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DEFENSE
MANAGEMENT

Opportunities
Exist to Improve
Implementation of
DOD's Long-Term
Corrosion Strategy



G A O

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Highlights of [GAO-04-640](#), a report to congressional committees

Why GAO Did This Study

Each year, the Department of Defense (DOD) spends an estimated \$20 billion to repair the damage to military equipment and infrastructure caused by corrosion. Furthermore, corrosion profoundly impacts military readiness as well as the safety of military personnel.

In the Bob Stump National Defense Authorization Act for Fiscal Year 2003, Congress directed that DOD develop a long-term corrosion strategy, including specific requirements, and that GAO assess it. DOD submitted its strategy in December 2003. This report assesses the potential of the corrosion strategy (in terms of three elements—resources, performance metrics, and policy guidance) to effectively prevent and mitigate corrosion and its effects on military equipment and infrastructure.

What GAO Recommends

To provide better assurances that the long-term corrosion strategy is implemented as envisioned by Congress, GAO is recommending that the Secretary of Defense address certain shortcomings in funding, performance measures, and policy.

In written comments, DOD agreed with all of these recommendations. However, GAO emphasized the need to complete the baseline study well before 2011, institutionalize corrosion project funding, and extend the review of corrosion prevention plans.

www.gao.gov/cgi-bin/getrpt?GAO-04-640.

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

DEFENSE MANAGEMENT

Opportunities Exist to Improve Implementation of DOD's Long-Term Corrosion Strategy

What GAO Found

While DOD's new long-term corrosion strategy generally addresses the requirements in the congressional mandate, it falls short of representing a comprehensive plan needed to implement successfully the strategy and manage DOD's extensive corrosion problems in the future. An effective, results-oriented strategy identifies resources required to achieve its goals and outcome-based performance metrics that can measure progress toward achieving those goals. Without addressing certain key elements, the strategy is unlikely to serve as an effective tool in preventing and mitigating corrosion and its effects on military equipment and infrastructure. These shortcomings could lead to the loss of billions of dollars in avoidable maintenance costs and the degradation of safety and readiness. GAO's review of three key elements showed the following:

- **Funding and personnel resources**—The strategy does not identify the level of funding and personnel resources needed to implement the corrosion reduction plan in the near- or long-term. Officials in DOD's corrosion office said that resource needs are still being determined and firm estimates should be available in December 2004. However, preliminary projections made by the corrosion task force indicated that the DOD-wide corrosion reduction program would require about \$1.9 billion for fiscal years 2004 through 2009. DOD and the services, however, have not included any funds for fiscal year 2004 and less than 10 percent of the task force's fiscal year 2005 estimates. While the strategy calls for a mechanism that ensures sustained, long-term funding, DOD has been using a year-by-year funding approach.
- **Performance measures and milestones**—While the strategy includes some performance measures and milestones, they are not the results-oriented metrics needed to successfully monitor the program's progress. In addition, DOD does not plan to complete a critically needed, corrosion cost baseline study until 2011 because of limited funding. Without results-oriented metrics and a baseline, DOD will not be in a sound position to establish cost-effective resource priorities or monitor progress toward corrosion reduction.
- **Policy guidance**—While the strategy strengthens DOD's policy guidance on corrosion prevention and mitigation, improvements can be made. The new guidance establishes a review process for corrosion prevention plans for major weapon systems programs, such as the Joint Strike Fighter. However, the guidance does not extend the review to non-major weapons systems and infrastructure programs, which are under the purview of the military services. The guidance also does not require the Chairman, Joint Chiefs of Staff's Focused Logistics Functional Capabilities Review to consider corrosion prevention planning when it reviews project requirements.

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United States General Accounting Office
Washington, DC 20548

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Congressional Committees

Corrosion and its deteriorating impacts are so extensive that military equipment and military infrastructure are severely affected. The financial burdens are also substantial—estimates show that the Department of Defense (DOD) spends as much as \$20 billion a year in direct costs alone to repair the damage caused by corrosion. Corrosion has equally profound impacts on the safety and readiness of the military services. For example, as we recently reported, the Navy suspended carrier operations in March 2002 when one F-14 aircraft crashed because its landing gear collapsed because of corrosion. Our report also indicated that corrosion-related problems had degraded the readiness of all of the Army's approximately 2,450 force modernization helicopters.¹

Congress, in the fiscal year 2003 defense authorization act,² directed the Secretary of Defense to develop and implement a long-term strategy to reduce corrosion and the effects of corrosion on the DOD's military equipment and infrastructure.³ The mandate required that the strategy include, among other things, policy guidance, performance measures and milestones, and an assessment of the necessary personnel and funding to accomplish the long-term strategy. The mandate also required that DOD include an assessment of these elements for four specific initiatives. The mandate directed us to monitor the implementation of the long-term strategy and submit our report to Congress no later than 18 months after the date of the enactment of the act.

¹ U.S. General Accounting Office, *Defense Management: Opportunities to Reduce Corrosion Costs and Increase Readiness*, [GAO-03-753](#) (Washington, D.C.: July 7, 2003).

² Bob Stump National Defense Authorization Act for Fiscal Year 2003, Pub. L. 107-314, § 1067 (Dec. 2, 2002).

