements mandated by the Air Force Safety Agency, Kirtland, NM. SM-ALC/CC notified AFLC/CV and requested funding assistance. An assessment of available funds was made and SM-ALC was provided 3010, BP 12 (Aircraft Procurement, Aeronautical Ground Support Equipment) funds. Based on the nonavailability of

B. UTILIZATION OF THE MANEUVERABLE NEUTRON RADIOGRAPHY INSPECTION SYSTEM

RECOMMENDATION. We recommend that the Commander, SM-ALC, discontinue using the Maneuverable Neutron Radiography Inspection System (MNRS) on the F-111 and F-15 aircraft, and establish a plan for the disposition of the system that will maximize the recovery of expenditures made for it.

MANAGEMENT COMMENTS. Nonconcur. At the time of the audit, facility production was low, however, the facilities were utilized in the pre-production robotic programming of aircraft and training of certified operators. This ramp-up posture provided the system and its operators a period of time to mature. As experience in maneuverable neutron radiography technology matured, the weapon system engineers evaluated how best to apply maneuverable neutron radiography by selecting panels that are not designed to be removed from the aircraft and have a history of failure due to corrosion. Current projected workload for the MNRS is 8,964 hours; this includes 26 F-111 and 24 F-15 aircraft. This is a one of a-kind system. There is currently no system worldwide that duplicates its capabilities. A decision to dismantle it at this time would be premature. We believe that as aircraft technology expands, uses for this system will increase. Future use of this system will be a topic of discussion in the 29 Oct 91 meeting discussed previously.

C. FUNDING THE AIR FORCE'S STATIONARY NEUTRON RADIOGRAPHY INSPECTION SYSTEM (SNRS)

RECOMMENDATIONS FOR CORRECTIVE ACTION

We recommend that the Commander, SM-ALC, and the Commander, Air Force Logistics Command (AFLC), in conjunction with the Assistant Secretary of the Air Force (Financial Management and Comptroller):

RECOMMENDATION C-1. Determine and make the appropriate accounting adjustments to reimburse the $10,856,761 of aircraft procurement, industrial fund, and military construction appropriations that were improperly used to procure the Stationary Neutron Radiography Inspection System.

MANAGEMENT COMMENTS. Nonconcur, in part. The amount of funding, in question, obligated on this project is $10,856,761. After full review of the budget policies in effect at the time funds were obligated, it was determined that, with the exception of $3,155,100 of 3010, BP 12 (Aircraft Procurement, Aeronautical Ground Support Equipment) and $148,989 of Depot Maintenance Service, Air Force Industrial Fund (DMS, AFIF), all funds were charged to the correct appropriation. Paragraphs a through c below provide background information on the SNRS. Paragraphs d through j detail all obligations in question.

PRAM RDT&E funds, it would have been appropriate to fund this requirement from DMS, AFIF. However, due to oversight, actions required to reprogram these available funds to the DMS, AFIF were not accomplished.

i. In May 89, $1,299,500 of 3010, BP 18 (Aircraft Procurement, Depot Level Support Equipment) funds were used to support the SNRS. Based on SAF/ACBM Msg 251800Z May 89, which formalized the policy of using appropriated funds for the purchase of depot level support equipment for a new activity, this was an appropriate obligation of funds.

j. In summary, $3,155,100 of 3010, BP 12 funds and $148,989 of DMS, AFIF were erroneously used on this project.

RECOMMENDATION C-2. Monitor actions to implement Recommendation C-1 to determine if they cause an overobligation in the appropriation accounts. If overobligations occur, follow Air Force Regulation 177-16, "Administrative Control of Appropriations," paragraph 49, which provides procedures for reporting alleged antideficiency violations and paragraph 55, which outlines recommended disciplinary action for those officials who authorized the improper use of funds.

MANAGEMENT COMMENTS. Nonconcur in part. If current budgetary guidance for program adjustments allows, actions necessary to implement applicable corrections will be made. However, in reference to disciplinary actions, current funding policy and management practices for the DMS, AFIF ensure compliance with public law and regulations.

RECOMMENDATION C-3. Report and track the material weaknesses related to compliance with the requirements of United States Code, title 31, section 1301; DoD Budget Guidance Manual 7110-1-M; and Air Force Regulations 172-1 and 177-16, as required by DoD Directive 5010.38, "Internal Management Control Program."

MANAGEMENT COMMENTS. Nonconcur. Current funding policy and management practices for the DMS, AFIF ensure compliance with public law and regulations.

LIST OF AUDIT TEAM MEMBERS

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Jose J. Delino, Team Leader
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