



November 2018

DEFENSE MANAGEMENT

DOD Should Take Additional Actions to Enhance Corrosion Prevention and Mitigation Efforts

Accessible Version

Why GAO Did This Study

A DOD-contracted study reported the cost impact of corrosion to DOD was \$20.6 billion in fiscal year 2016. Corrosion can affect military readiness by taking critical weapon systems out of action and creating safety hazards. Corrosion can also lead facilities to experience structural failures and loss of capital investments.

Senate Armed Services Committee Report 115-125, accompanying a bill for the Fiscal Year 2018 National Defense Authorization Act, included a provision for GAO to review aspects of DOD's corrosion prevention and mitigation efforts. In this report, among other things, GAO assesses the extent to which DOD has (1) consistently reported the funding levels needed to perform the Corrosion Executives' duties and (2) provided oversight of corrosion planning for major weapon system programs. GAO analyzed DOD guidance, funding (fiscal years 2010-2017) and corrosion planning information, and interviewed officials charged with overseeing DOD's corrosion efforts.

What GAO Recommends

GAO is making five recommendations to DOD, including (1) issuing guidance for identifying and reviewing funding levels for performing Corrosion Executive duties, (2) ensuring that the Corrosion Office develops a process to maintain documentation of its reviews of corrosion planning, and (3) ensuring that Corrosion Executives establish guidance on reviewing the adequacy of corrosion planning. DOD concurred with all of GAO's recommendations.

View [GAO-19-39](#). For more information, contact Diana Maurer at (202) 512-9627 or maurerd@gao.gov.

DEFENSE MANAGEMENT

DOD Should Take Additional Actions to Enhance Corrosion Prevention and Mitigation Efforts

What GAO Found

The Department of Defense's (DOD) Office of Corrosion Policy and Oversight (Corrosion Office) provides information, including the needed funding levels for the military departments' Corrosion Control and Prevention Executives (Corrosion Executives), in its Corrosion Office Annual Reports to Congress. Corrosion Executives are responsible for overseeing efforts to prevent and mitigate corrosion of weapon system programs and infrastructure. GAO reviewed these reports for fiscal years 2010 through 2017 and found inconsistencies in the reported funding levels. Specifically, the military departments:

- *Used different methods to identify funding levels:* In fiscal year 2017, the Army and Navy used direct costs, such as salary and training costs, to identify their funding levels, but the Army also included other associated costs. The Air Force used the prior year's funding level and adjusted it for inflation. The use of differing methods may not yield consistent and quality information for decision-making purposes.
- *Did not consistently have supporting documentation:* The Army data GAO received did not reconcile with data presented in the Corrosion Office Annual Reports to Congress for 5 of 8 fiscal years. The Navy data did not reconcile for 2 of 8 fiscal years, and there was no supporting documentation identifying how these figures were calculated. Air Force officials did not provide any figures or supporting documentation for 4 fiscal years, stating that these figures were not available. Without maintaining supporting documentation, DOD may not be able to ensure the accuracy of the reported information.

DOD's Corrosion Office has not issued guidance for identifying funding levels and maintaining documentation. Without such guidance, Congress will not receive quality information needed to effectively conduct its oversight activities.

DOD has taken several actions to maintain oversight of corrosion planning, such as developing sustainment and engineering documents that take corrosion considerations into account, for major weapon system programs. However, DOD lacks documentation of some of its oversight efforts. DOD Corrosion Office officials told GAO that since October 2016, they have reviewed corrosion planning documents during the earliest phases of the acquisition process for 11 major weapon system programs. However, DOD Corrosion Office officials could not provide supporting documentation of all their reviews or the actions taken by program offices to address the Corrosion Office's comments.

For example, Army and Air Force Corrosion Executives described some actions taken to oversee corrosion planning, such as providing comments on key sustainment and engineering documents. However, Army and Air Force Corrosion Executive Office officials had limited documentation of the oversight provided. In addition, guidance cited by Army and Air Force officials does not specifically describe how the Corrosion Executives will ensure that the processes for overseeing the adequacy of corrosion planning are being accomplished. Without the DOD Corrosion Office and the Army and Air Force Corrosion Executives taking steps to address these issues, DOD's actions to oversee its corrosion prevention and mitigation efforts may not be consistent or effectively addressing DOD requirements.

Contents

Letter	1
Background	6
DOD Has Not Reported Consistent Information on the Funding Levels Needed to Perform Corrosion Executives' Duties	12
DOD Lacks Documentation of Its Oversight of Corrosion Planning for Major Weapon System Programs during Early Acquisition Phases	18
DOD Has Mechanisms to Collect, Maintain, and Make Information Available to Other Agencies about Technologies for Preventing and Mitigating Corrosion of Infrastructure	30
Conclusions	35
Recommendations for Executive Action	36
Agency Comments	37
Appendix I: Comments from the Department of Defense	39
Appendix II: GAO Contact and Acknowledgments	43
GAO Contact	43
Staff Acknowledgments	43
Appendix III: Accessible Data	44
Agency Comment Letter	44
Related GAO Products	48
Table	
Table 1: Fiscal Years in which the Corrosion Office's Annual Report Included and Did Not Include Summaries of Funding Levels Required under Section 2228 for the Corrosion Executives, 2010 through 2017	15
Figures	
Figure 1: Overview of the Defense Acquisition System Framework	10

Figure 2: Department of Defense's (DOD) Hierarchy for Managing and Supporting Major Defense Acquisition Programs	11
Figure 3: Use of Electro-Osmotic Pulse Technology by the Department of Interior's Bureau of Reclamation to Prevent Water Leaks on the Trinity River Dam, 2011	35

Abbreviations

ACAT	Acquisition Category
Corrosion Executive	Corrosion Control and Prevention Executive
Corrosion Office	Office of Corrosion Policy and Oversight
DOD	Department of Defense

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November 8, 2018

The Honorable James M. Inhofe
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

Corrosion can significantly affect the cost and expected service life of military equipment and infrastructure.¹ A contracted study reported the cost impact of corrosion to the Department of Defense (DOD) was \$20.6 billion in fiscal year 2016.² DOD also has reported that corrosion affects military readiness by taking critical weapon systems out of action and creates safety hazards. While corrosion is not always highly visible, it can lead facilities to experience structural failures, loss of capital investments, and environmental damage. Corrosion is defined in section 2228 of Title 10 of the United States Code as the deterioration of a material or its properties due to a reaction of that material with its chemical environment. It can take varied forms, such as rusting, pitting, galvanic reaction, calcium or other mineral buildup, degradation due to ultraviolet light exposure, and mold, mildew, or other organic decay.

Congress has enhanced DOD's ability to prevent and mitigate corrosion and to provide Congress with greater transparency over the department's efforts. In 2002, Congress passed legislation—codified at section 2228 of Title 10, U.S. Code—that led to the creation of the Office of Corrosion

¹Section 2228(f) of Title 10, U.S. Code, defines military equipment as all weapon systems, weapon platforms, vehicles, and munitions of the Department of Defense, as well as components of these items. 10 U.S.C. § 2228(f) defines infrastructure as all buildings, structures, airfields, port facilities, utility systems, heating and cooling systems, fuel tanks, pavements, and bridges.

²LMI, *Estimated Impact of Corrosion on Cost and Availability of DOD Weapon Systems, FY18 Update* (March 2018). This cost estimate, which was produced by a DOD contractor, is the latest estimate available on DOD corrosion costs.

Policy and Oversight (Corrosion Office).³ Section 2228 requires the Secretary of Defense to, among other things, develop and implement a long-term strategy to reduce corrosion and its effects on military equipment and infrastructure. Additionally, the statute requires the Secretary of Defense to annually submit, in fiscal years 2009 to 2022, along with the defense budget materials, a report to Congress on corrosion funding, including funding requirements for the long-term strategy (hereafter referred to as Corrosion Office Annual Report). In 2008, Congress directed that the Departments of the Army, Navy, and Air Force designate a Corrosion Control and Prevention Executive (Corrosion Executive).⁴ The Corrosion Executive is responsible for coordinating corrosion prevention and mitigation activities within its respective military department with the Office of the Secretary of Defense and other DOD entities.⁵ A provision in section 2228 requires the three Corrosion Executives to each submit a report annually, until 2020, to the Secretary of Defense that includes recommended funding levels needed to perform their duties (hereafter referred to as Military Department Corrosion Executive Report).

We have previously reported on DOD's corrosion prevention and mitigation program, including strategic planning, performance management, inter-service coordination, and technical development projects issues. In our most recent report in 2014, we recommended five actions to improve DOD's management of corrosion research projects, in which DOD partners with universities and military research labs.⁶ DOD

³The Bob Stump National Defense Authorization Act for Fiscal Year 2003 required the Secretary of Defense to designate an officer, employee, board, or committee as the individual or office with the responsibility to prevent and mitigate corrosion of military equipment and infrastructure at DOD. Pub. L. No. 107-314, § 1067 (2002) (codified, as amended, at 10 U.S.C. § 2228). The National Defense Authorization Act for Fiscal Year 2008 amended this requirement by creating the position of the Director of the Corrosion Policy and Oversight Office as the position with these responsibilities. Pub. L. No. 110-181, § 371 (2008) (codified, as amended, at 10 U.S.C. § 2228).

⁴The Navy's Corrosion Executive also is responsible for the Marine Corps' corrosion issues.

⁵Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, § 903 (2008) (codified as amended at 10 U.S.C. § 2228 note (Corrosion Control and Prevention Executives for the Military Departments)).

⁶GAO, *Defense Research: Improved Management of DOD's Technical Corrosion Collaboration Program Needed*, [GAO-14-437](#) (Washington, D.C.: May 29, 2014).

partially agreed with recommendations to track and maintain accurate funding data and to document procedures to select and approve labs, and has taken actions to implement these recommendations. DOD did not agree with our recommendations to document procedures for approving projects for civilian institutions, to document procedures for selecting and approving projects for military academic institutions, and to establish a process to transition project results to the military departments. The Related GAO Products section at the end of this report lists our prior work since 2008.