³ The act defines corrosion as the deterioration of a material or its properties due to a reaction of that material with its chemical environment; it defines military equipment as all weapon systems, weapon platforms, vehicles, munitions, and the components of such items; and it defines infrastructure as all buildings, structures, airfields, port facilities, surface and subterranean utility systems, heating and cooling systems, fuel tanks, pavements, and bridges.

In July 2003, following the enactment of this legislation, we issued a report on corrosion costs and readiness issues. In that report, we recommended, and DOD concurred with those recommendations, that in crafting an effective strategy, DOD should include a number of key elements, including clearly defined goals, outcome-oriented objectives, performance measures, and the level of resources needed to accomplish the goals and objectives.

DOD submitted its long-term corrosion strategy⁴ to Congress in December 2003. As agreed with your offices, because so little time has passed since the strategy was submitted, our assessment focused on the potential of the overall corrosion strategy in terms of three elements—funding and personnel resources, performance measures and milestones, and policy guidance—to effectively prevent and mitigate corrosion and its effects on military equipment and infrastructure in the long term. We also assessed these three elements as they relate to the four initiatives specifically identified in the congressional mandate.

In conducting our review, we monitored the activities of the DOD corrosion task force set up to develop the long-term strategy and reviewed briefings and studies associated with its preparation. We met with DOD and military service officials to obtain their views, documentation, and studies on the strengths and weaknesses of the new strategy. We also analyzed the adequacy of the strategy's key elements by comparing them with criteria established in the Government Performance and Results Act of 1993⁵ and related internal controls guidance and studies. We conducted our review between November 2003 and April 2004 in accordance with generally accepted government auditing standards and determined that the data used in the report are sufficiently reliable for meeting our purposes. A detailed description of our scope and methodology is provided in appendix I.

Results in Brief

While DOD's new long-term corrosion strategy generally addresses the requirements identified in the mandate (e.g., policy guidance, performance measures and milestones, and an assessment of the necessary funding and

⁴ 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.: Dec. 2003).

⁵ Pub. L. No. 103-62 (1993).

personnel), it falls short of representing the comprehensive plan that is necessary to implement successfully the strategy and manage DOD's extensive corrosion problems in the future. As we described in our July 2003 report recommendation, a results-oriented comprehensive plan identifies the level of resources needed to achieve the strategy's goals and provides outcome-based performance metrics to measure progress toward achieving the goals. Without fully addressing these key elements, the strategy is unlikely to serve as an effective management tool in preventing and mitigating corrosion and its effects on military equipment and infrastructure. In addition, without an effective strategy, DOD may lose or delay the opportunity to save billions of dollars in avoidable maintenance costs for military equipment and infrastructure by not investing in corrosion-reduction efforts now. Our review of three key elements showed the following:

- **Funding and personnel resources**—While DOD's corrosion strategy generally addresses the issue of funding, the strategy does not identify the specific level of funding and personnel resources that are needed to implement the long-term strategy, including the four initiatives specified in the mandate. In developing the strategy, DOD was to provide an assessment of the funding and personnel necessary to accomplish the long-term strategy, including the four initiatives. According to officials in DOD's corrosion office, an estimate of the funding and personnel resources needed was not included because the requirements are still being determined, although they said they expect to have these estimates by December 2004. While DOD did not identify funding and personnel needs in the strategy, the corrosion task force charged with preparing the strategy developed a preliminary estimate of funding needs, amounting to a total of about \$1.9 billion for fiscal years 2004 through 2009. However, DOD and the services have not included any funding estimates for fiscal year 2004 and only \$27 million for fiscal year 2005 projects, about 9 percent of the task force's projected needs. While the strategy calls for a funding mechanism that will ensure sustained, long-term funding, DOD has thus far used, and plans to continue using, a year-by-year approach. In terms of personnel needs, the strategy identified the establishment of a DOD Corrosion Policy and Oversight Office that would be headed by a director and be supported by a task force of corrosion professionals from government and industry.
- **Performance measures and milestones**—While DOD's corrosion strategy identifies some performance measures and milestones for the four initiatives, the metrics are not the results-oriented performance measures needed to implement the strategy successfully. In addition, DOD does not plan to complete a baseline study that is of critical importance in measuring progress toward achieving the strategy's goals and objectives

until 2011 because of limited funding. The strategy contains performance metrics that measure program activities, rather than outcome-based performance metrics. For example, DOD plans to measure progress by counting the number of major acquisition programs that have developed corrosion prevention plans rather than by determining the amount of savings realized within a specific time frame from corrosion reduction projects involving Navy aircraft carriers. Without a baseline and outcome-based performance metrics, DOD will be unable to establish cost-effective resource priorities and measure—and report on—its progress toward reducing corrosion and its impacts.

- **Policy guidance**—DOD strengthened its policy guidance on corrosion prevention and mitigation in the long-term strategy, but improvements can be made. The new guidance, contained in a policy memorandum⁶ appended to the strategy, establishes a review process for corrosion-related issues for major weapon systems programs, such as the Joint Strike Fighter. According to DOD corrosion officials, the guidance does not extend the review process to non-major weapons systems and infrastructure programs, which are under the responsibility of the individual military services, in order that the services can retain flexibility in managing their own programs. Furthermore, DOD's new corrosion strategy does not include the need for the Chairman, Joint Chiefs of Staff's Focused Logistics Functional Capabilities Review Board to consider corrosion prevention planning when it reviews project requirements. One of the board's responsibilities is to help ensure that an assessment of the sustainability of weapon systems is incorporated into Chairman, Joint Chiefs of Staff requirements. While the strategy provides general policy guidance, it does not specifically provide guidance for the four initiatives.

