FINAL
Long Term Management Plan for Non-Time-Critical Removal Action for PCB Contamination at
Installation Restoration Site 29 (Hangar 1) at Former Naval Air Station Moffett Field, California

Submitted to:
U.S. Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310
PERMAC Contract No. N62473-08-D-8816
Contract Task Order 0005

Submitted by:
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June 2013

DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
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JUN 11 2013

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Dear Ms. Fong and Ms. Wells:

SUBJECT: FINAL LONG-TERM MANAGEMENT PLAN FOR NON-TIME-CRITICAL REMOVAL ACTION FOR POLYCHLORINATED BIPHENYL CONTAMINATION AT INSTALLATION RESTORATION SITE 29, FORMER NAVAL AIR STATION MOFFETT FIELD, CALIFORNIA

The Department of the Navy is pleased to transmit the Final Long-Term Management Plan (LTMgt Plan) for Non-Time-Critical Removal Action for Polychlorinated Biphenyl Contamination at Installation Restoration Site 29 for your files.

The LTMgt Plan was prepared to ensure the long-term protectiveness for Hangar 1. NASA Headquarters issued a letter dated May 26, 2009 providing its commitment to the Navy that "To enable the Navy's planning for ultimately ending direct involvement in environmental activities at Moffett Field, NASA will assume responsibility for the operations and maintenance of remaining Moffett Field remediation sites after remedial actions are completed at each of those sites, as determined by EPA Region 9." As the facility owner, NASA is responsible for the implementation of the institutional controls, which includes compliance with the LTMgt Plan and final remedy for Hangar 1.

In a letter dated April 8, 2013, the Director of BRAC PMO responded to NASA's letter of February 28, 2013, reiterating the importance of NASA assuming long-term responsibilities for Hangar 1, as committed in NASA's May 26, 2009 letter. The Director of BRAC PMO asserted the exigent nature of properly

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addressing long-term O&M requirements for Hangar 1 into NASA's Request for Proposal and any lease agreements in order to meet Government objectives for assuring environmental compliance.

If you have any questions, please contact me at (619) 532-0938. The Navy appreciates your continued participation on this complex project.

Sincerely,

SCOTT D. ANDERSON
BRAC Environmental Coordinator
By direction of the Director

Enclosure: 1. *Final Long-Term Management Plan for Non-Time-Critical Removal Action for Polychlorinated Biphenyl Contamination at Installation Restoration Site 29, Former Naval Air Station Moffett Field, Moffett Field, California, June 2013*

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FINAL

LONG TERM MANAGEMENT PLAN FOR NON-TIME-CRITICAL REMOVAL ACTION FOR PCB CONTAMINATION AT

Installation Restoration Site 29 (Hangar 1) at Former Naval Air Station
Moffett Field, California

PERMAC Contract Number N62473-08-D-8816
Contract Task Order 0005

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Final
Long Term Management Plan
For Non-Time-Critical Removal Action For PCB Contamination

June 2013

Installation Restoration Site 29 (Hangar 1) at Former Naval Air Station
Moffett Field, California

Prepared for:

U.S. Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
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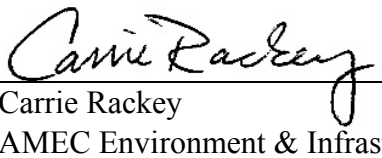
Prepared by:  11 June 2013

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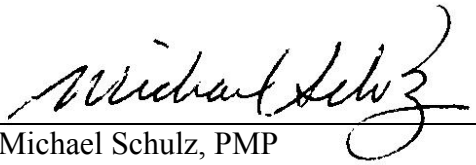
Reviewed/Approved by:  11 June 2013

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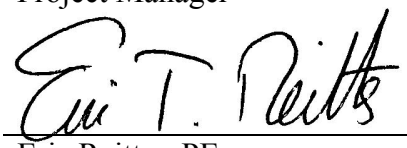
Reviewed/Concurred by:  11 June 2013

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ACRONYMS AND ABBREVIATIONS

AACR	After Action Completion Report
ACM	Asbestos-containing material
AM	Action Memorandum
AMEC	AMEC Environment & Infrastructure, Inc.
APP	Accident Prevention Plan
ASTM	ASTM International
BASH	Bird/Wildlife Aircraft Strike Hazard
BHAP	Biological Hazard Abatement Program
BRAC	Base Reassignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm^2	Square centimeter
CM15	Carbomastic 15
CMU	Concrete masonry unit
COC	Contaminant of concern
CQC	Construction Quality Control
CTO	Contract Task Order
DFT	Dry film thickness
DoD	Department of Defense
DQO	Data quality objective
EE/CA	Engineering Evaluation/Cost Analysis
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ft^2	Square foot
HASP	Site-Specific Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IC	Institutional Controls
IR	Installation Restoration
kg	Kilogram
LTMgmt Plan	Long Term Management Plan
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Command

ACRONYMS AND ABBREVIATIONS (Cont.)

Navy	U.S. Department of the Navy
NFESC	Naval Facilities Engineering Services Center
NTCRA	Non-Time-Critical Removal Action
OMB	Office of Management and Budget
PA	Painting Application
PCB	Polychlorinated biphenyl
PERMAC	Performance-Based Multiple Award Contract
PPE	Personal protective equipment
psi	Pounds per square inch
QA	Quality Assurance
QC	Quality Control
RAO	Removal Action Objective
ROICC	Resident Officer in Charge of Construction
SC	Site Closeout
SSPC	Society for Protective Coatings
SWPPP	Storm Water Pollution Prevention Plan
TCRA	Time-Critical Removal Action
TU	Technology Update
µg	Microgram
U.S.	United States
VIS	Visual Standard
VOC	Volatile organic compound

1.0 INTRODUCTION

The U.S. Department of the Navy (Navy) is conducting a Non-Time Critical Removal Action (NTCRA) at Installation Restoration (IR) Site 29 (Hangar 1), which is located at former Naval Air Station (NAS) Moffett Field near Mountain View, California (Figure 1). The objective of the NTCRA is to mitigate known polychlorinated biphenyl (PCB) contamination at Hangar 1, thereby reducing the potential for negative impact to human health and the environment from these materials. The NTCRA consists of the complete removal of the siding, deconstruction of interior structures, removal of debris to appropriate off-site disposal or recycling facilities, and application of an epoxy coating system to the hangar's structural steel frame.

1.1 Purpose and Scope of Long Term Management Plan

The objective of this Long Term Management (LTMgmt) Plan is to provide information and guidance needed to ensure that the NTCRA remains effective after the NTCRA is complete at the site in June 2013. An LTMgmt program is required because the remedy at Hangar 1 includes encapsulation of the Contaminant of Concern (COC) (i.e., PCBs); therefore, hazardous substances will remain in place at Hangar 1 above levels that would allow unlimited use and unrestricted exposure. Actions during the LTMgmt phase will involve primarily 1) inspection and maintenance of the new coating, 2) implementation of Institutional Controls (ICs), and 3) sediment sampling to ensure that the new coating is providing the required encapsulation. LTMgmt will continue until Site Closeout (SC) has been obtained.

This LTMgmt Plan does not include routine facilities maintenance activities because these activities are not within the scope of the NTCRA. Responsibility for routine facility maintenance activities is discussed in correspondence between the Navy and NASA dated April 24, 2012, August 6, 2012, and September 6, 2012 (Navy 2012; NASA 2012; Navy 2012a). In the letter dated September 6, 2012, NASA accepted responsibility for routine facility maintenance activities after the Navy completes the NTCRA and demobilizes from the site. Copies of the correspondence are provided in Appendix A. Examples of routine maintenance activities not within the scope of this LTMgmt plan are maintenance and repair related to: 1) control of ponding water in utility trenches, pits, and vaults that can accumulate storm water within the Hangar 1 footprint; 2) electrical vaults; 3) clamshell door operating mechanisms; 4) Bird Airstrike Hazard (BASH) management; 5) concrete deterioration and structural movement/cracking of building materials, and 6) access to and operation of the Federal Aviation Administration beacon and holiday star.

It should also be noted that the two former observation towers located east of the hangar (Buildings 032 and 033) were not included in the scope of the NTCRA; therefore, these buildings are not included in the scope of this LTMgmt Plan. The location of these two buildings is shown in Figure 2. Also excluded from the scope of the NTCRA (and this LTMgmt Plan) is any potential contamination within or below the concrete slab and the pavement surrounding the hangar, as well as any groundwater contamination below the site.

1.2 Site Location and General Description

Moffett Field is a federal airfield located 30 miles southeast of San Francisco and 10 miles northwest of San Jose. The facility is currently operated by the National Aeronautics and Space Administration (NASA) Ames Research Center. NASA shares the facility with several tenants including the U.S. Department of the Army, U.S. Department of the Air Force, and California Air National Guard.

Hangar 1 is situated west of the flight line at Moffett Field (Figure 1) between Sayre and Cummins Avenues. Hangar 1 is a large structure measuring 1,133 feet long, 308 feet wide and 198 feet high. The area surrounding the hangar is paved, with the exception of several small areas of bare soil located on the east side of the hangar. As originally constructed, the hangar consisted of a structural steel frame covered with corrugated siding and a built-up asphalt roof. The interior contained multi-story offices and shops and a concrete floor. All building materials were deconstructed or demolished and the waste materials were disposed or recycled as part of the NTCRA, leaving only the steel frame, door operating mechanisms, and concrete slab in the present condition.

1.3 Previous Investigations and Decisions

In 1999, PCBs were detected in a storm water sample collected from a manhole "downstream" of Hangar 1. Subsequent sampling of storm water and sediment performed in 1999 and 2000 failed to detect any PCBs in the storm water management system. PCBs were again detected in storm water samples collected in 2002, and an investigation was undertaken to test the building materials in Hangar 1 for PCBs and other potential contaminants, specifically lead and asbestos. The results of this sample and analysis program confirmed the presence of PCBs, specifically Aroclor-1260 and Aroclor-1268, in the building materials, with the highest concentrations detected in paint and interior layers of the siding panels.

NASA and the Navy completed Time-Critical Removal Actions (TCRAs) at Hangar 1 as interim measures to address potential threats to human health and the environment associated with elevated concentrations of PCBs in Hangar 1. The NASA TCRA took place in September 2003 and removed contaminated sediment from the storm water collection trench that surrounds the hangar. The Navy completed a second TCRA in October 2003 that involved coating the hangar's corrugated siding with an asphalt emulsion to mitigate migration of PCBs from exterior surfaces of the hangar into the storm water management system.

Subsequent to the TCRAs, the Navy evaluated 13 potential NTCRA alternatives for long-term control of PCB releases from Hangar 1. The results of this evaluation were presented in the Engineering Evaluation/Cost Analysis (EE/CA) dated July 30, 2008 (Navy, 2008a). Alternative 10 (Remove Siding and Coat Exposed Surfaces) was selected as the recommended NTCRA alternative, as documented in the Action Memorandum (AM) issued by the Navy's Base Realignment and Closure (BRAC) Program on December 31, 2008 (Navy, 2008b).

In response to public questions regarding the responsibility for reuse of the hangar, the Office of Management and Budget issued a determination on March 5, 2010 that the Navy is responsible for environmental cleanup actions, whereas NASA is responsible for Hangar 1 reuse and residing.

1.4 Removal Action Objectives and Cleanup Levels

The Removal Action Objective (RAO) of the NTCRA is to control the release of COCs at Hangar 1, thereby reducing the potential risks to human health and the environment while minimizing future operation and maintenance activities at the site. COCs at the site are PCBs (primarily Aroclor-1260 and Aroclor-1268), which were present in the siding, soil and sediment adjacent to the hangar, and the original paint that was applied to the structural steel frame and other building materials. The RAO was achieved by 1) removing and disposing of the contaminated building materials, soil, and sediment; 2) overcoating the structural steel with an epoxy coating system to encapsulate the PCB-containing paint; and 3) decontaminating the concrete floor of Hangar 1. The PCB cleanup levels are 10 micrograms (µg) per 100 square centimeters (cm^2) for surface contamination on the floor and 1.0 mg per kilogram (kg) for soil and sediment media. Although lead is not a COC for this NTCRA, a project-specific clearance level of 40 µg/square foot (ft^2) has also been established for surface contamination on the floor.

1.5 NTCRA Implementation

On September 25, 2009, the Navy awarded a contract to AMEC Environment & Infrastructure, Inc. (AMEC) for implementation of the NTCRA under Naval Facilities Engineering Command Southwest (NAVFAC SW) Performance-Based Multiple Award Contract (PERMAC) No. N62473-08-D-8816, Contract Task Order (CTO) 0005. Details of NTCRA implementation are contained in the After Action Completion Report (in progress) and are summarized below.

1.5.1 Summary of Work Performed

Planning and pre-mobilization activities were conducted from September 2009 through June 2010 and included preparation of an Implementation Work Plan, Sampling and Analysis Plan, Accident Prevention Plan (APP), Biological Hazard Abatement Plan (BHAP), and various surveys needed to establish the baseline conditions at the site and to support NTCRA implementation. These surveys included the following:

- A biological survey to address potential impacts to protected species, biological health hazards, and bird/aircraft strike hazards related to the Hangar 1 NTCRA (AMEC, 2010a).
- A coating condition survey to evaluate the condition of the existing steel coating and the performance of the new overcoating system (AMEC, 2010b). The coating condition survey included adhesion test results for the overcoating system, recommended surface preparation and coating application methods, and an overall assessment of the risks associated with the overcoating system, which were determined to be very low. A copy of the Coating Condition Survey is provided in Appendix B. The selected coating system (Carbomastic 15®) is an epoxy mastic coating that has a 30-year record of long-term, low-maintenance performance on similar structures that are exposed to the elements. Carbomastic 15® (CM15) is manufactured by Carboline Company of St. Louis, Missouri.
- An asbestos survey (AMEC, 2010c) to identify the asbestos-containing materials (ACM) present in the hangar and define the procedures for abating the ACM prior to demolition.
- A baseline sampling and analysis program to establish the initial concentration of COCs in soil, sediment, and air at the project site (AMEC, 2010d). PCBs were detected in sediment and soil samples above action levels. Sediment containing PCBs above the action limit was removed using dry, vacuum methods and disposed of in a permitted disposal facility. A polyethylene liner was installed to cover the contaminated soils to await removal after completion of the NTCRA.

On June 7, 2010, the NTCRA contractor work force mobilized to the site to begin field activities. Mobilization activities included:

- Transportation of construction equipment, materials, and personnel to the site.
- Utility clearance.
- Construction of Storm Water Pollution Prevention Plan (SWPPP) controls for management of storm water run on/off.
- Implementation of protective buffer zones and other measures for compliance with the Migratory Bird Treaty Act and abatement of potential bird-aircraft strike hazards and other potential biological hazards present in Hangar 1.

After mobilization, the initial NTCRA construction activities began with isolation of the utilities entering the hangar. In general, utilities were cut and secured at the point that they enter the hangar; however electrical service to the six electrical vaults, sump pump, holiday star, door motors, and roof-mounted navigation beacons remains intact. As-built drawings for the utility terminations are included in Appendix C.

During the remainder of 2010, NTCRA activities continued with demolition of the three-story shops and office buildings that lined the inside of the hangar. Most of these buildings contained ACM, which was abated prior to demolition. At the conclusion of the interior demolition phase of the project, all of the interior structures had been removed with the following exceptions:

- Concrete masonry unit (CMU) enclosures for the six electrical vaults.
- CMU shear walls at the former toilets and hazardous materials storage room.
- Mezzanine deck steel floor and associated stairways.
- Door operating mechanisms (including the motors, electrical panels, trucks/bolsters, and drive gear systems).

After the interior structures were removed, an extensive scaffolding system was erected inside the hangar to allow workers to wash and coat the steel structure before removing the roof and siding. Scaffold construction, coating, and siding removal were completed sequentially in six separate zones. As coating and demolition work were completed in one zone, the scaffolding was dismantled and moved to the next zone ahead of the cleanup work. This sequence of coating and siding removal occurred throughout 2011 and was completed in September 2012.

Preparation for coating generally consisted of pressure washing the surfaces to be coated at 3,000 to 4,000 pounds per square inch (psi) to remove dust, light corrosion, and loose or poorly bonded paint. Oily surfaces were hand cleaned and areas with excessive rusting were cleaned with power tools. Storm Water pollution prevention measures were designed and installed to ensure that storm water was not impacted during the pressure washing activity. Storm water protection Best Management Practices (BMPs) included installation of environmental controls (containment sheeting) around the active washing areas, construction of berms on the hangar floor, installation of inflatable packers in the hangar perimeter storm drain trench, and placement of sediment filters over catch basins and storm drains surrounding the hangar.

The structural steel frame contains numerous "back-to-back angles", where the steel surfaces are too close together (i.e., separated by 1 inch or less) to allow sufficient access for proper coating; therefore, the gap between these angles was sealed with Sikaflex 1A sealant, which is a premium-grade, high-performance, moisture-cured, 1-component, polyurethane-based, elastomeric sealant. The CMU surfaces to be coated were sealed with Carboguard 1340®, a penetrating primer/sealer, prior to coating. After the surfaces were pressure washed and primed where needed, these areas were inspected to ensure that the new coating would properly bond to the surface.

The applied CM15 coating system is an epoxy coating product with performance characteristics specifically designed for overcoating applications. CM15 is a 90% solids, ultra-low volatile organic compound (VOC), aluminum-flake-filled epoxy mastic designed for single-coat application over aged coatings and rusted steel. Coating product data is included in Appendix D. The CM15 coating product was applied in accordance with the manufacturer's specifications using airless spray equipment to apply one full coat of CM15 at an application of 4 to 6 mils Dry Film Thickness (DFT). Areas that could not be accessed with spray equipment were coated using brush and roller methods.

As identified in the Coating Condition Survey (AMEC 2010b), the mezzanine decks on both the east and west sides of the hangar required additional preparation prior to coating because they contained mill scale and they had not been primed during original construction. These decks were abrasive blasted on both the top and bottom side, to completely remove the existing paint, rust, and mill scale. The decks were then coated with one coat of Carbozinc 859® rust-inhibiting epoxy primer applied at 3 to 5 mils DFT and one finish coat of CM15 applied at 4 to 8 mils DFT.

The condition of the PCB-containing paint on the concrete stem walls that surround the perimeter of the hangar and support the structural steel frame was too poor to allow successful coating; therefore, the PCB-containing paint on the stem walls was entirely

removed by ultra-high pressure (40,000 psi) water blast and abrasive methods. The bare concrete was then sealed with Carboguard 1340® penetrating sealer.

The roofing, siding and windows that previously covered the exterior of the steel structure were removed by hand. All demolition waste materials were characterized for disposal and hazardous materials were disposed offsite at the appropriately permitted facility. Over 1 million pounds of metal and other recyclable materials were ultimately salvaged during the NTCRA project. In addition, approximately 400,000 board feet of redwood planking was removed from the hangar roof and salvaged for reuse.

In order to provide a means of access to the roof-mounted navigation lights after demolition, a new stairway was erected on the east side of the hangar and a new catwalk was constructed on the roof. This new access was constructed of galvanized steel and was not coated.

The clam shell doors in Hangar 1 are supported by 36 bolsters that travel along rails when the doors are opened. The tracks that enclose these rails contained multiple layers of composite board that served as expansion joints on either side of the rails. Samples of the boards and sediment within the tracks were analyzed and found to contain asbestos, lead, and PCBs. Consequently, the boards and sediment were removed; however the metal rails have been left in place for potential future use.

At the conclusion of the NTCRA, the concrete floor was decontaminated by pressure washing and approximately 170 tons of contaminated soil located on the east side of the hangar was excavated and disposed of at a properly-permitted offsite facility. The excavation was subsequently backfilled with clean, imported fill. The storm drain system surrounding the hangar was pressure washed and residual sediment was characterized and disposed of offsite.

1.5.2 Condition of Site at Completion of Removal Action

After completion of the NTCRA, Hangar 1 consists of a concrete floor and stem walls that support the newly-coated structural steel frame. For long-term management purposes, it is important to delineate the portions of the site where PCB-containing paint remains in place beneath the CM15 epoxy coating encapsulation. These areas are identified on Figure 3. Overcoated structures where PCBs remain encapsulated include:

- Structural steel frame.
- CMU walls surrounding the six electrical vaults.
- CMU walls surrounding the former hazardous materials storage room.

- CMU walls that were part of the former toilets.
- Door operating mechanisms (trucks/bolsters, motor housing, electrical vaults and drive gear housing).
- Bottom side of the risers for stairs leading from the ground surface up to the mezzanine deck.
- Bottom side of stairs and handrails leading to the roof.

All other areas within the site have been remediated to completely remove any PCB contamination, and these remediated areas specifically include the following:

- Surface of the concrete floor.
- Surface of the stem walls.
- Top and bottom sides of the metal mezzanine decks and the I-beams supporting the mezzanine decks.
- Top side of the risers and handrails for stairs leading from the ground surface up to the mezzanine deck.
- Bare soil areas on the east side of the hangar.
- Storm drain system surrounding the hangar.

As noted above, the bottom sides of the stairs leading from the ground floor to the mezzanine deck have been completely overcoated with the new CM15 coating to encapsulate the original PCB paint and meet the removal action objectives. The topside treads and handrails of the stairways leading from the ground floor to the mezzanine deck level were abated by blasting to remove all underlying PCB paint because those surfaces would get wear during any future use and complete abatement of the underlying PCBs was undertaken to minimize the need for touchup and maintenance. The bottom of the stairs will not get such wear so were not abated, but were still overcoated. The handrails and treads on the stairways leading from the mezzanine deck to the roof were also not abated because they are intended for limited use by maintenance staff that needs to access the roof to maintain the FAA beacons. The handrails on the roof catwalk were never painted with PCB paint, so these were not abated either, but were nonetheless coated with a new overcoat of CM-15.

At the request of NASA and for re-use purposes, the clam-shell door operating mechanisms were not removed as part of the NTCRA. These mechanisms have been left in "as-found" condition and were not tested or repaired to ensure functionality. These mechanisms (e.g., bolsters, motors, hinge pins, and gears) contain oils that have leaked in the past and may continue to leak until they are repaired. A plastic wrap has been placed around the bolsters to shield them from rain and minimize the transport of oils offsite; however, this is a temporary measure only and will require routine inspection and/or repair as part of facility maintenance. Oils are not a COC for this NTCRA; therefore they are not addressed in this LTMgmt Plan (see Section 1.1).