Senate Armed Services Committee Report 115-125 accompanying a bill for the Fiscal Year 2018 National Defense Authorization Act includes a provision for us to review aspects of DOD's corrosion prevention and mitigation efforts. In this report we (1) assess the extent to which DOD has consistently reported the funding levels needed to perform the Corrosion Executives' duties, (2) assess the extent to which DOD has provided oversight of corrosion planning for major weapon system programs during the early phases of the acquisition life cycle, and (3) describe how DOD makes information on technologies that prevent and mitigate corrosion of infrastructure available to other federal agencies.

For objective one, we reviewed provisions in section 2228 and DOD guidance that identify the duties and responsibilities of the Corrosion Executives and Corrosion Office for developing and submitting the Corrosion Office Annual Reports to Congress on corrosion prevention and mitigation, including funding levels. We obtained and analyzed DOD's Corrosion Office Annual Reports for fiscal years 2010 through 2017. We selected this timeframe because the joint explanatory statement accompanying the National Defense Authorization Act for Fiscal Year 2009 directed the Corrosion Executives to first report on their funding levels in December 2009. We also reviewed documentation supporting the funding information submitted by the Corrosion Executives to the Corrosion Office in preparation of the Corrosion Office Annual Reports to compare and corroborate the figures reported to Congress. We compared the evidence we collected with criteria in the *Standards for Internal Control in the Federal Government* related to documenting policies and processes; establishing an organizational structure to fulfill responsibilities; and using quality information that is: appropriate, current, complete, accurate, accessible, and provided on a timely basis.⁷ For the

⁷GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 10, 2014).

purposes of this report, if one of these six attributes of quality information was missing, we determined that the information presented was not quality information.

We also interviewed Corrosion Office officials about their processes for preparing and consolidating the Corrosion Office Annual Reports to Congress. We interviewed Corrosion Executive officials about their methods for identifying funding levels. In assessing these methods, we did not evaluate the soundness of the different cost or budgeting methods used or the needed funding levels reported. Where we had questions about the reported needed funding levels, such as gaps, fluctuations, or errors, we asked the officials to provide further explanation and information on what plans, if any, they had to address the identified issues.

For objective two, we reviewed provisions in section 2228 and DOD guidance that describe the roles and responsibilities of the Corrosion Office and Corrosion Executives to provide oversight of corrosion planning efforts for weapon systems. We interviewed and obtained pertinent documents and work products, if available, from officials at the Corrosion Office and Corrosion Executives to identify the nature and level of oversight being provided during the acquisition process.⁸ We requested documentation of reviews that these offices had conducted. We received examples such as comments they made on Systems Engineering Plans, Requests for Proposals, or other acquisition documentation prepared by weapon system program offices, and the resolution of the comments. We focused primarily on Acquisition Category (ACAT) I major weapon system programs that were in the early phases of the acquisition life cycle, which is a time when conducting corrosion prevention and mitigation activities

⁸For the purposes of this report, we did not assess the technical or scientific quality of the pertinent documents or work products obtained, such as the Corrosion Office's or the Corrosion Executives' corrosion strategic plans, reviews of acquisition planning documentation, or the support provided by corrosion-related subject matter experts.

yield the maximum life cycle return on investment.⁹ For the purposes of this report, early phases of the acquisition life cycle include pre-milestone B phases, such as the material solution analysis, and technology maturation and risk reduction phases.

We compared this evidence with the latest DOD guidance related to Corrosion Office responsibilities on leading discussions on the review and evaluation of corrosion planning for ACAT I programs, and guidance on the need for the Corrosion Executives to establish a process for reviewing and evaluating the adequacy of corrosion planning.¹⁰ We also compared the evidence collected to our *Standards for Internal Control in the Federal Government* related to clearly documenting transactions, policies, processes, and other significant events; and having documentation readily available for examination.¹¹ When documented reviews of oversight activities by the Corrosion Office and the military departments' Corrosion Executives were not available, we discussed the reasons for the lack of supporting documentation and obtained officials' views on actions that might be taken to mitigate identified issues.

For objective three, we obtained Corrosion Office documentation describing and tracking projects that it funded to demonstrate corrosion technologies in fiscal years 2005 through 2017. We selected this timeframe because the Corrosion Office began funding these projects in fiscal year 2005. We interviewed Corrosion Office officials on how the projects were selected, funded and evaluated, and how DOD

⁹ACAT I programs are Major Defense Acquisition Programs. A Major Defense Acquisition Program is a program that is not a highly sensitive classified program and that is designated by the Secretary of Defense as a Major Defense Acquisition Program or that is estimated to require eventual total expenditure for research, development, test, and evaluation of more than \$480 million (fiscal year 2014 constant dollars) or for procurement of more than \$2.79 billion (fiscal year 2014 constant dollars). There are two subcategories of ACAT I programs: ACAT ID are programs where the milestone decision authority is the defense acquisition executive, or as delegated; and ACAT IC are programs where the milestone decision authority is the head of the DOD component or, if delegated, the component or service acquisition executive.

¹⁰DOD Instruction 5000.67, *Prevention and Mitigation of Corrosion on DOD Military Equipment and Infrastructure*, (Feb. 1, 2010) (incorporating change 1, effective Nov. 21, 2017) and Corrosion Office, *DOD Corrosion Prevention and Mitigation Strategic Plan* (September 2015). The strategic plan was first issued in November 2004 and most recently updated in 2015.

¹¹[GAO-14-704G](#).

incorporates the results of successful projects into its infrastructure designs. We also requested 25 examples of technologies that successfully prevent or mitigate corrosion of infrastructure, including 10 examples from the Corrosion Office and 5 examples each from the Army, Navy, and Air Force Corrosion Executive Offices, to gain a better understanding of the types of technologies DOD has funded to prevent or mitigate corrosion of its infrastructure. In addition, we interviewed officials from the Corrosion Office and Corrosion Executives, and obtained related documentation, such as online and printed publications, demonstrating how DOD makes information about such technologies available to non-DOD federal agencies. We attended DOD's annual Corrosion Forum in December 2017, where we observed various presentations on corrosion-related topics. Furthermore, we interviewed officials from three non-DOD agencies—the U.S. Department of Transportation, the National Aeronautics and Space Administration, and the U.S. Department of the Interior—with which Corrosion Office officials stated they had coordinated. In interviews, we asked about officials' experiences with accessing and using information regarding DOD's demonstrated technology projects to help prevent and mitigate corrosion of each department's or agency's respective infrastructure.

We conducted this performance audit from August 2017 through November 2018 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Strategy and Organizational Structure for Preventing and Mitigating Corrosion

DOD's long-term strategy for preventing and mitigating corrosion calls for implementing DOD-wide standards and improving strategies and processes to prevent, detect, and treat corrosion.¹² The strategy is also

¹²Corrosion Office, *DOD Corrosion Prevention and Mitigation Strategic Plan* (September 2015).

intended to address corrosion's negative operational effects and associated total ownership costs for military equipment and infrastructure. To provide leadership on corrosion matters, including the development of policy guidance and oversight, consistent with section 2228, DOD has established an organizational structure that includes the Corrosion Office and Corrosion Executives.

The Corrosion Office resides within the department's Office of the Deputy Assistant Secretary of Defense for Materiel Readiness. The Director of the Corrosion Office is to provide management and coordination of corrosion control and prevention for the department and also leads the Corrosion Prevention and Control Integrated Product Team. In addition, seven working-level integrated product teams focus on specific corrosion-related issues. The Corrosion Prevention and Control Integrated Product Team and the working integrated product teams have representatives from the military departments, other DOD components, and some entities outside DOD. The military departments have each assigned officials to serve as Corrosion Executives. The Corrosion Executives operate within the chain of command of their respective military department while also coordinating with the Corrosion Office.

According to DOD's strategy, the seven working integrated product teams play a role in implementing policies, strategies, objectives, and developing and executing plans, procedures and milestone schedules.¹³ These product teams are associated with the following seven missions and conduct various tasks, including:

- **Corrosion Policy, Procedures, Processes and Oversight:** Identifying, assessing, creating and recommending policy, procedures, processes and oversight for both weapon systems and infrastructure throughout its life cycle.
- **Metrics, Impact and Sustainment:** Identifying, collecting, and analyzing quantifiable measures to provide product or process changes that will positively affect acquisition and life cycle maintenance activities to sustain weapon systems and infrastructure.
- **Science and Technology:** Facilitating the development of technology solutions to corrosion problems affecting weapon systems and

¹³Corrosion Office, *DOD Corrosion Prevention and Mitigation Strategic Plan* (September 2015).

infrastructure through sponsorship of science and technology and through collaboration with stakeholders within and outside DOD.

- **Outreach and Communications:** Ensuring that all military departments and supporting government, industrial, and academic communities of interest have the communications resources and information networks needed to help prevent and mitigate materiel degradation of equipment and infrastructure.
- **Facilities:** Developing and implementing a plan to improve DOD's ability to prevent and mitigate facilities and infrastructure corrosion.
- **Training and Certification:** Improving corrosion prevention management through training of the acquisition workforce to enhance operational effectiveness, sustainment, and mission readiness.
- **Specifications, Standards and Qualification Process:** Producing corrosion-related specifications and standards and developing a streamlined process for product introduction for suppliers of corrosion prevention technologies.

Duties of Corrosion Officials

Section 2228 of Title 10, U.S. Code, and section 903 of Public Law 110-417, as amended, contain provisions on the duties of the Director of the Corrosion Office and the Corrosion Executives. The Director of the Corrosion Office is to oversee and coordinate efforts throughout DOD to prevent and mitigate corrosion of military equipment and infrastructure, and to develop and recommend corrosion policy guidance to be issued by the Secretary of Defense. Another duty of the Director is to review corrosion programs and funding levels proposed by the military departments during the budget review process, and to submit recommendations regarding those programs and proposed funding levels to the Secretary of Defense. Moreover, the Director is responsible for providing oversight and coordination of efforts to prevent or mitigate corrosion during the design, acquisition, and maintenance of military equipment, as well as the design, construction, and maintenance of infrastructure. Furthermore, the Director is to monitor DOD acquisition practices to ensure that the use of corrosion prevention technologies and the application of corrosion prevention treatments are fully considered during research and development in the acquisition process. Also, the Director is to ensure that, to the extent determined appropriate for each acquisition program, such technologies and treatments are incorporated into that program, particularly during the engineering and design phases of the acquisition process.