To strengthen DOD's corrosion strategy, we are recommending that DOD provide Congress with the long-term funding and personnel resources needed for corrosion prevention and mitigation projects. We are also recommending that DOD complete a departmentwide baseline corrosion study and improve the strategy's corrosion reduction policy guidance. In commenting on a draft of this report, DOD agreed with all of the recommendations.

Background

DOD acquires, operates, and maintains a vast array of physical assets, ranging from aircraft, ships, and land vehicles to buildings, ports, and

⁶ Policy Memorandum dated November 12, 2003, from Acting Under Secretary of Defense for Acquisition, Technology and Logistics to Secretary of the Military Departments.

other facilities. Corrosion is an extensive problem that affects these assets and has an impact on military funding requirements, readiness, and safety. It is estimated that the direct costs to DOD of corrosion on military equipment and infrastructure is between \$10 billion and \$20 billion annually.⁷

In our prior work, we reported in July 2003 that, although the full impact of corrosion could not be quantified because of the limited amount of reliable data that DOD and the military services had available, corrosion has a substantial impact in terms of cost, readiness, and safety on military equipment and facilities. Moreover, we found that DOD and the military services did not have an effective management approach to mitigate and prevent corrosion. As a result, we recommended, and DOD concurred, that it should develop a departmentwide strategic plan with clearly defined goals, measurable outcome-oriented objectives, and performance measures.

In recognizing the extent of DOD's corrosion problem, Congress enacted legislation as part of the Bob Stump National Defense Authorization Act for Fiscal Year 2003 that directed the Secretary of Defense to designate an officer or organization to be responsible for the prevention and mitigation of corrosion of military equipment and infrastructure. The legislation also required the Secretary to develop a long-term strategy to reduce corrosion and the effects of corrosion on military equipment and infrastructure, and submit the report to Congress no later than 12 months after the date of the enactment of the Act.

The mandate required that the strategy include, among other things, policy guidance, performance measures and milestones, and an assessment of the necessary personnel and funding to accomplish the long-term strategy. The mandate also required that DOD include an assessment of these elements for four specific initiatives. These initiatives are: (1) expansion of the emphasis on corrosion prevention and mitigation within DOD to include coverage of infrastructure; (2) application uniformly throughout DOD of requirements and criteria for the testing and certification of new corrosion-prevention technologies for equipment and infrastructure with similar characteristics, similar missions, or similar operating environments; (3) implementation of programs, including supporting databases, to ensure that a focused and coordinated approach is taken

⁷ [GAO-03-753](#).

throughout DOD to collect, review, validate, and distribute information on proven methods and products that are relevant to the prevention of corrosion of military equipment and infrastructure; and (4) establishment of a coordinated research and development program for the prevention and mitigation of corrosion for new and existing military equipment and infrastructure that includes a plan to transition new corrosion prevention technologies into operational systems.

To prepare a strategy, DOD established a corrosion policy and oversight task force. The task force is located in the Office of the Under Secretary of Defense for Acquisitions, Technology, and Logistics and reports to the Principal Deputy Under Secretary for Acquisitions, Technology, and Logistics. The task force consists of seven working groups responsible for addressing seven corrosion focus areas: (1) policy and requirements; (2) impact, metrics, and sustainment; (3) science and technology; (4) communication and outreach; (5) training and doctrine; (6) facilities; and (7) specifications or standards and product qualification. According to DOD officials, these seven areas were identified to address the congressional concerns that led to the mandate and the issues discussed in our 2003 report. These officials said that because the key elements of the mandate (funding and personnel, performance measures and milestones, and policy guidance) are comprehensive, they each apply one way or another to the seven focus areas in the strategy.

Corrosion Strategy Shortcomings May Hinder Successful Implementation

While the long-term corrosion strategy generally addresses the mandate's requirements, several shortcomings are likely to hamper the successful implementation of DOD's long-term corrosion strategy. The strategy (1) does not identify the level of funding and personnel resources needed to tackle corrosion problems; (2) does not provide outcome-oriented performance measures and a baseline study to measure progress; and (3) strengthens existing policy guidance, but some improvements can be made. In addition, we recommended in our July 2003 corrosion report, and DOD concurred with our recommendation, that a long-term strategy should include elements compatible with the Government Performance and Results Act of 1993. Among these elements were the level of resources needed to accomplish the strategy's goals and objectives and performance measures, such as the expected return on investment and realized net savings of prevention projects that show progress toward achieving the strategy's objectives.

Strategy Does Not Identify Specific Funding and Personnel Resources

While DOD's corrosion strategy generally addresses the issue of funding, it does not include any estimates of the specific dollar amounts that are needed for its near- or long-term implementation. According to the strategy, the newly formed Corrosion Policy and Oversight task force will develop inputs to the Future Years Defense Program based on corrosion requirements and projects. DOD corrosion officials told us, however, that funding estimates were not included in the strategy because DOD and the military services are still in the process of determining the requirements. The officials said they expect to have firm estimates by December 2004.

