

Audit Report



HAZARDOUS MATERIAL MANAGEMENT FOR
THE F-15 AIRCRAFT PROGRAM

Report No. 00-012

October 15, 1999

Office of the Inspector General
Department of Defense

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Acronyms

PESHE
SFFAS

Programmatic Environmental, Safety, and Health Evaluation
Statement of Federal Financial Accounting Standards



INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
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October 15, 1999

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

SUBJECT: Audit Report on Hazardous Material Management for the F-15 Aircraft
Program (Report No. 00-012)

We are providing this audit report for your information and use. The Joint Logistics Commanders requested an audit of hazardous material management for major Defense systems. This report is the fifth in a series of reports resulting from the requested audit.

We considered Air Force comments on a draft of this report in preparing this final report. The comments on the draft report conformed to the requirements of DoD Directive 7650.3. Therefore, we do not require additional comments.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. John E. Meling at (703) 604-9091 (DSN 664-9091) (jmeling@dodig.osd.mil) or Mr. Jack D. Snider at (703) 604-9087 (DSN 664-9087) (jsnider@dodig.osd.mil). See Appendix C for the report distribution. The audit team members are listed inside the back cover.

A handwritten signature in cursive script, reading "Robert J. Lieberman", is positioned above the typed name.

Robert J. Lieberman
Assistant Inspector General
for Auditing

Office of the Inspector General, DoD

Report No. 00-012
(Project No. 8AE-5037.05)

October 15, 1999

Hazardous Material Management for the F-15 Aircraft Program

Executive Summary

Introduction. The F-15 aircraft (the F-15), an Air Force Acquisition Category II program, consists of Eagle and Strike Eagle variants. The F-15 Eagle (F-15 models A through D) is an all-weather, tactical fighter designed to gain and maintain air superiority in aerial combat. The F-15 Strike Eagle, F-15 model E, is a dual-role fighter designed for air superiority and air-to-ground attack missions. The Air Force acquired the F-15 starting in March 1973 and has 409 F-15 Eagles and 201 F-15 Strike Eagles in active squadrons and 168 F-15 Eagles that are trainers, inactive, or in storage. The F-15 System Program Office plans to acquire 17 additional F-15 Strike Eagles through FY 2000 and estimates life-cycle costs for the F-15 aircraft in active squadrons to total about \$53.3 billion through FY 2024. The Air National Guard also has 118 F-15 Eagles.

Objectives. The Joint Logistics Commanders requested an audit of hazardous material management for major Defense systems. The F-15 is one of a series of programs included in the audit. The overall audit objective was to evaluate the adequacy of planning and providing for the reduction and control of hazardous materials used in the design, manufacture, maintenance, and disposal for the F-15. Specifically, we evaluated whether the program manager managed the selection, use, and disposal of hazardous materials so that DoD incurs the lowest cost possible that is consistent with the system's cost, schedule, and performance goals while protecting human health and the environment over the system's life cycle. We also evaluated the management control program as it related to the audit objective.

Results. Overall, the F-15 System Program Office planned and provided for the reduction and elimination of hazardous material in the F-15 Program. However, the following two areas warrant management attention.

- The F-15 System Program Office did not include environmental costs for demilitarization, disposal, and associated cleanup of the F-15 aircraft at the end of their useful life in the F-15 life-cycle cost estimate. As a result, the System Program Office understated the total life-cycle costs and would not be able to accurately report the liability for demilitarization, disposal, and environmental cleanup costs when DoD guidance for reporting those costs in financial statements becomes available (finding A).
- The F-15 System Program Office did not include program environmental responsibilities and a methodology to track and document the completion of its environmental strategy throughout the system acquisition life-cycle in its programmatic environmental, safety, and health evaluation (PESHE). Without a PESHE that includes program environmental responsibilities and a methodology to track and document the completion of the environmental strategy, the System Program Office cannot ensure that it is aware of the

impact of environmental, safety, and health issues on mission and cost and may also be forgoing opportunities to further reduce environmental life-cycle costs over the life span of the F-15 Program (finding B).

Recommendations in this report, if implemented, will improve the hazardous material management of the F-15 Program. The management controls reviewed were effective in that we identified no material management control weakness (Appendix A).

Summary of Recommendations. We recommend that the Air Force include a cost element in the F-15 life-cycle cost estimate to account for demilitarization, disposal, and environmental cleanup of the F-15 aircraft, include those costs in future total ownership cost submissions, and annually review the programmatic environmental, safety, and health evaluation for the F-15 Program to incorporate the environmental effects of upgrades to the system, as appropriate.

Management Comments. The Office of the Assistant Secretary of the Air Force (Acquisition) concurred with the findings and recommendations and provided the actions the F-15 System Program Office plans to take in response to the recommendations. A discussion of the management comments is in the Findings section of the report, and the complete text is in the Management Comments section.