The duties of the Corrosion Executives include ensuring that corrosion prevention and control is maintained in each military department's policy and guidance.¹⁴ The Corrosion Executives also are responsible for identifying the funding levels necessary to accomplish their duties. Further, the Corrosion Executives are to develop, support, and provide the rationale for resources to initiate and sustain an effective corrosion prevention and control program in their department. Also, they are to evaluate the program's effectiveness and ensure that corrosion prevention and control requirements for materiel are reflected in budgeting and policies of the department for the formulation, management, and evaluation of personnel and programs for the entire military department, including its reserve components. Finally, each Corrosion Executive must serve as the respective department's principal point of contact to the Director of the Corrosion Office, and submit the annual Military Department Corrosion Executive Report to the Secretary of Defense.

Pursuant to section 2228, DOD developed and issued a DOD instruction that establishes policy, assigns responsibilities, and provides guidance for corrosion prevention and mitigation.¹⁵ In addition to DOD's long-term strategy, each of the military departments has developed its own strategic plan on corrosion.

Defense Acquisition System Framework

The defense acquisition system framework establishes the steps that DOD weapon system programs generally take as the department plans, designs, acquires, deploys, operates, and maintains its programs. It consists of five program life-cycle phases and multiple related decision

¹⁴Pub. L. No. 110-417, § 903(b).

¹⁵DOD Instruction 5000.67, *Prevention and Mitigation of Corrosion on DOD Military Equipment and Infrastructure* (Feb. 1, 2010) (incorporating change 1, effective Nov. 21, 2017).

points (three of which are referred to as milestones), which are shown in figure 1.¹⁶

Figure 1: Overview of the Defense Acquisition System Framework



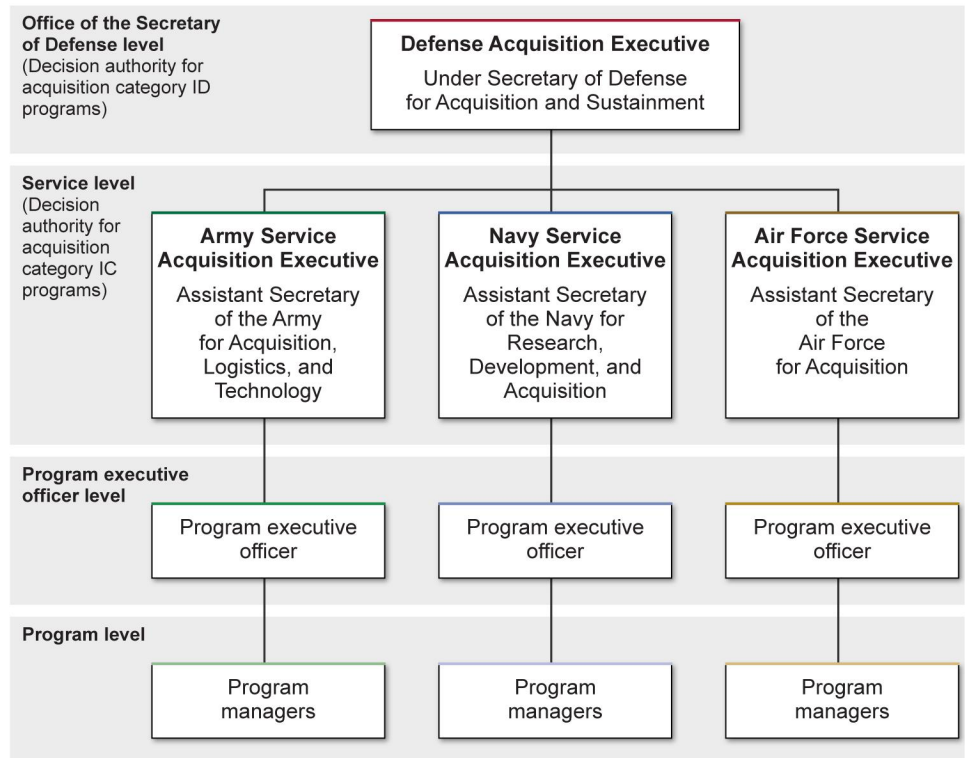
Source: GAO analysis of Department of Defense (DOD) information. | GAO-19-39

Note: This figure is meant to provide an overview of the defense acquisition system framework and does not identify all decision points or activities.

DOD’s acquisition process is managed and supported by officials at different hierarchical levels. Weapon system program managers typically report to program executive officers in each military service who are charged with overseeing the execution of a portfolio of related systems, such as fighter aircraft or ships. Program executive officers, in turn, typically report to a military service acquisition executive, who reports to the defense acquisition executive. As part of the milestone decision process, programs are reviewed at each level before reaching the milestone decision authority. Figure 2 shows the different levels.

¹⁶Milestone A is the decision for an acquisition program to enter into the technology maturation and risk reduction phase; Milestone B is the decision to enter the engineering and manufacturing development phase; and Milestone C is the decision to enter the production and deployment phase. In addition to the three milestone decision points included in this framework, the framework includes several other decision points, such as: (1) materiel development decision, which directs officials to conduct analyses to assess the potential solutions that can satisfy the program’s requirements, and (2) full rate production or full deployment decision, which authorizes the system to be deployed to all remaining locations beyond the limited fielding locations. Limited fielding involves the deployment of a capability to a limited number of users to test the capability in an operational environment.

Figure 2: Department of Defense's (DOD) Hierarchy for Managing and Supporting Major Defense Acquisition Programs



Source: GAO analysis of Department of Defense (DOD) data. | GAO-19-39

A program's milestone decision authority reviews acquisition planning documents and makes program decisions at major milestones, including milestones A, B, and C. The milestone decision authority for programs under this framework is either the Under Secretary of Defense for Acquisition and Sustainment; the DOD component head; a Component Acquisition Executive; or, when authorized, a designee.¹⁷ In 2015, the National Defense Authorization Act for Fiscal Year 2016 amended section 2430 of Title 10 of the U.S. Code to require that the milestone decision authority for major defense acquisition programs reaching milestone A after October 1, 2016, shall be the Service Acquisition Executive of the military department that is managing the program, unless the Secretary of

¹⁷DOD Instruction 5000.02, *Operation of the Defense Acquisition System*, para. 4(a), Encl. 1, Table 1 (Jan. 7, 2015) (incorporating change 3, effective Aug. 10, 2017); Defense Acquisition Guidebook, Ch. 1--3.2.3.1.1 (Dec. 5, 2017) (milestone decision authority for ACAT I programs).

Defense designates another official to serve as the milestone decision authority under section 2430(d)(2).¹⁸

DOD Has Not Reported Consistent Information on the Funding Levels Needed to Perform Corrosion Executives' Duties

To meet its reporting requirements to Congress, DOD has submitted information detailing the funding levels needed to perform the duties of the Corrosion Executive across the military departments, but it has not consistently provided information on these funding levels. The military departments used different methods to identify their funding needs, including different cost elements. In addition, we found that the Corrosion Office's Annual Reports had discrepancies that included gaps where funding levels were not provided by at least one military department, and that the Corrosion Executives did not have supporting documentation for these funding levels for some years. The inconsistent reporting occurred because DOD does not have guidance for identifying, documenting, and reviewing this information for inclusion in the Corrosion Office's Annual Report.

Military Departments Used Different Methods for Identifying the Annual Funding Levels Needed to Perform Corrosion Executive Duties

The military departments used different methods to identify the annual funding levels needed to perform the duties of their respective Corrosion Executives. The military departments develop and report these funding levels to address a provision of section 2228 of Title 10, U.S. Code, which requires their Corrosion Executives to provide this information in the Military Department Corrosion Executive Reports not later than December 31 of each year to the Director of the Corrosion Office. The Corrosion Office collects this and other data from the Corrosion Executives and then submits the Military Department Corrosion Executive Reports as an annex to its Corrosion Office Annual Report to the Office of the Secretary of Defense, which the Secretary of Defense in turn submits to Congress.

¹⁸National Defense Authorization Act for Fiscal Year 2016, Pub. L. No. 114-92, § 825(a) (2015) (codified at 10 U.S.C. § 2430(d)).

Our review of the Corrosion Office's Annual Reports and information from the Corrosion Executives showed the military departments used different methods to identify their yearly funding needs, such as including different cost elements in their estimates.

- **Army:** The Army's method to determine the resources needed to carry out the Corrosion Executive's duties was included in the analysis to estimate the total cost of the Army's Corrosion Prevention and Mitigation program.¹⁹ Using this method, the Army reported a total of \$2.4 million for salaries of personnel, contractor support, and other associated costs, of which \$1 million of this total was associated with the Office of the Corrosion Executive in fiscal year 2017. However, Army Corrosion Executive officials stated they cannot assure the accuracy or comprehensiveness of reported funding levels because they do not account for all the costs that are associated with the various personnel that may perform corrosion-related duties. Specifically, these officials stated they embed the cost of corrosion prevention activities with other activities and are not able to isolate corrosion costs. For example, the Army's current Corrosion Executive has other responsibilities not related to corrosion, such as serving as the Army's Aviation Logistics and Safety Officer for the Army G-4 logistics organization, and the corrosion-related costs of conducting the Corrosion Executive role are not separated from this other function.
- **Navy:** The Navy's method captured direct costs associated with personnel performing the duties of the Corrosion Executive, according to Navy Corrosion Executive officials. These officials said that the \$220,000 reported for fiscal year 2017 includes the salary for one full-time staff member and his related training and travel costs. However, Navy officials acknowledged that this method does not capture other costs, such as personnel assigned to other offices that provide support to the Corrosion Executive.
- **Air Force:** The Air Force's method used the prior year's funding level as a baseline and adds an inflation adjustment, according to Air Force

¹⁹Army Corrosion Executive officials stated that the Army used a standard cost benefit analysis to determine the resources needed to carry out the Army's Corrosion Prevention and Mitigation program—which included the Corrosion Executive's duties. According to the Fiscal Year 2017 Army Military Department Corrosion Executive Report, this cost benefit analysis was initially conducted in fiscal year 2013, and the funding requirement was adjusted to estimate the fiscal year 2017 funding level.