In a separate study during the preparation of the strategy, however, DOD's corrosion task force developed a preliminary schedule of funding requirements for corrosion reduction efforts. These estimates projected that DOD and the military services would need a total of about \$1.9 billion in departmentwide corrosion prevention and mitigation resources for fiscal years 2004 through 2009. DOD corrosion officials said that the task force's figures represent an initial attempt to estimate DOD's and the military service's funding needs. Table 1 shows the task force's estimated funding requirements for corrosion prevention and mitigation efforts for both military equipment and infrastructure for the period from fiscal year 2004 through fiscal year 2009.

Table 1: Estimated Funding Needs for Corrosion Prevention Projects for Fiscal Years 2004 through 2009 by Military Services

Dollars in millions							
	Fiscal year						Total by service
	2004	2005	2006	2007	2008	2009	
Equipment							
Army	10.0	81.9	82.8	83.8	112.8	155.8	527.1
Navy/Marines	30.0	58.8	47.5	46.8	43.4	39.8	266.3
Air Force	15.4	3.7	24.5	31.2	35.7	38.6	149.1
Facilities							
All services	19.0	168.0	177.0	189.0	195.0	183.0	931.0
Total	74.4	312.4	331.8	350.8	386.9	417.2	1,873.5

Source: Corrosion Policy and Oversight Task Force.

The task force's estimates indicated that the services would need about \$74.4 million in fiscal year 2004 for corrosion prevention and mitigation projects, but this funding has not been allocated or obligated. The task force identified 93 projects that had high potential returns on investment and were ready to be undertaken immediately. These projects included,

for example, the installation of sensors to monitor fuel tanks and pipes for corrosion and the use of corrosion-inhibiting lubricants for avionics equipment on military aircraft. Corrosion officials told us that the \$74.4 million was not included in DOD's fiscal year 2004 budget request because the task force developed the estimate too late to be incorporated in the budget request. Corrosion officials said they hoped to obtain funding that would become available during fiscal year 2004, but, as of April 2004, DOD and the services had not allocated or obligated these funds.

The task force also estimated that the services would need about \$312 million for equipment and infrastructure corrosion projects in fiscal year 2005. However, DOD's Comptroller officials told us that the services included only \$27 million, less than 10 percent of the projected amount for departmentwide corrosion prevention and mitigation projects in their fiscal year 2005 budget request. To fund these projects, DOD Comptroller officials approved a budget change of \$27 million from a special project designed to counter threats to the Civil Reserve Fleet and other aircraft to the services' operation and maintenance accounts (\$9 million each for Army and Air Force, \$7 million for the Navy, and \$2 million for the Marine Corps). DOD corrosion officials told us that they are using these service accounts because DOD does not have an account that is dedicated to departmentwide corrosion reduction. These officials also said that, after the funds are appropriated, they plan to issue a letter of instruction to the services requiring them to obtain approval from DOD's corrosion office for the use of these funds. Of the \$27 million, DOD corrosion officials said they expect to use \$24 million for corrosion projects (e.g., for rinse facilities for the services' helicopters and other aircraft and temporary shelters for military equipment and vehicles), \$2.5 million to begin a corrosion impact baseline study; and \$500,000 for the corrosion task force's operating expenses. DOD corrosion officials told us that, while the \$27 million falls far short of the amount needed to fully implement the strategy, it represents the first time that DOD expects to use funds for corrosion reduction on a departmentwide basis, and it demonstrates DOD's commitment to augment the funding resources that have previously been under the purview of the military services.

DOD Comptroller officials told us that, in future fiscal years, corrosion reduction efforts would likely continue to be funded on a year-to-year basis by program offsets, such as those used for 2005. They said they eventually expect that departmentwide funding will no longer be needed as the military services assume a greater role in funding their own corrosion reduction projects. Comptroller officials said that the services have the knowledge and expertise to manage their own corrosion control

projects and, therefore, are in a much better position to identify and allocate funding for these efforts. However, DOD corrosion officials said that the services are not in a position of knowing which corrosion projects have the best potential to provide departmentwide benefits and, furthermore, that these projects are not well coordinated within and among the military services.

DOD's corrosion officials said that the corrosion reduction strategy may continue to be underfunded because of the lack of an effective long term funding mechanism that would better ensure that corrosion reduction projects have sustained funding over a period of years. At the present time, the corrosion prevention program is being supported piecemeal through budget change proposals or offsets. Corrosion officials told us that with a long-term funding mechanism dedicated to departmentwide corrosion prevention and mitigation, the program might be able to secure a commitment for funding these projects for future years. Such a mechanism could also fund projects that crosscut the services and that have the greatest potential for cost savings. Corrosion officials said that they prefer to have a long-term funding mechanism, such as a program element, but the DOD Comptroller does not think that this is necessary at this time.

As we reported in July 2003, the corrosion mitigation program may continue to be underfunded because DOD and the military services continue to give corrosion prevention a lower priority than other requirements.⁸ According to DOD corrosion officials, corrosion reduction projects must compete with other operation and maintenance programs. Because DOD and the military services give higher priority to projects that show immediate results, they have limited funding for corrosion reduction efforts whose benefits may not be apparent for many years. Corrosion officials told us that one of the biggest challenges to getting needed funding is to change DOD and military service personnel attitudes—from thinking that money spent on corrosion prevention detracts from other projects to realizing that it saves money in the long run.

