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DEFENSE MANAGEMENT

High-Level Leadership Commitment and Actions Are Needed to Address Corrosion Issues



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DEFENSE MANAGEMENT

High-Level Leadership Commitment and Actions Are Needed to Address Corrosion Issues

Why GAO Did This Study

Corrosion can have a deleterious effect on military equipment and infrastructure in terms of cost, readiness, and safety. Recognizing this concern, the Bob Stump National Defense Authorization Act of Fiscal Year 2003 required the Department of Defense (DOD) to designate an official or organization to oversee and coordinate efforts to prevent and mitigate corrosion. Recently, the National Defense Authorization Act of Fiscal Year 2006 directed GAO to examine the effectiveness of DOD's corrosion prevention and mitigation programs. In addition, GAO evaluated the extent to which DOD has incorporated corrosion prevention planning in acquiring weapon systems. GAO reviewed strategy documents, reviewed corrosion prevention planning for 51 recent major weapon system acquisitions, and interviewed DOD and military service officials.

What GAO Recommends

GAO is recommending that the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology and Logistics ensure that actions designed to effectively implement DOD's corrosion prevention strategy are taken. In commenting on a draft of this report, DOD partially concurred with GAO's four recommendations. DOD's actions are generally responsive to the intent of GAO's recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-07-618.

To view the full product, including the scope and methodology, click on the link above. For more information, contact William Solis at (202) 512-8365 or solisw@gao.gov.

What GAO Found

DOD continues to have problems that hinder progress in implementing its corrosion prevention and mitigation strategy. While it has created a Corrosion Policy and Oversight Office, that office lacks the ability to oversee and coordinate its efforts throughout DOD, as envisioned by Congress. For example:

- DOD's office does not review all of the services' proposed funding requests for corrosion programs, even though it is required to do so, because DOD has not directed the services to provide such information and none of the services has a designated official or office to oversee and coordinate servicewide corrosion activities. Without comprehensive reviews of the services' corrosion-related programs and proposed funding requests, the office cannot fulfill its oversight and coordination role.
- DOD has made some progress in identifying corrosion cost impacts, but it has not identified readiness and safety impacts. It recently completed corrosion cost impact studies for Army ground vehicles and Navy ships, identifying an estimated \$4.5 billion in annual corrosion costs. Although the studies provided potentially useful data for reducing these costs, DOD has not developed an action plan to apply these data to developing corrosion prevention and mitigation strategies. Without an action plan, it could miss opportunities to achieve long-term cost savings.
- DOD has not yet developed results-oriented metrics, although GAO has previously recommended that it do so.

Without top DOD and service leadership commitment to address these issues, corrosion prevention and mitigation will remain elusive goals and opportunities to reduce costs, enhance readiness, and avoid safety problems will be lost.

Most of the weapon system acquisition programs GAO reviewed had not incorporated key elements of DOD corrosion prevention guidance. GAO found that only 14 of the 51 programs reviewed had both corrosion prevention plans and advisory teams, as encouraged in the DOD guidance. The primary reason most programs did not have these two elements is that they are not mandatory. As a result, these programs may be missing opportunities to prevent and mitigate corrosion.

Corrosion Prevention Planning for Major Acquisition Programs

| | Programs that have a corrosion prevention and control plan | | | Programs that have a corrosion prevention advisory team | | |
|--------------|--|-----------|-----------|---|-----------|-----------|
| | Yes | No | Total | Yes | No | Total |
| Army | 5 | 8 | 13 | 5 | 8 | 13 |
| Air Force | 4 | 9 | 13 | 5 | 8 | 13 |
| Navy | 11 | 14 | 25 | 8 | 17 | 25 |
| Total | 20 | 31 | 51 | 18 | 33 | 51 |

Source: GAO analysis of service data.

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United States Government Accountability Office
Washington, DC 20548

April 30, 2007

Congressional Committees

The Department of Defense (DOD) spends an estimated \$10 billion to \$20 billion each year on corrosion-related maintenance on weapon systems and infrastructure. Corrosion can affect mission readiness by taking critical systems out of action. It also affects safety. For example, since 1985, the Army has reported over 50 aircraft accidents, including 12 fatalities, caused by corrosion. Incorporating corrosion prevention planning early in the acquisition process is the most effective way to reduce and perhaps avoid corrosion impacts in terms of costs, readiness and safety.

In recognition of the harm that corrosion can cause, Congress enacted, as part of the Bob Stump National Defense Authorization Act of Fiscal Year 2003, legislation that requires DOD to designate a senior official or organization responsible for preventing and mitigating the corrosion of military equipment and infrastructure.¹ The authorization act requires the designated official or organization to oversee and coordinate efforts throughout the department, recommend policy guidance, and review the corrosion prevention and mitigation programs and funding levels proposed by each military service that will enable them to make recommendations to the Secretary of Defense. The authorization act also requires the official to provide oversight and coordination of the efforts within the Department to prevent or mitigate corrosion throughout the life cycle of military equipment and infrastructure and to monitor DOD acquisition practices to ensure that corrosion prevention technologies and treatments are fully considered during research and development phases of the acquisition process and are incorporated in each acquisition program to the extent deemed appropriate. In addition, the authorization act directs the Secretary of Defense to develop and implement a long-term strategy to reduce corrosion and the effects of corrosion on DOD's military equipment and infrastructure. In response to this act, DOD created the Corrosion Policy and Oversight Office (Corrosion Office) within the Office of the Under Secretary of Defense for Acquisition,

¹ Pub. L. No. 107-314, § 1067 (2002), which added § 2228 to Title 10 of the United States Code.

Technology, and Logistics and in December 2003 developed a long-term strategy to reduce corrosion of military equipment and infrastructure.² As part of the strategy, DOD is developing a corrosion baseline to identify the effects of corrosion on cost, readiness, and safety.

Since the passage of the Defense Authorization Act of 2003, we have issued several reports on corrosion. Among other things, we have found that DOD and the services do not have an effective approach to prevent and mitigate corrosion, DOD's long-term strategy falls short of a comprehensive strategic plan, and the Army is not adequately storing land-based pre-positioned equipment to protect it from corrosion.³ In 2003, we recommended that DOD develop a strategic plan for corrosion prevention and mitigation that included standardized methodologies for collecting and analyzing corrosion cost, readiness, and safety data; clearly defined goals, outcome-oriented objectives, and performance measures; identification of the level of resources needed to accomplish goals and objectives; and mechanisms to coordinate and oversee prevention and mitigation projects across the department. In 2004 we further recommended that DOD accelerate completion of its corrosion baseline, establish a funding mechanism to implement the corrosion strategy, and submit to Congress a report identifying the long-term funding and personnel resources needed to implement the strategy. DOD concurred with all of these recommendations.

In response to a request of the Under Secretary of Defense for Acquisition, Technology, and Logistics, the Defense Science Board issued a report in October 2004 on DOD's efforts for corrosion control, referring to "the importance of leadership commitment and proper incentives for ensuring corrosion is considered early and often in decisions" and calling for an increased commitment on the part of DOD to prevent and mitigate corrosion.⁴ This report found that corrosion prevention has not been a

² Department of Defense, *Report to Congress, Department of Defense, Long-Term Strategy to Reduce Corrosion and the Effects of Corrosion on the Military Equipment and Infrastructure of the Department of Defense* (Washington, D.C.: December 2003).

³ GAO, *Defense Management: Opportunities to Reduce Corrosion Costs and Increase Readiness*, [GAO-03-753](#) (Washington, D.C.: July 7, 2003); *Defense Management: Opportunities Exist to Improve Implementation of DOD's Long-Term Corrosion Strategy*, [GAO-04-640](#) (Washington, D.C.: June 23, 2004); and *Defense Management: Additional Measures to Reduce Corrosion of Prepositioned Military Assets Could Achieve Cost Savings*, [GAO-06-709](#) (Washington, D.C.: June 14, 2006).

⁴ Defense Science Board, Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics, *Report on Corrosion Control* (Washington, D.C.: October 2004).

priority across DOD, and it made 17 recommendations, most of which DOD concurred with. Specifically, DOD concurred on 11, partially concurred on 4, and did not concur on 2. Appendix I contains a complete list of Defense Science Board recommendations and DOD's responses. Of the recommendations with which DOD concurred, it has taken actions to incorporate some into its strategy document and to begin implementing some of those. According to our assessment, only minimal changes have been made to DOD's corrosion strategy in response to the recommendations contained in the report of the Defense Science Board.