Corrosion Executive officials.²⁰ To calculate the \$3.0 million reported for fiscal year 2017, Air Force officials used the reported figure of \$2.9 million for fiscal year 2016 and then increased that amount using an inflation rate. According to these officials, the reported funding level included costs for performing Corrosion Executive duties, as well as costs for executing the Air Force strategic plan on corrosion and contributing to technology demonstration projects. Air Force Corrosion Executive officials stated that identifying funding levels for the Corrosion Executive's duties is challenging because the costs are not separated from other corrosion-related functions, such as executing the Air Force's Strategic Plan and contributing to other corrosion projects.

The result of using different methods to identify yearly funding needs is the reporting of inconsistent data. The differing methods may not yield quality information to allow decision makers to compare this data across departments, and hinders the ability to use this information for decision-making purposes.

DOD's Recent Corrosion Office Annual Reports Address Prior Gaps in Reporting Funding Levels

Our review of DOD's Corrosion Office Annual Reports for fiscal years 2010 through 2017 found that recent Corrosion Office Annual Reports do not contain gaps in reporting funding levels needed to perform the duties of the Corrosion Executives, but there were gaps in reporting this information in prior years. For example, we found gaps where the Corrosion Office's Annual Reports did not include the Corrosion Executives' funding levels—at least a summary of which are required as annexes under section 2228—for all three military departments. See table

²⁰According to Air Force Corrosion Executive officials, in fiscal year 2014 Air Force officials conducted a study to identify the resources needed for personnel, including the Corrosion Executive, to execute tasks described in its strategic plan. The figure identified for the Corrosion Executive in this study became the baseline for estimating the Corrosion Executive's funding levels in future years, beginning in fiscal year 2015.

1 for a description of the fiscal years in which the Corrosion Office's Annual Report included and did not include funding levels.²¹

Table 1: Fiscal Years in which the Corrosion Office's Annual Report Included and Did Not Include Summaries of Funding Levels Required under Section 2228 for the Corrosion Executives, 2010 through 2017

Military department	2010	2011	2012	2013	2014	2015	2016	2017
Army	not included	included	included	included	not included	not included	included	included
Navy	not included	included	included	included	included	included	included	included
Air Force	not included	not included	included	included	included	included	included	included

✓ Annual Report submitted in this fiscal year included the military department's funding levels.
— Annual Report submitted in this fiscal year did not include the military department's funding levels.
Source: GAO analysis of Department of Defense information. | GAO-19-39

According to Corrosion Office officials, they did not always report funding levels for each of the military departments in the Corrosion Office Annual Report annex because the Corrosion Executives did not provide funding levels for these years in the Military Department Corrosion Executive Reports. Corrosion Office officials also told us that sometimes the Corrosion Executives missed the required December 31 Military Department Corrosion Executive Report deadline. However, since fiscal year 2016, the Corrosion Executives have included these funding levels in these reports.

²¹The Corrosion Office's Annual Report includes the Corrosion Office's report on the topics described in section 2228(e)(1) of Title 10, U.S. Code—officially titled, *Report to Congress on Corrosion Policy and Oversight Budget Materials for Fiscal Year 20xx* and which the Secretary of Defense must submit to Congress with the annual defense budget materials until the budget for fiscal year 2022—as well as annexes containing summaries of the Military Department Corrosion Executive Reports of the three military departments' Corrosion Executives, in accordance with section 2228(e)(2)(A). Instead of summaries of these Corrosion Executive Reports, the Corrosion Office has routinely submitted all three Military Department Corrosion Executive Reports to serve as the annexes required under section 2228(e)(2)(A).

DOD's Corrosion Office Lacks Supporting Documentation on Funding Levels for the Corrosion Executives

DOD's Corrosion Office Annual Reports for fiscal years 2010 through 2017 do not have supporting documentation for some years for funding levels needed to perform the duties of the Corrosion Executives. For example, we compared data on funding levels provided to us by the military departments and the data included in the Corrosion Office's Annual Reports, which include the Military Department Corrosion Executive Reports as annexes. Specifically, we requested funding data directly from the military departments to corroborate the data the departments had reported in their Military Department Corrosion Executive Reports for fiscal years 2010 through 2017. The data provided by the military departments, however, did not always reconcile with the reported figures. When we sought explanations from the military departments, they could not produce supporting documentation that would explain these differences. For example:

- Army data provided to us did not reconcile with funding data in the Army's Military Department Corrosion Executive Reports for 5 of the 8 fiscal years (all fiscal years except 2013, 2016, and 2017). For instance, for fiscal years 2010 and 2011, the Army provided us figures—\$40.5 million and \$22.5 million, respectively—which did not reconcile with the funding levels included in their Military Department Corrosion Executive Reports of nothing for fiscal year 2010—which Corrosion Office officials described to us as “no specified amount”—and \$145,000 for fiscal year 2011. Army officials explained how they obtained the estimated data for our request, but their supporting documentation does not break out funding for the Corrosion Executive's duties because this funding is embedded in other corrosion-related functions.
- For the Navy, we found in 2 of 8 fiscal years—2010 and 2011—that the figures did not reconcile. For example, for fiscal year 2011, the Navy's Military Department Corrosion Executive Report showed the number was \$973,000. However, Navy officials stated that for fiscal year 2011 they did not report an official number to the Corrosion Office. In addition, Navy officials told us that their Corrosion Executive funding level was \$634,000 in fiscal year 2011; however, they did not

provide supporting documentation or the data sources used to calculate these figures.²²

- Air Force officials did not provide us any figures for fiscal years 2010 through 2013, stating that these figures were not available. However, the Air Force's Military Department Corrosion Executive Reports included reported funding levels for fiscal years 2012 and 2013. Air Force officials stated they had not maintained supporting documentation that would explain the figures included in the Air Force Military Department Corrosion Executive Reports for those years.

According to *Standards for Internal Control in the Federal Government*, agencies should implement internal control activities through documented policies; ensure that complete and accurate documentation is readily available for examination; and use quality information that is appropriate, current, complete, accurate, accessible, and provided on a timely basis.²³

Corrosion Office officials stated that they have not provided such guidance because the military departments should have the freedom to manage their own resources to prevent and manage corrosion. However, Corrosion Executive officials stated that, in the absence of standard guidance from DOD, they have used their own methods for identifying funding levels, and they acknowledged that it is unclear what corrosion-related cost elements should be included.

DOD Does Not Have Guidance on Processes for Identifying and Reviewing Funding Levels

DOD has not consistently reported information on funding levels needed to perform the duties of the Corrosion Executives because:

- the Corrosion Office has not issued guidance on a process for the Corrosion Executives to use for identifying these funding levels, the specific cost elements and methods that may be used to estimate these levels, and the supporting documentation that should be maintained, and

²²In the absence of adequate supporting documentation, we did not verify the reliability of the data used or the soundness of the funding level data provided to us by the military departments' for the 2010 through 2017 period.

²³[GAO-14-704G](#).

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- the Corrosion Office does not have a documented process for reviewing the information it receives from the military departments for inclusion in its Corrosion Office Annual Reports.

The Corrosion Office is required to review the programs and annual funding levels for each military department as they relate to the prevention and mitigation of corrosion. Specifically, section 2228 states that the Director of the Corrosion Office shall review the programs and funding levels proposed by the Secretary of each military department during the annual internal DOD budget review process as they relate to the prevention and mitigation of corrosion and shall submit to the Secretary of Defense recommendations regarding those programs and proposed funding levels. Corrosion Office officials stated they do not believe they need to document their review process because it is working adequately. However, the *Standards for Internal Control in the Federal Government* states that agencies benefit from a documented process to retain organizational knowledge and mitigate the risk of having that knowledge limited to a few personnel.²⁴ Such a process can help ensure that agencies have access to documentation that will allow them to ensure the accuracy of the reported information. Without issuing guidance for identifying, documenting, and reviewing funding levels needed to perform the duties of the Corrosion Executives, DOD will continue to report inconsistent funding levels to Congress. As a result, Congress will not receive quality information needed to effectively conduct its oversight activities and make decisions on funding for DOD's corrosion prevention and mitigation efforts.

DOD Lacks Documentation of Its Oversight of Corrosion Planning for Major Weapon System Programs during Early Acquisition Phases

Section 2228 of Title 10, U.S. Code, and DOD guidance requires the Corrosion Office and Corrosion Executives to oversee planning for the prevention and mitigation of corrosion in major weapon system programs. Officials from the Corrosion Office stated they had taken several actions to fulfill these requirements. However, they were not able to consistently provide supporting documentation about their reviews and evaluations of corrosion planning. The level of oversight by the Corrosion Executives

²⁴GAO-14-704G.

varied. The Navy Corrosion Executive has documented guidance for reviewing and evaluating the adequacy of corrosion planning for weapon system programs, including ACAT I programs, and maintains documentation on the guidance provided. However, the Army and Air Force Corrosion Executives do not have documented guidance describing their oversight of corrosion planning for such programs and lack documentation of the guidance officials told us they provided.

Corrosion Office and Corrosion Executives Are Required to Oversee Corrosion Planning for Major Weapon System Programs

The Corrosion Office is generally responsible for, among other things, ensuring corrosion issues are considered in the early phases of the design and acquisition processes for major DOD systems. Specifically, section 2228 states that the Director of the Corrosion Office shall provide oversight and coordination of the efforts within the department to prevent or mitigate corrosion during the design, acquisition, and maintenance of military equipment, among other duties. Additionally, DOD guidance states that the Director of the Corrosion Office shall head the DOD Corrosion Prevention and Control Integrated Product Team and a review and evaluation of corrosion planning for ACAT I programs shall be a topic for that product team.²⁵

According to Corrosion Office officials, a legislative change in fiscal year 2016 delegated milestone decision authority from the Office of the Secretary of Defense staff, which includes the Corrosion Office, to the military departments' Service Acquisition Executives, and reduced their oversight activities.²⁶ Consistent with the change in milestone decision authority in fiscal year 2016, Corrosion Office officials stated that major milestone processes and decisions for 19 ACAT IC programs are being made at the service level, not the DOD level. According to Corrosion Office officials, this reduces the number of ACAT I weapon system programs for which the Corrosion Office reviews acquisition planning documentation. These officials added that, although they do not generally review acquisition planning documentation such as Systems Engineering

²⁵DOD Instruction 5000.67 and Corrosion Office, *DOD Corrosion Prevention and Mitigation Strategic Plan* (September 2015).