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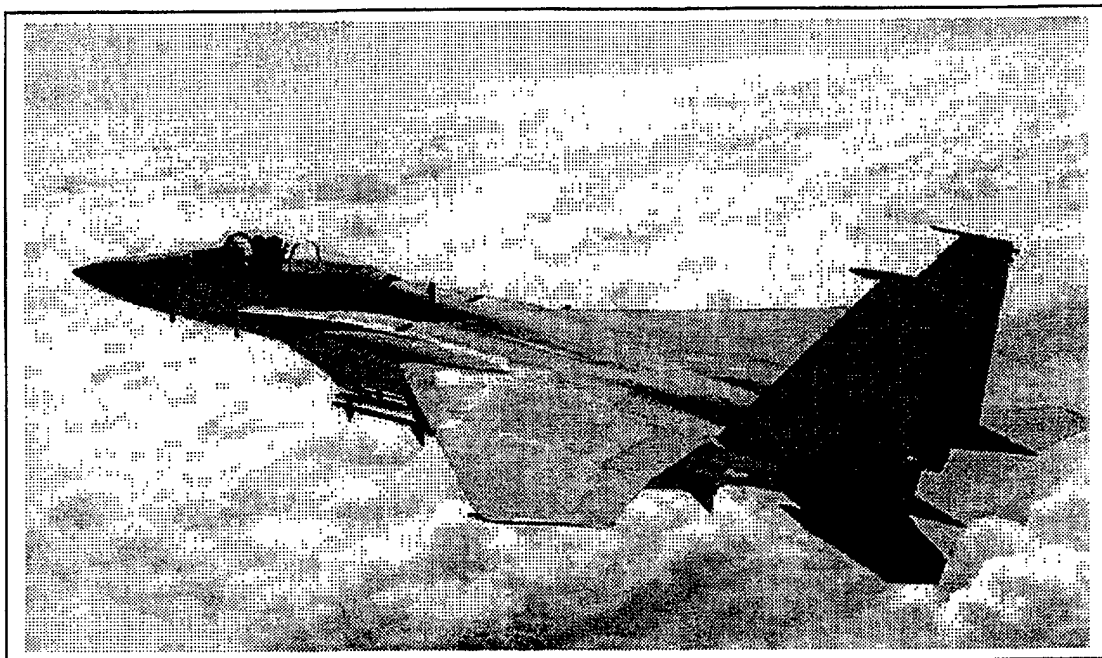
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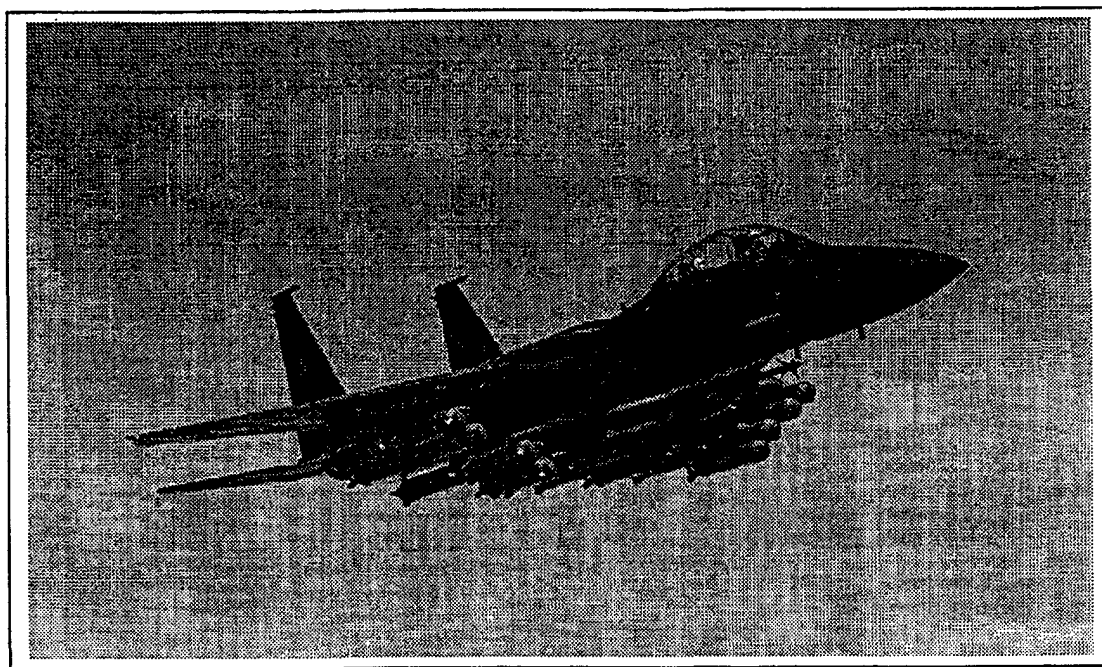
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F-15 Eagle Aircraft



F-15 Strike Eagle Aircraft

Background

This report discusses the adequacy of planning and providing for the reduction and control of hazardous materials used in the design, manufacture, maintenance, and disposal for the F-15 Aircraft (the F-15). DoD environmental management policy relating to hazardous materials is to prevent, mitigate, or remediate environmental damage that acquisition programs cause. In designing, manufacturing, testing, operating, and disposing of systems, DoD program managers are to prevent or reduce all forms of pollution at the source, whenever feasible. Prudent investments in pollution prevention can reduce life-cycle environmental costs and liability and improve environmental quality and program performance. Further, the Secretary of Defense, in his 1998 annual report to the President and Congress, stated that DoD urgently needed to reduce the total ownership costs of its systems to sustain force modernization and recapitalization. To reduce total ownership costs, program managers need to focus on total life-cycle costs in the development and production phases of the weapon system acquisition life-cycle so that trade-offs can be made between investments in the development and production phases and reduced costs in the operation and support phase. Appendix B provides definitions of technical terms used in this report.

The F-15 is an Air Force Acquisition Category II program that consists of Eagle and Strike Eagle variants. The F-15 Eagle (F-15 models A through D) is an all-weather, tactical fighter designed to gain and maintain air superiority in aerial combat. The F-15 Strike Eagle, F-15 model E, is a dual-role fighter designed for air superiority and air-to-ground attack missions. The F-15 System Program Office, through an ongoing multistage improvement program, is upgrading the F-15 variants to maintain and improve performance and tactical capabilities. In March 1973, the McDonnell Douglas Corporation,¹ the prime contractor, began production of the F-15. The Air Force has 409 F-15 Eagles and 201 F-15 Strike Eagles in active squadrons and 168 F-15 Eagles that are trainers, inactive, or in storage. The F-15 Eagles in storage are at the Aerospace Maintenance and Regeneration Center, Davis Monthan Air Force Base, Tucson, Arizona. The F-15 System Program Office will acquire 17 additional F-15 Strike Eagles by FY 2000 and estimates life-cycle costs for active F-15s to total about \$53.3 billion through FY 2024. The Air National Guard also has 118 F-15 Eagles. The Warner Robins-Air Logistics Center, Robins Air Force Base, Georgia, and Korean Air Lines, Kimhae, Korea, provide program depot-level maintenance for the F-15.

Objectives

The Joint Logistics Commanders requested an audit of hazardous material management for major Defense systems. The F-15 is one of a series of programs included in the audit. The overall audit objective was to evaluate the adequacy of planning and providing for the reduction and control of hazardous

¹The Boeing Company acquired the McDonnell Douglas Corporation in FY 1997.

materials used in the design, manufacture, maintenance, and disposal of the F-15. Specifically, we evaluated whether the program manager managed the selection, use, and disposal of hazardous materials so that DoD incurs the lowest cost possible that is consistent with the system's cost, schedule, and performance goals while protecting human health and the environment over the system's life cycle. We also evaluated the management control program as it related to the audit objective. This report is the fifth in a series of reports on our ongoing audit of hazardous material management for major Defense systems. The first four reports address hazardous material management for the Army Grizzly Program, the Air Force C/KC-135 Stratotanker Aircraft Program, the Navy T-45 Undergraduate Jet Pilot Training System, and the Army Black Hawk Helicopter Program. Appendix A discusses the scope and methodology used to accomplish the objective as well as management controls and prior audit coverage.