The National Defense Authorization Act of Fiscal Year 2006 directed us to examine the effectiveness of DOD's corrosion prevention and mitigation programs.⁵ Specifically, we examined the extent to which DOD has implemented its corrosion strategy in its oversight of funding; its identification of cost, readiness, and safety impacts through its corrosion baseline study; and its development of results-oriented metrics. In addition, as agreed with your offices, we evaluated the extent to which DOD has incorporated corrosion prevention planning in the acquisition of major weapon systems.

In performing our work, we used the requirements for the DOD corrosion strategy set forth in the Bob Stump National Defense Authorization Act of Fiscal Year 2003, along with our previous recommendations, as a baseline for evaluating DOD's corrosion prevention efforts. We reviewed DOD and service guidance relating to corrosion prevention, and we interviewed officials from the Office of the Secretary of Defense (OSD), the Army, the Air Force, and the Navy. We also gathered and reviewed information about corrosion prevention planning from a nonprobability sample of 51 major defense acquisition programs. The sample was based on the programs contained in DOD's Fiscal Year 2006 Major Defense Acquisition Program List.⁶ We reviewed documents from these programs, including their acquisition plans and corrosion prevention plans. A detailed description of our scope and methodology is presented in appendix II. We conducted our

⁵ Pub. L. No. 109-163, § 356 (2006).

⁶ Department of Defense, Under Secretary of Defense for Acquisition, Technology and Logistics *Fiscal Year 2006 Major Defense Acquisition Program List* (Washington, D.C.: September 2006). The programs on this list were designated by the Secretary of Defense as major acquisition program or are estimated to require a total expenditure of more than \$365 million in research, development, test, and evaluation funds or require a total expenditure of more than \$2.19 billion in procurement funds.

work from April 2006 through January 2007 in accordance with generally accepted government auditing standards.

Results in Brief

While DOD has taken some steps toward implementing its corrosion prevention strategy since our 2003 and 2004 reports, its progress in providing oversight of funding, identifying corrosion impacts, and developing results-oriented metrics has been limited. For example:

- With regard to funding, the Corrosion Office does not review all of the services' proposed funding requests related to prevention and mitigation of corrosion, even though such reviews are required by 10 U.S.C. § 2228(b)(3). DOD has not directed the services to provide the Corrosion Office with comprehensive data on their annual funding requirements for corrosion prevention and mitigation. Furthermore, none of the four services has a designated official or office to oversee and coordinate servicewide corrosion activities, including identifying annual funding requirements. Without comprehensive reviews of the services' corrosion-related programs and proposed funding requests, the Corrosion Office cannot fulfill its oversight and coordination role for the department.
- With regard to developing a corrosion baseline, DOD has made some progress in identifying cost impacts but has not identified readiness and safety impacts. DOD has acknowledged that determining these impacts is critical to implementing its corrosion strategy and assessing progress. DOD accelerated the time frames for completing the overall cost study and recently completed corrosion cost impact studies for two segments of its corrosion baseline—Army ground vehicles and Navy ships. Although these two cost impact studies provide potentially useful data for reducing the estimated \$4.5 billion in annual corrosion costs, DOD has not developed an action plan to apply these data toward developing corrosion prevention and mitigation strategies. Without an action plan, DOD could miss opportunities for achieving long-term corrosion cost savings. DOD officials told us that they decided to identify cost impacts before they identify readiness and safety impacts because more information is available regarding costs and identifying cost impacts is an important step towards identifying readiness and safety impacts.
- DOD has not yet developed results-oriented metrics that would provide the capability to measure progress toward reducing corrosion impacts, although we and Defense Science Board have previously recommended that it do so. DOD asserts that it cannot establish such metrics until it has first identified the corrosion impacts—yet, as stated above, DOD has made only minimal progress in the identification of these impacts. The lack of

results-oriented metrics impedes DOD's ability to implement its corrosion strategy.

Without top DOD and service leadership commitment to address these issues, corrosion prevention and mitigation will remain an elusive goal, and opportunities to reduce costs, enhance readiness, and avoid safety problems will be lost.

Most of the weapon system acquisition programs we reviewed had not incorporated key elements of corrosion prevention planning. Of the 51 recent major acquisitions we reviewed, only 14 had both corrosion prevention plans and advisory teams. The guidebook created by the Corrosion Office encourages weapon system acquisition programs to incorporate corrosion prevention and control plans and advisory teams in order to achieve viable corrosion prevention and control planning. DOD acquisition program officials retain broad discretion in developing individual approaches to corrosion prevention planning, and many different approaches are taken within and among the services. However, 27 of the 51 programs we reviewed had not included either of the two key elements of corrosion prevention planning. Most programs did not have corrosion prevention plans or corrosion prevention advisory teams in part because these plans and teams are not mandatory. As a result, the Corrosion Office could not effectively monitor DOD acquisition practices, as required by 10 U.S.C. § 2228(b)(5), to ensure that corrosion prevention technologies and techniques were being fully considered and incorporated when deemed appropriate. Moreover, these programs may be missing opportunities to prevent future corrosion and therefore mitigate the impacts of corrosion on the costs, readiness, and safety of military equipment.

We are making recommendations designed to improve DOD's and the services' efforts to prevent and mitigate corrosion. In commenting on a draft of this report, DOD partially concurred with our recommendations. In its response, DOD cited actions it planned to take which are generally responsive to our recommendations. In addition, the department provided several technical comments which we considered and incorporated where appropriate. DOD's comments and our evaluation of them appear later in this report.

Background

The Principal Deputy Under Secretary of Defense for Acquisition, Technology, and Logistics has been designated DOD's Corrosion Executive. The Corrosion Executive is supported by staff assigned to the

Corrosion Office. The Corrosion Office was initially established in 2003 as an independent activity within the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, reporting directly to the Corrosion Executive.⁷ In 2004, the Corrosion Office was formally assigned to the Defense Systems Directorate. The direct chain of command went through the Defense Systems Directorate, which provided management and administrative support. Following a reorganization of the Acquisition, Technology, and Logistics organization in 2006, the Corrosion Office was moved to the Systems and Software Engineering Directorate. The Corrosion Office no longer reports directly to the Corrosion Executive. Appendix III depicts DOD's organizational structure to address corrosion.

The Corrosion Office is led by the Special Assistant for Corrosion Policy and Oversight and works closely with the Corrosion Prevention and Control Integrated Product Team, which has representatives from the military services and other DOD organizations to accomplish the goals and objectives of the Corrosion Office. Several working teams have also been established to conduct work in the seven areas making up the corrosion strategy: policy and requirements; impact, metrics, and sustainment; science and technology; communications and outreach; facilities; training and doctrine; and specifications, standards, and product qualification.

The *Defense Acquisition Guidebook*⁸ contains guidance regarding the defense acquisition system, which exists to manage the nation's investments in technologies, programs, and product support necessary to achieve the National Security Strategy and support the United States Armed Forces. This guidebook contains specific guidance regarding acquisition strategies, which define the approach a program manager will use to achieve program goals. Among other things, an effective strategy minimizes the time and cost required to satisfy approved capability needs. DOD's directive on the defense acquisition process states that program managers shall consider corrosion prevention and mitigation when making trade-off decisions that involve cost, useful service, and effectiveness.⁹

⁷ Because the position of Principal Deputy Under Secretary of Defense for Acquisition, Technology, and Logistics is currently vacant, the Under Secretary of Defense for Acquisition, Technology, and Logistics is acting as DOD's Corrosion Executive.

⁸ Defense Acquisition University, *Defense Acquisition Guidebook*, v. 1.6 (Ft. Belvoir, Va.: July 24, 2006).

⁹ Department of Defense Directive 5000.1, *The Defense Acquisition System* (May 12, 2003).