1.6 Post-Completion Removal Action Inspection and Acceptance

Preparatory, initial and follow-up phase inspections for all of the of NTCRA work elements were conducted as described in the NTCRA Work Plan (AMEC, 2010e) and Construction Quality Control (CQC) plan (Appendix A of the Work Plan) as the work proceeded from mobilization through the conclusion of field activities. These inspections were performed by the AMEC CQC Manager and attended by the Navy ROICC, who provided Quality Assurance (QA) oversight. Additional inspections were performed by the coating contractor QC staff as required by the CQC Plan and applicable Society for Protective Coatings (SSPC) standard procedures. The coating system manufacturer, Carboline, conducted independent inspections of the coating operations as well to support their product warranty. The 12-year coating warranty is contained in Appendix E for reference.

Confirmation samples were collected from the concrete floor and soil areas adjacent to the hangar to confirm that cleanup levels were achieved. Wipe samples were collected from the floor of Hangar 1 to assess the adequacy of the decontamination methods and confirm that the PCB concentrations met the acceptance limit of 10 μg/100 cm^2 and a geometric mean of 40 μg/ft^2 was achieved for lead. After soil excavation, soil confirmation sample data were collected and compared to the pre-construction sample data to confirm that removal actions have not resulted in residual contamination, and that PCB concentrations in soil are within the regulatory limit of 1.0 mg/kg.

At the conclusion of NTCRA field activities, the Navy and regulatory agencies conducted post-completion inspections to verify that the NTCRA was complete. The results of confirmation sampling and post-completion inspections are documented in the After Action Completion Report (AACR). At the completion of the NTCRA, the confirmation sampling data demonstrated that the RAOs had been met.

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2.0 ROLES AND RESPONSIBILITIES

The organizational responsibilities for implementing this LTMgmt Plan, and the associated training, certification, and site access control requirements, are discussed below.

2.1 Responsibility for Long Term Management Activities

Responsibility for implementing this LTMgmt Plan currently resides with the Navy, as the Federal Lead Agency responsible for Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) response at the site under a Federal Facility Agreement. The facility owner will assume responsibility for the operations and maintenance of remaining Moffett Field remediation sites after remedial actions are completed at each of those sites as determined by EPA Region 9. When this occurs, the requirements of this LTMgmt plan will be the responsibility of the facility owner and will be incorporated into the facility's Master Plan (or equivalent document) and will also be subject to any transfer agreements and/or deed restrictions. The activities described in this LTMgmt Plan will remain in effect until SC status is achieved. The duties of the Navy, or other entity responsible for implementing this LTMgmt Plan, include:

- Issuing and managing contracts as needed to complete LTMgmt activities.
- Developing ICs and monitoring IC effectiveness.
- Coordinating with the facility owner/operator to schedule LTMgmt activities and resolve any site logistics issues.
- Inspection and maintenance of the CM15 coating material applied as part of the NTCRA.
- Conducting storm water sediment monitoring.
- Preparing reports of LTMgmt activities, including evaluation of IC effectiveness and providing them to the facility owner/operator and regulatory agencies.
- Modifying this plan as needed to adapt to any site use changes, lessons learned, technology improvements, or unforeseen conditions that might affect the LTMgmt program at the site.
- Ensuring that the requirements of this LTMgmt Plan are incorporated into any future property transfer agreements.

The site Owner or Operating Agency (Owner/Operator), which is currently NASA, has responsibility for facility management at Hangar 1. Owner/Operator responsibilities relative to this LTMgmt Plan include:

- Implementing the necessary site management measures to ensure compliance with ICs.
- Controlling access to the site as required by this LTMgmt Plan.
- Conducting routine maintenance at the facility. Routine maintenance includes all maintenance activities other than inspection and maintenance of the CM15 coating material applied as part of the NTCRA Examples of routine maintenance include maintenance and repair related to: 1) control of ponding water in utility trenches, pits, and vaults that can accumulate storm water within the Hangar 1 footprint; 2) electrical vaults; 3) clamshell door operating mechanisms; 4) Bird Airstrike Hazard (BASH) management; 5) concrete deterioration and structural movement/cracking of building materials, and 6) access to and operation of the Federal Aviation Administration beacon and holiday star.
- Conducting additional maintenance as needed to promote the longevity of the CM15 coating, for example removal of standing water, oils, corrosives, and other chemical contaminants from coated surfaces.
- Maintaining biological controls as outlined in the Biological Survey (AMEC, 2010e) and Biological Hazard Abatement Plan (AMEC, 2011).

2.2 Training and Certification Requirements

Coating inspection and maintenance will be performed by professionals who possess SSPC QP 1 and QP 2 certification. Storm water monitoring activities will be conducted and/or managed by qualified environmental professionals possessing the necessary State of California Regional Water Quality Control Board (Water Board) certifications.

LTMgmt activities will be associated with a variety of safety hazards including, but not limited to, exposure to hazardous chemicals and working at heights that require fall protection. Safety training and certification will be required for all personnel conducting LTMgmt activities at Hangar 1. The agency or contractor responsible for implementing these activities will develop an APP or Site-Specific Health and Safety Plan (HASP) which will include detailed information regarding required safety training for inspection, maintenance, and monitoring personnel.

2.3 Site Access Control

The site Owner/Operator is responsible for providing and controlling access to Hangar 1 for implementation of LTMgmt operations. Through the implementation of ICs, the Owner/Operator will also be responsible for ensuring that if facility maintenance items or future site operations impact the integrity of the NTCRA coating, then the Owner/Operator or its tenants will be responsible for the appropriate inspections and touchups in accordance with this LTMgmt Plan. This includes providing the necessary measures to ensure that the coating is repaired if damaged (e.g., scratched, cut, cracked, abraded, drilled through, exposed to oils or contaminants, or otherwise compromised). These measures are further discussed in Section 6.0 (Institutional Controls) below.

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3.0 INSPECTION AND MAINTENANCE

A coating maintenance program is required to prevent deterioration of the CM15 epoxy coating that provides encapsulation of the underlying PCB-contaminated paint at Hangar 1. The CM15 coating will require routine inspection and maintenance as part of the LTMgmt program. The coating inspection and maintenance procedures specified in this plan were developed in accordance with *"SSPC Paint Application Guide Number 5 (PA 5): Guide to Maintenance Coating of Steel Structures in Atmospheric Service"* (SSPC, PA 5). These procedures are also compliant with the coating manufacturer's product specifications and warranty terms (see Appendix D and E). All coating inspection and maintenance activities must be performed by qualified coating contractors that possess SSPC QP 1 and QP 2 certification.

If the CM15 manufacturer warranty terms are voided or cannot be met, the entity responsible for long-term management of Hangar 1 will proceed with the necessary repairs to meet the NTCRA objectives regardless of the warranty terms. This may result in a cost impact; however there will be no impact on the effectiveness of the NTCRA. In this case, the entity responsible for long-term management of Hangar 1 would continue to make the repairs using the CM15 epoxy coating product and qualified coating contractors.

3.1 Coating Inspection

The initial condition assessment, evaluation of coating options, and selection of the appropriate coating system has been thoroughly documented in the Coating Condition Survey (AMEC, 2010b) that was completed during the NTCRA planning phase. Routine coating inspections must be performed as part of this LTMgmt program to determine the extent of any corrosion, deterioration, and/or damage to the coating and to determine the need for coating repair and maintenance. These routine LTMgmt inspections are not intended to re-evaluate the entire coating system, but rather are intended to document the amount of deterioration and corrosion, if any, for purposes of complying with the warranty, and to determine the necessary repairs to maintain the effectiveness of the coating.

3.1.1 Structures to be Inspected

The areas within Hangar 1 that require LTMgmt inspections are the entire overcoated structures where PCBs remain encapsulated, including:

- Structural steel frame (excluding the top and bottom sides of the mezzanine deck because these decks were completely abated to remove all PCBs as described in section 1.5.1).

- CMU walls surrounding the six electrical vaults.
- CMU walls surrounding the former hazardous materials storage room.
- CMU walls that were part of the former toilets.
- Door operating mechanisms (trucks/bolsters, motor housing, electrical vaults, and drive gear housing).

These structures are identified on Figure 3 and representative photographs of each structure are included in Figure 4. The total coated surface area is 2.4 million square feet, based on the coating applicators records of material usage and application rates. This total surface area will be the basis for calculating coating corrosion and degradation factors for warranty purposes.

3.1.2 Inspection Methods

The LTMgmt coating inspection process is a tiered approach consisting of a general condition assessment, detailed visual assessment, and physical testing if necessary. The results of each inspection will be recorded on standard inspection forms. An example inspection form is contained in Appendix F.

3.1.2.1 General Coating Condition Assessment

The general coating condition assessment is a qualitative visual survey to assess the general condition of the coated surfaces, including rusting or degradation of the coating. This assessment will be conducted in accordance with Society of Protective Coatings guidance contained in SSPC PA5, section 5.3.1. SSPC intends that the first step in the coating inspection process, the general condition assessment, be a very preliminary assessment which forms the basis for planning the more rigorous detailed visual assessment described in section 3.1.2.2 below. The general condition assessment will be performed by inspectors meeting SSPC QP1 level of training and certification. In order to provide consistency between the general condition assessment and the subsequent detailed assessment, both assessments will be performed by the same inspector(s).

The general condition assessment will be conducted from the ground (using binoculars), manlifts, and/or other available access points, such as the permanent roof access. The general condition assessment will result in a qualitative rating of the overall condition of the coating which will then be used to develop the plan for the detailed visual assessment described below. Items that will be specifically included as part of the general condition assessment are:

- Presence of paint flakes on the ground.

- Presence of rusting or other signs of coating degradation.
- Presence of bird guano, oils, or other potential environmental conditions that might degrade the coating.
- Areas that will require special attention during the subsequent detailed inspection, like areas that collect water, receive more exposure to the elements, or high traffic areas.

3.1.2.2 Detailed Visual Assessment

The detailed visual assessment is a semi-quantitative assessment of the coating condition that also relies exclusively on visual observations, but these are performed more systematically than for a general assessment. Numerous structural elements (e.g., support beams, connections, and edges) are separately rated according to SSPC Visual Standard 2 (VIS 2), ASTM International (ASTM) D 610, or equivalent, and combined to provide an overall structure or facility rating. Often, several condition parameters (e.g., loss of topcoat, cracking, and rust staining) and several corrosion parameters (e.g., rusting, blistering, scaling, loss of metal) are recorded. The detailed visual assessment results in a rating of the percent of surface deteriorated, and may be used to support warranty claims.

The detailed visual assessment will require man lift, boom, and/or crane access, in addition to access from existing stairs and walkways in the hangar. The exact number and location of inspection points will be determined by the general condition assessment results. Since the hangar is a large structure and the total surface area of the coating is extensive (approximately 2 million square feet) it will not be feasible to obtain a detailed visual inspection of the entire surface during any single inspection event. The visual assessment will at a minimum be designed to evaluate representative coating locations from Level 1 to Level 9 at support Column 14 to Column 1 (i.e., every level and every column in the hangar). The coating inspector will develop a sampling scheme with each inspection to ensure that the areas most likely to exhibit corrosion receive the greatest attention. The inspector will select areas for assessment and sampling that are representative of the various conditions within the hangar, and will give special consideration to areas with a higher potential for coating degradation. The detailed visual inspection sampling scheme will include consideration of portions of the hangar frame at different heights, areas exposed to rain and sun, areas impacted by bird guano, areas of higher and lower traffic, and areas where water collects. The detailed visual inspections will include an evaluation of the effectiveness and integrity of any repairs previously made to the coating. In addition, the ground surface will be inspected for the presence of paint flakes to further identify areas requiring more detailed inspection.

3.1.2.3 Physical Coating Testing

Visual assessment gives no information on the film adhesion, thickness, brittleness, or under film corrosion. These parameters were, however, thoroughly evaluated and tested as part of the initial coating condition survey (AMEC, 2010b). The results of these tests, which are documented in the coating condition survey, provided a high level of confidence in the performance of the overcoating system. Wet and dry film coating thickness measurements were also made during the application of the coating and verified by QC inspections to ensure that the CM15 coating was applied at the required thickness. In order to confirm the findings of the initial coating condition survey, physical tests including adhesion tests and coating thickness measurements will be performed at a minimum of eight representative locations. Additional physical tests may be prescribed by the qualified coating inspector on a case-by-case basis if the visual inspections indicate problem areas requiring further evaluation. Physical tests will be performed and evaluated in accordance with "*SSPC Technology Update No. 3 Overcoating"* (SSPC, TU 3).

3.2 Coating Maintenance

Coating maintenance will be conducted, as needed, based on condition of the coating as noted during the inspections. The range of potential maintenance activities includes the following:

1) No Active Maintenance Required - If the coating is in good condition and there is no indication of potential corrosion or degradation prior to the next scheduled inspection, no active maintenance will be required.
2) Spot Maintenance - If corrosion, degradation, or coating loss is noted in isolated areas (i.e., less than 2% of the total coated surface area) spot maintenance will be conducted. Spot maintenance entails surface preparation and touch-up coating of localized areas of deteriorated coating and corrosion.
3) Spot Maintenance and Overcoating - If corrosion, degradation, or coating loss is more extensive, then portions of the structure may require overcoating in addition to spot maintenance. This level of maintenance involves spot repair of deteriorated coating and corroded areas followed by the application of a full coating over larger portions of the surface, including both the spot repaired areas and surrounding intact coating areas. This type of system would be expected to extend the service life of the entire surface area by helping to prevent further deterioration of the intact coating. Successful spot maintenance and localized overcoating will often delay the need for a full overcoating.

4) Complete Recoat of the Structure - When the overall coating condition is poor and the remaining life of the structure justifies the expense, a decision to recoat the structure in its entirety is usually made. Complete recoating would require additional CERCLA approval and documentation and is therefore out of the scope of the LTMgmt program.

3.2.1 Maintenance Coating Methods

All coating maintenance will be conducted in accordance with SSPC PA 5, and the coating manufacturer's (Carboline) application instructions. Carboline requires that surface preparation and application of the maintenance coating must be done in strict accordance with Carboline's then current Application Instructions. In general, these instructions will require surface preparation and application of CM15 using methods similar to those that were used during the completion of the NTCRA. Surface preparation may include high-pressure water washing (SSPC Surface Preparation [SP] Standard-12) and/or localized mechanical cleaning and removal of rust using hand tools (SSPC SP-2) or power tools (SSPC SP-3). Abrasive blasting will be avoided and used only as a last resort because of the associated emission control hazards and the potential for damaging adjacent intact coating. CM15 application may include spray, brush, or roller methods to achieve the specified 4 to 6 mil DFT thickness.

Any coating maintenance activities that could release contaminants to the environment, such as pressure washing, grinding, and/or abrasive blasting, must be controlled. Environmental controls will be designed and installed as appropriate to prevent release of airborne emissions or storm water contamination. The selected controls may include performing work inside containments and installing storm water pollution prevention measures. Storm water protection BMPs will be developed and implemented based on the specific coating maintenance activities performed, and these BMPs may include, as appropriate, installation of containment sheeting around the active maintenance areas, construction of berms on the hangar floor, installation of inflatable packers in the hangar perimeter storm drain trench, and placement of sediment filters over catch basins and storm drains surrounding the hangar. Waste materials that are generated by coating maintenance activities will be properly contained, characterized, transported and disposed of offsite in accordance with local, state, and federal waste management regulations.

Only Carboline-approved products may be used during maintenance coating. Carboline must also be notified within ten days of the date any coating problems are observed and must be afforded opportunities to inspect any such areas prior to application of the maintenance coating.

If the coating manufacturer, Carboline, is no longer in business or the CM15 product is no longer available, there are numerous other epoxy mastic coating products that are compatible with CM15 and would provide an equivalent level of protection to the underlying steel. In the event that a product other than CM15 is needed during the LTMgmt phase, a new coating condition survey would be conducted to confirm the effectiveness of the new product in meeting RAOs.

3.3 Inspection and Maintenance Schedule

Coating inspections will be performed every three years from the date of completion of the initial coating effort (i.e., from March 2013). The rationale for inspections at 3-year intervals is based on the Coating Condition Survey results and Carboline's recommendations for maintenance of the CM15 coating system. Maintenance coating will be performed as needed in conjunction with each inspection effort. Any coating maintenance repairs that may be required will be completed within 60 days of the inspection that identified the need for repair. Depending on the severity of corrosion at the repair location, temporary protective measures may be needed if coating repairs cannot be completed within 60 days. Temporary measures may include wrapping or covering the damaged area with a plastic containment and/or installing storm water pollution prevention measures as described in Section 3.2.1. If maintained in accordance with the warranty, the service life of a CM-15 coating on steel structures can extend many decades without the need for a complete recoating. The inspection and maintenance schedule is summarized in Table 3-1.

Table 3-1. Inspection and Maintenance Schedule

Inspection/Maintenance Activity	LTMgmt Plan Section	Frequency	Method
General Coating Condition Assessment Section	3.1.2.1	Every three years after NTCRA completion.	SSPC PA5
Detailed Visual Assessment	3.1.2.2	Every three years after NTCRA completion.	SSPC PA5
Physical Coating Testing	3.1.2.3	In conjunction with detailed visual assessment, every 3 years after NTCRA completion.	SSPC TU3
Maintenance Coating Repairs	3.2	In conjunction with detailed visual assessment, every 3 years after NTCRA completion. Repairs will be made within 60 days of inspection.	SSPC PA5; Carboline CM15 Application Instructions

3.4 Preventive Maintenance

In some cases, regular removal of contaminants can eliminate potential problems before they become severe. Examples are oil leaks or chemical spills that might occur or concentrations of de-icing salts. In some cases, changes can be made that will eliminate water or other chemicals collecting in crevices or other areas vulnerable to corrosion attack. An example would be the elevator shafts along each side of the hangar. As confirmed in a letter dated August 6, 2012, NASA will be responsible for these routine facility maintenance activities once the NTCRA is complete and the Navy demobilizes from the site (NASA, 2012).

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4.0 MONITORING PROGRAM

A storm water sediment monitoring program will be implemented to evaluate the effectiveness of the removal action during the LTMgmt period. The monitoring program will begin one year after NTCRA completion, which is anticipated to occur in June 2013. Since the removal action objective is encapsulation of PCB-containing paint, any failure of the NTCRA completion would be detected through the transport of contaminated paint chips or corrosion particulates in storm water runoff. The chemicals of concern, if present, are expected to adhere to sediment carried in storm water exiting the hangar area. Therefore, sediment samples will be collected and analyzed for PCBs to evaluate the removal action. Although lead is not a COC for the NTCRA, samples will also be analyzed for lead for comparison to previously collected data.

To assess the potential release of PCBs and lead from the site, sediment samples will be collected annually at Manhole SD-107, which is the first storm water drainage system manhole located downstream from Hangar 1. If PCBs and/or lead are detected above the established trigger levels in SD-107, then additional sediment samples will be collected to evaluate the source of contaminants. Sediment samples will be collected from all four quadrants of the existing storm water conveyance system surrounding the hangar as well as the nearest storm drain manholes located upstream from the hangar. Data quality objectives, sampling and analysis procedures, and data evaluation methods are discussed below. The effectiveness of the sediment monitoring program will be evaluated as part of the required CERCLA Five-Year Reviews, and opportunities for optimizing or eliminating the monitoring requirements will be considered at that time.

4.1 Data Quality Objectives

Data quality objectives (DQOs) for LTMgmt sediment monitoring were developed using the U.S. Environmental Protection Agency (EPA), February 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006). The process used is summarized in Table 4-1 below. Figure 5 presents a flow chart of the monitoring approach and data evaluation process.

Table 4-1. Data Quality Objectives for LTMgmt Storm Water Monitoring

Process	Response
Step 1 State the problem.	The results of the various sampling and analysis investigations conducted at and adjacent to Hangar 1 confirmed that building materials used in the original construction were the source of the PCBs that were originally detected in the settling basin in 1997. PCBs, specifically Aroclor-1260 and Aroclor-1268, were found in the building materials, with the highest concentrations detected in paint and interior layers of the siding panels. The removal action was conducted to address human health and environmental concerns associated with potential exposure pathways, including the surface water runoff pathway to the storm water management system, through controlling the migration of PCBs from Hangar 1 to the environment. All PCB-containing building materials were removed from Hangar 1 and disposed of offsite with the exception of the original paint that is still present on the remaining steel structure and certain concrete masonry unit (CMU) surfaces. All of the remaining PCB-containing painted surfaces have been encapsulated within an epoxy mastic overcoating as part of the removal action. Long-term monitoring is necessary to evaluate the continued effectiveness of the removal action. The primary pathway for any potential release of PCBs from the site is through storm water-borne transport of paint chips or particulates derived from corrosion or deterioration of the coating and underlying paint.
Step 2 Identify the goals of the study	Data collected during the annual storm water sediment sampling events will be used to assess the following: 1. Does the storm water sediment contain PCBs or lead indicating that contaminants were released to the environment after completion of the removal action? 2. Do the concentration of PCBs in the storm water sediment samples exceed the trigger level of 0.21 mg/kg? Do the concentrations of PCBs in the storm water sediment samples indicate that additional inspection and repair of the coating is necessary or that the NTCRA has failed or is no longer protective? 3. Do the concentrations of lead in storm water sediment samples exceed the trigger level of 93.8 mg/kg?
Step 3 Identify information inputs	A sediment sample will be collected from manhole SD-107 annually for analysis of PCBs and lead. Additional sediment samples may be collected from the perimeter trench and upstream manholes, based on the results of the SD-107 sample analysis.
Step 4 Define the study boundaries	A sediment sample will be collected from manhole SD-107 in September of each year. The samples will be analyzed for PCBs and lead. If sample results exceed project trigger levels, a confirmation sample will be collected from manhole SD-107, and additional sediment samples will also be collected from catch basins located in the four quadrants of the perimeter trench (CB-463D, CB-447A, CB-443B, and CB-454D) and in upstream catch basin CB-107F and manhole SD-442 to evaluate the source of the contaminants.
Step 5 Develop the analytic approach	1. If the concentration of PCBs or lead in sediment samples collected at sampling location SD-107 exceeds the established trigger level, then confirmation sampling will be performed at SD-107. In addition, sediment samples will be collected at the four quadrants of the perimeter trench (CB-463D, CB-447A, CB-443B, and CB-454D) and in upstream catch basin CB-107F and manhole SD-

Table 4-1. Data Quality Objectives for LTMgmt Storm Water Monitoring

Process	Response
	442 to evaluate the source of the contaminants. 2. If the concentration of PCBs or lead in sediment samples exceeds the trigger level, the entity responsible for long-term management of Hangar 1 will provide notifications to the appropriate regulatory agencies. 3. If the concentration of PCBs or lead in confirmation samples exceeds the trigger level, then coating inspection and repairs may be required, depending on the identified source location. The entity responsible for long-term management of Hangar 1 will consult with the Water Board and EPA on this action. 4. If the PCB or lead concentrations in sediment do not exceed the trigger level, then no further action is required.
Step 6 Specify performance or acceptance criteria	The sediment trigger levels are based on the remediation goals for IR Site 25 (i.e., the Storm Water Settling Basin located downstream from Hangar 1) as follows: • PCB = 0.21 mg/kg • Lead = 93.8 mg/kg If these trigger levels are exceeded, the specific actions that will be taken depend on the upstream sampling results (see Step #5 above). If the source of the contaminants is determined to be from offsite sources and not related to Hangar 1, then NASA or the agency responsible for managing Moffett Field will be responsible for identifying the source and taking appropriate action. If the source of the contaminants is determined to be the hangar, then the following actions may be appropriate: • Conduct a coating inspection for the affected quadrant(s) of the hangar in accordance with section 3.1.2 of the LTMgmt Plan. • Conduct coating maintenance or repairs if required in accordance with section 3.2 of the LTMgmt Plan. • Consider recommendations for increased monitoring frequency and/or monitoring locations. Laboratory data will be developed and evaluated using EPA protocols. To minimize error, samplers will be trained and samples will be collected in accordance with procedures described in this SAP. The laboratories will be evaluated by the Naval Facilities Engineering Services Center (NFESC) or will hold the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) certification, and the California Department of Public Health ELAP certification (for methods certified by California). Laboratory standard operating procedures will comply with DoD Quality System Manual version 4.1.
Step 7 Develop the plan for obtaining the data	The sampling design is presented in Section 4.2 of this plan.