²⁶See Pub. L. No. 114-92, § 825(a) (2015).

Plans for ACAT IC programs, occasionally program officials have requested that Corrosion Office officials review these programs' Systems Engineering Plans, and Corrosion Office officials provided advisory assistance to these programs.

An official from the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness and Programs stated that even though the Office of the Secretary of Defense has delegated some milestone decision authorities to the military departments, it still retains the responsibility to provide governance for all major weapon system programs. This official added that the Office of the Secretary of Defense and the Corrosion Office maintain the responsibility to ensure the integration of corrosion considerations is taking place in acquisition planning and during the execution of sustainment to produce reliable and maintainable weapon system programs.

DOD's long-term corrosion strategy, which was last updated in 2015, also includes broad guidance on corrosion prevention and mitigation planning for weapon system programs.²⁷ For example, the strategy states that each program should include corrosion planning throughout the entire weapon system life cycle—during technology development, acquisition, and sustainment phases. In addition, the Strategic Plan references other, more specific guidance—such as DOD's *Corrosion Prevention and Control Planning Guidebook for Military Systems and Equipment* (February 2014)—which presents a compilation of approaches and processes designed to ensure successful corrosion-related planning efforts. Corrosion Office officials told us they are updating the 2015 version of this strategy to align it with the military departments' corrosion strategic plans and changes in DOD's forthcoming acquisition and sustainment strategic plan. After DOD's acquisition and sustainment strategic plan is issued, these officials estimated taking 6 to 12 months to complete the revisions to the corrosion strategy.

Each of the military departments has also developed strategic plans that include overarching guidance on planning for the prevention and

²⁷Corrosion Office, *DOD Corrosion Prevention and Mitigation Strategic Plan* (September 2015).

mitigation of corrosion of military weapons.²⁸ For example, the Army's 2016 strategic plan highlights the importance of incorporating corrosion prevention and mitigation considerations into the planning and design of new weapon systems, beginning with the earliest stages of requirement development and continuing throughout the entirety of weapon systems' life cycles. Similarly, the Navy's 2014 strategic plan states that the Navy will ensure that corrosion prevention and mitigation considerations are maintained in its policy and guidance to support corrosion prevention and mitigation planning efforts across weapon systems' acquisition and sustainment life cycles, and that it will evaluate the adequacy of these planning efforts. The Air Force's 2014 strategic plan notes the need to ingrain corrosion prevention and mitigation in the weapon system life cycle so the effects of corrosion can be abated before they become unsustainable. The strategic plan states that corrosion issues must be addressed early in the system acquisition process, when prevention activities yield the maximum life cycle return on investment.

Corrosion Office Lacks Documentation of its Efforts to Oversee Corrosion Planning

Corrosion Office officials told us that since October 2016, they have reviewed corrosion planning documents during the earliest acquisition phases (pre-milestone B phase) for 11 ACAT ID weapon system programs. However, officials could not provide supporting documentation of all the reviews they conducted for each of the 11 programs or provide documentation of program offices' actions taken to resolve the comments Corrosion Office officials said they provided.

Corrosion Office officials emphasized that because they have had strategic-level oversight over the majority of ACAT I programs, they are aware of common challenges and potential solutions associated with corrosion issues. According to Corrosion Office officials, they perform a variety of oversight-related activities, including providing program offices with the necessary tools, such as policies, procedures, standards, and

²⁸Department of the Army, *U.S. Army Corrosion Prevention and Control Strategic Plan* (Revision 2, Jan. 21, 2016) (effective March 2016); Department of the Navy, *Strategic Plan for Corrosion Prevention and Control* (September 2014); and Department of the Air Force, *Air Force Enterprise Corrosion Prevention and Control Strategic Plan* (August 2014). For our review of DOD corrosion strategies, see GAO, *Defense Management: Additional Information Needed to Improve Military Departments' Strategies for Corrosion Prevention and Control*, [GAO-13-379](#) (Washington, D.C.: May 16, 2013).

training to facilitate the implementation of corrosion planning in acquisition programs.²⁹ Corrosion Office officials provided documentation of two reviews their office had conducted on acquisition planning documentation for 11 programs over the last 2 years. Corrosion Office officials characterized the types of comments they provided to program management as input addressing corrosion-related concerns and reported that the military departments had adopted some of their recommendations. Specifically, Corrosion Office officials provided a September 2017 review that included the Corrosion Office's comments on potential corrosion-related issues within a Systems Engineering Plan.³⁰ As of February 2018, these officials told us, three of their four comments had been addressed based on subsequent reviews of the updated plan. Corrosion Office officials also shared their October 2016 review³¹ of a draft Request for Proposals.³² This review included remarks and recommendations to facilitate the program in executing its corrosion prevention and mitigation program.

The *Standards for Internal Control in the Federal Government* states that agencies should clearly document transactions and other significant events, and the documentation should be readily available for examination.³³ However, the Corrosion Office has not developed a

²⁹The Corrosion Office provided this information in July 2018, as we were completing this report, and we did not have the opportunity to assess the scope, alignment, or effectiveness of these reported activities.

³⁰According to DOD Instruction 5000.02, Program Managers will prepare a Systems Engineering Plan as a management tool to guide systems engineering activities on the program. Specifically, this plan describes a program's overall technical approach, including key technical risks, processes, resources, organization, metrics, and design considerations.

³¹According to Corrosion Office officials, this review was conducted prior to the release of the program's competitive Request for Proposals for the engineering and manufacturing development phase of the acquisition life cycle.

³²A Request for Proposals communicates government requirements to prospective contractors and solicits proposals; defines the government's expectations in terms of the performance and functional specifications, program planning, program process, risks, and assumptions; and reflects the program's plans articulated in the draft Acquisition Strategy and other draft, key planning documents such as the Systems Engineering Plan and Life Cycle Sustainment Plan. GAO, *Acquisition Reform: DOD Should Streamline its Decision-Making Process for Weapon Systems to Reduce Inefficiencies*, [GAO-15-192](#) (Washington, D.C.: Feb. 24, 2015), 43.

³³[GAO-14-704G](#).

process to consistently maintain documentation of its reviews and evaluate corrosion planning for major weapon system programs. Corrosion Office officials told us their method for conducting reviews and evaluations is sufficient. However, without developing a process to consistently maintain documentation of its corrosion oversight reviews and evaluations, the Corrosion Office may not be positioned to help ensure oversight of and accountability for corrosion planning for major weapon system programs. Also, by not having supporting documentation of the reviews that they conducted for each of the 11 programs, officials were not in a position to follow up on the comments they had provided when conducting their reviews and whether the areas of concern had been addressed.

The Navy Has Established a Documented Process for Overseeing Corrosion Planning, but the Army and Air Force Have Not

The military departments' Corrosion Executive officials stated they have taken actions to oversee corrosion planning for major weapon system programs, including developing corrosion strategic plans, reviewing acquisition planning documentation, and providing the support of corrosion-related subject matter experts. The Navy Corrosion Executive has a documented process for carrying out its oversight and was able to provide documentation of oversight actions it provided. However, the Army and Air Force Corrosion Executives lacked documented processes for how to conduct their oversight and had limited documentation of the oversight they provided.

Navy's Oversight of Corrosion Planning

The Navy Corrosion Executive has guidance on a documented process for overseeing the adequacy of corrosion planning for major weapon system programs.³⁴ These guidance documents, although not specifically about corrosion, refer to corrosion as a subject of oversight. Navy

³⁴Secretary of the Navy Manual 5000.2, *Department of the Navy Acquisition and Capabilities Guidebook* (May 9, 2012); Department of the Navy, *Navy Systems Engineering Technical Review Handbook* (Version 1.0, Jan. 25, 2013); and Secretary of the Navy Instruction 5000.02E, *Department of the Navy Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System* (Sept. 1, 2011).

Corrosion Executive officials told us that their oversight process is integrated into the systems engineering process of major weapon system programs to ensure corrosion considerations are addressed in the design, development, and life-cycle logistics phases. For example, the Navy's oversight process, which is described in various Navy guidance documents, includes direction on advanced planning for corrosion-related considerations and conducting reviews of acquisition planning documentation.

Specifically, Secretary of the Navy Manual 5000.2 states that the program manager should identify the corrosion susceptibility of a prospective weapon system at the time of program initiation and may prepare a Life Cycle Corrosion Management Plan during phase B that calls for advance planning for the insertion of new corrosion prevention technologies within the system.³⁵ In addition, the Navy's System Engineering Technical Review Handbook provides guidance on the planning, execution, and follow-on activities associated with this review process.³⁶ According to this handbook, the systems engineering technical reviews provide program management with assessments of program technical health and maturity at key points in the development life cycle. Moreover, the handbook describes this process as intended to help program management formally review and evaluate whether required systems engineering tasks have been completed successfully before proceeding beyond critical events. Furthermore, Secretary of the Navy Instruction 5000.02E describes the role of overarching integrated product teams in evaluating the overall program prior to a milestone or formal program review and working integrated product teams, among other things, in addressing issues in areas of concern, such as corrosion prevention and mitigation.³⁷

Additionally, Navy Corrosion Executive officials reported they have four ACAT I programs in a pre-milestone B phase. However, as of July 2018, these officials told us they had not been involved in these programs' corrosion planning efforts for various reasons, including that most of the

³⁵Secretary of the Navy Manual 5000.2, *Department of the Navy Acquisition and Capabilities Guidebook* (May 9, 2012).