Moreover, on November 12, 2003, the Under Secretary of Defense for Acquisition, Technology, and Logistics issued a policy memorandum stating that corrosion prevention should be specifically addressed at the earliest phases of the acquisition process by decision authorities at every level.¹⁰

DOD Continues to Have Problems That Hinder Progress in Implementing Its Corrosion Prevention and Mitigation Strategy

DOD has had long-standing problems in funding, identification of impacts, and development of metrics, and these are continuing. DOD's implementation of its long-term corrosion strategy, as required under 10 U.S.C. § 2228(c), has been hindered by weaknesses in these three critical areas. First, the Corrosion Office does not review the services' corrosion programs or annual budget requests, even though this is required by 10 U.S.C. § 2228(b)(3). Second, the Corrosion Office has made only minimal progress in identifying corrosion impacts. Third, the Corrosion Office has not developed results-oriented metrics, even though we have previously recommended that it do so.

DOD's Corrosion Office Does Not Review All of the Military Services' Funding Requests

Although 10 U.S.C. § 2228(b)(3) requires the Corrosion Office within OSD to review the annual funding requests for the prevention and mitigation of corrosion for each military service, the Corrosion Office has not done so. The Corrosion Office does not review comprehensive corrosion data from the services on their programs and funding requests because (1) DOD has not required the services to provide budget information to the Corrosion Office and (2) the services lack an effective mechanism for coordinating with the Corrosion Office with respect to their corrosion funding requests. None of the four services has a designated official or office to oversee and coordinate corrosion activities, including identifying annual servicewide funding requirements. Without a requirement or mechanism for reporting service funding information, the Corrosion Office officials said they are unable to review the services' complete corrosion-related funding information, and thus DOD is hampered in its ability to provide oversight of the services' funding requests.

The Corrosion Office currently has oversight over only a small portion of departmentwide corrosion spending that is provided through a separate

¹⁰ Under Secretary of Defense for Acquisition, Technology, and Logistics, Memorandum for Secretaries of the Military Departments, Subject: Corrosion Prevention and Control, November 12, 2003.

appropriations account. The Corrosion Office reviews and selects for funding the projects that are proposed by the services based on a combination of criteria, including: whether a project would benefit more than one service, whether it is projected to be completed within 2 years of its initial funding, the availability of matching funds; and the return on investment that it offers. For fiscal year 2006, DOD and the military services funded about \$24 million for corrosion strategy efforts. Of this amount, \$19 million was spent on 29 corrosion-related projects and about \$5 million on contractor support, training, outreach, and other administrative activities. The DOD Corrosion Office projects a combined average return on investment of 42.5 to 1 for the \$19 million, or a projected savings of \$809 million over the life of the projects.

The services frequently bypass the Corrosion Office to obtain their funding for corrosion-related efforts. We reviewed the President's budget justification for fiscal year 2006 and identified more than \$97 million for service-specific corrosion mitigation-related projects in addition to those reviewed by the Corrosion Office. These projects had not been submitted to the Corrosion Office for review, and Corrosion Office officials told us that they lacked any information about the \$97 million and the status of the associated efforts. Because corrosion-related projects may be included under other maintenance projects or budget accounts, it is likely that there is more funding that we have not identified. According to recent corrosion cost studies conducted by DOD, the annual corrosion costs for Army ground vehicles and Navy ships alone were identified to be \$2.019 billion and \$2.438 billion, respectively. Without comprehensive reviews of the services' corrosion-related programs and proposed funding requests, the Corrosion Office cannot fulfill its oversight and coordination role for the department.

None of the four services has a designated official or office to oversee and coordinate corrosion activities, despite a recommendation by the Defense Science Board that they do so. Currently, multiple offices in the services are responsible for corrosion programs and related budgets. For example, several Air Force offices are responsible for corrosion-related matters: maintenance issues belong to the Air Force Corrosion Prevention and Control Office, corrosion policy for weapon systems is managed by an office within the Air Force Maintenance Directorate, and corrosion policy for infrastructure is handled by the Air Force Civil Engineering Directorate. None of these offices has comprehensive knowledge about corrosion activities throughout the Air Force. Without a designated official or office for corrosion, the services do not have the mechanism or

capability to fully identify their annual servicewide corrosion funding requirements.

Progress in Identifying Corrosion Impacts Has Been Minimal

DOD has acknowledged since 2002 that the identification of cost, readiness, and safety impacts is critical to the implementation of its corrosion strategy. We recommended in 2003 that DOD complete a study to identify these impacts, and further recommended in 2004 that DOD accelerate its efforts in order to complete the baseline prior to its original estimated date of 2011. According to DOD, the purpose of the study is to document where corrosion problems exist, identify their causes, and prioritize them for funding according to their relative severity in terms of their impact on DOD costs, readiness, and safety.

In August 2004, after developing a cost-estimating methodology, a DOD contractor began a study to determine the total cost of corrosion for military equipment and facilities across the services. DOD currently plans to complete this cost study by 2009, 2 years earlier than originally planned. The study uses fiscal year 2004 costs as a measurement baseline and consists of several segments, to be completed sequentially. To date, it has made some progress in identifying corrosion cost impacts. For example, in April 2006, DOD completed the Army ground vehicle and Navy ship corrosion segments of this study.¹¹ Several segments remain to be completed, including Army and Marine Corps aviation. Corrosion Office officials told us that progress has been slower than expected, primarily because of a lack of corrosion data. Table 1 shows the corrosion cost segments included in the study and their planned completion dates.

¹¹ LMI Government Consulting, *The Annual Cost of Corrosion for Army Ground Vehicles and Navy Ships* (McLean, Va.: April 2006).

Table 1: Corrosion Cost Segments and Estimated Completion Dates

| Corrosion cost segments | Estimated completion date |
|---------------------------------|----------------------------------|
| Army ground vehicles | 2006 (actual) |
| Navy ships | 2006 (actual) |
| DOD facilities | 2007 (planned) |
| Army aviation and missiles | 2007 (planned) |
| USMC ground vehicles | 2007 (planned) |
| Navy and USMC aviation | 2008 |
| Coast Guard aviation and ships | 2008 |
| Air Force aviation and missiles | 2009 |

Source: LMI Government Consulting.

The two completed studies generated data that could be potentially useful for developing initiatives aimed at reducing long-term corrosion costs, but DOD lacks an action plan for using these data. For example, the studies estimate the annual corrosion costs for Army ground vehicles and Navy ships at \$2.019 billion and \$2.438 billion, respectively. Costs are segregated in multiple ways, such as costs incurred at the depot, organizational, and intermediate maintenance levels; costs incurred while addressing a corrosion problem (corrective); costs incurred while addressing a potential problem (preventive); and direct costs incurred on end items or removable parts. However, the Corrosion Office has not developed an action plan on how it will use these data, or the data expected from future cost studies, to develop corrosion prevention and mitigation strategies. Without an action plan, DOD could miss opportunities for achieving long-term corrosion cost savings.

Finally, although it acknowledges the importance of identifying corrosion impacts related to readiness and safety, DOD has made virtually no progress in assessing these impacts. DOD officials told us that they decided to identify cost impacts before they identify readiness and safety impacts because more information is available regarding costs, and identifying cost impacts is an important step towards identifying readiness and safety impacts. They said that some of their efforts will shift to readiness and safety as the cost impact study approaches completion.

DOD Has Not Yet Developed Results-Oriented Corrosion Metrics

In June 2004, we reported that DOD lacked results-oriented metrics in its corrosion strategy and, as a result, could not effectively monitor progress toward achieving the goals of the corrosion strategy. In May 2005, DOD updated its November 2004 long-term corrosion strategy, but the update

still does not contain results-oriented metrics for measuring progress toward targeted, quantifiable goals. In the strategy update, DOD has catalogued the aspects of corrosion prevention cost, readiness, and safety impacts that will need to be measured, but it has not quantified them or linked them with targets for improvement. For example, on a table entitled “Potential Revised Metrics Set”, under the column of safety impacts, the “facilities incidents” entry is linked with the description “events over time related to corrosion.” No measurable outcomes are associated with either the designated impact or the description. In addition, DOD officials told us that they cannot establish quantifiable goals regarding corrosion costs until they have completed the corrosion cost baseline, which, as noted earlier, DOD plans to complete sometime in 2009. These officials said that metrics for readiness and safety will likely take several additional years to complete because less information is available regarding readiness and safety impacts than information regarding cost impacts. They told us that the accompanying definitions and procedures will also take several years to complete.