4.2 Sampling and Analysis

To assess the potential release of contaminants from the site, a sediment sample will be collected annually at Manhole SD-107, which is the first storm water drainage system manhole located downstream from Hangar 1. If the concentration of PCBs or lead in the sediment sample collected at sampling location SD-107 exceeds the established trigger levels, then a second sample will be collected at SD-107 to confirm the results. In addition, sediment samples will be collected from catch basins located within the four quadrants of the perimeter trench (CB-463D, CB-447A, CB-443B, and CB-454D) and from upstream catch basin CB-107F and manhole SD-442 to evaluate the source of the contaminants. Sampling locations are shown on Figure 6. The perimeter trench samples will identify potential PCB or lead releases emanating from each of the four quadrants of the hangar. The upstream samples will identify potential releases that may not be related to Hangar 1.

4.2.1 Sampling

Storm water sediment sampling will be conducted annually in September of each year. Sampling will be conducted prior to the onset of the rainy season so that there is sufficient sediment available for analysis, since heavy rains may wash out any accumulated sediment. Samples will be collected during daylight business hours. If sufficient material is not available for sampling, then sampling will be rescheduled and samples will be collected as soon as a sufficient volume of sediment is available.

Samples will be collected at the locations shown on Figure 6. Sediment samples will be collected from the manholes and catch basins by inserting sampling equipment into the manhole or catch basin from the surface whenever possible, since entry into the manhole may require confined space entry procedures.

The samples will be placed in containers supplied by the analytical laboratory and stored in an ice-filled cooler for laboratory pickup or delivery. Samples will be sent to the laboratory under chain-of-custody procedures. All field activities will be recorded in a bound field logbook.

For quality assurance and quality control (QA/QC) purposes, a duplicate sample will be collected at a designated location and matrix spike/matrix spike duplicate analysis will be performed on one of the samples. No field, equipment, or trip blanks are necessary because new sampling equipment will be used at each sample location and there will be no analysis of VOCs.

4.2.2 Analysis

Sediment samples will be analyzed for PCBs using EPA Method 3550B/8082 and for lead using EPA Method 6020. Samples will be sent to an off-site laboratory evaluated by NFESC or will hold the DoD ELAP certification, and the California Department of Public Health ELAP certification (for methods certified by California).

4.3 Data Evaluation

Data will be subject to a QA/QC review, which will be conducted in accordance with the EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (EPA, 2008). The specific analytical method performance objectives and acceptance criteria will be defined in a project-specific sampling and analysis plan once the monitoring program contractor has been selected.

Sediment sampling and analytical data will be reviewed and validated to determine whether the data conform to the specified criteria, thus satisfying the project objectives. Field data will be reviewed to identify inconsistencies or anomalous values. Laboratory data will be validated by a systematic review of the primary and QC sample analytical results. Data will be validated at 80% EPA Level III and 20% EPA Level IV. Data validation will be performed in accordance with the Navy Installation Restoration Chemical Data Quality Manual (Navy, 1999), and patterned after the EPA Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review (EPA, 2008).

Validated PCB sediment data will be compared to the trigger level of 0.21 mg/kg. The validated lead sediment data will be compared to the trigger level of 93.8 mg/kg. If the concentration of PCBs or lead in confirmation samples are above their respective trigger level, and the source of the contamination is derived from Hangar 1, then additional coating inspection and repairs may be required. The entity responsible for long-term management of Hangar 1 will coordinate with the Water Board and EPA on this action. If the PCB and lead concentration in storm water sediment does not exceed the trigger levels, then no further action is required.

The effectiveness of the storm water sediment monitoring program will also be evaluated as part of the required CERCLA Five-Year Reviews. If PCB concentrations in storm water sediment have not exceeded the trigger levels at the first Five Year Review, then consideration will be given to reducing or eliminating the monitoring requirements as part of the review process.

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5.0 HEALTH AND SAFETY

LTMgmt activities will present various job hazards to workers, including potential exposure to PCBs and work at heights that require fall protection. Each organization participating in LTMgmt activities will be responsible for performing activity hazard analyses and developing and implementing an APP and/or HASP describing applicable safety protocols and training requirements for coating inspection and maintenance activities and storm water monitoring at Hangar 1. The HASP will address, at a minimum:

- Safety program roles and responsibilities;
- Proper handling of coating materials;
- Personal Protective Equipment (PPE) requirements;
- Safety protocols for working at height;
- Safety training requirements (40-hour Hazardous Waste Operations and Emergency Response [HAZWOPER], working at height, etc.);
- Requirements for air monitoring;
- Recordkeeping; and,
- Accident reporting.

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6.0 CONSIDERATIONS FOR REUSE

Since residual PCB contamination will remain in Hangar 1, encapsulated by the CM15 over coating, it is essential that any reuse of the hangar is controlled to prevent accidental exposure to these contaminants and/or releases of the contaminants to the environment. The Navy will develop ICs to maintain the viability and effectiveness of the NTCRA. ICs will be developed to ensure that the integrity of the CM15 overcoating is not compromised. The selection of ICs will be documented in a Record of Decision. In general, the overcoating must be protected or require repair from any and all cutting, drilling, grinding, abrasion, welding, fastening, or impact that could damage the coating. This will require the Owner/Operator to develop procedures for controlling the use of the hangar and any modifications to the hangar that could compromise the integrity of the overcoating and expose the underlying PCB contamination.

Potential ICs may include, but are not limited to, the following measures:

- Signs notifying building inhabitants of the potential exposure hazard.
- Owner/Operator procedures for approval of any building modifications.
- Development of standard specifications for building modifications that address worker exposure hazards, require low-impact construction methods, and require post-construction repairs of the over coating.
- Owner/Operator procedures for approval of property use changes.
- Recordation of ICs in the facility and/or public records repository.
- Incorporation of the ICs and the LTMgmt Plan requirements in any property transfer agreements.

NASA, or the future owner/operator, will need to include in requests for proposals for reuse of the hangar requirements to allow access by the entity responsible for long-term management of Hangar 1 (and/or its contractors) to conduct inspection and maintenance. NASA will also review its Hangar 1 reuse guidelines, prepared pursuant to the National Historic Preservation Act, Sec. 106 Programmatic Agreement associated with the NASA Ames Development Plan, to determine if an addendum to the reuse guidelines is needed to incorporate restrictions on impacting the coating and requirements to allow access for inspection and maintenance of the coating by the navy and its contractors. The Hangar 1 reuse guidelines are available at: http://historicproperties.arc.nasa.gov/map reuse/reuse guidelines.html.

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7.0 RECORD KEEPING AND REPORTING

Responsibility for record keeping and reporting currently resides with the Navy, as the Federal Lead Agency responsible for CERCLA response at the site under a Federal Facility Agreement. The facility owner will assume responsibility for the operations and maintenance of remaining Moffett Field remediation sites after remedial actions are completed at each of those sites as determined by EPA Region 9.

Records will be generated and maintained for all LTMgmt activities, including coating inspection, maintenance, repairs and storm water monitoring. In general, standardized forms or log books will be used to record inspection, maintenance and monitoring data. Required field records include, but are not limited to the following:

- Daily Log or Contractor Production Report;
- Coating Inspection Report;
- Coating Maintenance and Repair Report;
- Storm Water and Sediment Sample Collection Log;
- Storm Water and Sediment Sample Chain-of-Custody;
- Analytical Laboratory Report; and,
- Personnel Training and Certification Records.

An example Coating Inspection Form is included in Appendix F.

All field records will be submitted daily to the Navy Resident Officer in Charge of Construction (ROICC) and copies will be provided to the Owner/Operator's facility manager, or designee. At the completion of each LTMgmt program event (inspection, repair, monitoring, etc.), a summary report will be prepared to document the results of the event. These reports will be provided to the Project Manager in charge of Hangar 1 LTMgmt activities.

Reports of LTMgmt activities will be prepared and submitted to Owner/Operator and to regulatory agencies in accordance with the schedule outlined below:

- Storm Water Monitoring Report (annual);
- Coating Inspection Reports (every three years);
- Coating Maintenance and Repair Reports (after each event);
- CERCLA Five Year Review Reports (every five years).

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8.0 OTHER PLANS AND REPORTS

Other plans that provide additional information relevant to the LTMgmt Program include the BHAP (AMEC, 2011) and the AACR (AMEC, 2012).

8.1 Biological Hazard Abatement Plan

Control and mitigation of wildlife-related hazards to human health and to aircraft operations following completion of the NTCRA is not within the scope of this LTMgmt Plan. A separate BHAP was prepared to provide information on species present in the area, and to outline methods for minimizing wildlife hazards. The BHAP includes a summary of existing Bird/Wildlife Aircraft Strike Hazard (BASH) Plans prepared for the site. The BHAP should be referenced for recommendations on wildlife hazard control and mitigation measures that may be necessary during the LTMgmt period. In their letter dated August 6, 2012, NASA agreed that they would be responsible for implementation of BASH mitigation measures after the NTCRA is complete and the Navy demobilizes from the site.

8.2 After Action Completion Report

The AACR provides a comprehensive record of the NTCRA activities and results. The AACR contains a description of the work accomplished as well as supporting documentation including a photographic record, sampling data, QC records, waste disposal records, and final inspection and acceptance records. The AACR provides additional detail and background information that may be useful in planning LTMgmt activities.

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9.0 CONTACT INFORMATION

Table 9-1 contains contact information for the various parties involved in the NTCRA. These resources may be contacted as needed to assist with LTMgmt Plan implementation.

Table 9-1. Project Contact Information

Name	Title/Role	Organization	Office Telephone Number	Mailing Address	E-mail Address
Anderson, Scott	Environmental Coordinator	Navy	619-532-0938	1455 Frazee Road, Suite 900 San Diego, CA 92108	scott.d.anderson@navy.mil
Bartelma, Bryce PG	Project Manager	Navy	619-532-0975	1455 Frazee Rd, Ste 900 San Diego, CA 92108-4310	bryce.bartelma.ctr@navy.mil
Caringello, Rocci	Facility Engineering Planning Group Lead/Real Property Officer	NASA	650-603-9506	NASA Ames Research Center, MS 213-8 PO Box 1 Moffett Field, CA 94035	tony.r.caringello@nasa.gov
Chuck, Don	Chief, Environmental Management Division	NASA	650-604-0237	NASA Ames Research Center, MS 204-15 PO Box 1 Moffett Field, CA 94035	donald.m.chuck@nasa.gov
Clarke, Ann	Assistant Director of Center Operations	NASA	650-604-2350	NASA Ames Research Center, MS 200-9 PO Box 1 Moffett Field, CA 94035	ann.clarke@nasa.gov
Fong, Yvonne	Remedial Project Manager	EPA	415-947-4117	75 Hawthorne Street San Francisco, CA 94105	Fong.YvonneW@epa.gov
Humbert, Will	Coating Manufacturer Representative	Carboline	800-848-4645	2150 Schuetz Road, St. Louis, MO 63146	whumbert@carboline.com

Table 9-1. Project Contact Information

Name	Title/Role	Organization	Office Telephone Number	Mailing Address	E-mail Address
Munekawa, Gary J.	Navy ROICC	Navy	650-603-9834	PO Box 68 (Bldg 107) Moffett Field, CA 94035-0068	gary.munekawa@navy.mil
Schulz, Mike	Project Manager	AMEC	505-821-1801	8519 Jefferson NE Albuquerque, NM 87113	mike.schulz@amec.com
Venter, Keith	Historic Preservation Officer, Facility Engineering Planning Group	NASA	650-604-6408	NASA Ames Research Center, MS 213-8 PO Box 1 Moffett Field, CA 94035	keith.venter@nasa.gov
Wells, Elizabeth	Water Resource Control Engineer	Regional Water Quality Control Board San Francisco Bay Region	510-622-2440	1515 Clay Street, Suite 1400 Oakland, CA 94612	ewells@waterboards.ca.gov
Williams, Roy	Chief, Airfield Operations Division	NASA	650-604-5050	NASA Ames Research Center, MS 158-1 PO Box 1 Moffett Field, CA 94035	roy.a.williams@nasa.gov

10.0 REFERENCES

AMEC Earth & Environmental, Inc. (AMEC), 2010a, Final Biological Survey Letter Report for Non-Time Critical Removal Action for Polychlorinated Biphenyl (PCB) Contamination at Installation Restoration (IR) Site 29, Hangar 1 Former Naval Air Station (NAS) Moffett Field, Sunnyvale, California. May 2010.

AMEC, 2010b, Final Coating Condition Survey Letter Report, Hangar 1, Former Naval Air Station Moffett Field, Moffett Field, California. July 2010.

AMEC, 2010c Asbestos Survey Report, Non-Time Critical Removal Action for Polychlorinated Biphenyl (PCB) Contamination at Installation Restoration (IR) Site 29, Hangar 1 Former Naval Air Station (NAS) Moffett Field, Moffett Field, California. July 2010.

AMEC, 2010d, Pre-Construction Soil Sampling Letter Report for Non-Time Critical Removal Action for Polychlorinated Biphenyl (PCB) Contamination at Installation Restoration (IR) Site 29, Hangar 1 Former Naval Air Station (NAS) Moffett Field, Sunnyvale, California. June 2010.

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Society for Protective Coatings (SSPC) Paint Application Guide Number 5 (PA 5) - Guide to Maintenance Coating of Steel Structures in Atmospheric Service. March 1, 2009.

SSPC Technology Update Number 3 (TU 3): Overcoating. November 2004.

SSPC Surface Preparation Standard 2 (SP-2), Hand Tool Cleaning.

SSPC SP-3, Power Tool Cleaning.

SSPC SP-12, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating. July 2, 2002.

SSPC Visual Standard Number 2 (VIS 2), Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.

FIGURES

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0 1,000 2,000 4,000 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224			CLIENT: DEPARTMENT OF THE NAVY FACILITIES ENGINEERING COMMAND SOUTHWEST SAN DIEGO, CALIFORNIA	
TITLE: REGIONAL LOCATION MAP		DWN BY: SD	DATUM: NAD83	DATE: AUGUST 2012
PROJECT: HANGAR 1 LONG-TERM MANAGEMENT PLAN		CHK'D BY: DAB	REV. NO.: -	PROJECT NO.: N62473-08-D-8816 CTO-0005
		PROJECTION: CA SP III Ft.	SCALE: 1 inch = 2,000 feet	FIGURE No.: FIGURE 1

K:\Navy\CTO-005 Moffett\Figures_Long_Range_Monitoring\Figure 1 - Regional Location Map.mxd

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0 100 200 400
Feet

N

AMEC
7376 SW Durham Road
Portland, OR, U.S.A. 97224

CLIENT: DEPARTMENT OF THE NAVY
FACILITIES ENGINEERING
COMMAND SOUTHWEST
SAN DIEGO, CALIFORNIA

TITLE: SITE LOCATION MAP

PROJECT: HANGAR 1 LONG-TERM MANAGEMENT PLAN

DWN BY:	DATUM:	DATE:
SD	NAD83	JANUARY 2013
CHK'D BY:	REV. NO.:	PROJECT NO.:
DAB	-	N62473-08-D-8816 CTO-0005
PROJECTION:	SCALE:	FIGURE No.:
CA SP III Ft.	1 inch = 200 feet	FIGURE 2

K:\Navy\CTO-005 Moffett\Figures_Long_Range_Monitoring\Figure 2 - Site Location Map.mxd

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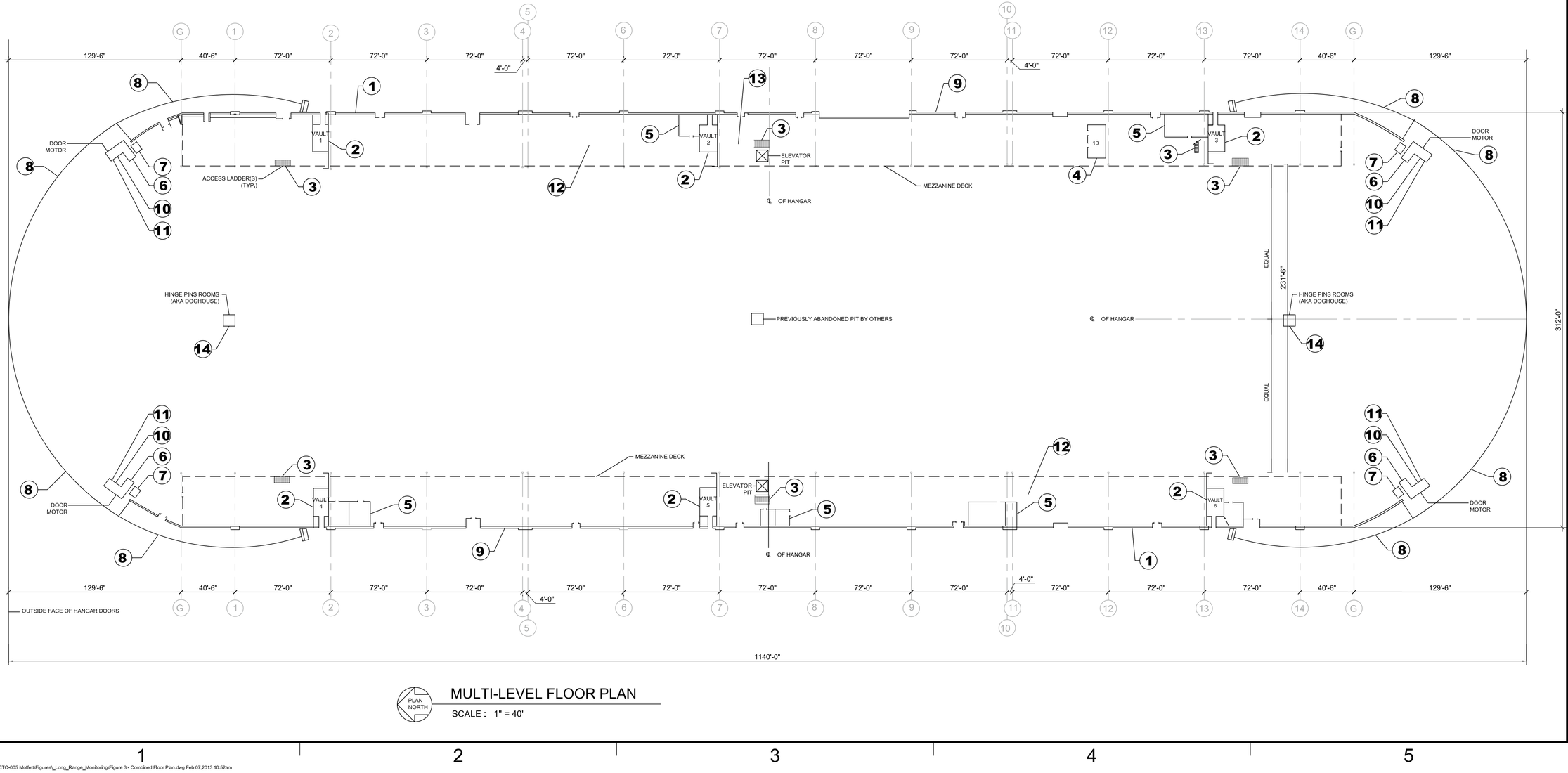
NOTES:

1. STRUCTURAL STEEL FRAME (ENTIRE HANGAR).
2. CMU WALLS SURROUNDING ELECTRICAL VAULTS.
3. ACCESS STAIRS LEADING FROM GROUND FLOOR TO MEZZANINE DECK.
4. FORMER STORAGE VAULT.
5. FORMER TOILETS.
6. DOOR MOTOR HOUSING.
7. DOOR MOTOR ELECTRICAL VAULT.
8. DOOR TRUCKS/BOLSTERS.
9. CONCRETE STEMWALLS.
10. DOOR DRIVE GEAR AND CHAIN.
11. DOOR GEAR HOUSING.
12. TOP AND BOTTOM SURFACES OF MEZZANINE STEEL DECK.
13. ACCESS TO ROOF BETWEEN COLUMNS 7 & 8.
14. HINGE PIN SYSTEM.