According to DOD corrosion officials, if DOD and the services do not request more funding for corrosion prevention projects, DOD may lose or delay the opportunity to realize savings amounting to billions of dollars in avoidable maintenance costs for military equipment and facilities now and

⁸ [GAO-03-753](#).

in the future. According to corrosion officials, the average potential return on investment for a corrosion prevention project is about 10 to 1, with some projects showing a return as high as 80 to 1, and with the savings realized about 5 years after funding begins. DOD corrosion officials said that this means, for example, that if DOD invests \$500 million in a corrosion project today, it could realize a potential savings of about \$4.5 billion 5 years from now.

In terms of personnel resources, the strategy generally provided an assessment of the personnel necessary to manage the corrosion program effectively in DOD and the services, but the strategy did not identify the level of personnel resources needed to implement the strategy. The strategy noted the establishment of an Office of Corrosion Policy and Oversight that is responsible for developing and implementing the corrosion strategy and specified that the office would have a director. DOD corrosion officials told us the office also includes a deputy director and engineer and that these positions are temporary. The strategy also indicated that a corrosion prevention and control working group, consisting primarily of corrosion professionals from DOD, would provide support for the corrosion office. DOD corrosion officials said these individuals are not permanently assigned to the office but serve on a part-time basis. These officials added that, because the strategy was recently established, DOD and the military services have had little time to determine the number of personnel needed to implement it. These officials told us that the requirements would likely be minimal and they expect to have a firmer estimate by December 2004.

The strategy does not identify the specific amount of funding or personnel needed to move ahead with the four initiatives specified in the congressional mandate. While the strategy includes descriptions of military equipment and facilities projects that address in varying ways these four areas, it states that these projects require an assessment of funding and other resources needed to support them. DOD corrosion officials told us that they plan to systematically evaluate each project and that this assessment will include determining the resources needed to implement the effort.

Lack of Outcome-Based Performance Measures and Baseline Study Hamper Tracking Progress and Setting Priorities

While DOD's corrosion strategy includes performance measures and milestones, they are not the outcome-oriented metrics that are needed to successfully monitor the department's progress in mitigating corrosion and its impacts. Instead, the strategy contains output-oriented metrics that measure the number of program activities. For example, DOD plans to measure progress toward achieving the strategy's goals by counting the number of major acquisition programs that have developed corrosion prevention plans, tracking the number of injury-related incidents related to corroding equipment or facilities, and recording the number of maintenance personnel enrolled in corrosion-mitigation training modules. By contrast, an outcome-oriented performance metric would allow DOD to determine how much corrosion-prevention projects have reduced the amount of maintenance costs for Navy aircraft carriers, decreased the failure rates for the Army's 155 millimeter medium-towed howitzer, or decreased Air Force Base fuel pipeline ruptures—all within a certain timeframe.

In addition, the development of meaningful performance metrics will be hampered until a baseline study of the costs and the extent of corrosion problems departmentwide is completed. In our July 2003 report, we indicated that the lack of reliable data made it difficult to adequately assess the overall impact of the corrosion problem. A baseline study would identify the cost of corrosion on military equipment and facilities across the services as well as corrosion's impact on military personnel safety and operational readiness. Such a study would document where corrosion problems exist, identify their causes, and prioritize them according to their relative severity.

However, while the long-term strategy acknowledges the critical importance of developing a baseline of corrosion costs, including those related to safety and readiness, DOD does not plan to complete such a baseline until 2011. DOD corrosion officials told us they plan to allocate \$2.5 million of the \$27 million provided for fiscal year 2005 corrosion-related projects to begin such a study. DOD corrosion officials told us that the task force estimated that it would take an additional \$1.25 million for each of the next 6 fiscal years (2006 through 2011) to complete the study, for a total cost of \$10 million. They said that it would take that long primarily because of the limited funding available for the strategy, which has forced them to stretch out funding for the baseline over a period of several years. The officials also said that the study would take some time to complete because of data reliability issues, the lack of consistency in corrosion data within and among the military services, and the incompatibility of information systems that contain the data.

Without a corrosion baseline, DOD will not be able to develop adequate performance metrics to measure—or report on—its initial progress toward reducing corrosion and its impacts. Furthermore, DOD will not have an overall picture of the extent of corrosion problems, making it difficult to effectively identify areas that are most severely impacted by corrosion and that require high-priority attention and resources.

While DOD's corrosion strategy includes some performance measures and milestones for the four initiatives, the metrics are not the results-oriented performance measures needed to successfully implement the strategy.

**Strategy Strengthens
DOD's Corrosion
Mitigation Policy Guidance
but Could Be Improved**

As part of the long-term corrosion strategy, DOD strengthened its policy guidance for corrosion prevention and control activities, but there are opportunities to build on these improvements. The new guidance explicitly calls for the consideration of corrosion prevention and control planning during the earliest stages of the acquisition process for military weapon systems and military infrastructure programs; earlier guidance did not single out the need for such planning. DOD also included the need to consider corrosion prevention and control in an existing guidebook⁹ for weapons systems program managers.