Most Major Defense Acquisition Programs We Reviewed Have Not Incorporated Key Elements of Corrosion Prevention Planning

The *Corrosion Prevention and Control Planning Guidebook* encourages the establishment of corrosion prevention and control plans and corrosion prevention advisory teams as early as possible in the acquisition process. However, only 14 of the 51 programs we reviewed actually had both plans and advisory teams. DOD acquisition program officials have taken diverse approaches to corrosion prevention planning. We found that one reason why most programs did not have corrosion prevention plans or corrosion prevention advisory teams is that while they are strongly suggested, these elements are not mandatory.

DOD Guidance Encourages Corrosion Prevention Plans and Advisory Teams

The guidebook developed by the Corrosion Office is intended to assist acquisition program managers in developing and implementing effective corrosion prevention and control programs for military equipment and infrastructure.¹² According to the Corrosion Prevention and Control Guidebook, the corrosion prevention and control plan and the corrosion prevention advisory team should be established as early as possible in the acquisition process. DOD officials told us that establishing both a plan and

¹² Department of Defense, Principle Deputy Under Secretary of Defense, Acquisition, Technology, and Logistics, *Corrosion Prevention and Control Planning Guidebook* (Washington, D.C.: July 2004).

a team is critical to effective corrosion prevention planning, and they strongly recommend that corrosion prevention planning begin at the start of the technology development phase of acquisition (Milestone A), when the effort is made to determine the appropriate set of technologies to be integrated into the weapon system. They said it should certainly occur no later than the system development and demonstration phase (Milestone B), when the first system and long lead procurement for follow-on systems may be authorized. According to the guidebook, a corrosion prevention and control plan should address a number of things, including system design, including materials and processes to be used for corrosion prevention and control, and should define the membership and organization of the corrosion prevention advisory team. The team should be actively involved in the review of design considerations, material selections, costs, and any documentation that may affect corrosion prevention and control throughout the life cycle of the system or facility. Members should include representatives from the contractors and DOD. In addition to this DOD guidance, the individual services have issued guidance that also calls for incorporating corrosion prevention planning during acquisition of weapon system programs.¹³

Few Programs Have Both Corrosion Plans and Teams

Most of the acquisition programs we reviewed did not have either plans or advisory teams for corrosion prevention and control. We reviewed a nonprobability sample of 51 major defense acquisition programs from the Army, Navy, and Air Force and found that only 14 of them had both corrosion prevention and control plans and corrosion prevention advisory teams.¹⁴ A total of 20 programs had developed corrosion prevention and control plans, and 18 had established advisory teams. Of the 51 programs, 27 had neither a plan nor an advisory team. Tables 2 and 3 list, by service, the number of programs we reviewed that had developed corrosion prevention and control plans and established corrosion prevention advisory teams. Appendix IV contains information on specific programs that we reviewed.

¹³ For example, The Air Force's Aircraft Structural Integrity Program requires the creation of a corrosion prevention and control plan and corrosion prevention advisory board.

¹⁴ We reviewed 13 Army programs, 13 Air Force programs, and 25 Navy programs based on a nonprobability sample from the Fiscal Year 2006 Major Defense Acquisition Program List.

Table 2: Number of Major Acquisition Programs Having Either a Corrosion Prevention and Control Plan or a Corrosion Prevention Advisory Team

| | Programs that have a corrosion prevention and control plan | | | Programs that have a corrosion prevention advisory team | | |
|--------------|--|-----------|-----------|---|-----------|-----------|
| | Yes | No | Total | Yes | No | Total |
| Army | 5 | 8 | 13 | 5 | 8 | 13 |
| Air Force | 4 | 9 | 13 | 5 | 8 | 13 |
| Navy | 11 | 14 | 25 | 8 | 17 | 25 |
| Total | 20 | 31 | 51 | 18 | 33 | 51 |

Source: GAO analysis of service data.

Table 3: Number of Major Acquisition Programs Having Both a Corrosion Prevention and Control Plan and a Corrosion Prevention Advisory Team and Programs Having Neither a Plan Nor a Team

| | Programs having both a corrosion prevention and control plan and a corrosion prevention advisory team | Programs having neither a corrosion prevention and control plan or corrosion prevention advisory team |
|--------------|---|---|
| Army | 4 | 7 |
| Air Force | 4 | 8 |
| Navy | 6 | 12 |
| Total | 14 | 27 |

Source: GAO analysis of service data.

Service Acquisition Officials Cite Diverse Approaches Taken to Corrosion Prevention Planning

Service acquisition officials told us that they retain broad discretion in developing individual approaches to corrosion prevention planning. We found that planning is inconsistently performed, and that so many different approaches are taken within and among the services that DOD is unable to maintain the oversight needed to ensure that corrosion prevention is being effectively conducted. For example, the degree to which corrosion prevention planning is performed depends on the initiative of the respective acquisition program offices. The Air Force’s C-17A Globemaster program had a corrosion prevention plan and corrosion prevention team in place early in the acquisition process, several months before it obtained approval to proceed with full-scale development. C-17 officials told us that they took a proactive approach to avoid the corrosion problems experienced by the C-5 and KC-135 programs. In contrast, the Javelin program managed by the Army has not established a corrosion prevention plan or corrosion prevention team, even though the system

development and most of its production objectives have been completed. Javelin program officials told us that they have extensive corrosion prevention requirements in the system development specification and have obtained the advice of corrosion prevention experts located at the Aviation and Missile Research and Development Center.

Further, some program officials told us that specific corrosion prevention plans and corrosion advisory teams were not needed because other documents and processes provide the same function. The Navy's SSN 774 Class submarine program did not have a specific corrosion prevention plan or corrosion prevention advisory team because the program relied heavily on detailed specifications and technical documents and on the experience of similarly designed submarines.¹⁵

Officials from some programs said it was too early in the acquisition process for them to have a plan or team, while those from other programs claimed it was too late. The Air Force KC-135 Replacement program officials told us they do not have a corrosion prevention plan or team because their system is still in the early development phase and they have yet to establish firm dates for their program design reviews. In contrast, Army High Mobility Artillery Rocket System program officials said that it is not sensible to have a corrosion prevention plan or team at this time because their program is currently in full rate production.

Some programs we reviewed did not have a corrosion prevention plan or team because program officials told us that upgrades to existing weapon systems may be covered by an existing corrosion prevention plan or team. On the one hand, the Airborne Warning and Control System Block 40/45 upgrade program is a modification to the prime mission equipment of the E-3 aircraft. This program does not have its own corrosion prevention and control team or corrosion prevention advisory team, but rather is covered by the existing plan and team for the E-3 aircraft. On the other hand, a different Air Force program we reviewed represents an upgrade to the avionics system of the existing C-5 aircraft, and its officials told us that corrosion prevention issues are more appropriately addressed at the C-5 aircraft program level. These officials told us that while the C-5 program has an existing corrosion prevention advisory team, it does not currently

¹⁵ Such specifications and documents include a corrosion prevention and control design manual, submarine class building specifications, and material selection requirement documents.

have a current corrosion prevention plan, though one is under development and expected to be completed at the end of May 2007.

We found that one reason most programs have not prepared corrosion prevention plans or established corrosion prevention advisory teams is that these elements are not mandatory. Major acquisition programs perform corrosion prevention planning at their discretion, and that may or may not include having a corrosion prevention plan, a corrosion prevention advisory team, or both. Further, these programs are not required to provide the Corrosion Office information regarding corrosion prevention planning. As a result, the Corrosion Office could not effectively monitor DOD acquisition practices to ensure that corrosion prevention technologies and techniques are being fully considered and incorporated when appropriate. Moreover, these programs may be missing opportunities to prevent future corrosion and thereby mitigate the impacts of corrosion on the costs, readiness, and safety of military equipment.