Noteworthy Environmental Efforts

The F-15 System Program Office incorporated environmental planning into its acquisition and maintenance process by reducing ozone depleting chemicals and industrial toxins;² by evaluating replacement aircraft topcoat coatings; by examining chromated paint primer replacements; by preparing an engineer's and program manager's environmental, safety, and health guide; and by proposing the elimination of film-based images to x-ray the aircraft.

Ozone Depleting Chemicals and Industrial Toxins. The F-15 System Program Office, in conjunction with the contractor and Warner Robins-Air Logistics Center (the Center) depot operations, has pursued an aggressive pollution prevention program concerning the use of ozone-depleting chemicals and industrial toxins. As part of the pollution prevention program, the Program Office funded a 2-year initiative to have the prime contractor review technical orders for the F-15 aircraft to identify alternatives to hazardous materials. Through this initiative, the System Program Office eliminated ozone-depleting chemicals from the F-15 technical orders and the contractor created a data file of all F-15 consumables. As another part of the pollution prevention program, the Center conducted a Toxic Release Inventory Alternative Development program to identify and evaluate process areas and sub-processes that use ozone-depleting chemicals and industrial toxins and for which environmentally friendly replacements might be available. Actions taken included the Center eliminating ozone-depleting chemicals from its metal-bonding process and from its circuit board cleaning process. As a result of those efforts and other efforts from 1992 through 1996, the Program Office reported that it reduced the annual use of ozone-depleting chemicals from 15,357 pounds to 0 pounds and reduced the annual use of Environmental Protection Agency list of 17 industrial-toxins by 72.1 percent, from 60,779 pounds to 16,972 pounds.

²Industrial toxins include the Environmental Protection Agency's list of 17 industrial toxins and the Air Force Material Command's list of the top 24 toxic-release inventory items.

Aircraft Topcoat Coating. The F-15 contractor conducted a "Topcoat Replacement Trade Study," March 3, 1999, to evaluate replacement aircraft topcoats that would reduce industrial toxins, volatile organic compounds, and hazardous air pollutant ingredients used in the topcoat coating for the F-15. The contractor concluded that an advanced performance coating, which the C-17 System Program Office developed, provided a five-fold ultraviolet resistance improvement and a three-fold increase in gloss retention. If a field test of the advanced performance coating that the Florida Air National Guard plans to conduct on two F-15 aircraft in late FY 1999 is successful, the System Program Office will probably change to the coating, thereby reducing the F-15 Program's operational and support costs over the next 20 years by an estimated \$81 million.³

Chromated Paint Primer Replacements. The Joint Group for Pollution Prevention⁴ and the F-15 contractor initiated an effort to examine replacements for chromated paint primers used on exterior surfaces of the C-17, F-15, F/A-18, T-45, and AV-8B aircraft and the Harpoon and the Standoff Land Attack Missile weapon systems. The contractor completed laboratory testing of proposed nonchromated primers in March 1997. The F-15 System Program Office began a 6-year operational test of nonchromated primer on two F-15 aircraft in June 1997.

Engineer's and Program Manager's Guide. Environmental staff in the F-15 Program Office created the "ASC/FB Engineer's and Program Manager's Guide for Incorporating Environmental, Safety, and Health Requirements into Weapon System Acquisitions," April 27, 1998. The Guide is a reference tool for engineers and program managers to use for integrating environmental, safety, and health requirements for new acquisition programs. Specifically, the Guide addresses how to implement environmental, safety, and health policy contained in DoD Directive 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," Change 4, May 11, 1999.

Film-Based Images. The F-15 System Program Office has proposed eliminating the use of film-based images to conduct nondestructive radiographic examination (x-rays) of F-15 aircraft. The System Program Office submitted the proposal to the National Defense Center for Environmental Excellence for acceptance and funding support and has tested an acceptable commercial propriety replacement process. The replacement process relies on computer-based images that are faster to generate, require less storage space,

³Some of the savings would result from the elimination of a base-level scuff sand and re-topcoat application midway through the 6-year depot programmed maintenance cycle.

⁴The Joint Logistics Commanders established the Joint Group for Pollution Prevention to reduce or eliminate hazardous materials used in Defense systems by fostering joint service cooperation to avoid duplication of effort, to provide a single interface to Defense system program managers, and to provide a bridge to the sustainment community. As part of its charter, the Joint Group for Pollution Prevention funds research and development efforts to identify alternatives to the use of hazardous materials commonly used in the manufacture and maintenance of weapon systems.

and eliminate the environmental waste associated with film-based image processing and disposal. Although funding availability is uncertain, the replacement process has the potential for widespread use by other weapon systems.

Overall, the F-15 System Program Office provided for the reduction and elimination of hazardous material in the F-15. However, the System Program Office did not estimate the environmental costs for demilitarization, disposal, and cleanup of the F-15 aircraft in its system life-cycle costs and did not include program environmental responsibilities and a methodology to track and document the completion of its environmental strategy throughout the system acquisition life-cycle in its programmatic environmental, safety, and health evaluation. A discussion of the associated findings follows.

A. Environmental Life-Cycle Costs

The F-15 System Program Office did not include environmental costs for demilitarization, disposal, and associated cleanup for F-15 aircraft⁵ at the end of their useful life in the F-15 life-cycle cost estimate. The System Program Office excluded those environmental costs because its analysts did not include a cost element in their cost model to account for demilitarization and disposal of the aircraft and associated environmental cleanup. As a result, the System Program Office understated the total life-cycle costs for the F-15 Program and would not be able to accurately report the liability for demilitarization, disposal, and environmental cleanup costs for the F-15 aircraft in Air Force financial statements when DoD guidance for reporting those costs in financial statements becomes available.

Life-Cycle Cost Estimating and Reporting Guidance

DoD Guidance. DoD Regulation 5000.2-R, Change 4, May 11, 1999;⁶ DoD Manual 5000.4-M, "Department of Defense Cost Analysis Guidance and Procedures," December 1992; and the Defense Acquisition Deskbook provide life-cycle cost estimating and reporting guidance.

DoD Regulation. DoD Regulation 5000.2-R requires that life-cycle cost estimates be comprehensive and identify all costs for the development, production, and operation of a system regardless of the source of funding.