While the strategy contains a policy memorandum¹⁰ that sets up a review process for corrosion-related issues for major weapon systems programs (e.g., Joint Strike Fighter), it does not extend this review to non-major weapon systems (e.g., Torpedo Defense System Program) and infrastructure programs. The guidance directs the corrosion prevention and control working group to regularly review the adequacy of corrosion prevention plans of all weapon system programs subject to Defense Acquisition Board review. If they identify an issue, the product group will bring it to the attention of the board. Furthermore, the policy memorandum states that the Acting Undersecretary of Defense for Acquisitions, Technology, and Logistics will personally evaluate the corrosion plans for programs subject to board review. According to DOD corrosion officials, the guidance did not extend this review to the

⁹ Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, *Designing and Assessing Supportability in DOD Weapons Systems Guidebook* (Washington, D.C.: Oct. 24, 2003).

¹⁰ Policy Memorandum dated November 12, 2003, from Acting Under Secretary of Defense for Acquisition, Technology, and Logistics to Secretary of the Military Departments.

non-major weapons programs, which are under the responsibility of individual military services. The corrosion officials said this was done so that the services could retain flexibility in managing their own programs. Military service officials told us that they have not established a corrosion prevention plan review process for their programs because the policy memorandum is relatively new, and they prefer to wait to see how the process works before they establish a similar review process. However, these service officials and DOD officials said that they recognize that all programs, both major and non-major weapon systems and infrastructure, experience significant corrosion impacts and that all of their corrosion prevention plans would benefit from a review process.

In addition, DOD's new corrosion strategy does not include any corrosion planning or review requirements for the Chairman, Joint Chiefs of Staff's Focused Logistics Capabilities Board. However, Joint Chiefs of Staff officials said they will include corrosion prevention planning in the board's sustainability assessments of military weapon systems. DOD corrosion officials told us that this effort by the Joint Chiefs of Staff would support the strategy and enhance DOD's overall corrosion reduction programs.

While the strategy provides general policy guidance, it does not specifically provide policy guidance for the four initiatives.

Conclusions

By focusing attention on the extensive and costly problem of corrosion and its debilitating impact on military equipment and facilities, DOD's new long-term corrosion strategy is a step in the right direction. However, because the strategy falls short of providing the basic elements of an effective management plan, DOD's ability to implement it successfully remains at risk. Because of the strategy's limited assessment of funding and personnel needs, lack of a baseline study, and weak performance measures, it is not certain that DOD's corrosion prevention and mitigation efforts will be adequately funded, monitored, or thoroughly evaluated. Without a sufficient assessment of the funding and personnel resources required to reduce the effects of corrosion, Congress does not have the information it needs to make informed, corrosion-related funding decisions in the future. In addition, if DOD and the services do not adequately fund corrosion prevention efforts in the near term, they will lose or delay the opportunity to realize billions of dollars in avoidable maintenance costs over the long term. They will also face increasing degradation in the safety and readiness of military equipment and personnel. Furthermore, without establishing a departmentwide corrosion baseline, DOD cannot reliably estimate its overall resource needs,

determine which ones have the highest priority, and track and measure its progress toward meeting these needs. Moreover, without good results-oriented performance metrics, DOD cannot adequately measure its progress in reducing the impact of corrosion. Finally, without expanding its policy guidance to require a review of all corrosion prevention planning, DOD will not be able to ensure that all new programs and activities—including non-major weapon systems and infrastructure—are thoroughly evaluated. As a result, some acquisition and construction programs could slip by without effective planning to prevent and control corrosion. In addition, DOD will miss an opportunity to strengthen its efforts to reduce the impact of corrosion on all new acquisitions and facilities in the future. Without fully addressing the strategy's weaknesses, the effects of corrosion will continue to exact a tremendous toll on the financial and operational condition of the military.

Recommendations for Executive Action

To provide better assurances that the Department of Defense's long-term corrosion strategy is successfully implemented as envisioned by Congress, we are making five recommendations. We are recommending that the Secretary of Defense instruct the Undersecretary of Defense for Acquisition, Technology and Logistics, in consultation with the DOD Comptroller, take the following actions:

- Establish a date to complete the corrosion baseline study well before its original estimated completion date of 2011 in order that cost-effective resource priorities and results-oriented performance measures can be established to monitor progress in reducing corrosion and its impacts on equipment and infrastructure;
- Establish a funding mechanism to implement the corrosion strategy that would be consistent with the strategy's long-term focus; and
- Submit to Congress, as part of the fiscal year 2006 budget submission, a report identifying the long-term funding and personnel resources needed to implement the strategy, a status report of corrosion reduction projects funded in fiscal year 2005, and the status of a baseline study.

In addition, we recommend that the Secretaries of the military services establish policy guidance that would include the review of the corrosion prevention and control plans of non-major weapons systems and infrastructure programs.

Finally, we recommend that the Chairman, Joint Chiefs of Staff direct the Focused Logistics Capabilities Board to include corrosion prevention issues in its sustainability assessments of military weapon systems.

Agency Comments and Our Evaluation

In commenting on a draft of this report, the Director of Defense Procurement and Acquisitions Policy concurred with all five of our recommendations. The comments are included in appendix II of this report.