Conclusions

More than 4 years have passed since Congress enacted legislation requiring DOD to establish a corrosion prevention and mitigation program, yet DOD has not met Congress's expectations. Since the passage of this legislation, we have issued several reports on corrosion and made numerous recommendations to strengthen DOD's ability to combat corrosion. Further, the Defense Science Board has called for an increased commitment on the part of DOD to prevent and mitigate corrosion, referring to "the importance of leadership commitment and proper incentives for ensuring corrosion is considered early and often in decisions."¹⁶

DOD's progress in implementing its corrosion strategy has been stymied by critical weaknesses. These include the absence of DOD guidance directing the services to provide the Corrosion Office with comprehensive data about their annual funding requirements for corrosion prevention and mitigation, the absence of a designated corrosion official or corrosion office within each of the services, and the absence of a DOD action plan to guide use of data in the corrosion cost study to achieve long-term cost savings. Furthermore, the lack of a DOD requirement for all major defense acquisition programs to have both a corrosion prevention plan and a

¹⁶ Defense Science Board, Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics, *Report on Corrosion Control* (Washington, D.C.: October 2004).

corrosion prevention team could lead to inadequate corrosion prevention and, consequently, long-term corrosion problems throughout the life cycle of weapon systems. These and other weaknesses that we have raised in our previous reports severely hinder DOD's ability to combat corrosion. Without top DOD and service leadership commitment to addressing these issues, corrosion prevention and mitigation will remain an elusive goal and opportunities to reduce costs, enhance readiness, and avoid safety problems will be lost.

Recommendations for Executive Action

To effectively implement DOD's corrosion strategy and meet congressional expectations expeditiously, we recommend that the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology, and Logistics provide the necessary leadership and commitment to take the following four actions.

To ensure that DOD's Corrosion Office provides oversight and coordination of the services' proposed funding requests for corrosion prevention and mitigation programs, we recommend that the Secretary of Defense:

- Direct the Under Secretary of Defense for Acquisition, Technology, and Logistics to require the military services to provide comprehensive data about their annual funding requirements for corrosion prevention and mitigation efforts to the DOD Corrosion Office, before annual funding requests are sent to Congress.
- Direct the Secretaries of the Army, Navy, and Air Force to designate a corrosion official or a corrosion office within each service that is responsible for corrosion prevention and mitigation, and that the responsibilities of this official or office include identifying the annual funding requirements for corrosion prevention and mitigation efforts throughout the service.

To ensure that DOD does not miss opportunities for achieving long-term corrosion cost savings, we recommend that the Secretary of Defense:

- Direct the Under Secretary of Defense for Acquisition, Technology, and Logistics to develop an action plan for using the information contained in the Army ground vehicle and Navy ship segments of DOD's cost impact study. This plan should be completed as expeditiously as possible and be updated in time to support the fiscal year 2009 budget request. This plan should include information on corrosion cost areas having the highest

priority and a strategy for reducing these costs. DOD should develop comparable action plans for the information to be derived from cost segments completed in the future.

To improve DOD's ability to avoid or limit corrosion problems experienced by weapon systems, we recommend that the Secretary of Defense:

- Require major defense acquisition programs to prepare a corrosion prevention plan and establish a corrosion prevention advisory team as early as possible in the acquisition process.

Agency Comments and Our Evaluation

In written comments on a draft of this report, DOD partially concurred with each of our four recommendations. In its response, DOD cited actions it planned to take which are generally responsive to our recommendations. In addition, the department provided several technical comments which we considered and incorporated where appropriate. DOD's comments are reprinted in appendix V.

DOD partially concurred with our recommendation to require the military services to provide comprehensive data about their annual funding requirements for corrosion prevention and mitigation efforts to the DOD Corrosion Office before annual funding requests are sent to Congress. DOD stated that a draft Corrosion Prevention and Control Department of Defense Instruction will require the military departments during the annual internal DOD budget process to submit information on the proposed corrosion programs and funding levels to the DOD Corrosion Executive. We believe this action is long overdue and is a step in the right direction if implemented. However, it remains uncertain when the instruction will be approved and what it will look like when finalized. Although the instruction was expected to be approved in November 2006, according to DOD officials, it is still undergoing revision. In addition, the draft instruction, as it is currently written, does not provide enough detail regarding the identification and submission of comprehensive data for funding associated with all corrosion prevention and mitigation efforts throughout DOD. For example, the draft instruction does not specify the type of funding information that is to be obtained by the services and reported to the DOD Corrosion Office. DOD also commented that corrosion prevention and mitigation activities are funded through many different sources, no program elements exist in the military departments that directly tie to corrosion, and many activities are funded to complete corrosion-related work but are not identified as such in budget documents. However, as we stated in our report, we reviewed the President's budget

justification for fiscal year 2006 and were able to readily identify more than \$97 million for service-specific corrosion mitigation-related projects for which the Corrosion Office lacked any information.

DOD partially concurred with our recommendation that the Secretaries of the Army, Navy, and Air Force designate a corrosion official or a corrosion office within each service to be responsible for corrosion prevention and mitigation, and that the responsibilities of this official or office should include identifying the annual funding requirements for corrosion prevention and mitigation efforts throughout the service. DOD stated that the same draft DOD Instruction cited in response to the first recommendation also specifies that the heads of DOD components shall designate a senior individual or office for oversight of corrosion matters, and it directs the Secretaries of the military departments to support this individual or office. DOD stated that the Air Force has already designated such an official. The draft instruction as it pertains to each service having a corrosion executive or a corrosion office responsible for corrosion prevention and mitigation is responsive to our recommendation if implemented.

DOD partially concurred with our recommendation to develop an action plan for using the information contained in the Army ground vehicle and Navy ship segments of DOD's cost impact study. In response, DOD stated that it would be impractical to develop an action plan in time to be used for the 2008 budget cycle. While our recommendation was intended for DOD to develop an action plan as soon as possible to support near-term funding decisions for corrosion prevention and mitigation efforts, we agree that DOD can not do this in time to be used for the 2008 budget cycle. Therefore, we have modified our recommendation to say that DOD develop an action plan as expeditiously as possible and revise the plan in time to support the fiscal year 2009 budget request. DOD also stated that the DOD Corrosion Prevention and Mitigation Strategic Plan already includes a requirement to select and fund corrosion research projects and integrated product team activities to enhance and improve corrosion prevention and mitigation throughout DOD. DOD further stated that the Military Departments assess and make priorities regarding corrosion based, in part, on funding for the "Top Ten" high cost of corrosion-vulnerable systems. While these efforts may have merit, we still believe that an action plan would provide additional benefits as we recommend.

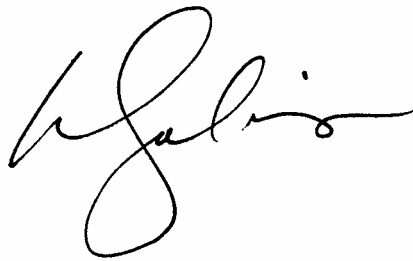
DOD partially concurred with our recommendation to require every major defense acquisition program to prepare a corrosion prevention plan and establish a corrosion prevention advisory team as early as possible in the

acquisition process. DOD stated that a corrosion prevention control plan will be developed for all ACAT I programs before preliminary design review and implementation will be reviewed at each milestone. DOD noted that the establishment of a separate, formal Corrosion Prevention Advisory Team may not be necessary for all program levels, though such a team will be established for all ACAT I programs. DOD's response is essentially responsive to our recommendation if carried out. In subsequent discussions DOD officials told us that they partially concurred because the response in some respects goes beyond our recommendation by requiring that all ACAT I programs have a corrosion prevention control plan and corrosion prevention advisory team.

In addition to providing comments to our recommendations, DOD commented about our statement that the development of metrics for readiness and safety will likely take several additional years to complete because DOD officials have placed a higher priority on completing the cost impact studies. DOD commented that this is an inaccurate and dangerous assertion and implies that the department holds safety and readiness, the two linchpins of the operation military mind-set, in lower esteem than cost. In subsequent discussions, DOD officials told us that they decided to identify cost impacts before they identify readiness and safety impacts because more information is available regarding costs, and identifying cost impacts is an important step towards identifying readiness and safety impacts. We have modified our report by incorporating this statement.

We are sending copies of this report to the Secretary of Defense and interested congressional committees. We will also make copies available to others upon request. This report will also be available at no charge on GAO's Web site at <http://www.gao.gov>.

If you or your staff have any questions regarding this report, please contact me at (202) 512-8365 or solisw@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 VI.

A handwritten signature in black ink, appearing to read "W. Solis". The signature is fluid and cursive, with a large initial "W" and a distinct "S" at the end.