KEYED NOTE	DESCRIPTION	COATING APPLICATION	INSPECTION/REPAIR REQUIREMENT
1	STRUCTURAL STEEL FRAME	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
2	CMU WALLS SURROUNDING ELECTRICAL VAULTS	NEW CM15 OVERCOAT ON CMU. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
3	ACCESS STAIRS LEADING FROM GROUND FLOOR TO MEZZANINE DECK	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT ON STAIR TREADS AND HANDRAILS REMOVED COMPLETELY. ORIGINAL PAINT ON BOTTOM SURFACES OF STAIR RISERS CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS. NOTE THAT TOPSIDE OF STAIR RISERS AND HANDRAILS HAVE BEEN COMPLETELY ABATED TO REMOVE PCBS PRIOR TO OVERCOATING WITH CM15. THESE SURFACES WILL BE MAINTAINED BY THE OWNER.
4	FORMER STORAGE VAULT	NEW CM15 OVERCOAT ON CMU. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
5	FORMER TOILETS	NEW CM15 OVERCOAT ON CMU. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
6	DOOR MOTOR HOUSING	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
7	DOOR MOTOR ELECTRICAL VAULT	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
8	DOOR TRUCKS (BOLSTERS)	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
9	CONCRETE STEMWALLS SURROUNDING HANGAR PERIMETER	ORIGINAL PAINT REMOVED COMPLETELY. CONCRETE SEALED WITH CARBOGUARD 1340 SEALER.	NO LTMGMT INSPECTIONS NEEDED. OWNER IS RESPONSIBLE FOR MAINTENANCE OF SEALER.
10	DOOR MOTOR DRIVE GEAR (CHAIN AND ROLLERS)	NOT OVERCOATED WITH CM15.	NO LTMGMT INSPECTIONS NEEDED. OWNER IS RESPONSIBLE FOR MAINTENANCE OF DOOR DRIVE GEAR COMPONENTS.
11	DOOR GEAR HOUSING	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.
12	TOP AND BOTTOM SURFACES OF MEZZANINE DECKS	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH REMOVED COMPLETELY.	NO LTMGMT INSPECTIONS NEEDED. OWNER IS RESPONSIBLE FOR ROUTINE MAINTENANCE AND TOUCHUP OF THE COATING ON THE MEZZANINE DECKS.
13	ACCESS TO ROOF BETWEEN COLUMNS 7 AND 8	NEW CM15 OVERCOAT ON NEW GALVANIZED STEEL GRIP STRUTS. ORIGINAL PAINT ON HANDRAILS DOES NOT CONTAIN PCBS.	NO LTMGMT INSPECTIONS NEEDED. OWNER IS RESPONSIBLE FOR ROUTINE MAINTENANCE AND TOUCHUP OF THE COATING ON THE ROOF ACCESS.
14	HINGE PIN SYSTEM ON TOP OF ROOF (DOOR PIVOT POINTS)	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTMGMT INSPECTIONS.



PLAN NORTH

MULTI-LEVEL FLOOR PLAN

SCALE : 1" = 40'

APPR | DATE | DESCRIPTION | SYM

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
SAN DIEGO, CALIFORNIA

HANGAR 1 LONG-TERM MANAGEMENT PLAN

SUBMITTED BY amec
FIRM MEMBER DATE 20-JUNE-2012
APPROVED
ACTIVITY - SATISFACTORY TO DATE
APPROVED
FOR COMMANDER NAVFAC DATE
DES JAT/DAB DR SD
CHK DAB QC
DESIGNER OF RECORD
REVIEWED BY
QC
PROJECT MANAGER
FIRE PROTECTION
BLT LEADER
IPT LEADER

FIGURE 3 - LOCATION OF EPOXY-COATED STRUCTURES AND SCHEDULE OF INSPECTION REQUIREMENTS

CODE ID. NO. 80091 SIZE D
SCALE: 1"=40'
STA. DWG. NO.
STA. PROJ. NO.
SPEC. NO.
CONSTR. CONTR. NO. **N62473-08-D-8816 CT0-0005**
NAVFAC DRAWING NO.
SHEET 3 OF 4
DRAWING NO. 3 REV. NO. A

DRAWFORM REVISION 27 JULY 2003

K:\Navy\CTO-005 Moffett\Figures_Long_Range_Monitoring\Figure 3 - Combined Floor Plan.dwg Feb 07,2013 10:52am

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CLAMSHELL DOOR DRIVE CHAIN
(FIGURE 3, NOTE 10)

CMU WALL VAULT 6
(FIGURE 3, NOTE 2)

CMU WALL VAULT 6
(FIGURE 3, NOTE 2)

DOOR DRIVE GEAR
(FIGURE 3, NOTE 10)

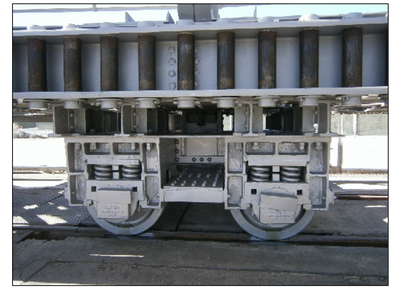
DOOR GEAR HOUSING
(FIGURE 3, NOTE 11)

DOOR GEAR AND MOTOR HOUSING
(FIGURE 3, NOTES 6 & 11)

DOOR MOTOR ELECTRICAL VAULT
(FIGURE 3, NOTE 7)

DOOR MOTOR HOUSING
(FIGURE 3, NOTE 6)

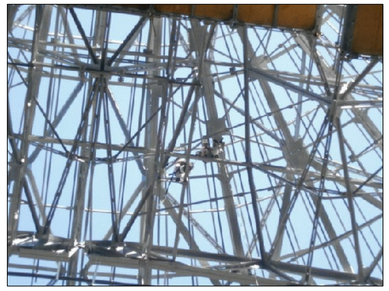
DOOR TRUCK-BOLSTER
(FIGURE 3, NOTE 8)



DOOR TRUCK-BOLSTER AND DRIVE CHAIN
(FIGURE 3, NOTES 8 & 10)

FORMER MATERIALS STORAGE
(FIGURE 3, NOTE 4)

FORMER TOILET CMU WALLS
(FIGURE 3, NOTE 5)



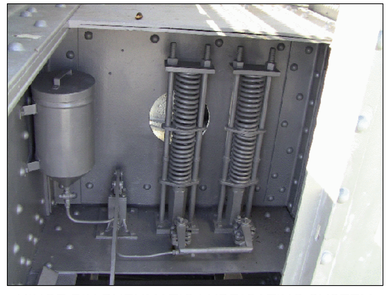
STRUCTURAL STEEL
(FIGURE 3, NOTE 1)

UNDERSIDE OF MEZZANINE DECK
(FIGURE 3, NOTE 12)

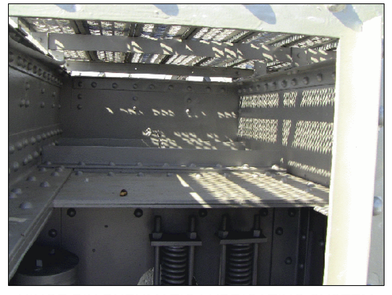
NEW GALVANIZED GRIP STRUT ACCESS
FROM MEZZANINE LEVEL TO ROOF
(FIGURE 3, NOTE 13)

NEW GALVANIZED GRIP STRUT CATWALK
ON ROOF
(FIGURE 3, NOTE 14)

HINGE PIN HOUSING
(FIGURE 3, NOTE 14)



HINGE PIN PNEUMATIC LUBRICATING SYSTEM
(FIGURE 3, NOTE 14)



HINGE PIN PNEUMATIC LUBRICATING SYSTEM
(FIGURE 3, NOTE 14)

APPR	DATE	DESCRIPTION	SYM

DEPARTMENT OF THE NAVY

HANGAR 1
LONG-TERM
MANAGEMENT
PLAN

SUBMITTED BY
amec
FIRM MEMBER DATE 20-JUNE-2012

APPROVED
ACTIVITY - SATISFACTORY TO DATE

APPROVED
FOR COMMANDER NAVFAC DATE

DES	JAT/DAB	DR	SD
CHK	DAB	QC	

DESIGNER OF RECORD
REVIEWED BY
QC
PROJECT MANAGER
FIRE PROTECTION
BLT LEADER
IPT LEADER

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
FACILITIES ENGINEERING COMMAND SOUTHWEST
SAN DIEGO, CALIFORNIA

FIGURE 4 - REPRESENTATIVE PHOTOS OF EPOXY-COATED STRUCTURES

CODE ID. NO. 80091	SIZE D
SCALE:	NTS
STA. DWG. NO.	
STA. PROJ. NO.	
SPEC. NO.	
CONSTR. CONTR. NO.	N62473-08-D-8816 CT0-0005
NAVFAC DRAWING NO.	
SHEET 4 OF 4	
DRAWING NO. 4	REV. NO. A

DRAWFORM REVISION 27 JULY 2003

K:\Navy\CTO-005 Moffett\Figures_Long_Range_Monitoring\Figure 4 - Representative Photos of Epoxy-coated Structures.dwg Feb 07,2013 11:14am

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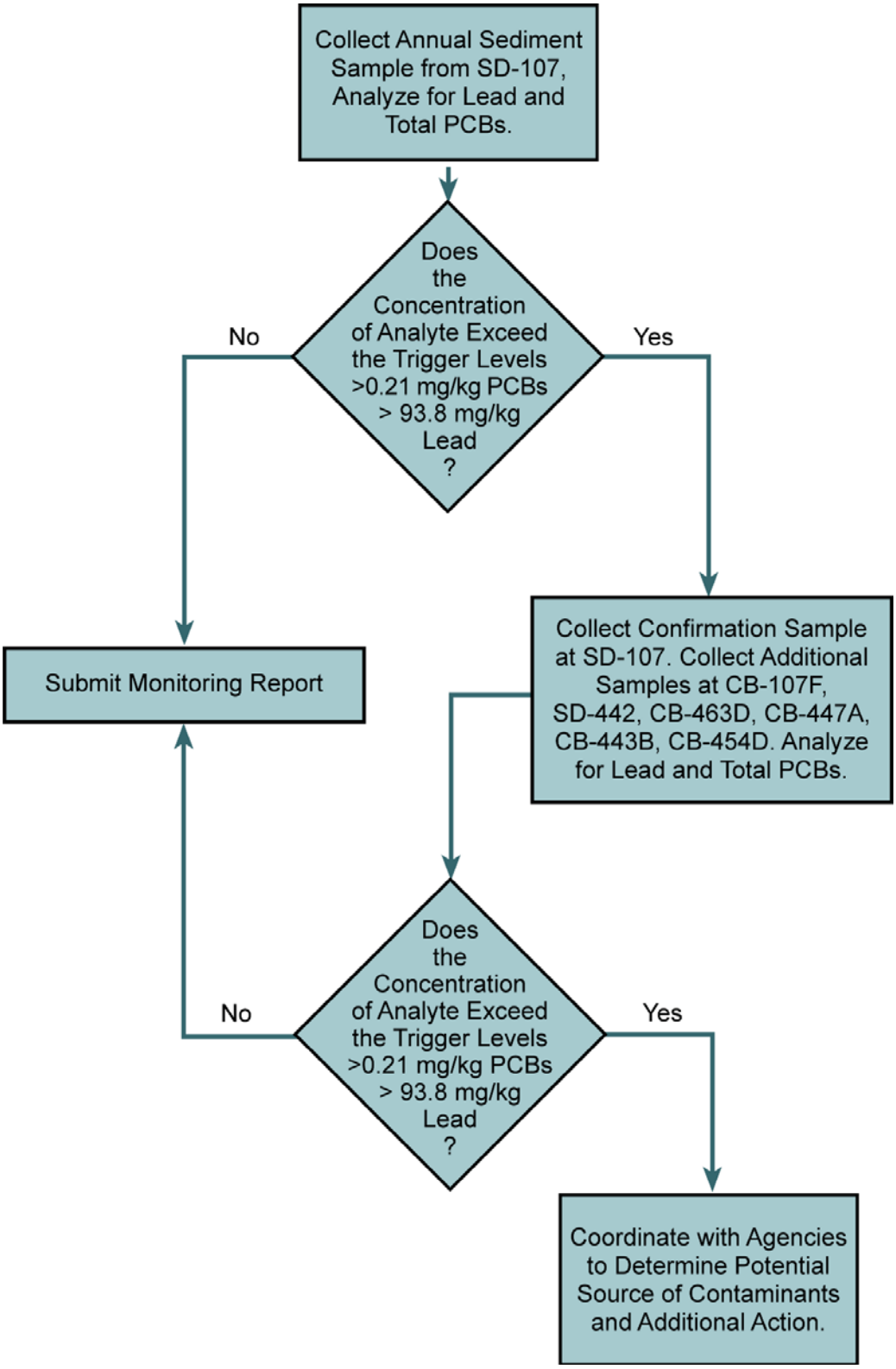

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224			CLIENT: DEPARTMENT OF THE NAVY FACILITIES ENGINEERING COMMAND SOUTHWEST SAN DIEGO, CALIFORNIA	
TITLE: Storm Water Sediment Monitoring Approach		DWN BY: BW	DATUM:	DATE: MAY 2013
PROJECT: HANGAR 1 LONG-TERM MANAGEMENT PLAN		CHK'D BY:	REV. NO.: -	PROJECT NO.: N62473-08-D-8816 CTO-0005
		PROJECTION:	SCALE:	FIGURE No.: FIGURE 5

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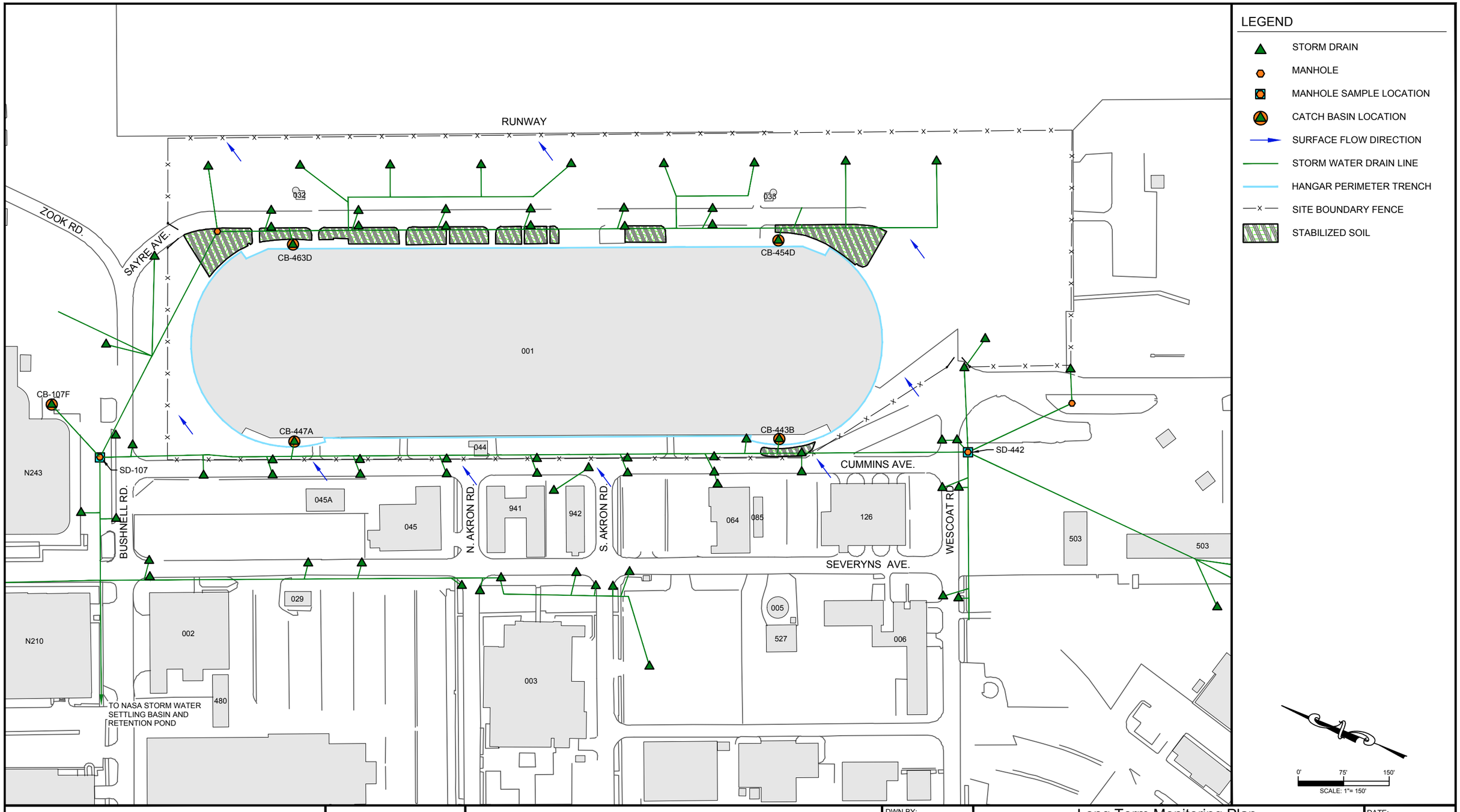

U.S. Department of the Navy
San Diego, California

AMEC Environment & Infrastructure
9210 Sky Park Court, Suite 200
San Diego, California 92123

DWN BY:	PM/BRJ
CHK'D BY:	MS
DATUM:	NAD83
PROJECTION:	CA SP III Ft.
SCALE:	1" = 150'

Long Term Monitoring Plan

Non-Time-Critical Removal Action For PCB Contamination At Site 29, Hangar 1
Former Naval Air Station Moffett Field
Moffett Field, California

STORM WATER SEDIMENT MONITORING LOCATIONS

DATE:	MAY 2013
CONTRACT NO:	N62473-08-D-8816 CTO-0005
REV. NO.	0
FIGURE NO.	6

K:\Navy\CTO-005 Moffett\Figures_Long_Range_Monitoring\Figure 6 - Storm Water Sediment Monitoring Locations.dwg May 28,2013 8:24am

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APPENDIX A

CORRESPONDENCE REGARDING RESPONSIBILITY FOR ROUTINE MAINTENANCE

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DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

5090
Ser BPMOW.akl/0223
APR 2 4 2012

Dr. Ann Clarke
NASA Ames Research Center
Mail Stop 237-14 (Room 115)
Moffett Field, CA 94035

Dear Dr. Clarke:

SUBJECT: NAVY TRANSITION OF NASA FACILITY MAINTENANCE AT INSTALLATION RESTORATION SITE 29, HANGAR 1, MOFFETT FIELD, SANTA CLARA COUNTY, CALIFORNIA

The Navy is currently on track to complete the Installation Restoration (IR) Site 29, Non-Time Critical Removal Action (NTCRA) at Hangar 1. As the Navy works towards completion of the cleanup, it is important that NASA is prepared to resume facility maintenance upon Navy's demobilization from the site.

As stated in NASA's June 22, 2011 Office of Inspector General Audit Report for NASA's Hangar 1 Re-Siding Project, in March 2010, the Office of Management and Budget determined that, while the Navy would have to pay for the environmental cleanup, NASA was responsible for the cost of re-siding the hangar and making any additional upgrades and repairs necessary to prepare the hangar for re-use. The Navy has started preparation of the Long-Term Management (LTMgt) Plan for the Carbomastic 15 (CM15) coating, including storm drain sampling for polychlorinated biphenyls. The LTMgt Plan for CM15 will be available for review in the coming months and is not included as a part of this letter; however, the following items have been identified to date as facility maintenance to be resumed by NASA by October 1, 2012:

1. **Maintain Sump Pump and Utility Trenches for Storm Water**

   During rain events, the Navy has observed ponding in various areas of the hangar concrete floor. Until the hangar is re-sided, periodic inspection and maintenance will be necessary during the wet weather season to reduce ponding storm water and ensure continued operation of the Hangar 1 sump pump and utility trenches. Re-siding the hangar following the Navy's demobilization from the site will eliminate this issue.

2. **Maintain Electrical Vaults**

The Navy has sealed the vault walls and placed an additional concrete sealer coating over the vaults to protect them from storm water. However, periodic inspection and maintenance will be necessary to ensure waterproofing and the continued operation of the electrical vaults. Re-siding the hangar following the Navy's demobilization from the site will eliminate this issue.

3. **Maintain Clam Shell Doors (hinge pins [2], trucks [36], and gear motors [4])**

We understand that NASA has already planned to "repair and service the existing clam shell door motors, trucks, pivots, dog house mechanisms and any miscellaneous components to an operable condition" as noted in the November 2011 *Condition Assessment and Rehabilitation Plan* prepared for NASA by CH2MHILL. An update regarding the condition of the clam shell doors and operating mechanisms was provided to NASA by a Navy letter of February 1, 2012. As stated in this letter, there is potential concern about oil leakage from the hinge pins, trucks, and gear motors and, therefore, to prevent pollutants from entering the storm water system and protect the newly coated structural steel, the Navy will not refill the oils in the trucks or upper hinge pins. However, the Navy has left the oils within the gear motors at NASA's request. Although the trucks and gear motors will be wrapped in plastic to temporarily secure them from the elements (wind, water, solar, etc.), NASA will need to conduct routine inspection, maintenance, and/or replacement plastic to ensure any residual oil is not leaking into the storm drain system. In addition, maintenance and cleanup for any residual or newly placed oil within any component of the clam shell doors will become NASA's responsibility on October 1, 2012, including the cleaning of steel or CM15 touch-ups required as a result of degradation from residual or newly placed oil. On March 15, 2012, NASA made a request for the Navy to construct a temporary containment for each hinge pin. The Navy will not be making any additional upgrades or repairs to prepare the hangar for re-use.

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4. Bird Air Strike Hazard (BASH) Responsibilities

On February 6, 2012, the Navy notified NASA of our intentions to transition BASH responsibilities to NASA upon our demobilization from the site. On March 15, 2012, NASA notified the Navy that they are looking into resuming these responsibilities and requested the Navy to place netting over the hangar. The use of netting in this manner as a mitigation technique was evaluated and ruled out in the *Final Biological Hazard Abatement Plan, NTCRA for Polychlorinated Biphenyl Contamination at Installation Restoration Site 29, Hangar 1*, AMEC, May 2011.

5. Permanent Access for Federal Aviation Administration (FAA) Beacon and Holiday Star

The Navy will be completing the galvanized grip strut permanent access for the FAA beacon and holiday star by or before October 1, 2012. Periodic inspection and maintenance of the beacon, holiday star, and grip struts (minimal maintenance) will be necessary to ensure their continued operation and use.