DoD Manual. DoD Manual 5000.4-M requires that program offices identify the cost of any hazardous, toxic, or radiological materials that may be encountered or generated during system development, manufacture, transportation, storage, operation, and disposal. Furthermore, the guidance states that program offices should include the costs of demilitarization, detoxification, or long-term waste storage in the cost estimates.

Defense Acquisition Deskbook. The Defense Acquisition Deskbook addresses life-cycle estimates in its "Scope of Life-Cycle Cost Estimates" and the "Cost Estimate Documentation Guidelines" sections. Specifically, the Deskbook states that life-cycle cost estimates should:

- cover the entire planned life of a program and include all cost categories (concept exploration, if applicable; demonstration and validation; engineering and manufacturing development;

⁵The F-15 System Program Office does not include any costs for the Air National Guard F-15 aircraft in its life-cycle cost estimate.

⁶DoD initially issued DoD Regulation 5000.2-R on March 15, 1996. It included the requirement to prepare a comprehensive life-cycle cost estimate.

production and deployment; operations and support; and demilitarization and disposal) and all appropriation accounts; and

- address environmental costs (examples of such costs include pollution prevention, hazardous waste management, demilitarization and disposal of equipment, and cleanup of real estate).

Air Force Guidance. Air Force Instruction 16-402, "Aerospace Vehicle Assignment, Distribution, Accounting, and Termination," August 1, 1997, provides procedures for programming, assigning, transferring, distributing, accounting, and terminating of Air Force aerospace vehicles. The Instruction also directs how the Air Force will process aerospace vehicles after becoming excess to operational needs and satisfying reclamation requirements. The Air Force Materiel Command, "Environmental, Safety, and Health (ESH) Cost Analysis Guide," May 22, 1998, provides guidance on cost analyst processes to assure that the program office includes all environmental, safety, and health costs in the weapon system program cost estimate and trade studies supporting design alternatives.

Federal Financial Accounting Standards Guidance. The Statement of Federal Financial Accounting Standards (SFFAS) No. 6, "Accounting for Property Plant, and Equipment," requires that Federal agencies, beginning in FY 1998, recognize a liability in agency financial statements for cleanup costs associated with Federal property, plant, and equipment, including weapon systems, when the agency places the property, plant, and equipment into service. SFFAS No. 6 defines cleanup costs as those costs to remove, contain, or dispose, or any combination of the three, of hazardous waste from material or property that is permanently or temporarily shut down. In addition, cleanup costs include decontaminating, decommissioning, site restoring, site monitoring, and closure and post-closure costs. However, DoD has yet to provide guidance to the Military Departments for reporting on the environmental liability.

F-15 Life-Cycle Cost Estimate

The F-15 System Program Office participated in the FY 2002 Modernization Planning Process at the direction of the Air Combat System Program Office to support the FYs 2002 through 2007 Program Objective Memorandum submittal. To develop cost data for the Program Objective Memorandum, the System Program Office developed total life-cycle cost estimates for the F-15 Eagles and for the F-15 Strike Eagles in active squadrons. The System Program Office used the Cost-Oriented Resource Estimating model (the Estimating model), actual F-15 operational cost data, and Air Force cost factors to develop the life-cycle cost estimates. The System Program Office projected a life-cycle cost estimate of \$19.1 billion for 270 F-15 Eagles from FYs 2000 through 2014 and a life-cycle cost estimate of \$34.4 billion for 218 F-15 Strike Eagles from FYs 2000 through 2024. The System Program Office did not include in the Estimating model a life-cycle cost estimate for the remaining 139 F-15 Eagles in active squadrons because the Air Force plans to give 119 Eagles to the

Air National Guard when F-22 aircraft become available and 20 are Air Force Material Command aircraft. Further, the System Program Office did not include in the Estimating model a cost element for demilitarization, disposal, and environmental cleanup of the F-15 aircraft at the end of their useful life because:

- the System Program Office and F-15 user commands did not budget for demilitarization, disposal, and environmental cleanup costs;
- the Aerospace Maintenance and Regeneration Center was responsible for demilitarization and disposal costs; and
- the System Program Office had not established a demilitarization and disposal schedule for F-15 aircraft.

Demilitarization, Disposal, and Environmental Cleanup Budget. The F-15 System Program Office and major Air Force command users of the F-15 aircraft did not budget for demilitarization, disposal, and environmental cleanup costs because they were primarily interested in costs that effected proposed modifications and system improvements. The System Program Office created and maintains F-15 life-cycle cost estimates to simplify the process of conducting modification and improvement evaluations to support the program objective memorandum budgeting process. The System Program Office uses the F-15 life-cycle cost estimates to evaluate the cost effects of proposed aircraft modifications and improvements. While proposed modifications and system improvements may effect environmental costs for demilitarization, disposal, and associated cleanup, the costs addressed in the Estimating model pertained only to those budgeted costs that were the responsibility of the system users and system supporters.

Aerospace Maintenance and Regeneration Center Responsibility. The F-15 System Program Office also did not budget for the demilitarization and disposal of the F-15 system because the Aerospace Maintenance and Regeneration Center (the Maintenance Center) is responsible for budgeting for reclamation and disposal of aerospace vehicles, including all F-15 aircraft. Aerospace vehicles that the System Program Office and the Maintenance Center identify for disposal undergo environmental cleanup and other preparations before they transfer to the Defense Reutilization and Marketing Organization for final disposition. The Maintenance Center estimated that the cost to prepare all F-15 aircraft for disposal would be approximately \$19.5 million, which does not include other environmental cleanup activities, such as base cleanup, that may be necessary.

Demilitarization and Disposal Schedule. The F-15 System Program Office did not establish a demilitarization and disposal schedule for F-15 aircraft because it had difficulty predicting when an aircraft should be demilitarized and disposed. However, the System Program Office did estimate an economic life end-date for the 270 F-15 Eagles and 218 F-15 Strike Eagles when it developed the life-cycle cost estimates. The System Program Office estimated a remaining

economic life of 14 years from FYs 2000 through 2014 for the 270 F-15 Eagles and a remaining economic life of 24 years from FYs 2000 through 2024 for the 218 F-15 Strike Eagles.

Estimating and Reporting DoD Liability for Aircraft Disposal

The General Accounting Office Report No. AIMD-98-9, "DoD's Liability for Aircraft Disposal Can Be Estimated," November 1997, states that:

- DoD did not implement SFFAS No. 6 that requires recognizing and reporting liabilities such as those associated with aircraft disposal.
- DoD did not provide implementation guidance to the Military Departments.
- Aircraft disposal was an ongoing process, and the Military Departments could reasonably estimate the disposal cost.
- Information on the three major disposal processes, namely demilitarization, storage and maintenance, and hazardous materials removal and disposal, was available to help develop cost estimates.
- DoD officials stated that the total disposal cost estimate for aircraft would result in a significant liability.