In concurring with our recommendation to complete a corrosion baseline study as soon as possible, DOD noted that, as part of the long-term strategic plan, it would continue its efforts to evaluate corrosion costs. However, DOD did not indicate when it would complete the overall, departmentwide baseline study of corrosion costs that we believe is essential for establishing cost-effective resource priorities and tracking progress towards reducing corrosion and its impacts on equipment and infrastructure. We continue to believe that this baseline study should be completed as soon as possible. Therefore, we have modified our recommendation to be more specific and stated that DOD should establish a date to complete the corrosion baseline study well before its original estimated completion date of 2011.

In concurring with our recommendation to establish a funding mechanism to implement the corrosion strategy that would be consistent with the strategy's long-term focus, DOD stated that the corrosion office would submit funding requests through the Planning, Programming, Budgeting, and Execution process. In addition, DOD noted that funding requests for corrosion prevention would compete for funds with other DOD programs based on need priorities and fiscal constraints. Although DOD did not provide specific details, we would expect that funding requests for corrosion would be made during the budget submission process and be included in DOD's submission to Congress rather than be made through budget change proposals or offsets after funds are obligated. We would also expect that corrosion prevention funding estimates would be included in the Future Years Defense Program. Unless DOD adopts these types of approaches, corrosion prevention funding will continue to receive a lower priority than other DOD efforts, and as a result, DOD will lose the opportunity to save billions of dollars in avoidable maintenance costs and to improve the safety and readiness of military equipment and infrastructure.

In concurring with our recommendation that the Secretaries of the military services establish policy guidance calling for reviews of corrosion prevention and control plans of non-major weapons systems and infrastructure programs, DOD indicated that it would encourage the Secretaries to implement such reviews. DOD also stated that non-major programs are reviewed subject to the requirements of different acquisition

authorities within the military services. We do not believe that DOD's comments are fully responsive to our recommendation. We continue to believe that non-major weapons systems experience corrosion problems similar to those experienced by major weapons systems and that they would benefit from the same kind of corrosion prevention plan review. Our recommendation also applies to infrastructure programs that are primarily managed by the military services. We recognize that the authority to manage the activities of non-major weapons systems and infrastructure programs lies, for the most part, with the military services and that is why our recommendation is directed to the Secretaries of the services. As a result, we would expect the Secretaries to implement the recommendation by establishing policy guidance appropriate to their respective services.

We are sending copies of this report to the Secretary of Defense; the Director, Office of Management and Budget; and other interested congressional committees. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

Please contact me on (202) 512-8365 if you or your staff have any questions concerning this report. Key contributors to this report were Lawson Gist, Jr., Allen Westheimer, Hector Wong, Nancy Benco, and Katherine Lenane.

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

William M. Solis, Director
Defense Capabilities and Management

List of Congressional Committees

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

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

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

The Honorable Jerry Lewis
Chairman
The Honorable John P. Murtha
Ranking Minority Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Scope and Methodology

To assess each of the three key areas of the report, we held numerous discussions with officials of DOD's Corrosion Policy and Oversight task force and reviewed relevant DOD documents, including the final strategy report to Congress. Furthermore, to determine the adequacy of each key area, we applied internal control tools and results-oriented performance standards that are necessary components for successful management activities in departments and, by extension, individual programs.

To assess whether the DOD's corrosion strategy identified and obtained resources to prevent and mitigate corrosion on equipment and infrastructure, we reviewed funding requirements and cost estimates for DOD and the military services and spoke to DOD officials about unfunded corrosion prevention project requirements, the identification of funding resources, and future-year funding requirements. We also reviewed the unfunded service requirements list and the fiscal year 2004 corrosion prevention projects list. We interviewed DOD Comptroller officials and discussed the fiscal year 2005 budget request and the prospect for future years funding. We also discussed our review of DOD's Program Budget Directive document to understand why the task force did not have its own budgeted account.

To determine whether the strategy's performance measures and baseline data were adequate to prevent and mitigate corrosion DOD-wide, we interviewed the leader of the task force working group for Metrics, Impacts, and Sustainment about the development of the strategy's performance measures, barriers to gathering cost data across the military services, and plans to develop a corrosion cost baseline. We analyzed the costs used to prepare existing cost impact studies, particularly studies the metrics working groups plan to use to help establish the baseline. We observed meetings and internal discussions of the working group for Metrics, Impacts, and Sustainment at four separate corrosion forums sponsored by the task force. We also reviewed corrosion prevention documents related to the development of performance metrics and the baseline study.

To assess the adequacy of the strategy's policy guidance for preventing and mitigating corrosion, we met with the Office of the Deputy Undersecretary of Defense for Defense Systems, the Joint Chiefs of Staff for Logistics, and members of the task force's working group for Policy and Requirements. To determine how the corrosion policy affected military infrastructure, we interviewed officials in the Office of the Deputy Under Secretary of Defense for Installations and Environment, and members of the task force's working group for Facilities. We also attended

the TriService Corrosion Conference, the Army Corrosion Conference, and all four Corrosion Forums sponsored by the corrosion task force to better understand the role of policy and its impact on military equipment and infrastructure. We also reviewed relevant policy documents, memos, instructions, and regulations.