³⁶Department of the Navy, *Navy Systems Engineering Technical Review Handbook* (Version 1.0, Jan. 25, 2013).

³⁷Secretary of the Navy Instruction 5000.02E, *Department of the Navy Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System* (Sept. 1, 2011).

programs are still in the initial design phase and there are no systems to assess for corrosion. As a result, conducting corrosion prevention and mitigation planning and oversight activities on these programs would not take place until after they reached milestone B. Although Navy Corrosion Executive officials had not yet conducted oversight of corrosion planning efforts for these four ACAT I programs, they stated that they use an internal information system, which manages data on all ACAT programs, to maintain documentation of the guidance provided when conducting corrosion-specific reviews of programs and acquisition planning documentation.³⁸ These officials reported that reviews of corrosion planning conducted by the Corrosion Executive, as well as actions taken by program management officials to address the Corrosion Executive's comments, are stored on a shared information exchange platform.

Specifically, a Navy Corrosion Executive official shared a comments resolution matrix created in 2012, which detailed the corrective actions taken by program officials to address corrosion concerns. In this review of a Systems Engineering Plan, the reviewer noted that multiple categories of information, including corrosion control, had been omitted from a table presented in the plan. Based on these comments, the weapon system program's management added the corrosion control information requested by the reviewer to present a more complete table. This Navy official also shared the comments the Navy Corrosion Executive provided on another weapon system program's corrosion prevention and control plan. One of the comments asked why the plan did not follow specific corrosion guidance contained in the guidebook on corrosion prevention and control. As a result of this comment, the weapon system program's management noted that it reorganized the plan to more closely follow the guidance from the guidebook. Furthermore, this Navy official provided briefing slides reviewed by the Corrosion Executive in 2012 and 2013 on the health ratings of more than three dozen weapon system programs' corrosion prevention and mitigation efforts.³⁹ To conduct oversight over corrosion planning efforts, the Navy Corrosion Executive received updates on topics such as the development and status of weapon system programs' corrosion planning activities and whether corrosion-prone areas had been addressed for these programs.

³⁸According to Navy Corrosion Executive officials, the Navy's internal information system is called the Research, Development & Acquisition Information System.

³⁹The briefing slides presented information on various types of weapon system programs, including ACAT ID, IC, and pre-major defense acquisition programs.

Navy Corrosion Executive officials also provided us with examples of checklists with criteria, and said they used this information to evaluate programs' corrosion prevention and mitigation considerations within Systems Engineering Plans and Life Cycle Sustainment Plans, which help inform standardized reviews of corrosion planning information. Also, Navy officials described examples of its Corrosion Executive making engineers available to provide corrosion-related support for a weapon system program in a post-milestone B phase. Furthermore, these officials stated that, as policy has expanded the corrosion-planning requirement substantially for all ACAT programs, the Corrosion Executive is evaluating the best way to provide corrosion support to a greater number of programs.

Army and Air Force Oversight of Corrosion Planning

The Corrosion Executives for the Army and the Air Force reported taking some actions to provide oversight of corrosion planning efforts within their departments. However, they have not documented their guidance and processes for overseeing the adequacy of corrosion planning within their respective military departments. Instead, Army and Air Force Corrosion Executive Office officials cited overarching, broad guidance, such as the duties of the Corrosion Executive and the need to incorporate corrosion considerations throughout the life cycle of a weapon system. However, this guidance does not specifically describe how the Army and Air Force Corrosion Executives will ensure that the processes for overseeing the adequacy of corrosion planning are being accomplished. Furthermore, Army and Air Force Corrosion Executive Office officials had limited documentation of the oversight they provided when conducting corrosion-specific reviews of programs and acquisition planning documentation.

Army and Air Force Corrosion Executives provided examples of weapon system programs reviewed. Army officials described how their Corrosion Executive reviewed and approved the Life Cycle Sustainment Plan for a major weapon system, which had not reached milestone B, and the involvement that the Army Corrosion Executive's Office had in reviewing another weapon system program's Request for Proposals.⁴⁰ Air Force

⁴⁰According to DOD Instruction 5000.02, a program's Life Cycle Sustainment Plan is a document that describes sustainment influences on system design and the technical, business, and management activities to develop, implement, and deliver a product support package that maintains affordable system operational effectiveness over the system life cycle and seeks to reduce cost without sacrificing necessary levels of program support.

officials shared an example of a Systems Engineering Plan for a program that had been reviewed by one of its Corrosion Executive officials in September 2016, along with an internal list of comments made to address corrosion-related topics.⁴¹ The reviewer's comments noted that the Systems Engineering Plan did not include a separate corrosion document to identify the expertise and resources needed to address corrosion-related considerations within the engineering and sustainment plans. As a result of these comments, the weapon system program's management created a separate corrosion document to address corrosion prevention and mitigation considerations.⁴²

In addition, Army officials stated they ensured that corrosion subject matter experts were made available to help support corrosion prevention and mitigation planning efforts for the various programs in a pre-milestone B phase as of February 2018, including fulfilling all corrosion-related planning requirements, for example. Similarly, Air Force officials told us that giving the managers of weapon system programs access to the Air Force's Corrosion Prevention and Control Working Group helps them to discuss and resolve corrosion issues that are unique to their weapon system during the acquisition and sustainment life cycles.⁴³

Moreover, Army and Air Force Corrosion Executive Office officials cited mechanisms they use to conduct oversight activities of corrosion planning efforts, and stated they have processes in place for overseeing the adequacy of corrosion planning. Specifically, Army officials cited corrosion planning guidance outlined in DOD Instruction 5000.67, *Prevention and Mitigation of Corrosion on DOD Military Equipment and Infrastructure*, and the existence of the Army Corrosion Board and the Army Corrosion Integrated Product Team as mechanisms for

⁴¹This program was in a pre-milestone B phase when, according to an Air Force official, the Corrosion Executive Office official reviewed its Systems Engineering Plan in September 2016 and reached milestone B in December 2017.

⁴²However, we could not access the embedded file in this plan, and Air Force Corrosion Executive Office officials were unable to locate the file for our review.

⁴³According to the Air Force's 2014 strategic plan on corrosion control and prevention, the Air Force Corrosion Prevention and Control Working Group provides a forum for cross-enterprise coordination and alignment of corrosion-related activities; is the primary body supporting objectives of the Air Force Corrosion Executive and the Air Force Corrosion Strategy; and identifies pervasive corrosion issues, provides advocacy within member organizations, and monitors corrosion activities related to safety, cost, and system availability.

communicating corrosion-related concerns to the Corrosion Executive.⁴⁴ However, Army officials did not provide any related documentation on the guidance or processes used for overseeing the adequacy of these planning efforts. Moreover, these Army officials did not provide us any documentation of the guidance they told us they provided. In addition, Air Force officials did not have documented guidance describing their oversight of corrosion planning. They did provide us a Systems Engineering Plan reviewed by a former Corrosion Executive official, who held this role until June 2017, and said this was an example of their established review and evaluation process. Air Force officials did not provide us with any additional documentation of the guidance they said they provided.

DOD guidance states that the Corrosion Executives shall establish a process to review and evaluate the adequacy of corrosion planning and require program and project managers to consider and implement corrosion prevention and mitigation planning to minimize the effect of corrosion throughout the system's life cycle.⁴⁵ Also, the *Standards for Internal Control in the Federal Government* states that agencies should implement internal control activities through documented policies, and that agencies benefit from a documented process to retain organizational knowledge and mitigate the risk of having that knowledge limited to a few personnel.⁴⁶

Army and Air Force Corrosion Executive officials have not issued clear guidance establishing a process for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the system's life cycle, including during the early phases of the acquisition life cycle. Also, these Corrosion Executives have not maintained documentation of all oversight actions, including documentation of the guidance they told us they provided to weapon system program offices. Army and Air Force Corrosion Executive

⁴⁴According to the Army's 2016 strategic plan on corrosion prevention and control, the Army Corrosion Board sets the strategic direction for the Army corrosion prevention and control program in coordination with the Army Corrosion Executive; and a team of working-level representatives, known as the Army Corrosion Integrated Product Team, meets regularly to monitor implementation of Army corrosion prevention and control efforts.

⁴⁵DOD Instruction 5000.67.

⁴⁶[GAO-14-704G](#).

officials stated that their existing guidance and processes are informing reviews and evaluations of the adequacy of corrosion planning efforts for major weapon system programs. However, we found that they lack the documentation to demonstrate their oversight contributions.

Without clear guidance to establish a process for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon system programs throughout their life cycle, the Army and the Air Force will not have assurance that such reviews and evaluations are effectively addressing DOD corrosion prevention and mitigation program requirements.

DOD Has Mechanisms to Collect, Maintain, and Make Information Available to Other Agencies about Technologies for Preventing and Mitigating Corrosion of Infrastructure

DOD Collects and Maintains Information on Technologies for Preventing and Mitigating Corrosion

The Corrosion Office collects and maintains information on hundreds of technologies for preventing and mitigating corrosion, including those relating to infrastructure. As part of implementing DOD's long-term corrosion strategy under section 2228 of Title 10, U.S. Code, the Corrosion Office established a corrosion technology demonstration program, which helps to fund demonstration projects that test and validate technologies for preventing and mitigating corrosion of both infrastructure and weapon systems.⁴⁷ The Corrosion Office invites the military departments to submit proposals annually and has a process and criteria for selecting projects for funding. The projects typically take 1 to 3 years to implement, and the military departments are to provide follow-up reports on the results.

The Corrosion Office tracks the funded projects using a master spreadsheet containing more than 20 categories of information, including the benefits of the technology, its return on investment, and lessons learned from its technology demonstration. As of January 2018, the Corrosion Office has funded and tracked more than 300 corrosion demonstration projects funded from fiscal years 2005 through 2017. Of these projects, approximately 40 percent were infrastructure-related. Examples are an Army system to protect elevated water tanks from ice and corrosion damage in cold climates and a Navy epoxy system to

⁴⁷Section 2228(d)(1) of Title 10 U.S.C. requires the Secretary of Defense to develop and implement a long-term strategy to reduce corrosion and the effects of corrosion on DOD military equipment and infrastructure, including, in § 2228(d)(2)(C), by the implementation of programs, including supporting databases, to ensure a focused and coordinated approach throughout DOD to collect, review, validate, and distribute information on proven technology methods and products that are relevant to the prevention of corrosion of military equipment and infrastructure.

extend the life of coatings protecting steel structures exposed to tidal waters.