The Report also states that Congress, in the National Defense Authorization Act for FY 1995, required DoD to develop life-cycle environmental costs, including demilitarization and disposal costs, for new weapon systems.

DoD Environmental Line Item Liability

The Inspector General, DoD, Report No. 99-209, "Data Supporting the DoD Environmental Line Item Liability on the FY 1998 Financial Statements," July 9, 1999, evaluated the reliability and completeness of the data used to calculate the DoD environmental liability for FY 1998. The Report states that:

- the data supporting the environmental line item liability stated in the Balance Sheet were not reliable or complete;
- DoD had not provided criteria for reporting environmental liabilities;
- the data were not adequately supported;
- the computer model used to prepare cleanup cost estimates was materially inaccurate;

-
- the reported liability did not include amounts for weapon system disposal, overseas environmental liabilities, or disposal or unexploded ordnance and ammunition; and
 - proposed guidance on environmental liabilities in DoD Regulation 7000.14-R, the "DoD Financial Management Regulation," includes questionable guidance on recognition of dollar amounts and the timing of environmental and disposal liabilities.

The Report recommends that the Under Secretary of Defense (Comptroller) amend DoD Regulation 7000.14-R to require that environmental and disposal liabilities include amounts for weapon system disposal, overseas environmental cleanup, and disposal of unexploded ordnance and ammunition. The Under Secretary of Defense did not agree with the recommendation; however, he recognized the need for additional guidance on environmental and disposal liabilities and prepared two draft chapters of DoD Regulation 7000.14-R addressing environmental and disposal liabilities.

Completeness of Life-Cycle Cost Estimate

Without a life-cycle cost estimate that includes demilitarization, disposal, and environmental cleanup costs for F-15 Eagle and F-15 Strike Eagle aircraft, the F-15 System Program Office understated the total life-cycle costs for the F-15 Program and could not accurately report the liability for F-15 environmental cleanup and disposal costs in future Air Force financial statements. Because the F-15 is a fielded system, the Air Force is required to report the environmental cleanup and disposal cost liability in accordance with SFFAS No. 6 when DoD guidance becomes available. Although demilitarization, disposal, and environmental cleanup costs may not be highly significant in terms of percentage of system life-cycle cost, these should not be ignored. Cumulatively, the environmental cleanup and disposal costs for Air Force weapon systems are likely to represent a material value on Air Force and DoD-wide consolidated financial statements.

Recommendation and Management Comments

A. We recommend that the System Program Manager for the F-15 include a cost element in the F-15 life-cycle cost estimate to account for demilitarization, disposal, and environmental cleanup of the F-15 Eagle and F-15 Strike Eagle aircraft and include those costs in future total ownership cost submissions.

Management Comments. The Principal Deputy Assistant Secretary (Acquisition and Management), Office of the Assistant Secretary of the Air Force (Acquisition), concurred with the recommendation, stating that the F-15 System Program Office will include a cost element in the F-15 life-cycle cost estimate to account for demilitarization, disposal, and environmental cleanup of the F-15 Eagle and F-15 Strike Eagle aircraft. The System Program

Office will include those costs in future total ownership cost submissions once the program completes its strategic plans for future operation and retirement of the F-15. The System Program Office will then report those costs when DoD guidance for reporting those costs in financial statements becomes available. The F-15 System Program Office does not have a requirement to update its total ownership cost projections. However, when it does have an update requirement, the System Program Office will include cost elements for demilitarization, disposal, and environmental cleanup. To assess the demilitarization and disposal costs, the System Program Office will use the May 1998 Air Force Material Command "Weapon System Environment, Safety, and Health (ESH) Cost Analysis Guide" (the Guide). The System Program Office has received training on the use of the Guide. Further, the System Program Office will consider system demilitarization and disposal information resulting from the Air Force Material Command Weapon System Pollution Prevention Center Working Group meeting in March 1999 at the Aerospace Maintenance and Regeneration Center. The System Program Office is working with the Aerospace Maintenance and Regeneration Center for system disposal planning and cost estimating. The complete text is in the Management Comments section of this report.

B. Programmatic Environmental, Safety, and Health Evaluation

The F-15 System Program Office did not include program environmental responsibilities and a methodology to track and document the completion of its environmental strategy throughout the system acquisition life-cycle in its programmatic environmental, safety, and health evaluation (PESHE). The F-15 PESHE was incomplete because the System Program Office did not:

- review and approve the PESHE after the Environmental Manager, who was detailed from the Air Combat System Program Office, drafted the document; and
- update the PESHE throughout the F-15 life-cycle to incorporate upgrades to the system.

Without a PESHE that includes program environmental responsibilities and a methodology to track and document the completion of the environmental strategy, the System Program Office cannot ensure that it is aware of the impact of environmental, safety, and health issues on mission and cost and may also be forgoing opportunities to further reduce environmental life-cycle costs over the life span of the F-15 Program.

Environmental, Safety, and Health Evaluation Policy

DoD Guidance. DoD Regulation 5000.2-R, Change 4, May 11, 1999,⁷ requires that all programs, regardless of acquisition category, conduct environmental, safety, and health analyses to integrate environmental, safety, and health issues into the system engineering process. The analyses must support the development of a PESHE that the program office includes in the acquisition strategy. The program manager must initiate the PESHE at the earliest possible time, usually in support of a program initiation decision (Milestone I), and must update the evaluation throughout the life-cycle of the program. Acquisition managers use the PESHE to:

- describe the program manager's strategy for meeting environmental, safety, and health requirements;
- establish program responsibilities; and
- identify how a program manager will track progress.

⁷DoD initially issued DoD Regulation 5000.2-R on March 15, 1996. It included the environmental, safety, and health evaluation policy.

Environmental, Safety, and Health Evaluation

The Environmental Manager from the Environmental Management Division, Air Combat System Program Office, who was assigned on a part-time basis to the F-15 System Program Office, prepared the PESHE for the System Program Office on March 7, 1997; however, the System Program Office did not review the PESHE for completeness and approve the document. The F-15 PESHE was incomplete because the PESHE documentation did not include program environmental responsibilities and a methodology to track and document the completion of its environmental strategy throughout the system acquisition life-cycle, as required by DoD Regulation 5000.2-R environmental requirements. Further, the System Program Office had not updated the PESHE to incorporate upgrades to the F-15 variants, resulting from the System Program Office's ongoing multistage improvement program to maintain and improve the aircraft's performance and tactical capabilities.