In summary, the Navy is working towards completion of the NTCRA and demobilization of project staff by or before October 1, 2012, at which time the Navy will relinquish control of Hangar 1 to NASA. At that point, the Navy's role of facility maintenance in support of the cleanup action at the hangar will cease. The Navy will continue to coordinate with NASA throughout this transitional period and provide notice of any additional observations.

If you have any questions regarding this letter, please contact Scott Anderson at (619) 532-0938 or myself at (619) 532-0905.

Sincerely,

Alan K. Lee

ALAN K. LEE
Base Closure Manager
By direction of the Director

5090
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APR 24 2012

Copy to:

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11011
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SEP 6 2012

Mr. Charles W. Duff II
Director of Center Operations
NASA Ames Research Center
Moffett Field, CA 94035

SUBJECT: FACILITY MAINTENANCE AT HANGAR 1, MOFFETT FIELD, SANTA CLARA COUNTY, CA

Dear Mr. Duff:

This is in response to your letter dated August 6, 2012, regarding NASA's resumption of facility maintenance responsibilities for Hangar 1 following the Navy's demobilization from the site. In your August 6th letter, you acknowledged that NASA would assume certain facility maintenance responsibilities after the Navy demobilized on or after October 2012, but you requested clarification as to which sump pump and utility trenches were referred to in my April 24, 2012 letter addressed to Dr. Ann Clarke.

Please be advised that the reference to "Sump Pump and Utility Trenches for Storm Water" in my April 24 letter was intended to be a reference to the sump pump and various utility trenches or pits and vaults within the Hangar 1 footprint that can accumulate water from rainfall. Because the sump pump and electrical vault 5 (EV-5) are currently connected to the West-Side Aquifer Treatment System (WATS), an excessive accumulation of water at these water collection points could potentially overload WATS and cause negative effects, including temporary shut-down of the system. Accordingly, due to the potential for rain water to accumulate in these water collection points, we would like to be assured that during or after rain events, NASA maintenance staff will simply inspect the site and eliminate (as appropriate) any ponding water from the hangar footprint to prevent a large volume of water from being collected that would potentially overload WATS. Furthermore, the Navy would like to confirm that NASA will not utilize EV-5 or the Hangar 1 sump pump for any water discharge.

In addition to the Hangar 1 sump pump and EV-5, there are other utility trenches (or pits) at Hangar 1 that may require storm water management. These include two elevator pits and

four clam shell door maintenance pits. Standing water has been a breeding ground for mosquitos. Periodic inspection and removal of any ponding water will eliminate this issue, as well as protect the coating integrity on the elevator structures from immersion in standing water. With these clarifications, I respectfully request your confirmation that NASA will resume facility maintenance with respect to the sump pump and utility trenches for storm water, upon the Navy's demobilization from the site.

In summary, the Navy is working towards completion of the Non-Time Critical Removal Action at IR Site 29 and demobilization of all equipment and project staff. Our current schedule indicates that our demobilization date will be on or about November 15, 2012. At that point, the Navy's responsibilities for facility maintenance in support of the cleanup action at the hangar will cease. As you noted in your letter, additional CERCLA documentation and regulatory agency approvals will be necessary prior to NASA's assumption of long-term CERCLA operation and maintenance responsibilities for the site. It is anticipated that additional information regarding the transfer of long-term CERCLA operation and maintenance obligations will be provided to NASA by separate correspondence in the near future.

The Navy has appreciated NASA's assistance with the successful implementation of the monumental removal action at Hangar 1. If you have any questions regarding this letter, please contact Scott Anderson at (619) 532-0938 or me at (619) 532-0905.

Sincerely,

Alan K. Lee

ALAN K. LEE
Base Closure Manager
By direction of the Director

11011
Ser BPMOW.sda/0544
SEP 6 2012

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August 6, 2012

Reply to Attn of: J:200-9

Alan K. Lee
Base Closure Manager
BRAC Program Management Office, West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310

Subject: Navy Transition of NASA Facility Maintenance at Installation Restoration Site 29, Hangar 1, Moffett Field, Santa Clara County, California

Dear Mr. Lee:

We received your letter dated April 24, 2012, addressed to Dr. Ann Clarke and sent in anticipation of the Navy's plan to demobilize its worksite at Hangar 1 in early Fall 2012 after completing the Non-Time Critical Removal Action (NTCRA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Federal Facility Agreement (FFA) signed by the Navy, U.S. Environmental Protection Agency (USEPA), and the State of California. Hangar 1 is an element of the Navy Installation Restoration Site 29 referenced in the FFA.

We understand that the Navy's Long-Term Management (LTM) Plan for the Carbomastic 15 (CM15) coating, including storm drain sampling for polychlorinated biphenyls (PCB), is being developed separately and is not the subject of your inquiry.

You have asked whether NASA will resume facility inspection and maintenance for certain itemized items that NASA maintained prior to the NTCRA, namely the sump pump, utility trenches for storm water management, electrical vaults, clam shell door hinge pins (2), trucks (36), and gear motors (4), and access to the beacon and holiday star, as well as Bird Air Strike Hazard (BASH) responsibilities. NASA requests clarification as to which sump pump and which utility trenches are referred to in your letter.

The Navy announced at the March 5, 2010, Navy Restoration Advisory Board meeting that the White House Office of Management and Budget arbitration had concluded with the finding that the Navy would be responsible for removal and NASA would be responsible for residing and reuse. We also understand that under the FFA between the Navy, USEPA, and the State of California, the Navy will submit to USEPA and the State a NTCRA report for the removal action, followed by submittal of a Feasibility Study (FS) and a Record of Decision (ROD) for the larger Site 29 remedial action for USEPA and State approval. The

ROD would include institutional controls and engineering controls. Once the FS and ROD are negotiated with USEPA, the Navy would enter into negotiations with NASA to assume those responsibilities only the landowner can implement.

Until the above steps are completed, NASA's position is that after the Navy demobilizes on or about October 2012, NASA will assume only the following responsibilities:

1. Inspection and maintenance of the waterproofing on the electrical vaults.
2. Inspection and maintenance of the clamshell door hinge pins (2), trucks (36), and gear motors (4), including clean up of associated oil that may spill from the hinge pins, trucks, or gear motors.
3. Inspection and maintenance of the galvanized grip strut permanent access for the FAA beacon and holiday star.
4. Bird Airstrike Hazard (BASH) management, which is intended to protect the Airfield. BASH management does not include removal of guano that may accumulate on the Hangar's steel frame.

Sincerely,

Charles W. Duff II
Director of Center Operations

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APPENDIX B

COATING CONDITION SURVEY

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COATING CONDITION SURVEY
HANGAR 1
FORMER NAVAL AIR STATION MOFFETT FIELD
MOFFETT FIELD, CALIFORNIA

COATING CONDITION SURVEY
HANGAR 1
FORMER NAVAL AIR STATION MOFFETT FIELD
MOFFETT FIELD, CALIFORNIA

Techno Coatings, Inc
1391 Allec Street
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Chuck Whitehead
TCI Project Manager

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ABBREVIATIONS AND ACRONYMS

APP	Accident Prevention Plan
ASTM	American Society for Testing Materials
CCS	Coating Condition Survey
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
IAW	In accordance with
IR	Installation Restoration
LTA	Lighter-than-air
Moffett	former Naval Air Station, Moffett Field
NACE	National Association of Corrosion Engineers
NAS	Naval Air Station
NTCRA	Non-Time-Critical Removal Action
PCN	Polychlorinated biphenyl
PPE	Personal protective equipment
SSPC	The Society for Protective Coatings

EXECUTIVE SUMMARY

This Coating Condition Survey (CCS) presents the results of the evaluation and recommendation of a surface preparation and overcoating action for Hangar 1 at the former Naval Air Station Moffett Field (Moffett), California. The CCS was performed in accordance with current Society for Protective Coatings (SSPC) and American Society for Testing and Materials (ASTM) methods and standards for protective coating evaluations. The CCS conformed to current U.S. Environmental Protection Agency (USEPA) and U.S. Department of the Navy (Navy) guidance documents for a Non-Time-Critical Removal Action (NTCRA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The CCS summarizes the existing protective coating system characteristics, describes the CCS objectives and discusses the conclusions derived from the CCS.

Testing conducted at Moffett Field has demonstrated that adhesion of the existing system is very good and results attest to the fact that the majority of the existing coating system has no risk for overcoating (see Section 15.0 for areas requiring additional work). Test patches of the recommended overcoat system of Carbomastic 15 have demonstrated excellent adhesion to the existing coating system. There were no adhesion failures at all of the Carbomastic 15 to the existing system. Test results of the overcoat system demonstrated that system split internally either between the existing topcoat and the existing primer, or a cohesive failure of the existing primer. The failure points of the overcoat system were identical to the failure point of the existing system.

On site testing has demonstrated unequivocally that the existing system has good adhesion and is acceptable for overcoating. It has also been shown that the Carbomastic 15 has excellent adhesion to the existing coatings. All testing when graded either by nuclear power standards, Departments of Transportation or SSPC Technology Update No. 3 have demonstrated that there is “essentially no risk of failure” to most of the areas of structural steel.

1. Introduction

1.1. This Coating Condition Survey (CCS) addresses the condition of the existing protective coating system and the suitability of overcoating the existing coatings to contain sources of lead compounds and polychlorinated biphenyls (PCBs) from Hangar 1 at the former Naval Air Station (NAS) Moffett Field (Moffett), California. The CCS evaluates condition and deterioration of the coating system applied to the steel support structural steel of Hangar 1 and evaluates the requirements for preparing the steel surfaces for overcoating.

2. Descriptions and Definitions

2.1. Description

2.1.1. Overcoating is generally defined as the practice of painting over an existing coating as a means of extending its useful service life. Overcoating may be a cost-effective alternative to complete coating removal and repainting. When the old coating contains toxic or hazardous materials like lead, cadmium, chromium, asbestos, and polychlorinated biphenyl, overcoating may be a particularly attractive option due to economic considerations. Overcoating presents certain risks as well (see risk definition below).

2.2. Definitions

2.2.1. **Coating stress:** The tension that a coating has, which is capable of being imparted to the steel substrate or other coating.

2.2.2. **Embrittled coating:** Coating that has degraded to a friable condition but still has enough elasticity to adhere to the substrate or existing coating.

2.2.3. **Flaking:** The detachment of small pieces of the coating film, usually preceded by cracking, checking or blistering.

2.2.4. **Loose coating:** Coating that has delaminated and disbonded from the substrate or other coats, but has not fallen off.

2.2.5. **Marginally adherent coating:** A coating that exhibits tape adhesion of 2A or less (per ASTM D 3359), such that the overcoating risk is moderate or high.

2.2.6. **Overcoating:** Application of coating materials over an existing coating in order to extend its service life, including use of the appropriate cleaning methods. The procedure includes preparation of rusted or degraded areas, feathering edges of existing paint, low-pressure water washing of the entire structure to remove contaminants, application of a full intermediate coat over repaired areas, and optional application of a full topcoat over the entire structure. Overcoating may be a cost effective alternative to complete coating removal and repainting. When the old coating contains lead, cadmium, or chromium, overcoating may be a particularly attractive option due to economic considerations. Overcoating presents certain risks as well.

2.2.7. **Repaint:** Complete removal of the existing coating system followed by application of a new coating system (including appropriate cleaning methods).

2.2.8. **Risk:** As used herein, “risk” refers to the chance that the overcoated system (old paint plus newly applied overcoat) either will fail catastrophically (e.g., delamination of the system) or will not provide the desired period of protection (e.g., early rust back).

2.2.9. **Spot repair:** A procedure entailing surface cleaning of isolated corrosion or paint breakdown areas using appropriate cleaning methods, and subsequent coating of these areas.

2.2.10. **Zone painting:** A procedure entailing surface preparation using appropriate cleaning methods and painting of a defined area of a structure. Zone painting may involve (a) many spot repairs within a defined area or (b) removal of all coating in a defined area, followed by application of a new coating system to that area.

3. Discussion

3.1. Risks Associated with Overcoating

3.1.1. **Delamination:** A primary risk associated with overcoating is that the overcoating system could cause delamination. If a delamination failure occurs, the overcoating investment is lost. Delamination is difficult to predict; however, an understanding of the underlying principles will help the coatings engineer reduce the chance of a delamination failure. Delamination is primarily the result of internal stresses in the overcoat material being transferred to underlying or existing coating layers. Internal stress occurs as the applied paint shrinks. Several factors affect the degree of internal stress in the overcoat material, including the type of coating, the formulation, the fi lm-forming conditions, the temperature and the coating's age and thickness. A good example of an increased internal stress is the oxidative curing of alkyds. Temperature fluctuations may also affect the level of internal stress. Brittle coatings are more apt to crack during temperature changes. The application of an overcoat may also affect the internal stress of the existing coating because the stress present in the overcoat is transmitted to the existing coating. The internal stress of the overcoat is counteracted by its adhesion to the existing coating. A loss of adhesion of the existing paint system either at the steel/coating interface or within the layers of the existing coating may result in cracking of the overcoat. Good overcoating systems should be designed so that there is higher tensile strength and rigidity in the existing or original coating than in the overcoat.

3.1.2. **Early Rust Back or Poor Coating Performance:** Another primary risk involved in overcoating is that the system will not provide an adequate period of service. The overcoat may not experience a catastrophic failure, such as delamination, but nonetheless may fail prematurely because of the severity of the service environment. This type of degradation may be manifested by pinpoint rust, undercutting at small breaks in the coating system, or blistering. The amount and type of surface preparation used prior to applying the overcoat can also affect the degree of protection afforded by the overcoat material.

3.2. Factors Affecting Risk in Overcoating

3.2.1. **Influential Factors:** The risk of delamination or other coating failure is influenced by the condition of the existing coating, substrate factors, compatibility of new and old system, the type of structure and the exposure environment, etc.

3.3. Condition of Existing Coating

3.3.1. **Existing Conditions:** Visual and physical inspections, patch testing, and previous experience with similar systems for the expected exposure and conditions are proven tools in assessing the risk.

3.3.1.1. **Existing Coating System Type:** It is important to be able to determine if multiple coating system types exist on the structure and to identify them in order to determine basic chemical composition, so that the proper overcoat system can be selected and special hazardous conditions can be identified.

3.3.1.2. **Thickness:** Thicker, aged coatings tend to be more highly stressed. Strong peeling forces can be generated during curing and aging of the overcoat. When overcoated, thicker, more highly stressed coatings are more likely to delaminate than thinner coatings with lower internal stress. Delamination may also be caused by thermal cycling that may disrupt the integrity of thick, aged coatings that have been overcoated. Rapid thermal cycling may accelerate system deterioration. Thicker, more highly stressed coatings are also more likely to sustain damage from blast media or other mechanical processes. This often results in a subsequent loss of adhesion that may affect the performance of the overcoat system.

3.3.1.3. **Number of Coating Layers:** Many layers of paint increase the chance of poor intercoat adhesion and may lead to delamination.

3.3.1.4. **Coating Age:** Depending on the curing mechanism, certain coatings tend to embrittle more with age than others. The existing coating system is believed to be approximately 80 years old

3.3.1.5. **Chalking and Erosion:** Epoxy and alkyd coatings may chalk and erode with prolonged exposure. Generally, this does not present a problem for overcoating as long as the loose chalk is removed prior to painting. Even severely eroded coatings with exposed primer may be good candidates for overcoating, provided the remaining coating has good adhesion and rusting is nominal.

3.3.1.6. **Delaminated Paint Films:** Paint films that exhibit delamination or other undesirable characteristics, such as cracking, are not good candidates for overcoating.

3.3.1.7. **Coating Brittleness:** Embrittled coatings tend to crack, providing sites for stress-induced peeling.

3.3.1.8. **Coating Adhesion:** The adhesion of the existing coating to itself and to the substrate is a critical factor. However, it is difficult to precisely define a satisfactory adhesion value. At present, adhesion is generally evaluated by either ASTM D 3359 or ASTM D 4541. Systems exhibiting low adhesion values in these tests are more likely to delaminate when overcoated than are aged coatings with higher adhesion values. Generally, the aged coating system will fail at its weakest point. Coating type, age, thickness, and surface preparation all affect the adhesion of the aged coating system.

3.3.1.9. **Substrate Factors and Corrosion Pattern:** The condition and type of the substrate under the existing coating system must be determined. Mill scale, because it is smooth and slick, generally presents the weakest point of adhesion of the coating, even if the mill scale itself is tightly adherent to the steel. Undercutting could continue beneath the film unless the source is removed. The condition of the substrate may affect the performance of the overcoat system. Generally, the more corrosion present, the higher the degree of surface preparation required. This may cause localized problems on structures that were not cleaned uniformly prior to receiving the original coating. Localized rusted areas may dictate a different strategy than would spot rust over the entire surface area. There is a point at which it may no longer be cost-effective to overcoat.

3.3.1.10. **Surface Preparation:** The performance of the system is influenced by surface preparation prior to initial coating application. A surface that was previously blast cleaned is more likely to have satisfactory adhesion values, and is generally a better overcoat candidate, than a surface with existing mill scale.

3.3.1.11. **Coating Compatibility:** Patch testing is a good method of determining whether the new coating is compatible with the existing one. The test should be performed so that the worst-case exposure to the patch is achieved.

3.3.2. Type of Structure

3.3.2.1. **Configuration of Surfaces:** Wide planar areas may delaminate first, particularly if the coating is applied over mill scale or poorly adhered coatings.

3.3.2.2. **Flexing:** The rigidity of the coated surface affects how the internal stresses in the coating are translated to interfaces. Flexible beams and wide planar areas tend to contribute more stress to a coating system than more angular, smaller planar areas.

3.3.2.3. **Exposure Environment:** The coating selected must be able to withstand the environmental conditions to which it will be exposed, as well as the surface conditions over which it is applied. Rapid thermal cycles tend to stress aged coatings, causing delamination at the weaker interfaces.

3.4. Application Considerations: The items below should be considered when determining whether overcoating is the most appropriate maintenance strategy for a particular situation.

3.4.1. Application Considerations

3.4.1.1. **Limitations on Surface Preparation Methods:** In some locations, because of noise or emission considerations, some methods of surface preparation cannot be used. As a result, complete removal and replacement of existing coating may not be an option. The preferred treatment would then be a limited surface preparation and overcoating.

3.4.1.2. **Limitations on Application Methods:** Some environmental or local restrictions prohibit certain application methods or coating products. It must be determined if the permissible application methods (e.g., brushing and rolling) are suitable for the overcoating product selected or considered.

3.4.2. Service Considerations

3.4.2.1. **Risk Threshold of Failure:** There is some chance of a catastrophic or premature failure of an overcoat system. Overcoating may not be a viable option if the risk of a coating failure cannot be tolerated.

3.4.2.2. **Continued Presence of Toxic and Hazardous Materials:** Another important difference between overcoating and full removal is that full removal permanently eliminates the toxic and hazardous materials. If the structure is coated with material that must be treated as a hazardous waste, such as a lead-based coating, a latent hazard will exist (whether or not an overcoating system is applied) until the lead-based coating is removed. In cases requiring elimination of potential hazards resulting from disturbance of lead-based coatings, overcoating is not a feasible maintenance strategy.

3.4.3. **Assessing Risk in Overcoating:** The coatings survey may assess the risk associated with overcoating by compiling historical data, performing visual and physical inspections, and by applying coating test patches.

3.4.3.1. **Coating History and Previous Overcoat Experience:** Historic data is commonly available on types of coating, number of coating layers, coating thickness, surface preparation, periodic maintenance, and periodic inspections. It should be determined if lead or any other hazardous material is present in order to properly assess the risks. If other structures have been painted in a similar or identical manner and subsequently overcoated, this information may also be useful. If no historic records of coating types exist, ASTM D 5043 can be used to determine the types of coatings on the structure.

3.4.3.2. **Visual Inspection:** A quantitative visual inspection of the aged coating system should be conducted to determine the extent of degradation including underfilm corrosion, chalking, peeling, flaking, cracking, checking, rusting, and blistering. Visible surface contaminants including mildew, debris, grease, and oil should be identified. Representative components or areas of the structure should be individually evaluated. ASTM D 5065 provides a detailed description of the visual inspection techniques that should be utilized.

3.4.3.3. **Physical Inspection:** A physical inspection of the structure and aged coating system should be conducted to determine the fi lm thickness, number of layers of paint, adhesion, underlying substrate condition, coating type, and presence of soluble salt contamination. The number of test locations examined must be enough to provide a representative picture of all major conditions existing on the structure. The thickness of the aged paint system may also be determined using ASTM D 4138.

4. Survey Process

4.1. Coating Condition Survey

4.1.1. A coating condition survey of the internal steel support structure of Moffett Field Hangar One was completed to determine the suitability of the existing protective coating system for overcoating to extend the useful service life of the existing coating system, and encapsulate any hazardous or toxic ingredients in the existing coatings. The survey assessed the risk of failure from overcoating using a combination of adhesion, film thickness, and compatibility of an overcoating applied over the existing coating system.

4.1.2. Adhesion testing was performed in accordance with ASTM Standards D3359 and D4541.

4.1.3. Coating film thickness is categorized as less than 10 mils (254 micrometers), between 10-20 mils (254-508 micrometers), and greater than 20 mils (508 micrometers).

4.1.4. The principle relationship is that the risk of failure is greater for thicker coating films, where lower adhesion exists between 1) the existing coating and the underlying substrate, and 2) where lower adhesion between the existing coating and the overcoating material exists.

4.1.5. The data are organized into a matrix shown in Table 1. The risks are categorized as: OK = essentially no risk, LR = low risk, MR = moderate risk, HR = high risk, NO = integrity too poor to salvage.

5. Structure History

5.1. The structure was constructed as an on-grade permanent maintenance and storage enclosure for the US Macon LTA (lighter-than-air) dirigible. The structure was assembled on-site from fabricated steel sections and riveted assembly. The internal steel support structure was painted during erection between 1930 and 1933. A rust-inhibitive protective coating system consisting of a two-coat pigmented linseed oil system using a lead-containing primer and an aluminum flake finish coat was applied to the structure during the erection process. Protective coating systems of the time typically consisted of functional pigments dispersed in an oxidizing linseed oil binder and diluted for application with a hydrocarbon solvent.

5.1.1. Functional pigmentation found in the Hangar One coating system includes red lead tetraoxide and laminar aluminum. The continuous exposure of the structure to wind and weather required this type of coating system to provide protection from moisture-induced rust corrosion.