William M. Solis, Director
Defense Capabilities and Management

List of Committees

The Honorable Carl Levin
Chairman
The Honorable John McCain
Ranking Minority Member
Committee on Armed Services
United States Senate

The Honorable Daniel Inouye
Chairman
The Honorable Ted Stevens
Ranking Minority Member
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Ike Skelton
Chairman
The Honorable Duncan Hunter
Ranking Minority Member
Committee on Armed Services
House of Representatives

The Honorable John P. Murtha
Chairman
The Honorable C.W. Bill Young
Ranking Minority Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Defense Science Board Recommendations

| Defense Science Board recommendation | DOD response |
|--|------------------|
| Create an independent team of corrosion experts to review all programs coming to the Defense Acquisition Board and all maintenance plans to provide the expertise necessary to decision makers. | Partially concur |
| Develop incentive structures to ensure corrosion and life cycle cost considerations in all designs and manufacturing. | Concur |
| Mandate corrosion testing and reporting at all stages of development. | Concur |
| Issue directive to require that all major weapon system corrosion prevention advisory team members complete a Defense Acquisition University-developed course on corrosion control. | Concur |
| Accelerate the introduction of activity based cost accounting to ensure future visibility into actual life cycle cost and cost of corrosion. | Concur |
| Contract for support in developing standard definitions, metrics, etc. to be completed and promulgated within a year. | Partially concur |
| Direct the services to conform with these standards and to enable capture of complete and accurate organizational, intermediate, and depot-level corrosion man-hour, material, and cost data. | Concur |
| Use these data to make fact-based decisions regarding corrosion and corrosion cost and to track progress of platform material improvement efforts. | Concur |
| Provide a separate funding line to support annual assessment teams, to provide the means and expertise to manage ongoing maintenance efforts, and to support organizational level training and maintenance. | Partially concur |
| Implement well-defined maintenance programs that included continuous corrosion performance improvement and continuing assessment and reporting. | Concur |
| Require each service to contract and execute its part. | Concur |
| Have all results reported to a common database for analysis and to support the development of a joint strategy for corrosion maintenance that accommodates the unique factors associated with each service and system. | Concur |
| Extend assessment database to capture existing aircraft and ship corrosion data. | Concur |
| Direct that services establish best practices maintenance plans, benchmarking and providing adequate training to all involved personnel at operator, intermediate, and depot levels. | Nonconcur |
| Establish a corrosion executive for each service with responsibility for oversight and reporting and full authority over corrosion-specific funding and a strong voice in corrosion-related funding. | Concur |
| Refocus and reinvigorate corrosion science and technology portfolio. Triple the effective funding in this area with particular emphasis on development of a materials-corrosion tool set that emphasizes science-based modeling and simulation; fundamental mechanistic understandings of corrosion phenomena as well as accelerated testing; substitutes for effective corrosion prevention materials which are being withdrawn because of environmental and safety considerations; newly developed materials; and nondestructive corrosion sensing and measurement in the field as feedback to prognostic and condition-based maintenance tools. | Partially concur |
| Divide the responsibilities for the Office of the Secretary of Defense's corrosion effort between three separate organizations: Defense Systems; Logistics, Materiel, and Readiness; and Installations and Engineering. | Nonconcur |

Source: DOD.

Note: Of the 17 total recommendations made by the Defense Science Board, DOD concurred on 11, partially concurred on 4, and did not concur on 2.

Appendix II: Scope and Methodology

To assess the Department of Defense's (DOD) efforts to implement its corrosion prevention and mitigation strategy, including the oversight of funding; identification of cost, readiness, and safety impacts; and the development of results-oriented metrics, we reviewed DOD's funding and progress for corrosion-related projects that it initiated during fiscal years 2005 and 2006. We reviewed the President's budget justification for fiscal year 2006 for corrosion-related efforts and met with DOD officials within the Comptroller's Office regarding their oversight of the Corrosion Policy and Oversight Office's budget. We also met with DOD officials within the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics to assess their oversight of programs and funding levels of the military services during the annual budget reviews as well as their monitoring of the services' acquisition practices. In particular, we met with officials with the Corrosion Policy and Oversight Office responsible for managing, directing, and reviewing corrosion prevention and mitigation initiatives. We met with DOD officials involved with developing DOD's long-term strategy to prevent and control corrosion. We obtained their assessments and perspectives on corrosion prevention and mitigation programs and strategies; obtained and reviewed DOD policies, procedures, guidelines, and draft instructions for prevention and mitigation of corrosion on DOD military equipment and infrastructure; and discussed additional actions that could be taken to further prevent and mitigate corrosion. We reviewed DOD's funding requirements for fiscal years 2005 through 2007 and future year projections.

To assess the extent to which the military services' have incorporated corrosion prevention planning in the acquisition of major weapon systems, we conducted a review of 51 major defense acquisition programs from the Army, Navy, and Air Force. These 51 programs were selected based on a nonprobability sample of acquisition programs from the Fiscal Year 2006 Major Defense Acquisition Program List approved by the Under Secretary of Defense for Acquisition, Technology, and Logistics. Navy programs were about half of the programs on the list. A program is designated a major acquisition program either by the Secretary of Defense, or because it is estimated to require a total expenditure of more than \$365 million in research, development, test, and evaluation funds or require a total expenditure of more than \$2.19 billion in procurement funds. Our program selection represented the functional capability areas for battle space awareness, focused logistics, force application, force protection, and joint training and included air, ground, and sea weapon systems. In particular, we selected and reviewed 13 Army programs, 25 Navy programs, and 13 Air Force programs. We met with officials responsible for managing the acquisition programs and with officials having primary responsibility for

overseeing corrosion prevention and mitigation within the respective services. We obtained and reviewed military service policies and instructions that establish corrosion prevention and control program requirements. For the acquisition programs we selected, we obtained and reviewed documents, including the acquisition strategy, acquisition plan, and corrosion prevention and control plans, as well as related information establishing corrosion prevention advisory teams and other reports used for tracking and monitoring corrosion-related design initiatives and corrections. In particular, we discussed the barriers that exist to more effectively employing corrosion control at program initiation and acquisition.

We also reviewed the recommendations of the Defense Science Board report on corrosion control issued in October 2004, and obtained DOD's related responses and actions taken to better address its strategy for corrosion prevention and mitigation. We met with Corrosion Policy and Oversight Office officials regarding their concurrence and the related actions taken to date.

We conducted our work from April 2006 through January 2007 in accordance with generally accepted government auditing standards. We did not validate the data provided by DOD. However, we reviewed available data for inconsistencies and discussed the data with DOD. We determined that the data used for our review were sufficiently reliable for our purposes.