In July 1999, the System Program Office agreed that the F-15 PESHE did not include program environmental responsibilities and a methodology to track and document the completion of its environmental strategy. The System Program Office stated that it would update its PESHE to include program environmental responsibilities and a methodology to track and document the completion of the environmental strategy throughout the life-cycle of the F-15 Program.

Benefits of Environmental, Safety, and Health Evaluation

When program managers perform the analyses for the PESHE, they gain timely information on the potential environmental, safety, and health effects of developing, fielding, storing, demilitarization, and disposing of their weapon systems. The information is critical because any unforeseen environmental, safety, or health effects that violate local, state, or Federal law could cause lengthy program delays and affect mission and program cost. Moreover, negative effects may lessen opportunities to further reduce maintenance-process environmental life-cycle costs over the life span of the F-15, including upgrades to the program, as appropriate. Therefore, the program manager should analyze and document all possible programmatic actions and update the evaluation throughout the program's life-cycle.

Recommendation and Management Comments

B. We recommend that the System Program Manager for the F-15 annually review the programmatic environmental, safety, and health evaluation for the F-15 Program to incorporate the environmental effects of upgrades to the system, as appropriate.

Management Comments. The Principal Deputy Assistant Secretary (Acquisition and Management), Office of the Assistant Secretary of the Air Force (Acquisition), concurred with the recommendation, stating that the

F-15 System Program Office agreed that the F-15 PESHE did not include program environmental, safety, and health responsibilities and a methodology to track and document the completion of its environmental, safety, and health strategy. The System Program Office will update its PESHE by the end of March 2000 to include program environmental, safety, and health responsibilities and a methodology to track and document the completion of the environmental, safety, and health strategy throughout the life-cycle of the F-15 Program. The System Program Office PESHE will:

- identify program office and contractor responsibilities for compliance with the National Environmental Policy Act, environmental compliance, system safety and health assessments and risk management, hazardous materials management, and pollution prevention;
- address how those responsibilities are integrated into the F-15 Program's systems engineering processes and how the systems engineering process integrates with those responsibilities to avoid a duplication of efforts;
- emphasize the Program Office's environmental, safety, and health strategy, individual responsibilities, and a method to track progress; and
- include an environmental, safety, and health checklist that its management will review annually to assess progress and to identify needed updates, especially updates associated with planned modification programs.

The System Program Office will consider the experiences that other Air Force programs have had in preparing a PESHE and will use the Air Force "Environmental, Safety and Health Evaluation Development Guide for Single Managers," November 1996, to prepare the PESHE. The complete text is in the Management Comments section of this report.

Appendix A. Audit Process

Scope and Methodology

We conducted this audit from May through July 1999 and reviewed documentation dated from September 1984 through July 1999. To accomplish the audit objective, we took the following steps:

- discussed the issues relating to DoD environmental management and the associated acquisition strategy with Government and contractor personnel;
- assessed whether the F-15 System Program Office implemented the DoD environmental management process in accordance with DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," Change 4, May 11, 1999;
- reviewed life-cycle costs of the F-15 Program to determine whether the System Program Office included environmental costs;
- evaluated Defense Contract Management Command involvement to reduce life-cycle environmental costs and liability while improving environmental quality and program performance;
- reviewed contractor's environmental program for the F-15 Program and reviewed available supporting documentation;
- determined whether the F-15 System Program Office had adequate funding to test alternative environmental technologies to reduce pollution;
- determined whether the F-15 System Program Office searched for opportunities to form partnerships for environmental projects, environmental alternative test and evaluation, and validation testing; and
- determined whether the F-15 System Program Office was aware of the environmental management process.

Auditing Standards. We conducted this program audit in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD. We included such tests of management controls as we deemed necessary.

Use of Computer-Processed Data. We did not rely on computer-processed data to develop conclusions on this audit.

Contacts During the Audit. We visited or contacted individuals and organizations within DoD and the Boeing Company, St. Louis, Missouri. Further details are available on request.

DoD-Wide Corporate-Level Government Performance and Results Act Goals. In response to the Government Performance and Results Act, DoD established 2 DoD-wide corporate-level goals and 7 subordinate performance goals. This report pertains to achievement of the following corporate-level goal and subordinate performance goal.

Corporate-level Goal 2: Prepare now for an uncertain future by pursuing a focused modernization effort that maintains U.S. qualitative superiority in key warfighting capabilities. Transform the force by exploiting the Revolution in Military Affairs, and reengineer the Department to achieve a 21st century infrastructure. **Performance Goal 2.4:** Meet combat forces' needs smarter and faster, with products and services that work better and cost less, by improving the efficiency of DoD's acquisition processes. (00-DoD-2.4)

DoD Functional Area Reform Goals. Most major DoD functional areas have also established performance improvement reform objectives and goals. This report pertains to achievement of the following acquisition functional issue area objective and goal.

Objective: Fostering Partnerships. **Goal:** Reduce total release of toxic chemicals by 20 percent. (ACQ-2.4)

General Accounting Office High-Risk Area. The General Accounting Office has identified several high-risk areas in DoD. This report provides coverage of the Defense Weapons Systems Acquisition high-risk area.

Management Control Program Review

The DoD Directive 5010.38, "Management Control (MC) Program," August 26, 1996, requires DoD managers to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

Scope of Review of the Management Control Program. In accordance with DoD Directive 5000.1, "Defense Acquisition," March 15, 1996, and DoD Regulation 5000.2-R, acquisition managers are to use program cost, schedule, and performance parameters as control objectives to implement the requirements of DoD Directive 5010.38. Accordingly, we limited our review to management controls directly related to the hazardous material management of the F-15 Program. Because we did not identify a material weakness, we did not assess management's self-evaluation.

Adequacy of Management Controls. Management controls were adequate in that we did not identify any material management control weakness applicable to the audit objective.

Summary of Prior Coverage

During the last 5 years, the General Accounting Office; the Inspector General, DoD; and the Military Department audit agencies have not issued reports specifically addressing the adequacy of planning and providing for the reduction and control of hazardous materials for the F-15 Program. However, the Inspector General, DoD, recently issued four final reports that address hazardous material management for major Defense systems and a final report that addresses reporting environmental and disposal liabilities.