6. Coating Survey Goals

6.1. The coating condition survey was performed to collect information as to the characteristics of the existing coating system. The survey investigated the following:

6.1.1. Exposure environment

6.1.2. Number of coating layers

6.1.3. Rusting and corrosion

6.1.4. Delamination and peeling

6.1.5. Blistering and cracking

6.1.6. Chalking and erosion

6.1.7. Coating system thickness

6.1.8. Adhesion

7. Coating Survey Safety

7.1. A team of coating inspection personnel assembled at the Moffett Field location, and outfitted with personal protective equipment (PPE) necessary to prevent exposure to lead, polychlorinated biphenyl, and asbestos materials previously identified within the structure.

7.2. Safety requirements for fall protection, hand, foot, head and eye injury prevention were met with additional PPE for each member of the inspection team.

7.3. Communication between the inspection team members and a support staff positioned at the structure entrance was maintained by the use of cellular telephones in case of emergency, and to provide information among the members.

7.4. The Coating Condition Survey (CCS) was performed in accordance with the Accident Prevention Plan (APP) for Non Time Critical Removal Action for polychlorinated biphenyl (PCB) contamination at Installation Restoration (IR) Site 29, Hangar 1, Former Moffett Field Naval Air Station, Moffett Field, CA.

8. Coating Condition Survey Planning

8.1. A sampling plan for the survey was developed to evaluate representative coating locations from Level 1 to Level 9 at support Column 14 to Column 1. The sampling plan provided for all of the conditions to be evaluated (listed above) at each location (these locations are identified on Figure 4).

8.2. There are no known records of the coatings that were applied to the support structure at the time of construction. ASTM D5043 was used to determine the generic types of surface preparation methods that were implemented, and the coatings that were applied. This ASTM standard permitted exposure of the underlying steel substrate to assess intact mill scale, underfilm corrosion and the degree of surface profile.

8.3. Sampling began at Column 14, Level 9 with the visual assessment of the overall appearance of the existing coating system. The visual evaluation included a description of the local environment, pinpoint rusting, underfilm corrosion, peeling, blistering, coating cracking, checking, or chalking, overall coating thickness, coating adhesion, and the condition of the underlying substrate.

8.4. Each assessment was performed IAW applicable ASTM and SSPC standards and methods commonly used throughout the industrial coatings industry. Assessments included appropriate numerical ratings, comparative observations, and actual measurement values as required.

8.4.1. Rust – ASTM D610

8.4.2. Underfilm corrosion - ASTM D1654

8.4.3. Peeling

8.4.4. Blistering - ASTM D714

8.4.5. Cracking/Checking - ASTM D660/D661

8.4.6. Chalking - ASTM D4214

8.4.7. Film thickness – ASTM D610

8.4.8. Adhesion - ASTM D3359/D4541

9. Coating Identification

9.1. The structure was last painted at the time of construction, although additions to the space within the structure have added various unidentified alkyd and latex coatings applied over the original coating system. No historic information for the existing coating system is known to exist. ASTM 5043 was used to make a determination of the generic types of coatings included. That determination provided the paint binder, or resin, was 1) negative for epoxy and polyester, 2) insoluble in ethyl alcohol, mineral spirits, xylene, methyl isobutyl ketone, and acetone solvents. Protective coating technology at the time of structure construction and painting had no inorganic binder materials available for use. Thereby, we conclude the binder system used that would produce the determined solubility characteristics is a chemically cured, oxidized (aged) oleoresinous product consistent with linseed oil. The red-orange coloration of the underlying base coating was consistent with the color of lead tetraoxide, an inorganic lead compound used in coatings as an anti-corrosive to inhibit rusting. Paint chips taken from the structure tested positive for lead, and negative for chromium. Visually, the finish coat was a metallic aluminum color. Taken together, the information from ASTM D5043 indicates the coating system consists of an oleoresinous lead-oxide primer with an oleoresinous aluminum flake filled finish coat.

10. Coating Condition Survey Summary

10.1. Summary

10.1.1. A quantitative inspection of the existing coating system was conducted to determine the extent of coating degradation. Inspection included underfilm corrosion, chalking, peeling, flaking, cracking, checking, rusting, and blistering. Visible surface contaminants including mildew, biological debris, dirt, dust, grease and oil were identified.

10.1.2. The thickness of the original existing coating system was measured in accordance with SSPC-PA 2 and determined to be between 3.0 mils and 10.0 mils (75 micrometers and 250 micrometers).

10.1.3. Adhesion testing was performed on representative areas of the structure, using ASTM D3359 Method B, and ASTM D4541. The ASTM D3359 X-cut adhesion and ASTM D4541 tensile adhesion was determined to be satisfactory at all locations.

10.1.4. Paint chips were previously taken from representative areas of the structure for analysis of the existing coating.

10.1.5. Previous analysis by others determined the presence of 200,000-ppm lead by weight in the total coating film. No other hazardous or toxic metals were detected.

10.2. Survey Results by Location

10.2.1. Column 14 Level 9

10.2.2. Column 12 Level 7

10.2.3. Column 10 Level 5

10.2.4. Column 8 Level 2

10.2.5. Column 6 Level 1

10.2.6. Colum 3 Level 3

10.2.7. Column 2 Level 5

10.2.8. Column 1-2 Level 7

Column 14 Level 9

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 14 Level 9	Interior Exposure – Dry, dusty	6P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	8.0 - 10.0 mils (200-250 micrometers)	4A to 3A	Epoxy – 350 psi (2413 kPa)	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – 475 psi (3275 kPa)	

ASTM D 4541 Adhesion Test Results:
Dollie on the left was adhered using super glue and resulted in a 475 psi pull, with adhesive failure of the existing topcoat to the existing primer.
Dollie on the right was adhered using an epoxy adhesive and resulted in a 350 psi pull. Primary adhesive failure was of the existing topcoat to the existing primer and a very small portion of cohesive failure of the existing primer. Approximately 2% of the failure was cohesive failure of the existing primer.

Column 12 Level 7

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 12 Level 7	Interior Exposure – Dry, dusty	7P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	6.0 - 7.0 mils (150-175 micrometers)	4A to 3A	Epoxy – 375 psi (2585 kPa)	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – glue failure	

ASTM D 4541 Adhesion Test Results:
Dollie was adhered using super glue but the adhesive failed.
Dollie shown above was adhered using an epoxy adhesive and resulted in a 375 psi pull. Primary adhesive failure was of the existing topcoat to the existing primer and a little cohesive failure of the existing primer. Approximately 2% of the failure was cohesive failure of the existing primer.

Column 10 Level 5

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 10 Level 5	Interior Exposure – Dry, dusty	7P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	5.0 - 6.0 mils (125-150 micrometers)	4A to 3A	Epoxy – 500 psi (2585 kPa)	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – 700 psi (4826 kPa)	

ASTM D 4541 Adhesion Test Results:
Dollie on the left was adhered using super glue and resulted in a 700 psi pull, with adhesive failure of the existing topcoat to the existing primer and a very small portion of cohesive failure of the existing primer. Approximately 3-5% of the failure was cohesive failure of the existing primer.
Dollie on the right was adhered using an epoxy adhesive and resulted in a 500 psi pull. Primary adhesive failure was of the existing topcoat to the existing primer and a small percentage of cohesive failure of the existing primer. Approximately 10% of the failure was cohesive failure of the existing primer.

Column 8 Level 2

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 8 Level 2	Interior Exposure – Dry, dusty	5P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	4.0 - 5.0 mils (100-125 micrometers)	4A	Epoxy – 900 psi (6205 kPa)	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – 775 psi (5343 kPa)	

ASTM D 4541 Adhesion Test Results:
Dollie on the left was adhered using super glue and resulted in a 775 psi pull, with adhesive failure of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 35% of the failure was cohesive failure of the existing primer.
Dollie on the right was adhered using an epoxy adhesive and resulted in a 900 psi pull. Primary adhesive failure was of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 20% of the failure was cohesive failure of the existing primer.

Column 6 Level 1

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 6 Level 1	Interior Exposure – Dry, dusty	7P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	3.0 - 4.0 mils (75-100 micrometers)	4A	Epoxy – glue failure	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – 800 psi (5516 kPa)	

ASTM D 4541 Adhesion Test Results:
Dollie on the left was adhered using super glue and resulted in an 800 psi pull, with adhesive failure of the existing topcoat to the existing primer and a small portion of cohesive failure of the existing primer. Approximately 5% of the failure was cohesive failure of the existing primer.
Dollie on the right was adhered using an epoxy adhesive but resulted in glue failure.

Column 3 Level 3

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 3 Level 3	Interior Exposure – Dry, dusty	6P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	7.0 - 9.0 mils (175-225 micrometers)	4A	Epoxy – 300 psi glue failure (2068kPa)	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – 1000 psi (6895 kPa)	

Dollie on the left was adhered using super glue and resulted in a 1000 psi pull, with adhesive failure of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 20% of the failure was cohesive failure of the existing primer.

Dollie on the right was adhered using an epoxy adhesive and resulted in a 300 psi pull, there was approximately 100% glue failure.

Column 2 Level 5

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 2 Level 5	Interior Exposure – Dry, dusty	5P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	4.0 - 7.0 mils (100-175 micrometers)	4A	Epoxy – 800 psi (5516 kPa)	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – 500 psi (3447 kPa)	

ASTM D 4541 Adhesion Test Results:
Dollie on the left was adhered using super glue and resulted in a 500 psi pull, with adhesive failure of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 50% of the failure was cohesive failure of the existing primer.
Dollie on the right was adhered using an epoxy adhesive and resulted in an 800 psi pull. Primary adhesive failure was of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 30% of the failure was cohesive failure of the existing primer.

Column 1-2 Level 7

Structure Component	Local Environment	Rust ASTM D610	Underfilm Corrosion ASTM D1654	Peeling	Blistering ASTM D714
Column 1-2 Level 7	Interior Exposure – Dry, dusty	6P	None	0	10

Cracking ASTM D660	Checking ASTM D661	Film Thickness SSPC-PA 2	Adhesion ASTM D3359	Adhesion ASTM D4541	Condition of Underlying Substrate
None	None	7.0 - 9.0 mils (100-175 micrometers)	3A	Epoxy – dolly lost	Adherent mill scale, no rust, no surface profile
				Cyanoacrylate – 900 psi (6205 kPa)	

ASTM D 4541 Adhesion Test Results:
Dollie on the left was adhered using super glue and resulted in a 500 psi pull, with adhesive failure of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 50% of the failure was cohesive failure of the existing primer.
Dollie on the right was adhered using an epoxy adhesive and resulted in an 800 psi pull. Primary adhesive failure was of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 30% of the failure was cohesive failure of the existing primer.

11. Selection of Overcoating Options

11.1. Overcoating Option:

11.1.1. Overcoating any existing paint system introduces failure risks of delamination caused by internal stresses in the overcoat material being transferred to the underlying coating layers as the overcoating material shrinks during the drying and curing process. If the internal stress of the overcoat exceeds the adhesive or cohesive strength of the existing paint system cracking, loss of adhesion and delamination from the steel substrate may result. Adhesion failure of the existing coating may not be catastrophic, but nonetheless cause premature failure by pinpoint rusting and undercutting at small breaks in the coating system. The recommended overcoating material was two-component epoxy mastic, which was claimed to be compatible over the existing aged oxidizing linseed oil paint, and over tight pinpoint rust. The recommended cleaning method for the existing paint is SSPC-SP 12 LP WC to remove visible surface contaminants.

11.2. Full Removal by High-Pressure Waterjetting Option:

11.2.1. With this option, the entire surface of the structure would be cleaned to bare metal using SSPC-SP 12, “Surface Preparation and Cleaning or Metals by Waterjetting Prior to Recoating.” A two-component epoxy mastic would be applied over the waterjetting-cleaned surface. This option would require full containment and ventilation; and would generate larger amounts of water for disposal. This option was eliminated prior to patch testing.

11.3. Full Removal and Abrasive Blast Cleaning Option:

11.3.1. With this option, the entire surface of the structure would be cleaned to bare metal using SSPC-SP 6, “Commercial Blast Cleaning.” A two-component epoxy mastic would be applied over the abrasive blast-cleaned surface. This option would require full containment and ventilation to collect lead-contaminated dust and debris from the abrasive blast process for disposal. This option was eliminated prior to patch testing.

12. Overcoating Material

12.1. Material Selection

12.1.1. The material selected for overcoating the existing coating system is a two-component modified aluminum epoxy mastic with low-stress and high solids properties. Designated Carbomastic 15 by the manufactures, Carboline Company of St. Louis, MO, this product is claimed to provide outstanding performance properties and proven industrial market field history. The material VOC compliant to current AIM regulations. Carbomastic 15 may be applied over most tightly adhering coatings following surface preparation by low-pressure water cleaning, abrasive blasting and hand or power tool cleaning. Application of Carbomastic 15 may be made by spray, brush or paint roller to achieve a recommended film thickness from 3.0 mils (75 micrometers) to 10 mils (250 micrometers).

13. Patch Testing:

13.1. Patch Test Locations

13.1.1. Two areas representative of the existing coating and steel structure were selected for patch testing. The areas were approximately 6 inches by 18 inches in size, and located at Column 7, East Side of Mezzanine Level, and Column 8, grade level on the East Side.

13.2. The patch test areas were prepared in conformance with the SSPC-SP 12 LP WC method mentioned above.

13.2.1. Surfaces were cleaned to a WJ-3 condition as specifies the following:

A WJ-3 surface shall be cleaned to a matte (dull, mottled) finish when viewed without magnification, is free of all visible oil, grease, dirt and rust except for randomly dispersed stains of rust, tightly adherent thin coatings, and other tightly adherent foreign matter. The staining or tightly adherent matter is limited to a maximum of 33% of the surface.

13.2.2. Carbomastic 15 was mixed according to the manufacturer's instructions and applied to prepared patch test areas with a paint roller application.

13.2.2.1. A single application was made to apply Carbomastic 15 to a wet film thickness of 6 mils to 8 mils (150 to 200 micrometers).

13.2.2.2. The applied Carbomastic 15 was allowed to cure for 33 days at ambient conditions before testing was performed.

13.3. Performance of the overcoating was evaluated by visual inspection and adhesion testing conducted after the Carbomastic 15 had cured for 33 days at uncontrolled ambient temperature and humidity conditions.

13.3.1. Adhesion testing was performed using ASTM D3359 Method B, and ASTM D4541.

Overcoating Patch Test
Column 7 Grade Level

Patch Test Area Adhesion

Surface Preparation: 5,000 psi pressure wash with potable water

Overcoating Application: 4/14/2010 - Carbomastic 15 prepared according to the manufacturer's instruction. Overcoating applied by paint roller at wet film thickness of 3 to 5 mils (75 to 125 micrometers).

Cure Time: 33 days

ASTM D 4541 Adhesion Test Results:

Dollie on the left was adhered using super glue and resulted in a 675 psi pull, with adhesive failure of the existing topcoat to the existing primer and cohesive failure of the existing primer. Approximately 40% of the failure was cohesive failure of the existing primer.

Dollie on the right was adhered using an epoxy adhesive and resulted in a 150 psi pull, with primary adhesive failure of the existing topcoat to the existing primer and cohesive failure of the existing primer. In addition there was approximately 40% glue failure. Approximately 5-10% of the failure was cohesive failure of the existing primer.

Overcoating Patch Test
Column 8 Grade Level

Patch Test Area Adhesion

Surface Preparation: 5,000 psi pressure wash with potable water

Overcoating Application: 4/14/2010 - Carbomastic 15 prepared according to the manufacturer's instruction. Overcoating applied by paint roller at wet film thickness of 3 to 5 mils (75 to 125 micrometers).

Cure Time: 33 days

ASTM D 4541 Adhesion Test Results:

Dollie was adhered using super glue and resulted in a 550 psi pull, with adhesive failure of the existing topcoat to the existing primer and minimal cohesive failure of the existing primer. Approximately 2% of the failure was cohesive failure of the existing primer.

There was no dollie applied using the epoxy adhesive in this area.

14. Risk Assessment Evaluation

14.1. The existing coating system was assessed using X-cut adhesion testing per ASTM D 3359 and pull off adhesion strength per ASTM D 4541. The ASTM D 3359 and ASTM D 4541 test results are summarized in the attachment. When coating systems are evaluated using ASTM D 3359 the minimum acceptable adhesion rating is a 3A rating. This degree of acceptability is based upon SSPC Technology Update No. 3 and by the United States Departments of Transportation. All test results passed the required 3A rating and a number of results had the higher performing rating of 4A.

14.2. Adhesion tests utilizing the ASTM D 4541 procedure for pull off adhesion strength resulted in an average pull strength of 603 psi. The nuclear power industry has a minimum coating adhesion strength requirement of 200 psi. Nuclear power plants require this level of adhesion because coating adhesion failure could result in a significant upset condition within the containment vessel of the power plant. As a result the coatings industry has established 200 psi as the minimum adhesion strength of coatings. Test results conducted at Moffett Field far exceed the minimum value of 200 psi. The SSPC Technology Update No. 3 document also references adhesion characteristics using ASTM D 4541. Within Technology Update No. 3 adhesion results greater than 600 psi receive the best possible rating. The risk assessment table in Technology Update No. 3 states that when you have adhesion ratings of 3A or better and adhesion pull strengths of 200 psi and better, there is “essentially no risk of failure”.

14.3. Testing conducted at Moffett Field have demonstrated that adhesion of the existing system is very good and all results attest to the fact that the existing coating system has no risk for overcoating. Test patches of the recommended overcoat system of Carbomastic 15 have demonstrated excellent adhesion to the existing coating system. There were no adhesion failures at all of the Carbomastic 15 to the existing system. Test results of the overcoat system demonstrated that system split internally either between the existing topcoat and the existing primer, or a cohesive failure of the existing primer. The failure points of the overcoat system were identical to the failure point of the existing system.

14.4. On site testing has demonstrated unequivocally that the existing system has good adhesion and is acceptable for overcoating. It has also been shown that the Carbomastic 15 has excellent adhesion to the existing coatings. All testing when graded either by nuclear power standards, Departments of Transportation or SSPC Technology Update No. 3 have demonstrated that there is “essentially no risk of failure”.

15. Areas Requiring Additional Work

15.1. Six locations within Hangar 1 were identified with conditions and characteristics not representative of the overall steel support structure as follows.

15.1.1. "Back-to-back angles"

15.1.1.1. There are some areas that consist of (2) 6" x 6" x 3/8" or (2) 3" x 5" x 3/8" steel angles that are "back-to-back" with a small void between these angles.

15.1.1.2. The application of coating material to these partially inaccessible areas cannot be controlled for specific film thickness.

15.1.1.3. Too little coating may cause rusting and staining where too much coating will cause runs, drips and the sagging of applied coatings.

15.1.1.4. The amount of steel requiring the additional attention is probably less than 1% of all building steel. In order to provide protection against rusting and staining in these areas, we recommend that "backer rod" and "caulking" be applied to these members. It should be installed on the top side and bottom side of each void.

15.1.1.5. This "backer rod" and "caulking" will seal these voids and prevent moisture from accumulating in the crevice.

15.1.1.6. The correct application would be to apply the backer rod and caulk after we apply the finish paint to the accessible areas. Caulking will be similar in color to the Carbomastic 15.

15.1.1.7. We find only 1344 lineal feet of "back-to-back" angles, and they appear to be within fifteen (15) feet of the hangar floor.

15.2.2. Rusted areas on each of the four doors.

15.2.2.1. Each of the four “clam shell doors” exhibit surface rusting in the first three of nine bays of the doors.

15.2.2.2. Excess moisture has caused surface rusting in these areas. This rusting of the steel is from top to bottom in the three bays of each door.

15.2.2.4. Additional cleaning is required in these areas to keep their warranty in place.

15.2.2.5. Cleaning should use a “Roto Head” on the water blaster wand with water pressure above the specified 3000 to 4000 psi. It is our opinion that 5000 psi to 8000 psi, and concentrate on these rusty areas to remove more of the rust and contamination allowing the Carbomastic 15 adhere to the properly cleaned steel.

15.2.3. Steel between Column Row 8 and 12 from grade level up approximately 24’ where the East door at column Row 8 has been propped open.

15.2.3.1. Steel surfaces in this area were exposed to excessive moisture and wind due to the open side door over the past many years.

15.2.3.2. The interior steel that has excessive rusting and contaminates is from grade elevation up to approximately 24’ elevation from Column Row 8 to 12.

15.2.3.3. Conclusion: These areas should have additional surface preparation.

15.2.4. Steel decks at the 24’ elevation running the entire length of the building on the East and West Side, 880’ x 28’ wide. These are

surfaces to be cleaned on top and bottom on both sides (East/West).

15.2.4.1. After the lower offices and buildings are removed from grade elevation up to the 35’ elevation, there will be a mezzanine deck remaining to clean and coat. This mezzanine is approximately 880 feet long by 28 feet wide. The mezzanine is on both sides of the hangar. The top side of the steel deck is flat and the bottom side of the mezzanine is flat plate resting on small three inch I-beams supporting the plate.

15.2.4.2. The topside and the bottom side of the deck have no primer. This deck has only the aluminum finish coat applied over mill scale. Much of this coating has failed and is severely rusted.

15.2.4.3. The large and small beams that support this steel deck have been painted with the red lead primer, and finish coated with the aluminum coating. These beams show the same condition as the superstructure. They are currently in good condition.

15.2.4.4. The underside of this metal deck is obscured because of the wood buildings below this deck that hide the underside, but we assume that the metal deck is consistent with our observations on both sides from end to end.

15.2.4.5. This deck should be abrasive blasted to a “Near White Metal Condition” (SSPC-SP 10 or NACE Level 2), both the top and bottom side, to remove the rust, mill scale, and the existing aluminum coating that has no rust inhibiting properties. This bare steel should be primed with Carboline Carbozinc 859, a rust inhibiting epoxy primer at 3-5 mils DFT, and finish coated with Carbomastic 15 at 4-8 mils DFT.

15.2.4.6. This abrasive blasting of the steel deck underside will damage adjacent coated surfaces such as the 15 I-beams supporting the deck. These beams are small, 3” x 3”, but run

the length of the deck on each side (880 LF) of the building. The same coating system should be applied to these beams.