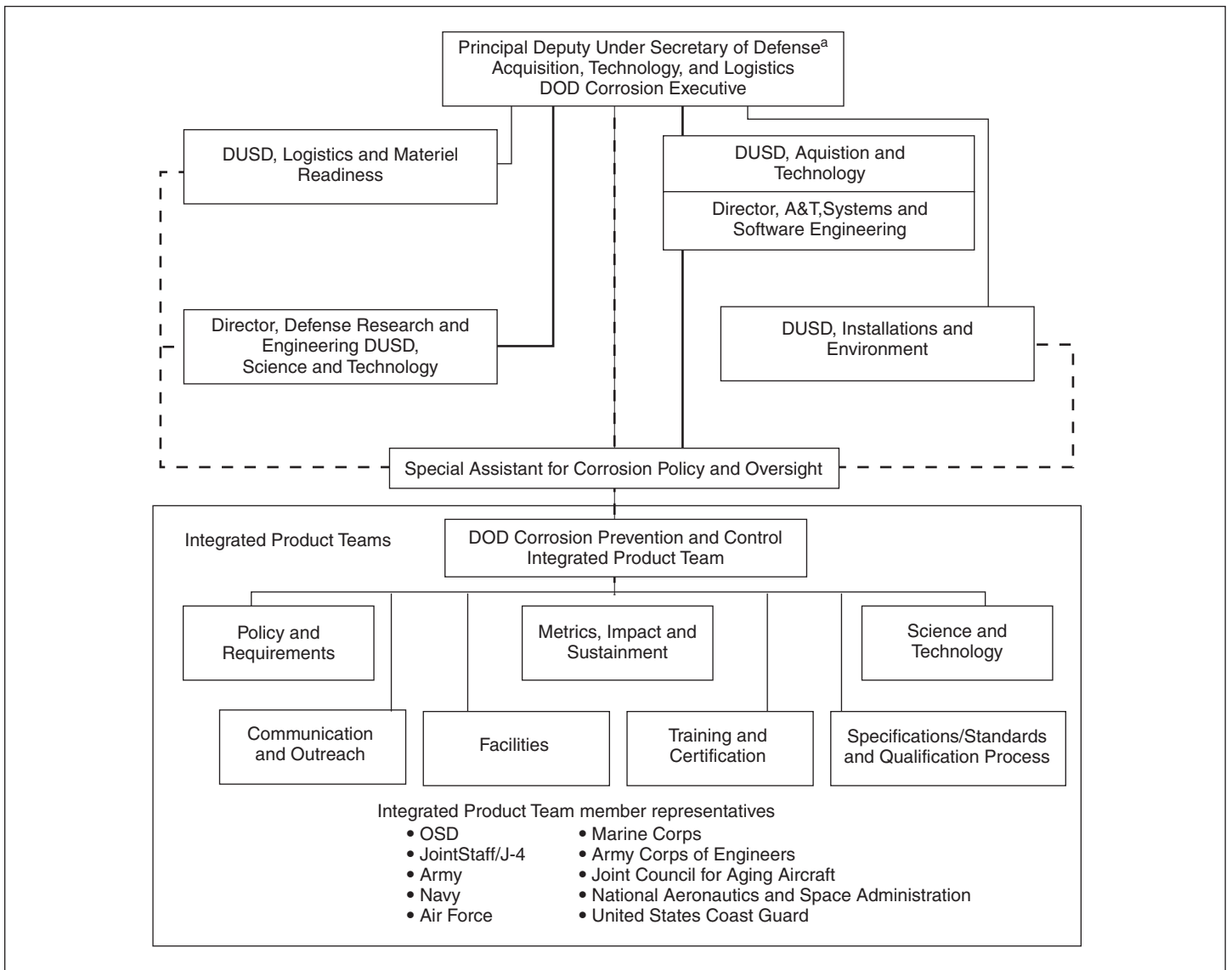
We interviewed officials and obtained documentation at the following locations:¹

- Office of the Under Secretary of Defense, Corrosion Policy and Oversight Office
- Army
 - U.S. Army Materiel Command, Fort Belvoir, Virginia
 - U.S. Army Aviation and Missile Command, Redstone Arsenal, Alabama

¹ Unless otherwise noted, the officials listed in this appendix have their offices in the Pentagon or at locations in the Washington, D.C., metropolitan area.

- Navy
 - Naval Air Systems Command, Patuxent River, Maryland
 - Naval Sea Systems Command, Washington Navy Yard
- Air Force, Aeronautical Systems Center, Wright Patterson Air Force Base, Dayton, Ohio

Appendix III: Organizational Structure of DOD's Corrosion Activities



Source: DOD.

Note: DUSD = Deputy Under Secretary of Defense.

^aCurrently filled by the Under Secretary of Defense for Acquisition, Technology, and Logistics.

Appendix IV: Corrosion Prevention Planning in Selected Major Defense Acquisition Programs

| Service and program | Corrosion prevention and control plan | Corrosion prevention advisory team |
|--|---------------------------------------|------------------------------------|
| Army | | |
| AB3, Apache Block III | Yes | No |
| UH-60M Blackhawk Upgrade, Utility Helicopter Upgrade Program | Yes | Yes |
| Light Utility Helicopter | No | No |
| CH-47F Cargo Helicopter | No | No |
| Joint Cargo Aircraft | No | No |
| Armed Reconnaissance Helicopter Program | Yes | Yes |
| Family of Medium Tactical Vehicles | No | No |
| Stryker, Armored Vehicle | Yes | Yes |
| Bradley Upgrade, Bradley Fighting Vehicle System Upgrade | No | Yes |
| High Mobility Artillery Rocket System | No | No |
| Javelin, Advanced Anti-tank Weapon System | No | No |
| Land Warrior, Integrated Soldier Fighting System | No | No |
| Future Combat Systems | Yes | Yes |
| Navy | | |
| CVN 21, Next Generation Nuclear Aircraft Carrier | No | Yes |
| DDG 1000, Zumwalt Class Destroyer | No | Yes |
| LHA Replacement New Amphibious Assault Ship | Yes | No |
| Littoral Combat Ship | Yes | No |
| Cobra Judy Replacement, Ship-based Radar System | No | No |
| Maritime Prepositioning Force (Future) | No | No |
| T-AKE, Lewis and Clark Class of Auxiliary Dry Cargo Ships | No | No |
| CG(X), Next Generation Cruiser | No | No |
| CVN 68, Nimitz Class Nuclear Powered Aircraft Carrier | No | No |
| DDG 51, Guided Missile Destroyer | Yes | Yes |
| LPD 17, Amphibious Transport Dock | No | No |
| SSGN, Ohio Class Conversion | No | No |
| SSN 774, Virginia Class Submarine | No | No |
| SSDS, Ship Self Defense System Program | No | No |
| E-2C Reproduction, Hawkeye Carrier-Based Early Warning Aircraft | No | No |
| E-2D AHE, Advanced Hawkeye | No | No |
| Vertical Takeoff and Land Tactical Unmanned Air Vehicle | Yes | No |
| MH-60S, Utility Helicopter to Replace Existing CH-46D, HH-60H, SH-3 & UH1N Helicopters | Yes | Yes |

**Appendix IV: Corrosion Prevention Planning
in Selected Major Defense Acquisition
Programs**

| Service and program | Corrosion prevention and control plan | Corrosion prevention advisory team |
|--|--|---|
| CH-53K, Heavy Lift Replacement Program | Yes | No |
| F/A-18E/F, Hornet Naval Strike Fighter | Yes | Yes |
| H-1 Upgrades, U.S. Marine Corps Mid-life Upgrade to AH-1W Attack Helicopter and UH-1N Utility Helicopter | No | No |
| MH-60R, Multi-Mission Helicopter Upgrade | Yes | Yes |
| P-8A, Multi-Mission Maritime Aircraft Program | Yes | No |
| V-22, Osprey Joint Advanced Vertical Lift Aircraft | Yes | Yes |
| VH-71, Presidential Helicopter Fleet Replacement Program | Yes | Yes |
| Air Force | | |
| AWACS Upgrade, Airborne Warning and Control System Block 40/45 Upgrade Program | No | No |
| Global Hawk, High Altitude Endurance Unmanned Aircraft System | No | Yes |
| C-130 Aircraft Avionics Modernization Program | No | No |
| C-130J, Hercules Cargo Aircraft Program | No | No |
| C-17A, Globemaster III Advanced Cargo Aircraft Program | Yes | Yes |
| C-5 Aircraft Avionics Modernization Program | No | No |
| C-5 RERP, Aircraft Reliability Enhancement and Reengineering Program | No | No |
| B-2 RMP, Radar Modernization Program | No | No |
| F-22A, Advanced Tactical Fighter | Yes | Yes |
| F-35, Joint Strike Fighter Program | Yes | Yes |
| Joint Primary Aircraft Training System | Yes | Yes |
| KC-135 Replacement | No | No |
| Combat Search and Rescue Replacement Vehicle | No | No |

Source: GAO analysis of service data.

Appendix V: Comments from the Department of Defense



ACQUISITION
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE
3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

APR 20 2007

Mr. William M. Solis
Director, Defense Capabilities and Management
U.S. Government Accountability Office
Washington, D.C. 20548

Dear Mr. Solis:

This is the Department of Defense (DoD) response to the GAO Draft Report, "DEFENSE MANAGEMENT: High Level Leadership Commitment and Actions Are Needed to Address Corrosion Issues," dated April 5, 2007 (GAO Code 350825/GAO-07-618).

The report recommends that the Secretary of Defense direct the Under Secretary for Acquisition, Technology, and Logistics to take several actions regarding corrosion: implement active oversight of the Military Departments' annual funding requests, develop plans using cost of corrosion baseline study findings, and require corrosion prevention control plans and assembly of corrosion prevention advisory teams. The report also recommends that the Secretary direct the secretaries of the Military Departments to designate Corrosion Executives or Corrosion Offices.

