Executive Summary

The Department of Defense (DoD) manages a global real property portfolio of more than 555,000 facilities (buildings, structures, and linear structures) that are located across more than 5,000 sites worldwide that cover more than 28 million acres,¹ and are located in a broad range of environmental severity zones.² Policy makers and facilities management personnel address corrosion—and all its associated challenges—based on their respective operational requirements and resource availability.

This report presents the results of an evaluation of corrosion control challenges and findings of a small, but representative sample size of DoD installations. It represents the efforts of a team of subject matter experts who represent all branches of the military, industry, and academia.

The House Report accompanying H.R. 1540, the National Defense Authorization Act (NDAA) for Fiscal Year 2012 (H. Rept. 112-78, p. 293), requested the Director, Corrosion Policy and Oversight (D, CPO) conduct an evaluation of DoD facilities and infrastructure in corrosion matters. The committee states “…Department of Defense’s $22.5 billion annual cost to address the impact of corrosion, the committee believes that there may be more cost-efficient opportunities for developing strategies for enhancing the sustainability of existing facilities as well as ensuring the integration of corrosion prevention and mitigation technologies into the buildup of future facilities.” The DoD cost of corrosion equals the annual corrosion-related costs for both facilities and weapon systems. The cost of corrosion specific to facilities is estimated at $1.549 billion.³

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² The corrosion of metallic systems is a function of the product of the severity of the environment and time exposed to that environment. DoD established an Environmental Severity Index (ESI) derived from 10 years of observations of steel and aluminum alloy samples (or “coupons”) left exposed to the elements at 130 military installations around the world.
Congress requested an evaluation of key cost drivers, and strategies to reduce their impact; an assessment of a planned facility construction program; and the examination and documentation of maintenance and facility engineering processes. The report accompanying the FY2012 NDAA also requested the sampling of facilities be representative by facility type, military department, and facility age, and that the evaluation be completed within 300 days.

The facilities and infrastructure corrosion evaluation team found the military services are doing what they can in the areas of corrosion prevention and control (CPC); however, opportunities for improvement exist throughout DoD. The study team also noted that corrosion is often perceived as rust and oxidation of metals, rather than the more comprehensive definition in congressional language. Discussions of corrosion challenges became more fruitful after a clear definition of corrosion was understood. That lack of awareness did not diminish the compelling need of the facilities and infrastructure community to address materials degradation.

The following are among the findings of the facilities and infrastructure corrosion evaluation study:

- The study team identified key cost drivers using maintenance databases. These cost drivers were then confirmed during site visits. Policy makers and facilities maintainers can use these cost drivers as a reference point for addressing strategic enhancements in the sustainment of their installations.

- Installations located in severe environments (as measured by the Environmental Severity Index, or ESI) are subject to greater corrosion costs, as indicated by a recent cost-of-corrosion study.4

- After an extensive review of DoD facilities and infrastructure policies and criteria5 in relation to corrosion mitigation, the study team compiled a list of guidance documents that specifically address CPC in the acquisition, development, and long-term management of DoD facilities and infrastructure. The study team noted considerable variability in the awareness and implementation of these CPC policies and guidance.

- Congress requested an assessment of a planned facility construction program. The D, CPO selected a construction program in an extreme ESI to assess CPC considerations during the planning, design, and construction phases. The study team noted that several design-phase requirements from that project included CPC material and installation criteria that were drawn from established DoD guidance and the experiences of the design community. The study team’s assessment

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5 Policy and criteria are formal instruments to implement required actions for desired results. Policies provide direction on roles, responsibilities, liable actions and required documentation, and adherence to other prescribed standards. Criteria provide guidance on the technical application of construction standards, products, and maintenance of facilities/infrastructure. Key criteria include unified facilities guide specifications (UFGSs) unified facilities criteria (UFCs).
demonstrated that appropriate CPC planning and decisions made during the planning phase directly enhance a facility’s life cycle—a good model of military construction from a CPC perspective.

- Maintenance and facility engineering processes in relation to CPC vary to some degree from installation to installation; however, most sites included in the study had similar CPC processes and practices, despite differences in mission and facility objectives.

- Resource constraints were a consistent concern at all sites included in the study. Compliance with required programs (such as Leadership in Energy and Environmental Design [LEED], Anti-Terrorism Force Protection, and the National Historic Preservation Act of 1966) reduces the funding an installation commander has available to eliminate or control the negative effects of corrosion.

- The study team noted several opportunities to improve the content and delivery of CPC training for the facilities and infrastructure community. Increased on-the-job and formal CPC training of facilities and infrastructure personnel would result in better corrosion-related decision making and help balance investments in preventive and corrective maintenance.

- Corrosion mitigation technology in the buildup of future facilities is purposefully explored by the military services, with some research and development funding provided by the D, CPO. The study team found that installations are reluctant to implement all but the most mature technologies, because of the inherent risk of failure and fear of losing scarce resources. These concerns can be alleviated somewhat; only proven and mature corrosion mitigating technologies are transitioned into the design and construction criteria.

- The process of transitioning new technology into criteria can be cumbersome and time consuming, resulting in large time lags before the new technology can be easily included in a contract.

- The study team believes better cross-installation communication would improve the dissemination and sharing of CPC best practices and accelerate the acceptance and implementation of new technologies.

- Effectiveness of contracting for facilities and infrastructure maintenance and repair varied across the services and installations. Where contracting personnel were familiar with facilities and infrastructure requirements, better CPC outcomes were achieved. Where contracting personnel were not familiar with facilities and infrastructure requirements, improved outcomes were not achieved. User involvement in the contracting process (from public works and engineering staff) improved the identification of CPC requirements and delivery of effective contracting solutions.
While not specific topics of this study, it should be noted that both Base Closure and Realignment and sequestration will have a bearing on corrosion impacts for DoD Facilities and Infrastructure. Closure of aging facilities will reduce associated corrosion-related sustainment costs. Sequestration will result in increasing levels of deferred maintenance and consequently result in higher levels of corrosion damage which will have negative impacts on cost and mission readiness.