Inspector General, DoD, Report No. 99-242, "Hazardous Material Management for the Black Hawk Helicopter Program," August 23, 1999.

Inspector General, DoD, Report No. 99-221, "Hazardous Material Management for the T-45 Undergraduate Jet Pilot Training System," July 21, 1999.

Inspector General, DoD, Report No. 99-177, "Hazardous Material Management for the C/KC-135 Stratotanker Aircraft," June 4, 1999.

Inspector General, DoD, Report No. 99-160, "Hazardous Material Management on the Grizzly Program," May 17, 1999.

Inspector General, DoD, Report No. 99-209, "Data Supporting the DoD Environmental Line Item Liability on the FY 1998 Financial Statements," July 9, 1999.

Appendix B. Definitions of Technical Terms

Acquisition Category. An acquisition category is an attribute of an acquisition program that determines the program's level of review, decision authority, and applicable procedures. The acquisition categories consist of I, major Defense acquisition programs; IA, major automated information systems; II, major systems; and III, all other acquisition programs.

Consumables. Consumables are administrative or housekeeping items, general purpose hardware, common tools, or any items not specifically identified as controlled equipment or spare parts.

Demilitarization. Demilitarization is part of the disposal process and is the act of deactivating or rendering a system inoperable by destroying its inherent military offensive or defensive advantage.

Depot-Level Maintenance. Depot-level maintenance is maintenance performed on material requiring major overhaul or a complete rebuild of parts, assemblies, subassemblies, and end items, including the manufacture of parts, modification, testing, and reclamation, as required. Depot-level maintenance supports organizational and intermediate maintenance activities by providing more extensive shop facilities and personnel of higher technical skill than are normally available at the lower levels of maintenance.

Disposal. Disposal is the process of transferring, donating, selling, abandoning, or destroying a system

Hazardous Material. Hazardous material is any waste that because of its quantity; toxicity; corrosiveness; flammability; or physical, chemical, or infectious characteristics may:

- cause or significantly contribute to an increase in mortality or an increase in a serious irreversible or incapacitating reversible illness; or
- pose a substantial present or potential hazard to human health or the environment when the waste is improperly treated, stored, transported, or disposed of.

Life-Cycle Cost. Life-cycle cost is the total cost to the Government of acquiring and owning a system over its useful life and includes the cost to develop, acquire, operate, support, and dispose of the system.

Programmatic Environmental, Safety, and Health Evaluation. The programmatic environmental, safety, and health evaluation describes the program manager's strategy for meeting programmatic environmental, safety, and health evaluation requirements, establishes responsibilities, and identifies how progress will be tracked. The program manager will initiate the

programmatic environmental, safety, and health evaluation at the earliest possible time, usually in support of a program initiation decision (Milestone I), and update the evaluation throughout the life-cycle of the program.

Technical Order. A technical order is an official document describing technical information, instructions, and safety procedures related to the operation, maintenance, installation, or modification of equipment.

Appendix C. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
Deputy Under Secretary of Defense (Environmental Security)
Deputy Under Secretary of Defense (Logistics)
Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
Deputy Chief Financial Officer
Deputy Comptroller (Program/Budget)

Department of the Army

Commander, Army Materiel Command
Assistant Secretary of the Army (Installations and Environment)
Auditor General, Department of the Army

Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Deputy Chief of Naval Operations (Logistics)
Auditor General, Department of the Navy
Deputy Chief of Staff (Installations and Logistics), Headquarters, Marine Corps

Department of the Air Force

Commander, Air Force Materiel Command
Assistant Secretary of the Air Force (Acquisition)
Commander, Warner Robins Air Logistics Center
F-15 System Program Director
F-15 Development System Manager
Assistant Secretary of the Air Force (Financial Management and Comptroller)
Auditor General, Department of the Air Force
Chairman, Joint Acquisition Sustainment Pollution Prevention Activity

Other Defense Organizations

Director, Defense Contract Audit Agency
Director, Defense Logistics Agency
Commander, Defense Contract Management Command
Commander, Defense Contract Management Command East
Commander, Defense Contract Management Command West

Other Defense Organizations (cont'd)

Director, National Security Agency
Inspector General, National Security Agency
Inspector General, Defense Intelligence Agency
Defense Systems Management College

Non-Defense Federal Organizations and Individuals

Office of Management and Budget
General Accounting Office
National Security and International Affairs Division
Technical Information Center

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Services
House Committee on Government Reform
House Subcommittee on Government Management, Information, and Technology,
Committee on Government Reform
House Subcommittee on National Security, Veterans Affairs, and International
Relations, Committee on Government Reform

Department of the Air Force Comments



OFFICE OF THE ASSISTANT SECRETARY

DEPARTMENT OF THE AIR FORCE
WASHINGTON, DC

OCT 8 1999

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

FROM: SAF/AQ
1060 Air Force Pentagon
Washington DC 20330-1060

SUBJECT: Draft of a Proposed Audit Report on Hazardous Material Management for the F-15
Aircraft Program, 4 August 1999, DoD(IG) Project No. 8AE-5037.05

This is in reply to your memorandum requesting the Assistant Secretary of the Air Force (Financial Management and Comptroller) to provide Air Force comments on the subject report.

The Air Force concurs with both of the DoD(IG) findings and recommendations. The attachment to this memorandum describes the actions the F-15 Program Office plans to take in response to the recommendations.

In addition, as we did with the similar findings and recommendations in the Audit Report on Hazardous Materials Management for the C/KC-135 Program, the Air Force will share these findings and recommendations with its other Program Offices.

Please have your staff refer any questions about this input to the SAF/AQ point of contact, LtCol Forbes, SAF/AQRE, 703-588-7839, sherman.forbes@pentagon.af.mil.

DARLEEN A. DRUYIN
Principal Deputy Assistant Secretary
(Acquisition & Management)

Attachment: a/s

cc:
AFPEO/FB
SAF/AQP
SAF/MIQ
HQ USAF/ILE
WR-ALC/LF

**SAF/AQ RESPONSES TO THE FINDINGS AND RECOMMENDATIONS IN
THE DRAFT AUDIT REPORT ON
HAZARDOUS MATERIAL MANAGEMENT FOR THE
F-15 AIRCRAFT PROGRAM, 4 AUGUST 1999,
DoD(IG) PROJECT No. 8AE-5037.05**

FINDING A. Environmental Life-Cycle Costs

The F-15 System Program Office did not include environmental costs for demilitarization, disposal, and associated cleanup for F-15 aircraft at the end of their useful life in the F-15 life-cycle cost estimate. The System Program Office excluded those environmental costs because its analysts did not include a cost element in their cost model to account for demilitarization and disposal of the aircraft and associated environmental cleanup. As a result, the System Program Office understated the total life-cycle costs for the F-15 Program and would not be able to accurately report the liability for demilitarization, disposal, and environmental cleanup costs for the F-15 aircraft in Air Force financial statements when DoD guidance for reporting those costs in financial statements becomes available.