DOD Uses Various Mechanisms to Make Information Available on Infrastructure Technologies

DOD uses various mechanisms to make information available on technologies for preventing and mitigating corrosion of infrastructure to entities outside DOD, including non-DOD federal agencies. According to Corrosion Office officials, the primary mechanism for making such information available is DOD's Unified Facilities Criteria program, which is publicly accessible on a website called the Whole Building Design Guide.⁴⁸ Corrosion Office officials stated that military departments use the Unified Facilities Criteria program for their own infrastructure projects. For example, Corrosion Office officials told us that the Army and Navy have developed or tested projects under the corrosion technology demonstration program and incorporated certain elements of those projects into the Unified Facilities Criteria program, including:

- The 2013 Durable Green Concrete project, which demonstrated a cement mixture designed to slow corrosion on concrete facilities.
- The 2006 Innovative Thermal Barrier Coatings for Heat Distribution Manholes project, which demonstrated how the use of ceramic coatings on new heating system pipes could reduce heat loss and corrosion.

In addition, the 2005 Supervisory Control Automation for Cathodic Systems project, which demonstrates a radio transmitting technology that remotely monitors corrosion on metals, is another funded demonstration project. According to Corrosion Office officials, as of May 2018, this project has not been incorporated into the Unified Facilities Criteria program, but may eventually be incorporated into this program.

⁴⁸See <http://www.wbdg.org/>. The National Institute of Building Sciences (Institute) owns, operates, and has a copyright on the content on this website. The Institute is a non-profit, non-governmental organization, originally created by Congress in 1974, to help ensure the construction of safe, affordable structures for housing, commerce and industry throughout the United States. According to the Institute, the Whole Building Design Guide provides government and industry personnel access to current information on building-related guidance, criteria, and technology.

Other mechanisms used to make information available outside DOD are corrosion meetings, conferences, a corrosion-related trade publication, an article published in a peer-reviewed journal, and direct contacts with entities interested in DOD's corrosion expertise.

- **DOD-sponsored corrosion meetings:** The Corrosion Office organizes meetings to distribute information on technologies that prevent or mitigate corrosion, including technologies related to infrastructure. We attended one such meeting, the triannual Corrosion Forum hosted by the Corrosion Office in December 2017, and observed that it provided officials from the military departments and other DOD components the opportunity to meet and discuss corrosion-related issues and potential solutions. In addition, a National Aeronautics and Space Administration official told us that she attended the biennial 2017 DOD Allied Nations Technical Corrosion Conference and learned about DOD corrosion prevention and mitigation technologies.
- **Industry-sponsored corrosion conferences:** In addition to DOD's corrosion meetings, Corrosion Office officials told us they attend industry-sponsored conferences, such as those hosted by the National Association of Corrosion Engineers and the Society for Protective Coatings. Corrosion Office officials told us that they use these conferences for presentations and other activities, including the promotion of corrosion-related training. Also, these officials told us that the military departments present technical papers on a variety of topics, including on technologies that prevent and mitigate corrosion of infrastructure. Moreover, officials from non-DOD federal agencies, such as the Department of the Interior and the Department of Transportation, said they attended industry-sponsored conferences hosted by the National Association of Corrosion Engineers.
- **Corrosion-related trade publication:** DOD makes information available on technologies that prevent and mitigate corrosion of infrastructure through a partnership with the publishers of the Journal of Protective Coatings and Linings, which provides a free subscription-based publication. For example, in spring 2018 CorrDigest reported on updates to the Whole Building Design Guide that included knowledge resources, training modules, and a

corrosivity estimation tool that was added to the website's section on corrosion prevention topics.⁴⁹

- **Article published in peer-reviewed journal:** DOD also makes information available on technologies that prevent and mitigate corrosion on infrastructure through a peer-reviewed journal. For example, in March 2008, Advanced Materials Research published an article from the U.S. Army Corps of Engineers on a technology that uses electric pulse technology to prevent water from leaking through concrete structures.⁵⁰
- **Direct contacts:** Corrosion Office officials said outside entities interested in DOD's corrosion expertise, including non-DOD federal agencies, sometimes contact them directly. These officials said they do not track these contacts, but they provided examples of contacts they have had. A U.S. Army Corps of Engineer official attending DOD's December 2017 corrosion forum told us his agency had worked with the U.S. Department of State on a water treatment system, including corrosion prevention. At this same forum, a Navy Facilities Engineering Command official told us they have discussed various corrosion-related activities with the Department of Interior's Bureau of Reclamation.

We contacted officials at three non-DOD federal agencies who told us they are aware that DOD is a source of information on corrosion technologies. Officials from one of the three agencies have worked with DOD officials and incorporated research from DOD into their own infrastructure projects.

- **U.S. Department of Transportation:** An official from the Federal Highway Administration said he was aware of DOD's corrosion program and had been in contact with the Corrosion Office to introduce himself and lay the foundation for future collaboration. However, he told us he had not yet obtained DOD corrosion information for use in Department of Transportation projects.

⁴⁹Cynthia Greenwood, "The Whole Building Design Guide Adds 'Knowledge' Resources, Training Modules And a Corrosivity Estimation Tool To Its Corrosion Prevention Source Section," *DOD CorrDigest Supplement to the Journal of Protective Coatings & Linings*, vol. 1, no. 2 (Spring 2018), accessed June 4, 2018.

⁵⁰V. Hock, O. Marshall, M. McInerney, and S. Morefield, "Electro-Osmotic Pulse Technology for Corrosion Prevention and Control of Water Intrusion in Below Grade Concrete Structures," *Advanced Materials Research*, vol. 38 (2008).

- **National Aeronautics and Space Administration:** An official from the Kennedy Space Center Corrosion Laboratory said she obtained information on coating technologies from the U.S. Air Force Civil Engineer Center to compare the effectiveness of these technologies on the prevention of corrosion on infrastructure near ocean environments. Moreover, the official said the National Aeronautics and Space Administration is working with the Army to develop an accelerated corrosion test method to approve coatings on their ground-support infrastructure.
- **Department of Interior's Bureau of Reclamation:** Officials from the Materials Engineering and Research Laboratory worked with the U.S. Army Corps of Engineers to test electro-osmotic pulse technology on a dam in California. This technology uses current and electric fields to prevent water from leaking through concrete and creating calcite deposits.⁵¹ (See fig. 3.) According to these officials, the test was conducted in 2011 and was successful, and the agency tested the same technology on a larger section of the same dam and plans to issue the results of this latest test in September 2018. These same officials told us that they obtained research on this technology from the U.S. Army Corps of Engineers.

⁵¹Department of Interior, Bureau of Reclamation, *Electro-Osmotic Pulse Leak Repair Method: Evaluation in Trinity Dam Bonnet Chamber - Central Valley Project, Trinity River Division – California* (Denver, CO: May 17, 2012). According to officials from the Materials Engineering and Research Laboratory, corrosion of equipment due to damp environments and calcite deposits affects the equipment's operation. Maintenance, including removing calcite deposits, is required to mitigate such corrosion damage.

Figure 3: Use of Electro-Osmotic Pulse Technology by the Department of Interior's Bureau of Reclamation to Prevent Water Leaks on the Trinity River Dam, 2011



Source: GAO analysis of Department of Interior, Bureau of Reclamation, information. | GAO-19-39

Conclusions

DOD continues to address ongoing challenges of corrosion that affect its weapon systems and infrastructure. DOD has reported information on funding levels needed to perform the duties of the Corrosion Executives in the Corrosion Office's Annual Reports to Congress, but it has not consistently provided information on these funding levels. The Corrosion Office has not issued guidance to require a standard process for the Corrosion Executives to use for identifying these funding levels, the specific cost elements that should be included, and the supporting documentation that should be maintained. Additionally, the Corrosion Office does not have a documented process for reviewing the information it receives from the military departments for inclusion in the Corrosion Office Annual Reports. Without issuing guidance on the processes for

identifying, documenting, and reviewing annual funding levels needed to perform the Corrosion Executives' duties, DOD will continue to report inconsistent information on these funding levels to Congress. As a result, Congress may not receive quality information it needs to effectively conduct oversight activities and make informed decisions on DOD's corrosion prevention and mitigation efforts.

The Corrosion Office has taken some actions to oversee corrosion planning as part of its statutory oversight responsibilities of DOD's corrosion program. Also, Corrosion Office officials stated they have conducted reviews and evaluations of corrosion planning for some major weapon system programs and provided comments to address corrosion-related concerns. However, the Corrosion Office has not consistently maintained documentation of its reviews or the actions taken by officials associated with the weapon system programs to resolve its comments. If the Corrosion Office develops a process to maintain documentation, officials would be better positioned to help ensure oversight of and accountability for corrosion planning for major weapon system programs throughout their acquisition life cycles.

We also found that the Army and Air Force Corrosion Executives have taken some actions to provide oversight for major weapon system programs. However, they have not issued clear guidance establishing a process for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the systems' life cycle. If the Army and Air Force do not issue clear guidance to establish and appropriately implement formal processes for reviewing, evaluating, and documenting the adequacy of corrosion planning for major weapon system programs—including during the early phases of the acquisition life cycle—and maintain documentation of oversight actions, they will not have assurance that reviews of corrosion planning and evaluations of the adequacy of these efforts are effectively addressing DOD requirements.

Recommendations for Executive Action

We are making a total of five recommendations to DOD.