15.2.5. Clam Shell Door "trucks" supporting each of the four doors.

15.2.5.1. If the Navy/NASA requests cleaning and coating of these items, the following specifications will apply.

15.2.5.2. There are 9 trucks for each door and a total of 36 trucks.

15.2.5.3. These trucks need additional surface preparation using a "Roto-Head" water blasting.

15.2.5.4. Grease and oil must be removed from the wheels, axles, and gears prior to surface preparation.

16. Referenced Standards and Methods

a) **SSPC STANDARDS:**

i) **PA 1** Shop, Field, and Maintenance Painting of Steel

ii) **PA 2** Measurement of Dry Paint Thickness with Magnetic Gages

iii) **PA Guide 4** **G**uide to Maintenance Repainting with Oil Base or Alkyd Painting Systems

iv) **PA Guide 5** Guide to Maintenance Painting Programs

v) **SP 1** Solvent Cleaning

vi) **SP 2** Hand Tool Cleaning

vii) **SP 3** Power Tool Cleaning

viii) **SP 5** White Metal Blast Cleaning

ix) **SP 6** Commercial Blast Cleaning

x) **SP 7** Brush-Off Blast Cleaning

xi) **SP 10** Near-White Blast Cleaning

xii) **SP 11** Power Tool Cleaning to Bare Metal

xiii) **SP 12** Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh Pressure Water Jetting Prior to Recoating

xiv) **Guide 6** Guide for Containing Debris Generated During Paint Removal Operation

xv) **Guide 7** Guide for the Disposal of Lead Contaminated Surface Preparation Debris

b) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS:

i) D 522 Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings

ii) D 610 Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces

iii) D 1654 Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

iv) D 2370 Standard Test Method for Tensile Properties of Organic Coatings

v) D 3359 Standard Test Methods for Measuring Adhesion by Tape Test

vi) D 3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings

vii) D 4138 Standard Test Method for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive Means

viii) D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

ix) D 4940 Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives

x) D 5043 Standard Test Methods for Field Identification of Coatings (Withdrawn 1997)

xi) D 5064 Standard Practice for Conducting a Patch Test to Assess Coating Compatibility

xii) D 5402 Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rub

xiii) **D 5065** Standard Practice for Assessing the Condition of Aged Coatings on Steel Surfaces

17 TABLES

17.1 TABLE 1

OVERCOATING RISK ASSESSMENT BASED ON ADHESION/FILM THICKNESS/RUSTING

COMPATIBILITY CHARACTERISTICS

ADHESION CHARACTERISTICS			COATING THICKNESS			RUST GRADING	
ASTM D3359 Method A	Percentage Removed	ASTM D4541 Tensile Strength at Failure	<10 mils (<254 µm)	10-20 mils (254-508 µm	>20 mils (>508 µm)	ASTM D610 Pinpoint Rust Grade	% of Surface Rusted
5A	0%	>600 psi (4136 kPa)	OK	OK	OK	10-P	≤ 0.01%
4A	1% to 5%	300-600 psi (2068 - 4136 kPa)	OK	OK	OK	9-P	0.01 to 0.03%
3A	6% to 15%	200-300 psi (1379 - 2068 kPa)	OK	OK	OK	8-P	0.03 to 0.1
2A	16% to 35%	100-200 psi (689 - 1379 kPa)	LR	LR	MR	7-P	0.1 to 0.3%
1A	36% to 65%	50-100 psi (345 - 689 kPa)	MR	HR	HR	6-P	0.3 to 1.0%
0B	>65%	≤ 50 psi (345 kPa)	NO	NO	NO	5-P	1.0 to 3.0%
						4-P	3.0 to 10%
						3-P	10 to 16%
						2-P	16 to 33%
						1-P	33 to 50%
						0	≥50%

Risk Assessment Values

OK = essentially no risk of failure

LR = low risk of failure

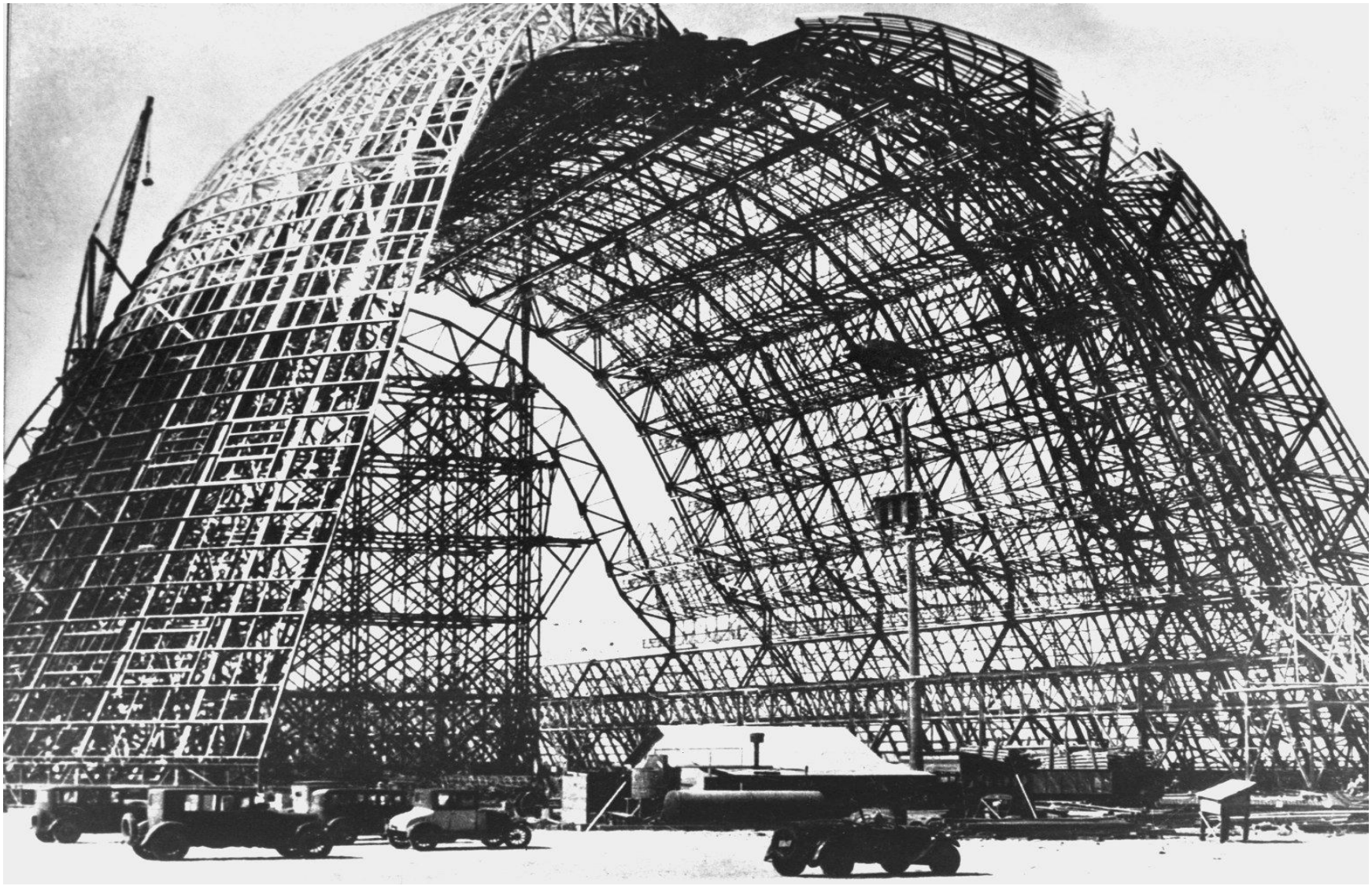
MR = moderate risk of failure

HR = high risk of failure

NO = coating condition too poor to overcoat

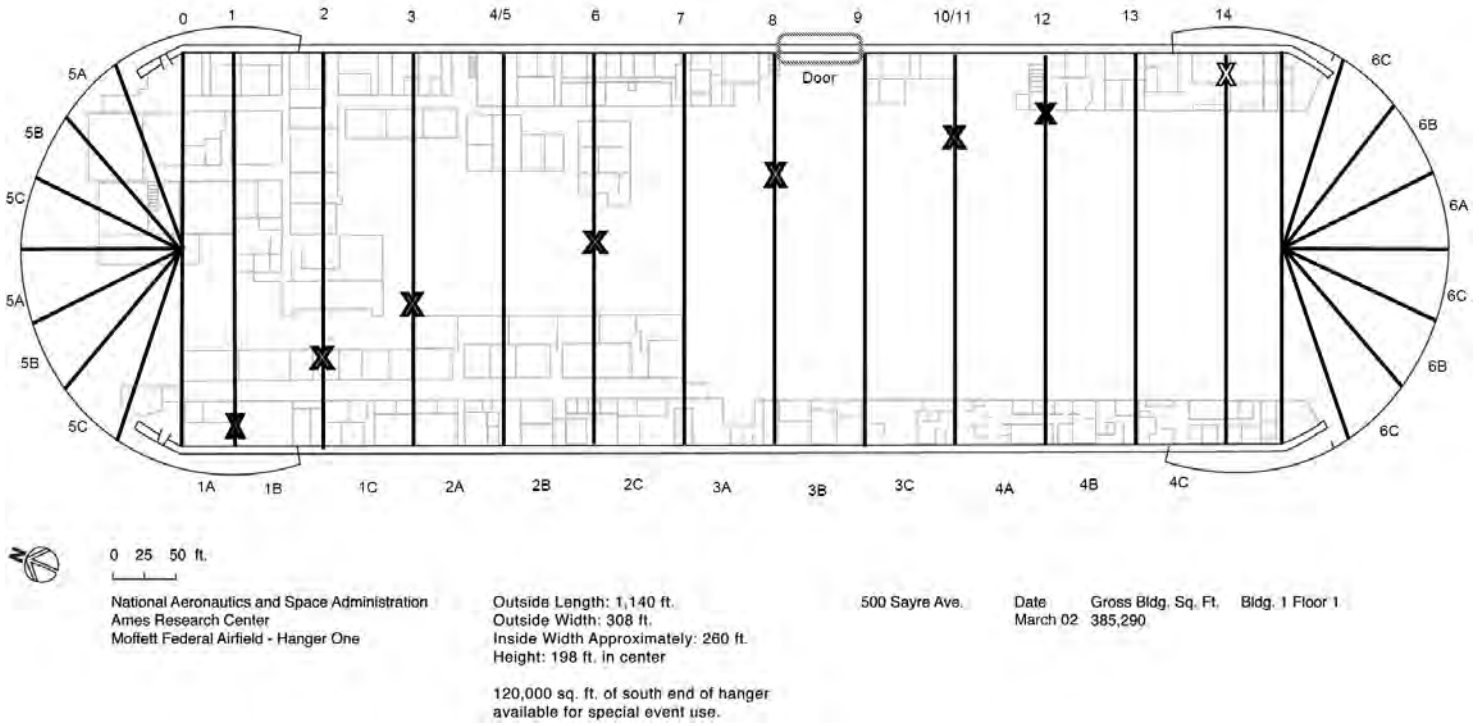
18 FIGURES

18.1 Figure 1 - Hangar 1 Steel Support Structure (under construction)

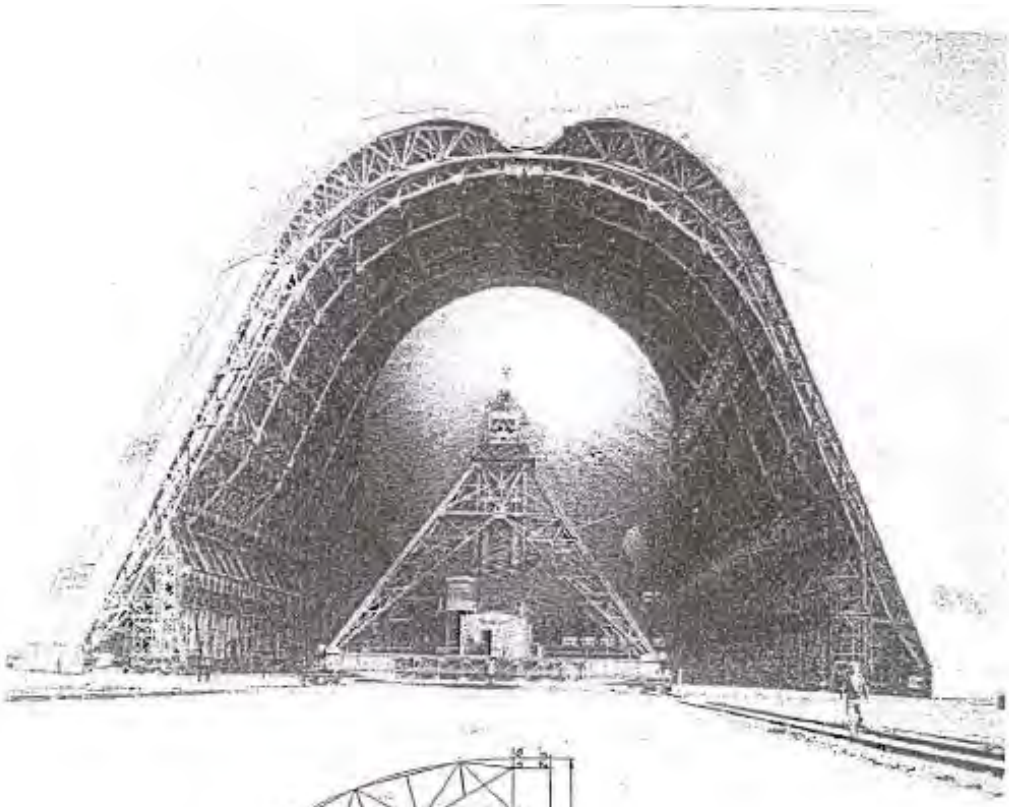


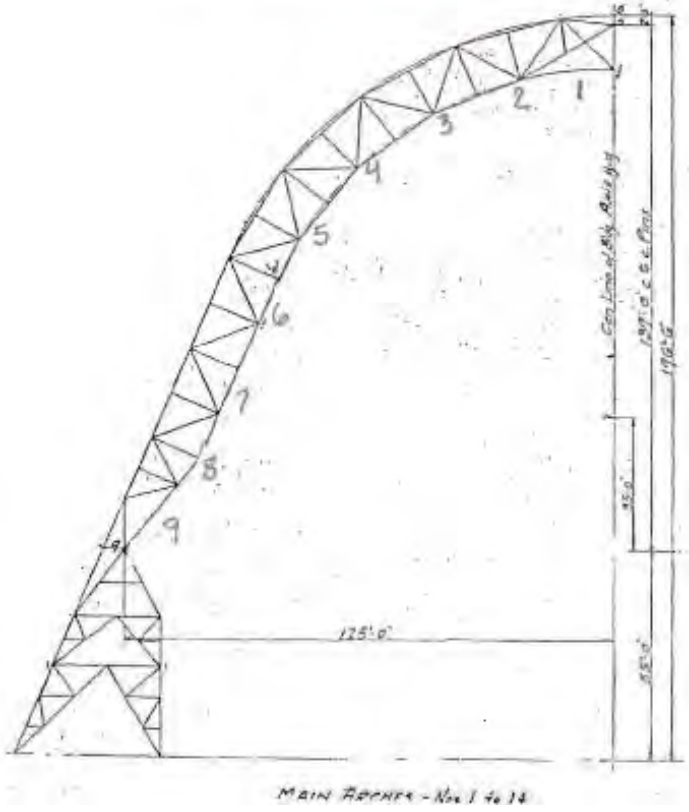
18.2 Figure 2 Moffett Field - Hangar 1 Column Locations

ITEM	Column Row	Level	Side	
A	14	9	East	South End
B	12	7	East	
C	10	5	East	
D	8	2	East	
E	6	1	West	
F	3	3	West	
G	2	5	West	
H	1—2	7	West	North End



18.3 Figure 3 Hangar 1 Level Index





"Level" Index

19 PHOTOGRAPHS

19.1 West Mezzanine – Rusty Deck

19.2 West Mezzanine – Scraped Aluminum paint off of deck to show "No Paint" and evidence of "Mill Scale"

19.3 Underside of East Mezzanine – Shows the 15 small I-beams supporting the Mezzanine Deck

19.4 Underside of Mezzanine showing the delaminating paint from the Aluminum

19.5 Rusty Deck of Mezzanine – East Side

19.6 Rusty Deck of Mezzanine – East Side

19.7 Rusty Deck of West Mezzanine

19.8 Rusty Door Truck at South East Door

APPENDIX C

UTILITY TERMINATION AS-BUILT DRAWINGS

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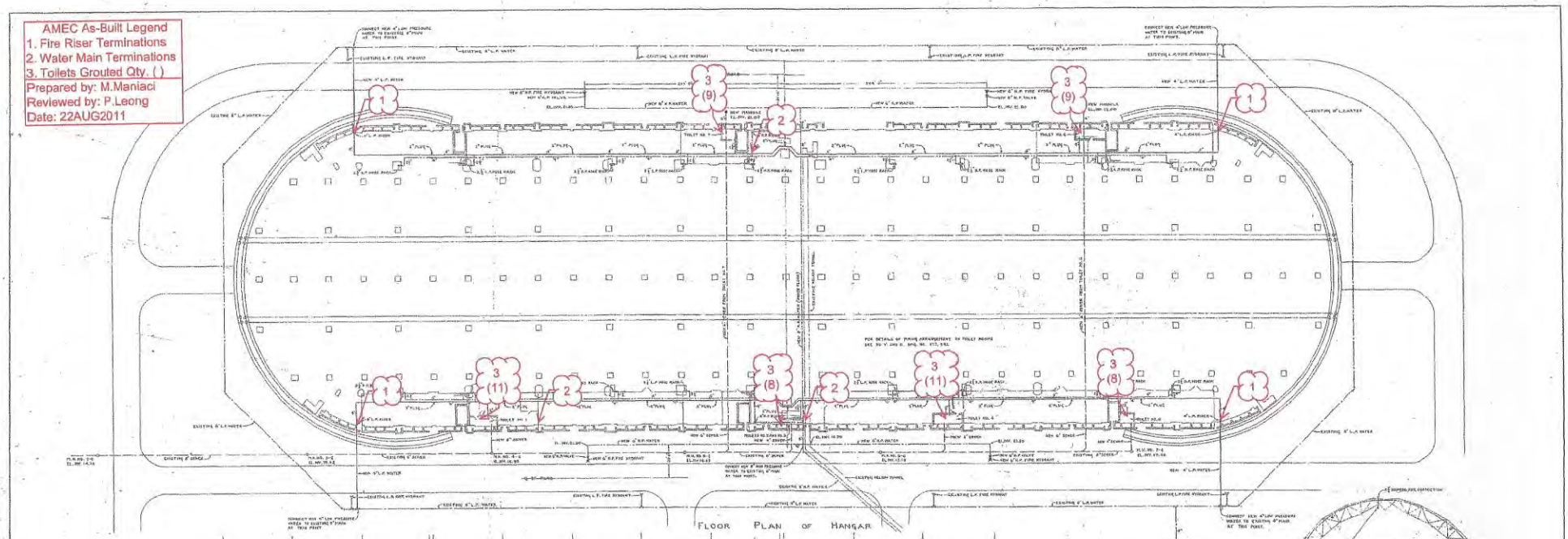
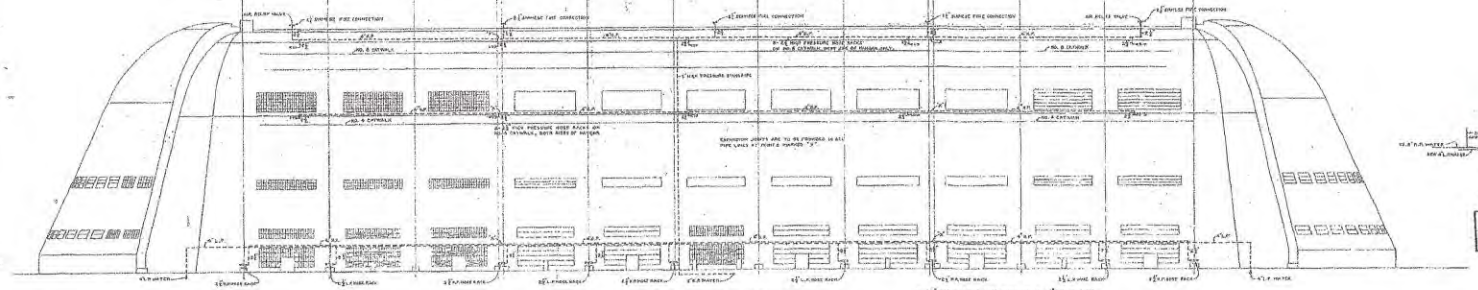
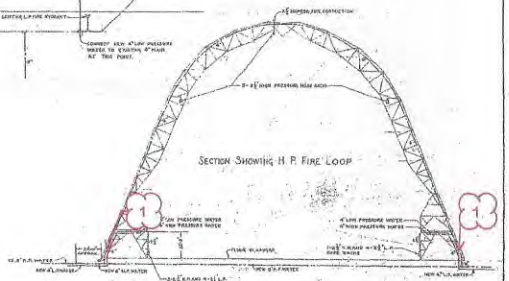
AMEC As-Built Legend
1. Fire Riser Terminations
2. Water Main Terminations
3. Toilets Grouted Qty. ( )
Prepared by: M.Maniaci
Reviewed by: P.Leong
Date: 22AUG2011



FLOOR PLAN OF HANGAR



WEST ELEVATION OF HANGAR
(FIRE SYSTEM)



SECTION SHOWING H. P. FIRE LOOP

ARC - MOFFETT
A4586-92 87-A094 1

U. S. NAVAL AIR STATION
SUNNYVALE, CALIF.
HANGAR
SEWER AND WATER SYSTEMS

113.983

1202-18-15

National Aeronautics and Space Administration
Ames Research Center
Moffett Field, California

A M4---0001-87 REV

APPENDIX D

CM15 EPOXY COATING PRODUCT DATA

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product data carboline®

Carbomastic® 15

Selection & Specification Data

Generic Type Epoxy mastic

Description Aluminum-pigmented, low-stress, high-solids mastic with outstanding performance properties and proven field history. Carbomastic 15 was the pioneer mastic coating in a number of industrial markets and today still provides unmatched levels of barrier protection and corrosion resistance over existing finishes and rusted or SSPC-SP2 or SP3-cleaned steel.

