Army Corrosion Prevention and Control (CPC) Program for Facilities and Infrastructure

Dr. Craig E. College
Deputy Assistant Chief of Staff for Installation Management (DACSIM)
Report Documentation Page

1. REPORT DATE
FEB 2010

2. REPORT TYPE

3. DATES COVERED
00-00-2010 to 00-00-2010

4. TITLE AND SUBTITLE
Army Corrosion Prevention and Control (CPC) Program for Facilities and Infrastructure

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

6. AUTHOR(S)

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Office of Assistant Chief of Staff for Installation Management (DACSIM), Washington, DC, 20301

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR’S ACRONYM(S)

11. SPONSOR/MONITOR’S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
2010 U.S. Army Corrosion Summit, Huntsville, AL, 9-11 Feb

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:

a. REPORT unclassified

b. ABSTRACT unclassified

c. THIS PAGE unclassified

17. LIMITATION OF ABSTRACT
Same as Report (SAR)

18. NUMBER OF PAGES
13

19a. NAME OF RESPONSIBLE PERSON

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18
FY09 Installation Management Resources = $28B  
(Including $3B - American Recovery and Reinvestment Act Funding (ARRA))
War on Corrosion

- The 2007 DoD Cost of Corrosion Study determined that the total cost of corrosion for both equipment and infrastructure was $20 billion/year.

- Corrosion of facilities and infrastructure costs the DoD approximately $1.8 billion/year (FY05 dollars).
  - 15.1% of the total maintenance budget

- The cost of corrosion in Army facilities and infrastructure was approximately $0.45 billion/year (FY05 dollars).
  - 15.8% of the total maintenance budget
  - Based on Army FY09 SRM, that equates to over $.5 billion/year
Army Corrosion Prevention and Control Program (CPC)

Facilities & Infrastructure

- Reduce life-cycle cost of facilities and infrastructure
  - Develop strategy for implementing CPC within the Army acquisition life cycle
    - Develop and implement policy and guidance on corrosion prevention and control for Army facilities.
    - Provide guidance for improving maintenance and training in corrosion.
    - Prioritize science and technology requirements to advance the state of the art.
    - Ensure that CPC is fully considered throughout the asset life cycle.
INFRASTRUCTURE ACQUISITION LIFE CYCLE

RDTE 6.1 (Basic Research)
RDTE 6.2 (Applied Research)

Time (years) →

0 1 3 6 73 75

- Planning & Programming
- Design
- Acquisition (Contracting)
- Construction
- Occupancy
- Disposal*

Planning and Design (P&D)
Military Construction
Operation and Maintenance

- DD 1390, DD 1391, Military Construction Program/Project Data
- Unified Facilities Criteria (UFC)
- Unified Facilities Guide Specifications (UFGS)
- Industry Standards
- Design-Build Request for Proposal (RFP)
- Construction Contract Documents

ICD = Initial Capabilities Document
DID = Design Intent Document
PD = Procurement Documents
ACC = Acceptance / Beneficial Occupancy

Systemic problems will not be solved by individual technical solutions

* Reduce, Reuse, Recycle
Army Facilities CPC Program

- Technology Demonstration
  - Validate benefits
  - Develop engineering guidance

- Supports
  - Readiness
  - Sustainability
  - Safety
**Army Investments**

Funds expended on corrosion prevention and control through the OSD Program:

**Army Facilities CPC Program Funding Summary**

<table>
<thead>
<tr>
<th></th>
<th>OSD ($000)</th>
<th>Service Match ($000)</th>
<th>Installation Supplemental ($000)</th>
<th>Total Funding ($000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY09</td>
<td>5,357</td>
<td>5,000</td>
<td>1,120</td>
<td>11,477</td>
</tr>
<tr>
<td>FY08</td>
<td>3,853</td>
<td>5,000</td>
<td></td>
<td>8,853</td>
</tr>
<tr>
<td>FY07</td>
<td>4,050</td>
<td>5,000</td>
<td></td>
<td>9,050</td>
</tr>
<tr>
<td>FY06</td>
<td>4,430</td>
<td>5,000</td>
<td>336</td>
<td>9,766</td>
</tr>
<tr>
<td>FY05</td>
<td>4,540</td>
<td>3,905</td>
<td>700</td>
<td>9,145</td>
</tr>
<tr>
<td>Total</td>
<td>22,230</td>
<td>23,905</td>
<td>2,156</td>
<td>48,291</td>
</tr>
</tbody>
</table>
AR-F-314 Green Chemical Treatment and Smart Control System for Heating and Cooling Systems