RECOMMENDATION A.

The DoD(IG) recommends that the System Program Manager for the F-15 include a cost element in the F-15 life-cycle cost estimate to account for demilitarization, disposal, and environmental cleanup of the F-15 Eagle and F-15 Strike Eagle aircraft and include those costs in future total ownership cost submissions.

SAF/AQ RESPONSE A.

Concur. The Program Office will include a cost element in the F-15 life-cycle cost estimate to account for demilitarization, disposal, and environmental cleanup of the F-15 Eagle and F-15 Strike Eagle aircraft. The Program Office will include those costs in future total ownership cost submissions once the program completes its strategic plans for future operation and retirement of the F-15. The Program Office will then report those costs when DoD guidance for reporting them in financial statements becomes available. Currently, the F-15 Program Office does not have a requirement to update its total ownership cost projections. However, when it does have a requirement for the next update, the Program Office will include cost elements for demilitarization, disposal, and environmental cleanup.

The F-15 Program Office will utilize the May 1998 Air Force Material Command (AFMC) "Weapon System Environment, Safety, and Health (ESH) Cost Analysis Guide." This guide contains information on assessing demilitarization and disposal costs and is in the Air Force portion of the DoD Acquisition Deskbook, available through the following web site -- <http://www.afmc.wpafb.af.mil/HQ-AFMC/DR/dri-home/deskbook/>. The Air Force conducted two training sessions on the use of this guide at Aeronautical Systems Center on 10 June 1999 and 05 August 1999. Representatives from the F-15 Program Office were among the 46 people who attended this training. The Air Force also conducted a third training session on 16 September 1999 at the Oklahoma City Air Logistics Center (OC-ALC). Representatives from the C/KC-135 Program Office were among the 19 people who attended this training session. The 65 attendees at the three training sessions included a mix of cost analysts, systems engineers, and

Attachment 1 (Page 1 of 3)

ESH engineers. The weapon system ESH cost analysis process presented in the guide relies upon having a team of engineers and cost analysts working together to estimate ESH costs as part of either life-cycle cost studies or trade studies supporting analysis of alternative design approaches.

The F-15 Program Office effort to address demilitarization and disposal costs will also benefit from the recent initiative by the AFMC Weapon System Pollution Prevention Center Working Group (CWG) to focus on the issue of demilitarization and disposal of systems. The CWG began by meeting for three days in March 1999 at the Aerospace Maintenance and Regeneration Center (AMARC). The purpose of the meeting was to assess the available information sources and to share lessons learned so that the CWG representatives could take that information back and share it with the program offices. Representatives from the other services and DLA participated in this meeting, along with AMARC representatives. The F-15 Program Office is currently working with AMARC for system disposal planning and cost estimating.

FINDING B. Programmatic Environmental, Safety, and Health Evaluation

The F-15 System Program Office did not include program environmental, safety, and health responsibilities and a methodology to track and document the completion of its environmental, safety, and health strategy throughout the system acquisition life-cycle in its programmatic environmental, safety, and health evaluation (PESHE). The F-15 PESHE was incomplete because the System Program Office did not:

- review and approve the PESHE after the Environmental Manager who was detailed from the Air Combat System Program Office drafted the document, and
- update the PESHE throughout the F-15 life-cycle to incorporate upgrades to the system.

Without a PESHE that includes program environmental, safety, and health responsibilities and a methodology to track and document the completion of the environmental, safety, and health strategy, the System Program Office cannot ensure that it is aware of the impact of environmental, safety, and health issues on mission and cost and may also be foregoing opportunities to further reduce environmental, safety, and health life-cycle costs over the life span of the F-15 Program.

RECOMMENDATION B.

The DoD(IG) recommends that the System Program Manager for the F-15 annually review the programmatic environmental, safety, and health evaluation for the F-15 Program to incorporate the environmental, safety, and health effects of upgrades to the system, as appropriate.

SAF/AQ RESPONSE B.

Concur. In July 1999, the System Program Office agreed with the DoD(IG) that the F-15 PESHE did not include program environmental, safety, and health (ESH) responsibilities and a

methodology to track and document the completion of its ESH strategy. The System Program Office estimates it will have its PESHE updated by the end of March 2000, to include program ESH responsibilities and a methodology to track and document the completion of the ESH strategy throughout the life-cycle of the F-15 Program.

The F-15 PESHE will identify program office and contractor responsibilities for compliance with the National Environmental Policy Act (NEPA), environmental compliance, system safety and health assessments and risk management, hazardous materials management, and pollution prevention. It will address how these elements are integrated into the F-15 Program's systems engineering processes and how the systems engineering process integrates across these elements so as to avoid duplication of efforts. It will emphasize the Program Office's ESH strategy, individual responsibilities, and a method to track progress. The F-15 Program Office's PESHE will also include an ESH checklist that its management will review annually to assess progress and to identify needed updates, especially updates needed to reflect planned modification programs.

The F-15 Program Office will leverage lessons learned from other Air Force programs that have prepared PESHEs as stand alone documents and those that have incorporated their ESH evaluations into their Single Acquisition Management Plans (SAMPs) and their Test and Evaluation Master Plans (TEMPs). The F-15 Program Office also plans to utilize the Air Force developed "Environmental, Safety and Health Evaluation Development Guide for Single Managers," dated November 1996. As with the ESH Cost Guide, this guidance document is in the Air Force portion of the DoD Acquisition Deskbook, and is also available at the following web site: <http://www.hanscom.af.mil/ESC-BP/pollprev/eshguide.htm>.

Finally, the Program Office assures that it is aware of the impact of ESH issues on mission and cost, and has not forgone opportunities to further reduce ESH life-cycle costs due to an incomplete PESHE. The PESHE both documents what has been done and the Program Office's strategy for managing NEPA compliance, environmental compliance, system safety and health, pollution prevention, hazardous material, and hazardous waste.

Audit Team Members

The Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, DoD, prepared this report.

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