The GAO report makes four "Recommendations for Executive Action;" the Department partially concurs with each. Also, the Department disputes the Report's characterization that cost is more important than readiness and safety. Detailed comments on the report are enclosed. The Department remains committed to meeting the requirements of the Congress and, to the extent compatible with our core mission, the positive recommendations of the subject GAO report.

Mark D. Schaeffer
Director
Systems and Software Engineering

Enclosure:
As stated



GAO DRAFT REPORT - DATED APRIL 5, 2007
GAO CODE 350825/GAO-07-618

“DEFENSE MANAGEMENT: High Level Leadership Commitment and Actions Are
Needed to Address Corrosion Issues”

DEPARTMENT OF DEFENSE COMMENTS

Comments on GAO recommendations:

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense direct the Under Secretary of Defense for Acquisition, Technology, and Logistics to require the Military Services to provide comprehensive data about their annual funding requirements for corrosion prevention and mitigation efforts to the DoD Corrosion Office, before annual funding requests are sent to Congress.

DOD RESPONSE 1. Partially Concur. The Corrosion Prevention and Control Department of Defense (DoD) Instruction 5000.rr, which is in coordination, requires that the Military Departments submit to the DoD Corrosion Executive, during the annual internal DoD budget process, information on the proposed corrosion programs and funding levels. The draft DoD Instruction also specifies that Services establish responsibilities and methods for collecting and submitting this data.

However, corrosion prevention and mitigation activities are funded through many different sources. No Program Elements exist in the Military Departments that are tied directly to corrosion and many activities are funded to complete corrosion-related work but are not identified as such in budget documents. Corrosion requirements are embedded in routine lifecycle maintenance costs (e.g. painting and normal wear and tear) and non-routine repair costs due to corrosion (e.g. material loss through rust and corrosion stress cracking), acquisition program funding, operations and maintenance, and research, development, testing and evaluation funding.

The Department expects that the Military Departments will use the results from the ongoing – and then repeatable – Cost of Corrosion Baseline Study (which is described in the report) in identifying the top ten biggest cost drivers by segment. The Military Departments will then be able to perform a technology assessment strategy of the biggest corrosion cost drivers to be considered with other projects for funding.

RECOMMENDATION 2: The GAO recommends that the Secretary of Defense direct the Secretaries of the Army, Navy, and Air Force to designate a Corrosion Executive or a Corrosion Office within each Service that is responsible for corrosion prevention and mitigation, and that the responsibilities of this official or office include identifying the

annual funding requirements for corrosion prevention and mitigation efforts throughout the Service.

DOD RESPONSE 2: Partially Concur. The draft DoD Instruction 5000.rr specifies that the Heads of DoD Components shall designate a Point of Contact (POC) (a senior individual or office) for oversight of corrosion matters, identified to the DoD Special Assistant for Corrosion Policy and Oversight (SA/CPO). The DoD Instruction also directs the Secretaries of the Military Departments to support the corrosion POC in providing to the DoD Corrosion Executive, through the SA/CPO, information on the Department's proposed corrosion programs. The Air Force has already designated such an official. However, the same issues with funding coordination as described in the response for Recommendation 1 apply to this response as well.

RECOMMENDATION 3: The GAO recommends that the Secretary of Defense direct the Under Secretary of Defense for Acquisition, Technology, and Logistics to develop an action plan for using the information contained in the Army ground vehicle and Navy ship segments of DoD's cost impact study. This plan should be completed in time to support the FY 2008 budget request and should include information on corrosion cost areas having the highest priority and a strategy for reducing these costs. DoD should develop comparable action plans for the information to be derived from cost segments completed in the future.

DOD RESPONSE 3: Partially Concur. The President's budget for FY08 is published. It would be impractical for the Military Departments coordinated requirements to be addressed in this budget cycle; FY09 and FY10 are the next best opportunities for corrosion cost studies to make an impact. The objective of the Cost of Corrosion Baseline Study has been to identify specific systems that incur high corrosion prevention and mitigation costs and to focus research and development projects on those vulnerable high corrosion cost systems.

The DoD Corrosion Prevention and Mitigation Strategic Plan already includes in the Policy Working Integrated Product Team Action Plan a requirement to select and fund corrosion research projects and integrated product team activities to enhance and improve corrosion prevention and mitigation throughout the DoD. The Strategic Plan also includes an Appendix titled "Project Selection and Management" which provides specific requirements for Service submittal of plans for proposed projects. A major requirement for project submittal is a documented return-on-investment computation, which must include cost details related to the current system and projected cost details related to the proposed system. Proposed projects that reflect significant savings are likely to be selected for funding and implementation if other project plan specifications are met and funding is available. As the results of the Cost of Corrosion Baseline Study are completed, the Military Departments are expected to use the results in selecting equipment and infrastructure projects for submittal. Likewise, the DoD Corrosion

Project Evaluation Team will cross check submitted project plans against the Baseline Study results to help establish funding priorities.

The Military Departments assess and make priorities regarding corrosion based on (1) funding for the “Top Ten” high cost of corrosion vulnerable systems, (2) funding for short-term, low-investment, high-payoff systems, and (3) important activities for corrosion program planning, execution and control. The Cost of Corrosion Baseline Study provides a solid basis for supporting the annual budget request.

RECOMMENDATION 4: The GAO recommends that the Secretary of Defense require major defense acquisition programs to prepare a corrosion prevention plan and establish a corrosion prevention advisory team as early as possible in the acquisition process.

DOD RESPONSE 4. Partially Concur. The draft DOD Instruction 5000.rr states: (1) for acquisition category (ACAT) I programs, a review and evaluation of corrosion planning shall be a topic for the Overarching Integrated Product Team with issues raised to the Defense Acquisition Board; (2) for all contracts exceeding \$5,000,000, each DoD Component shall establish a process to review and evaluate corrosion planning, and (3) for all Military Construction infrastructure projects and for all sustainment, restoration, and maintenance projects reported in the DoD Facilities Assessment Database, each DoD Component shall establish a process to review and evaluate corrosion planning.

The draft DoD Instruction also specifies that the Heads of DoD Components shall establish a process to review and evaluate corrosion planning that requires program and project managers to consider and implement corrosion prevention and mitigation planning to minimize the impact of corrosion and material deterioration throughout the system and infrastructure life cycle, and develop procedures for corrosion planning, process implementation, management, review and documentation of results. The current draft DoD Instruction specifically calls for corrosion prevention planning, but does not address corrosion advisory teams, since the method for implementing the instruction can vary from Service to Service. The outcome of each Service’s method must comply with the requirements of the instruction.

To strengthen this requirement, the Department concurs that a corrosion prevention control plan shall be developed for all ACAT I programs before preliminary design review and then implementation shall be reviewed at each milestone. The establishment of a separate formal Corrosion Prevention Advisory Team may not be necessary for all level of programs based on the complexity of the program or other guidelines already in place but shall be established for all ACAT I programs.

Additional comment of note:

GAO said, “. . . metrics for readiness and safety will likely take several additional years to complete because they [DoD officials] have placed a higher priority on completing the cost impact studies. They told us that the accompanying definition and procedures will also take several years to complete.”

Non concur. This is an inaccurate and dangerous assertion. It implies that the Department holds safety and readiness, the two linchpins of the operational military mind-set, in lower esteem than cost. The issue with readiness and safety is not one of priority but of information availability: the problem of data in this area is much more intransigent than cost and the cost methodology was difficult enough to develop. The Corrosion Prevention and Control Integrated Product Team representatives discussed readiness and safety at great length and concluded that the Department should target readiness and safety metrics very carefully.

Furthermore, in June 2003, the Department of Defense established the Defense Safety Oversight Council (DSOC) chaired by the Under Secretary for Personnel and Readiness and composed of the Under Secretaries of OSD and Military Departments. The DSOC makes recommendations to the Secretary of Defense on all matters and practices concerning safety and impacting readiness. The DSOC is responsible for reviewing, promoting, coordinating, and supporting activities to improve human performance, safety education, standards, procedures, and equipment.

Appendix VI: GAO Contact and Staff Acknowledgments

GAO Contact

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