- **Where:** Ft. Rucker, Ft. Hood, Red River Army Depot, Redstone Arsenal, and Brooke AMC
- **When:** FY 2005 - 2006
- **Benefits:** Reduced corrosion and fouling of boilers and cooling towers, greater energy efficiency and reduced environmental impact.
- **Cost:** $2,600K
- **ROI:** 13
- **Payback:** 2.6 years

F07AR19 – Epoxy Coating System Formulated with Carbon Nanotubes

- **Where:** Ft. Bragg, NC
- **When:** FY 2007 - 2008
- **Benefits:** Improved coating performance (flexibility, impact resistance, adhesion). Reduced use of heavy metal pigments.
- **Cost:** $950K
- **ROI:** 8
- **Payback:** 3.7 years
F08AR13: Remote Structural Health and Degradation Monitoring of Bridges

- **Where**: Rock Island Arsenal, I-20 Vicksburg, Mississippi, and Fort Bragg, NC
- **When**: FY2008 - 2010
- **Benefits**: Real time assessment of the condition of critical steel bridge infrastructure and warning of degradation processes that could cause failure. Assessment of long-term performance of innovative thermoplastic composite timber bridges.
- **Cost**: $2,183K
- **ROI**: 26
- **Payback**: 1.2 years
**F08AR07: Polymer Composite Wrapping and Galvanic Cathodic Protection System for Pilings**

- **Where**: Kawaihae Harbor, HI
- **When**: FY2008 - 2010
- **Benefits**: Polymer composite pile wrap that incorporates galvanic cathodic protection system provides corrosion resistance to steel reinforcements as well as impact and abrasion resistance.
- **Cost**: $1,092K
- **ROI**: 16
- **Payback**: 1.9 years

**F08AR23: EOP & Dehumidification Technologies in Ammunition Bunkers**

- **Where**: Kawakami Ammunition Depot, Japan and Naval Ordnance Station, Guam
- **When**: FY2009 - 2010
- **Benefits**: Stop water intrusion into earth covered magazines; maintain interior relative humidity to prevent corrosion and biological growth.
- **Cost**: $1,205K
- **ROI**: 59
- **Payback**: 0.5 years
F09AR04: Corrosion Resistant Roofs with Integrated Sustainable PV Power Systems

- Where: Kilauea Military Camp, HI
- When: FY2009 - 2011
- Benefits: Metal roofs with high performance coatings and thin film laminate PV appliqués can provide corrosion resistant sustainable roofs and cheap electric power.
- Cost: $688K
- ROI: 20
- Payback: 1.7 years

F09AR16: Lightweight Fiber Reinforced (Thermoset) Polymer Composite Bridge Decks as Replacement for Steel Reinforced Concrete Decks

- Where: Redstone Arsenal, AL
- When: FY2009 - 2011
- Benefits: Reduced corrosion due to elimination of metallic rebar, reduced weight equates to reduced dead load and increased dynamic live load, low maintenance.
- Cost: $850K
- ROI: 10
- Payback: 3.0 years
Technology Transfer is Key

- Technology-specific updates to UFCs, TMs, ETLs, and other relevant criteria documents
- Incorporation into Installation Design Standards
- Inclusion in industry standards such as ACMA, ASTM, AASHTO, NACE, AWWA, ICRI
- International data exchange agreements concerning corrosion prevention, control and mitigation:
  - Australian DoD (executed)
  - UK Ministry of Defense and Germany (in development)
- Cooperative Research & Development Agreements (CRADAs) with Industry
Challenges

- R&D
- Technology Transfer
- Funding
- Training/Awareness