To assess the reliability of the estimated funding needs for corrosion prevention projects for fiscal years 2004 through 2009 by the military services we (1) interviewed officials knowledgeable about the data and (2) assessed related funding requirements studies and reports. We determined that the data were sufficiently reliable for the purposes of this report. We conducted our review between November 2003 and April 2004 in accordance with generally accepted government auditing standards.

Appendix II: Comments from the Department of Defense



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

JUN 16 2004

Mr. William M. Solis
Defense Capabilities and Management
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Solis:

This is the Department of Defense (DoD) response to the GAO draft report, GAO-04-640 "DEFENSE MANAGEMENT: Opportunities Exist to Improve Implementation of DoD's Long-Term Corrosion Strategy," dated May 12, 2004 (GAO Code 350433).

The Department continues to consider corrosion to be an important issue associated with cost, readiness, and safety of its weapons systems and facilities. As a result, DoD has in the past and will continue combating corrosion and corrodibility in its many forms and focus on means to prevent and mitigate corrosion within the overall mission and obligations. We are pleased that GAO observed the Department's recent strategic planning activities related to corrosion and believe it is beneficial to both organizations in helping to place corrosion within our national security context.

The GAO report makes five "Recommendations for Executive Action," in which the Department concurs (enclosed) and remains committed to meeting the requirements of the Congress and, to the extent compatible with its core mission, the positive recommendations of the subject GAO report. The Department's primary point of contact for this report is Daniel J. Dunmire, Director, Corrosion Policy and Oversight and can be reached at 703-681-3464, or via e-mail at daniel.dunmire@osd.mil.

Deidre A. Lee
Director, Defense Procurement
and Acquisition Policy

Enclosure
As stated



GAO DRAFT REPORT – DATED MAY 12, 2004
GAO CODE 350433/GAO-04-640

“DEFENSE MANAGEMENT: Opportunities Exist to Improve
Implementation of DoD’s Long-Term Corrosion Strategy”

DEPARTMENT OF DEFENSE COMMENTS
TO THE RECOMMENDATIONS

To provide better assurances that the Department of Defense’s long-term corrosion strategy is successfully implemented as envisioned by Congress, GAO recommended that the Secretary of Defense instruct the Under Secretary of Defense for Acquisition, Technology, and Logistics, in consultation with the DoD Comptroller, to take the following actions:

RECOMMENDATION 1: Complete a corrosion baseline study as soon as possible so that cost-effective resource priorities and results-oriented performance measures can be established to monitor progress in reducing corrosion and its impacts on equipment and infrastructure. (p. 20/GAO Draft Report)

DoD RESPONSE:

Concur: DoD will continue Cost of Corrosion (CoC) Studies as part of its long term strategic plan. These CoC studies provide valuable information that will help DoD managers pinpoint areas requiring attention and enable them to make decisions on how to prioritize future investments. Performance in terms of operational benefits and return-on-investment will be measured and intangible benefits will be quantified, when possible, and evaluated.

RECOMMENDATION 2: Establish a funding mechanism to implement the corrosion strategy that would be consistent with the strategy’s long-term focus. (p. 20/GAO Draft Report)

DoD RESPONSE:

Concur: The Corrosion Prevention and Control (CPC) Policy and Oversight Office will submit funding requests through the Planning, Programming, Budgeting, and Execution (PPBE) process, and will compete with other DoD programs for funds based on priority of need and fiscal constraints.

Note: Page numbers in the draft report may differ from those in this report.

RECOMMENDATION 3: Submit to Congress, as part of the fiscal year 2006 budget submission, a report identifying the long-term funding and personnel resources needed to implement the strategy; the status report of corrosion reduction projects funded in fiscal year 2005; and the status of a baseline study. (p. 20/GAO Draft Report)

DoD RESPONSE:

Concur: As part of the FY06 budget submission, DoD will submit a report identifying the long-term funding and personnel resources to implement the strategy. A list of candidate corrosion reduction projects for FY05 will be included. The status of the baseline study discussed in the answer to recommendation one will be included.

RECOMMENDATION 4: The GAO recommended that the Secretaries of the Military Services establish policy guidance that would include the review of the corrosion prevention and control plans of non-major weapons systems and infrastructure programs. (p. 20/GAO Draft Report)

DoD RESPONSE:

Concur: Currently, DoD policy encourages but does not direct Service Secretaries to implement appropriate reviews of corrosion prevention and mitigation plans for lower acquisition level programs. However, Corrosion Prevention Control (CPC) language that will require all programs needing acquisition plans to have a CPC plan is being considered for incorporation in the Defense Federal Acquisition Regulation. All programs requiring acquisition plans are reviewed by different acquisition authorities depending on the acquisition level of a program. As a result, non-major programs are reviewed subject to the requirements of acquisition authorities within the military services.

RECOMMENDATION 5: The GAO recommended that the Chairman, Joint Chiefs of Staff, direct the Focused Logistics Capabilities Board to include corrosion prevention issues in the sustainability assessments of military weapon systems. (p. 20/GAO Draft Report)

DoD RESPONSE:

Concur: The Vice-Chairman of the Joint Chiefs of Staff is the vice chair for the Defense Acquisition Board (DAB), and as such considers the corrosion prevention issues associated with all programs requiring DAB reviews. In addition, the Joint Chiefs of Staff Focused Logistics Capabilities Board has agreed to consider corrosion planning when it performs sustainability assessments of military weapon systems.

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