The Secretary of Defense should ensure that the Director of the Corrosion Office, in coordination with the military departments, issues guidance to require a standard process for identifying and documenting the rationale for the annual funding levels needed to perform the duties of

each Corrosion Executive. The guidance should, at a minimum, identify and define the cost elements and the methods that may be used to estimate the funding levels and describe the supporting documentation that should be maintained. (Recommendation 1)

The Secretary of Defense should ensure that the Director of the Corrosion Office documents, within existing or new guidance, its process for reviewing the Military Departments' Corrosion Executive Reports prior to submitting the Corrosion Office Annual Report to Congress, including a process to consistently maintain documentation of its reviews. (Recommendation 2)

The Secretary of Defense should ensure that the Director of the Corrosion Office develops a process to consistently maintain documentation of its reviews and evaluations of corrosion planning for major weapon system programs. These records, at a minimum, should show what comments were made by the Corrosion Office in its reviews and evaluations, and track the actions taken to resolve those comments. (Recommendation 3)

The Secretary of the Army should ensure that its Corrosion Executive issues clear guidance establishing a process for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the systems' life cycle, including during the early phases of the acquisition life cycle, and maintain documentation of the oversight actions. (Recommendation 4)

The Secretary of the Air Force should ensure that its Corrosion Executive issues clear guidance establishing a process for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the systems' life cycle, including during the early phases of the acquisition life cycle, and maintain documentation of oversight actions. (Recommendation 5)

Agency Comments

We provided a draft of this report to DOD for review and comment. DOD provided written comments, which are reprinted in appendix I. In its comments, DOD concurred with our recommendations and stated it plans to take specific actions in response to all five of our recommendations.

We are sending copies of this report to interested congressional committees; the Secretaries of Defense, Interior, and Transportation; the Under Secretary of Defense for Acquisition and Sustainment; the Secretaries of the Army, Navy, and Air Force; and the Administrator of the National Aeronautics and Space Administration. This report also is available at no charge on GAO's website at <http://www.gao.gov>.

Should you or your staff have any questions on this report, please contact me at (202) 512-9627 or maurerd@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.

A handwritten signature in black ink that reads "Diana Maurer". The signature is written in a cursive, flowing style.

Diana Maurer
Director, Defense Capabilities and Management

Appendix I: Comments from the Department of Defense



SUSTAINMENT

ASSISTANT SECRETARY OF DEFENSE
3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

OCT 25 2018

Ms. Diana Maurer
Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

Dear Ms. Maurer:

This is the Department of Defense (DoD) response to the Government Accountability Office (GAO) Draft Report, GAO-19-39, "Defense Management: DOD Should Take Additional Actions to Enhance Corrosion Prevention and Mitigation Effort" dated September 26, 2018 (GAO Code 102285). Detailed comments on the report recommendations are enclosed.

Sincerely,

A handwritten signature in black ink, appearing to read "R. McMahon", is written over a horizontal line.

Robert H. McMahon

**GAO Draft Report Dated September 26, 2018
GAO-19-39 (GAO CODE 102285)**

**“DEFENSE MANAGEMENT: DOD SHOULD TAKE ADDITIONAL ACTIONS TO
ENHANCE CORROSION PREVENTION AND MITIGATION EFFORTS”**

**DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO RECOMMENDATIONS**

RECOMMENDATION 1: The Secretary of Defense should ensure that the Director of the Corrosion Office, in coordination with the military departments, issues guidance to require a standard process for identifying and documenting the rationale for the annual funding levels needed to perform the duties of each Corrosion Executive. The guidance should, at a minimum, identify and define the cost elements and the methods that may be used to estimate the funding levels and describe the supporting documentation that should be maintained.

DoD RESPONSE: Concur with recommendation. Currently, the Corrosion Control Prevention Executives for each of the Military Departments submit funding requirements that vary. As an example, the Navy provides the Corrosion Control Prevention Executive cost only in labor and travel, while the Air Force provides total costs associated with all aspects of corrosion control processes throughout the entire Military Department. These differences make it difficult to accurately compare each Departments’ needs. The Corrosion Policy and Oversight Office will develop a standardized process for identifying annual funding levels to perform the duties of each Corrosion Executive.

RECOMMENDATION 2: The Secretary of Defense should ensure that the Director of the Corrosion Office documents, within existing or new guidance, its process for reviewing the Military Departments’ Corrosion Executive Reports prior to submitting the Corrosion Office Annual Report to Congress, including a process to consistently maintain documentation of its reviews.

DoD RESPONSE: Concur with recommendation. The Corrosion Policy and Oversight Office does not have a formal written process for the review of the Military Departments Corrosion Executive Reports prior to submission of the Corrosion Office Annual Report to Congress. Development of an internal operating procedure for processing and documenting would be helpful towards standardization and turnover. The Corrosion Policy and Oversight Office will develop and implement this standardized operating procedure.

RECOMMENDATION 3: The Secretary of Defense should ensure that the Director of the Corrosion Office develops a process to consistently maintain documentation of its reviews and evaluations of corrosion planning for major weapon system programs. These records, at a minimum, should show what comments were made by the Corrosion Office in its reviews and evaluations, and track the actions taken to resolve those comments.

DoD RESPONSE: Concur with recommendation. The Corrosion Policy and Oversight Office does review and evaluate corrosion planning for major weapon system programs, but did not maintain this documentation. The Corrosion Policy and Oversight Office will develop and maintain a process that documents its reviews, evaluations, comments and track actions taken by the Program Office to resolve those comments.

RECOMMENDATION 4: The Secretary of the Army should ensure that its Corrosion Executive issues clear guidance establishing a process for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the system's life cycle, including during the early phases of the acquisition life cycle, and maintain documentation of the oversight actions.

DoD RESPONSE: Concur with recommendation. The Army Corrosion Control Prevention Executive will prepare an Army Regulation that will assign responsibilities and establish policy and processes directing requirements to review, evaluate, and document the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the system's life cycle. The regulation will include the early phases of the acquisition life cycle and require oversight actions to be documented and maintained.

RECOMMENDATION 5: The Secretary of the Air Force should ensure that its Corrosion Executive issues clear guidance establishing a process for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the system's life cycle, including during the early phases of the acquisition life cycle, and maintain documentation of oversight actions.

DoD RESPONSE: Concur with recommendation. The Air Force has taken actions to include developing corrosion strategic plans, reviewing acquisition planning documentation, and providing the support of corrosion-related subject matter experts to all Air Force programs. The Air Force will evaluate how best to incorporate guidance into acquisition policy and guidance documents for reviewing, evaluating, and documenting the adequacy of corrosion planning and oversight efforts for major weapon systems throughout the system's life cycle.

Appendix II: GAO Contact and Acknowledgments

GAO Contact

Diana Maurer, (202) 512-9627 or maurerd@gao.gov

Staff Acknowledgments

In addition to the contact named above, Thomas W. Gosling and Marilyn Wasleski (Assistant Directors), Yecenia Camarillo, Patricia F. Donahue, Dawn Godfrey, Amie Lesser, Richard Powelson, Benjamin Sclafani, Carter Stevens, Hai Tran, and Walter Vance made key contributions to this report.

Appendix III: Accessible Data

Agency Comment Letter

Accessible Text for Appendix I Comments from the
Department of Defense

Page 1

Ms. Diana Maurer

OCT 25 2018

Director, Defense Capabilities and Management

U.S. Government Accountability Office

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Washington, DC 20548

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Robert H. McMahon

Page 2

GAO Draft Report Dated September 26, 2018 GAO-19-39 (GAO CODE 102285)

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Page 3

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Related GAO Products

Defense Research: Improved Management of DOD's Technical Corrosion Collaboration Program Needed. [GAO-14-437](#). Washington, D.C.: May 29, 2014.

Defense Infrastructure: DOD's 2013 Facilities Corrosion Study Addressed Reporting Elements. [GAO-14-337R](#). Washington, D.C.: March 27, 2014.

Defense Management: DOD Should Enhance Oversight of Equipment-Related Corrosion Projects. [GAO-13-661](#). Washington, D.C.: September 9, 2013.

Defense Infrastructure: DOD Should Improve Reporting and Communication on Its Corrosion Prevention and Control Activities. [GAO-13-270](#). Washington, D.C.: May 31, 2013.

Defense Management: Additional Information Needed to Improve Military Departments' Corrosion Prevention Strategies for Corrosion Prevention and Control. [GAO-13-379](#). Washington, D.C.: May 16, 2013.

Defense Management: The Department of Defense's Annual Corrosion Budget Report Does Not Include Some Required Information. [GAO-12-823R](#). Washington, D.C.: September 10, 2012.

Defense Management: The Department of Defense's Fiscal Year 2012 Corrosion Prevention and Control Budget Request. [GAO-11-490R](#). Washington, D.C.: April 13, 2011.

Opportunities to Reduce Potential Duplication in Government Programs, Save Tax Dollars, and Enhance Revenue. [GAO-11-318SP](#). Washington, D.C.: March 1, 2011.

Defense Management: DOD Needs to Monitor and Assess Corrective Actions Resulting from Its Corrosion Study of the F-35 Joint Strike Fighter. [GAO-11-171R](#). Washington, D.C.: December 16, 2010.

Defense Management: DOD Has a Rigorous Process to Select Corrosion Prevention Projects, but Would Benefit from Clearer Guidance and Validation of Returns on Investment. [GAO-11-84](#). Washington, D.C.: December 8, 2010.

Defense Management: Observations on Department of Defense and Military Service Fiscal Year 2011 Requirements for Corrosion Prevention and Control. [GAO-10-608R](#). Washington, D.C.: April 15, 2010.

Defense Management: Observations on the Department of Defense's Fiscal Year 2011 Budget Request for Corrosion Prevention and Control. [GAO-10-607R](#). Washington, D.C.: April 15, 2010.

Defense Management: Observations on DOD's Fiscal Year 2010 Budget Request for Corrosion Prevention and Control. [GAO-09-732R](#). Washington, D.C.: June 1, 2009.

Defense Management: Observations on DOD's Analysis of Options for Improving Corrosion Prevention and Control through Earlier Planning in the Requirements and Acquisition Processes. [GAO-09-694R](#). Washington, D.C.: May 29, 2009.

Defense Management: Observations on DOD's FY 2009 Budget Request for Corrosion Prevention and Control. [GAO-08-663R](#). Washington, D.C.: April 15, 2008.

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