Features

- Excellent performance over minimal surface preparation of steel substrates
- Suitable as a topcoat for most tightly adhered existing coatings
- Excellent choice for field touch-up of zinc-rich primers and galvanized steel
- Unique formulation with aluminum flakes provides exceptional barrier protection
- May be applied at 35°F (2°C) when CM 15 FC's part B is utilized
- Suitable for use under insulation on hot surfaces operating up to 300°F(150°C)
- VOC compliant to current AIM regulations

Color Aluminum (C901); Red (M500)
Color variations within a batch and from batch to batch may occur due to the metallic pigments and variations in application techniques and conditions. Neither product is color matched, nor will they match each other. (15 FC may have a greenish appearance.) *Red (M500) is available for use as a contrasting primer in multiple coat applications, but should always be topcoated.

Primers Self-priming. May be applied over most tightly adhering coatings as well as inorganic zinc primers. A mist coat may be required to minimize bubbling over inorganic zinc primers.

Topcoats May be coated with Acrylics, Epoxies, Alkyds, or Polyurethanes depending on exposure and need.

Dry Film Thickness 3.0 - 5.0 mils (76 - 127 microns) per coat
7.0 - 10.0 mils (178 - 254 microns) per coat
Do not exceed 10.0 mils (250 microns) in a single coat.

Solids Content By Volume 90% +/- 2%

HAPs Values As supplied: 0.70 lbs/solid gal

Theoretical Coverage Rate
1444 ft^2 at 1 mil (35 m^2/l at 25 microns)
481 ft^2 at 3 mils (12 m^2/l at 75 microns)
144 ft^2 at 10 mils (4 m^2/l at 250 microns)

Allow for loss in mixing and application.

Severe Exposures Temperature resistance under insulation: Up to 300°F(150°C)
Discoloration is observed above 180°F(82°C) but does not affect performance.

VOC Values
Thinner 10 32 oz/gal: 2.o lbs/gal (242 g/l)
Thinner 236 E 32 oz/gal: 0.7 lbs/gal (88 g/l)
Thinner 76 32 oz/gal: 1.9 lbs/gal (231 g/l)
As Supplied 0.7 lbs/gal (88 g/l)
These are nominal values.

Selection & Specification Data

Substrates & Surface Preparation

General Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

Steel Immersion: SSPC-SP10 with a 2.0-3.0 mil (50-75 micron) surface profile.
Non-Immersion: SSPC-SP6 with a 2.0-3.0 mil (50-75 micron) surface profile for maximum protection. SSPC-SP2, SP3, SP7, or SP12 are also acceptable methods.

Galvanized Steel For optimum performance sweep blast cleaning is recommended. Consult your Carboline Sales Representative for specific recommendations.

Previously Painted Surfaces Lightly sand or abrade to roughen and degloss the surface. Existing paint must attain a minimum 3A rating in accordance with ASTM D3359 “X-Scribe” adhesion test.

Performance Data

Test Method	System	Results
ASTM 4060 Taber Abrasion	1 ct. CM15	130 mg loss; 1000 cycles using CS 17 wheel and 1000 gm load,
ASTM B117 Salt Spray	Rusted Steel 1 ct. CM 15	No blistering, rusting, or softening No rust creep from scribe
ASTM D1735 Water Fog	Rusted Steel 1ct CM 15	No blistering or softening, No creep from scribe
ASTM D522 Flexibility	Blasted steel 1 ct. CM15	A) Conical - crack 0.38", actual elongation 48.57% B) Cylindrical- no cracking observed
ASTM G 14 Impact Resistance	A) Blasted Steel 1 ct. CM 15, B) Rusted Steel 1 ct. CM 15	Area Damaged A) 1/4 inch (0.25") B) 1/4 - 9/16 inch (0.44")

Test reports and additional data available upon written request.

Application Equipment Guidelines

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

Spray Application (General) The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional Spray Pressure pot equipped with dual regulators, 3/8” I.D. minimum material hose, .086” I.D. fluid tip and appropriate air cap.

March 2012

0185

Carbomastic® 15

Application Equipment Guidelines

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

Brush & Roller (General) Multiple coats may be required to obtain desired appearance, recommended dry film thickness and adequate hiding. Avoid excessive re-brushing or rerolling. Use clean natural bristle brush or medium nap phenolic core roller. Work coating into all irregularities.

Airless Spray Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8" I.D. (min.)
Tip Size: .019-.025"
Output PSI: 1900-2100
Filter Size: 60 mesh
*Teflon packings are recommended and available from the pump manufacturer.

Plural Component May be applied by plural component spray equipment. Contact Carboline Technical Service for specific recommendations.

Mixing & Thinning

Mixing Power mix separately, then combine and power mix. DO NOT MIX PARTIAL KITS.

Thinning May be thinned up to 32 oz/gal (25%) with thinner #10. Substitute Thinner #72 when non-photochemically reactive thinners are desired or Thinner 236E if exempt thinners are required. To extend pot life, may be thinned up to 32 oz/gal (25%) with Thinner 72. Use of thinners other than those supplied by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

Ratio 1:1 Ratio (A to B)

Pot Life Approximately 30 minutes at 75°F (24°) unthinned. When thinned 12%, pot life will be 45 minutes at 75°F. Pot life ends when coating becomes too viscous to use.

*For CM 15 FC

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Minimum	50 °F (10 °C)	50 °F (10 °C)	50 °F (10 °C)	0%
Maximum	90 °F (32 °C)	130 °F (54 °C)	100 °F (38 °C)	95%

This product simply requires the substrate temperature to be above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel and interfere with proper adhesion to the substrate. Special application techniques may be required above or below normal application conditions.

Curing Schedule

Surface Temp. & 50% Relative Humidity	Final Cure Immersion	Dry to Recoat or Topcoat
50 °F (10 °C)	15 Days	5 Days
60 °F (16 °C)	10 Days	3 Days
75 °F (24 °C)	5 Days	24 Hours
90 °F (32 °C)	3 Days	18 Hours

For CM 15 Dry to Touch is 5 hours at 75°F (24°C). Maximum re-coat/topcoat times are 30 days for epoxies and 90 days for polyurethanes at 75°F (24°C).
These times are based on a 5.0-7.0 mil (125-175 micron) dry film thickness. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure. Excessive humidity or condensation on the surface during curing can interfere with the cure, can cause discoloration and may result in a surface haze. Any haze or blush must be removed by water washing before recoating. If the maximum recoat time is exceeded, the surface must be abraded by sweep blasting prior to the application of additional coats.
Note: This product contains conductive pigments and cannot be holiday tested.

Cleanup & Safety

Cleanup Use Thinner #2 or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation When used as a tank lining or in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. In addition to ensuring proper ventilation, appropriate respirators must be used by all application personnel.

Packaging, Handling & Storage

Shelf Life Part A & B: Min. 36 months at 75°F (24°C)
*Shelf Life : (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.

Shipping Weight (Approximate) 2 Gallon Kit - 25 lbs (11 kg)
10 Gallon Kit - 124 lbs (56 kg)

Storage Temperature & Humidity 45° - 110°F (7-43°C)
0-90% Relative Humidity

Flash Point (Setaflash) Part A: >200°F (93°C)
Part B: 76°F (24°C)

Storage Store Indoors.

carboline®
Coatings - Linings - Fireproofing
2150 Schuetz Rd., St. Louis, MO 63146
PH: 314-644-1000 Toll-Free: 800-848-4645
www.carboline.com

An RPM Company

March 2012
0185

carboline

Carboguard®1340

Selection & Specification Data

Generic Type
Polyamido-Amine Epoxy

Description
Penetrating primer/sealer for use on concrete substrates and Carboline Pyrocrete Fireproofing products. It performs extremely well in sealing cementitious surfaces and is designed to receive a variety of different generic types of finish coats. Some recommended uses of 1340 include the use as a curing compound or form release agent. When applied to "green" concrete it will retard the escape of moisture during the cure period. It is also excellent for use as a form release coating on plywood or steel forms. Meets the requirements of ASTM C309 when applied at 5.0-10.0 mils (125-250 microns) wet.

Features
- Exceptional wetting characteristics
- Low stress, highly flexible film
- Very high solids
- Low odor
- User-friendly brush & roller application
- VOC compliant to current AIM regulations

Color
Clear Amber (0910)

Finish
Gloss

Primers
Self-priming. May be applied over most generic types of coatings.

Topcoats
Acrylics, Epoxies, Polyurethanes

Dry Film Thickness
1.0 - 2.0 mils (25 - 50 microns) DFT for most applications but can be applied up to 4.0 mils (100 microns) for sealing rough surfaces or shot-blasted concrete. When used as a curing and/or form release agent, it may be applied up to 10.0 mils (250 microns) wet.

Solids Content
By Volume: 98% + 2%

Theoretical Coverage Rate
1572 mil ft^2 (38.5 m^2/l at 25 microns)
Allow for loss in mixing and application. Porous and irregular substrates like concrete/fireproofing coverage rates and should be taken into account.

VOC Values
Per EPA Method 24: 0.2 lbs/gal (24 g/l)
Thinned:
25 oz/gal w/ #76: 1.3 lbs./gal (156 g/l)
These are nominal values.

Dry Temp. Resistance
Continuous: 175°F (79°C)
Non-Continuous: 200°F (93°C)

Limitations
- Epoxies lose gloss, discolor and eventually chalk in sunlight exposure.
- Do not use for immersion service.

Substrates & Surface Preparation

Concrete
Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

As a Curing Membrane
Carboguard 1340 has been tested in accordance with ASTM C 309-98a Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete and passes the requirements set forth in the standard. While 1340 may be applied to green concrete, generally additional coats or other coatings should not be applied until the concrete has cured 28 days at 75°F (24° C) and 50% R.H. or equivalent. Prior to topcoating we recommend that a test patch be applied to insure proper adhesion.

General
Concrete must be cured 28 days at 75°F (24°C) and 50% relative humidity or equivalent. Prepare surfaces in accordance with ASTM D4258 Surface Cleaning of Concrete and ASTM D4259 Abrading Concrete. Voids in concrete may require surfacing. Application prior to surfacing assures tight adhesion between concrete and surfacers or membranes. Compatibility with other coatings, surfacers and polyurethane membranes eliminates need for form release oils or curing oils.

Pyrocrete Fireproofing Products
Contact Carboline Technical Service or your Carboline sales representative for specific applications and requirements.

Previously Painted Surfaces
Lightly sand or abrade to roughen and degloss the surface. Existing paint must attain a minimum 3B rating in accordance with ASTM D3359 "X-Scribe" adhesion test.

Carboguard® 1340

Application Equipment

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.
General Guidelines:

Spray Application (General) Contact Carboline Technical Service for spray equipment and technique.

Brush & Roller (General) Avoid excessive re-brushing or re-rolling. Apply only enough material to wet the surface uniformly. Any puddles formed must be brushed out.

Brush Use a medium bristle brush.

Roller Use a medium or long-nap synthetic roller cover with phenolic core.

Mixing & Thinning

Mixing Power mix separately, then combine and power mix. DO NOT MIX PARTIAL KITS.

Ratio 1:1 Ratio (A to B)

Thinning Normally not required but may be thinned up to 25 oz/gal (20%) with Thinner #76. Use of thinners other than those supplied or recommended by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

Pot Life 45 minutes at 75°F (24°C). Pot life will be less at higher temperatures.

Cleanup & Safety

Cleanup Use Thinner #2 or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation When used in enclosed areas and product is thinned, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved respirator.

Caution This product exotherms at the end of its pot life. Any unused quantities will become extremely hot. The material begins to thicken at the end of its pot life, which is an indication of exotherm. Immediately spread out on an appropriate surface or add sand or other suitable heat sink to the unused material to reduce the severity of exotherm. Take appropriate precautions against breathing fumes. This product when thinned contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	60°-80°F (16°-27°C)	60°-80°F (16°-27°C)	60°-80°F (16°-27°C)	0-80%
Minimum	60°F (16°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	130°F (54°C)	100°F (38°C)	90%

This product simply requires the substrate temperature to be above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel. Special application techniques may be required above or below normal application conditions.

Curing Schedule

Surface Temp. & 50% Relative Humidity	Dry to Topcoat or Handle	Maximum Recoat Time w/ Water Borne	Maximum Recoat Time w/ Solvent Borne	Final Cure
50°F (10°C)	24 Hours	14 Days	30 Days	9 Days
75°F (24°C)	12 Hours	14 Days	30 Days	6 Days
90°F (32°C)	6 Hours	7 Days	15 Days	3 Days

These times are based on a 1.0-2.0 mil (25-50 micron) dry film thickness. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure. Excessive humidity or condensation on the surface during curing can interfere with the cure, can cause discoloration and may result in a surface haze. Any haze or blush must be removed by water washing before recoating. During high humidity conditions, it is recommended that the application be done while temperatures are increasing. If the maximum recoat time is exceeded, the surface must be abraded by sweep blasting or sanding before the application of additional coats.

Curing Schedule for Curing/Form Release Agent

Surface Temp. & 50% Relative Humidity	Dry to Topcoat or Handle	Final Cure
75°F (24°C)	5 Hours	6 Days

These times are based on 5.0-10.0 (125-250 microns) mils dry film thickness.

Packaging, Handling & Storage

Shipping Weight (Approximate) 0.5 Gallon Kit: 6 lbs (3 kg); 2 Gallon Kit: 22 lbs (10 kg)

Flash Point (Setaflash) Part A: >205°F (96°C); Part B: >205°F (96°C)

Storage Temperature & Humidity 40° - 110°F (4°-43°C) Store indoors. 0-90% Relative Humidity

Shelf Life Part A & B: Min. 36 months at 75°F (24°C)

***Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.**

carboline.
350 Hanley Industrial Court, St. Louis, MO 63144-1599
314/644-1000 314/644-4617 (fax) www.carboline.com
An RPM Company

October 2009 replaces September 2009

Material Safety Data Sheet

CHEMTREC Transportation Emergency Phone: 800-424-9300

Pittsburgh Poison Control Center Health Emergency No.: 412-681-6669

•NOTE: The CHEMTREC Transportation Emergency Phone is to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals

Section 1 - Chemical Product / Company Information

Product Name: CARBOGUARD 1340 (fka PYROCOTE 1340) PART B

Identification Number: PLMSDS 0918B1NL

Product Use/Class: Polyamido-AMine Epoxy - FOR INDUSTRIAL USE ONLY

Revision Date: 05/18/2011

Supercedes : 07/28/2009

Preparer: Regulatory, Department

Manufacturer:
Carboline Company
2150 Schuetz Road
St. Louis, MO 63146
(800) 848-4645

Section 2 - Composition / Information On Ingredients

Chemical Name	CAS Number	Weight % Less Than	ACGIH TLV-TWA	ACGIH TLV-STEL	OSHA PEL-TWA	OSHA-CEIL
BENZYL ALCOHOL	100-51-6	65.0	N/E	N/E	N/E	N/E
TOFA, REACTION PRODUCTS WITH TEPA	68953-36-6	25.0	N/E	N/E	N/E	N/E
DIETHYLENETRIAMINE	111-40-0	5.0	1 PPM	N/E	4 MGM3	N/E
BISPHENOL A	80-05-7	5.0	N/E	N/E	N/E	N/E
4-NONYL PHENOL, BRANCHED	84852-15-3	5.0	N/E	N/E	N/E	N/E

Section 3 - Hazards Identification

Emergency Overview: Skin and eye irritant.

Effects Of Overexposure - Eye Contact: Can cause eye burns.

Effects Of Overexposure - Skin Contact: May cause skin sensitization. May cause allergic skin reaction. May be harmful if absorbed through the skin. Can cause skin burns.

Effects Of Overexposure - Inhalation: Harmful if inhaled, may affect the brain or nervous system, causing dizziness, headache, or nausea. May cause nose and throat irritation. May cause lung irritation. May cause allergic respiratory reaction, effects may be permanent.

Effects Of Overexposure - Ingestion: May be harmful if swallowed.

Effects Of Overexposure - Chronic Hazards: Reports have associated repeated and prolonged

occupational overexposure to solvents with permanent brain and nervous system damage.

Primary Route(s) Of Entry: Skin Contact, Skin Absorption, Inhalation, Ingestion, Eye Contact

Medical Conditions Prone to Aggravation by Exposure: If sensitized to amines, epoxies, or other chemicals do not use. See a physician if a medical condition exists.

Section 4 - First Aid Measures

First Aid - Eye Contact: If material gets into eyes, flush with water immediately for 15 minutes. Consult a physician.

First Aid - Skin Contact: In case of contact, wash skin immediately with soap and water.

First Aid - Inhalation: If inhaled, remove to fresh air. Administer oxygen if necessary. Consult a physician if symptoms persist or exposure was severe.

First Aid - Ingestion: If swallowed do not induce vomiting. Seek immediate medical attention.

Section 5 - Fire Fighting Measures

Flash Point, F: 206F (96C) (Setaflash)

Lower Explosive Limit, %: 6.0
Upper Explosive Limit, %: 36.0

Extinguishing Media: Carbon Dioxide, Dry Chemical, Foam, Water Fog

Unusual Fire And Explosion Hazards: This product contains less than 1% volatile components. The amount of vapors that could accumulate are minimal. However, vapors are heavier than air and could travel long distances, ignite, and flashback. Eliminate all ignition sources. Keep away from sparks, open flames, and heat sources. All electrical equipment and installations should be made and grounded in accordance with the National Electrical Code. In areas where explosion hazards exist, workers should be required to use nonferrous tools and to wear conductive and non-sparking shoes.

Special Firefighting Procedures: Evacuate hazard area of unprotected personnel. Use a NIOSH approved self-contained breathing unit and complete body protection. Cool surrounding containers with water in case of fire exposure.

Section 6 - Accidental Release Measures

Steps To Be Taken If Material Is Released Or Spilled: Eliminate all ignition sources. Handling equipment must be grounded to prevent sparking. Evacuate the area of unprotected personnel. Wear appropriate personal protection clothing and equipment. Follow exposure controls/personal protection guidelines in Section 8. Contain and soak up residual with an aborbent (clay or sand). Take up absorbant material and seal tightly for proper disposal. Dispose of in accordance with local, state and federal regulations. Refer to Section 15 for SARA Title III and CERCLA information.

Section 7 - Handling And Storage

Handling: Do not get in eyes, on skin, or on clothing. Keep container tightly closed when not in use. Wear personal protection equipment. Do not breathe vapors. Wash thoroughly after handling. If pouring or transferring materials, ground all containers and tools. Do not weld, heat, cut or drill on full or empty containers. Use only in accordance with Carboline application instructions, container label and Product Data Sheet.

Storage: Keep away from heat, sparks, open flames and oxidizing agents. Keep containers closed. Store in a cool, dry place with adequate ventilation.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use explosion-proof ventilation when required to keep below health exposure guidelines and Lower Explosion Limit (LEL).

Respiratory Protection: Use only with ventilation to keep levels below exposure guidelines listed in Section 2. User should test and monitor exposure levels to ensure all personnel are below guidelines. If not sure, or not able to monitor, use MSHA/NIOSH approved supplied air respirator. Follow all current OSHA requirements for respirator use. For silica containing coatings in a liquid state, and/or if no exposure limits are established in Section 2 above, supplied air respirators are generally not required.

Skin Protection: Recommend impervious gloves and clothing to avoid skin contact. If material penetrates to skin, change gloves and clothing. The use of protective creams may be beneficial to certain individuals. Protective creams should be applied before exposure.

Eye Protection: Recommend safety glasses with side shields or chemical goggles to avoid eye contact.

Other protective equipment: Eye wash and safety showers should be readily available.

Hygienic Practices: Wash with soap and water before eating, drinking, smoking, applying cosmetics, or using toilet facilities. Use of a hand cleaner is recommended. Launder contaminated clothing before reuse. Leather shoes can absorb and allow hazardous materials to pass through. Check shoes carefully after soaking before reuse.

Section 9 - Physical And Chemical Properties

Boiling Range:	149 F (65 C) - 404 F (207 C)	**Vapor Density:**	Heavier than Air
Odor:	Faint Amine	**Odor Threshold:**	N/D
Appearance:	Viscous Brown Liquid	**Evaporation Rate:**	Slower Than Ether
Solubility in H2O:	N/D		
Freeze Point:	N/D	**Specific Gravity:**	1.02
Vapor Pressure:	N/D	**PH:**	N/D
Physical State:	Liquid		

(See section 16 for abbreviation legend)

Section 10 - Stability And Reactivity

Conditions To Avoid: Heat, sparks and open flames.

Incompatibility: Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, nitrogen oxides, and unidentified organic compounds. Consider all smoke and fumes from burning material as very hazardous. Welding, cutting or abrasive grinding can create smoke and fumes. Do not breathe any fumes or smoke from these operations.

Hazardous Polymerization: Will not occur under normal conditions.

Stability: This product is stable under normal storage conditions.

Section 11 - Toxicological Information

Product LD50: N/D

Product LC50: N/D

Chemical Name	CAS Number	LD50	LC50
BENZYL ALCOHOL	100-51-6	1230MG/KG RAT,ORAL	1000PPM/8HRS RAT,INHALATION
TOFA, REACTION PRODUCTS WITH TEPA	68953-36-6	>4750 MG/KG ORAL,RAT	NOT AVAILABLE
DIETHYLENETRIAMINE	111-40-0	1080 MG/KG, ORAL ,RAT	>10 MG/L / 1 HOUR, INH, RAT
BISPHENOL A	80-05-7	11.4 G/KG, ORAL, RAT	NOT AVAILABLE
4-NONYL PHENOL, BRANCHED	84852-15-3	1620 MG/KG ORAL 2140 MG/KG SKIN	NOT AVAILABLE

Section 12 - Ecological Information

Ecological Information: No data

Section 13 - Disposal Information

Disposal Information: Dispose of in accordance with State, Local, and Federal Environmental regulations. Responsibility for proper waste disposal is with the owner of the waste.

Section 14 - Transportation Information

DOT Proper Shipping Name: Not Regulated

DOT Technical Name: N/A

DOT Hazard Class: None

DOT UN/NA Number: N/A

Packing Group: N/A

Hazard Subclass: N/A

Resp. Guide Page: N/A

Additional Notes: None.

Section 15 - Regulatory Information

CERCLA - SARA HAZARD CATEGORY

This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE HEALTH HAZARD, CHRONIC HEALTH HAZARD

SARA SECTION 313

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372:

Chemical Name	CAS Number
BISPHENOL A	80-05-7

TOXIC SUBSTANCES CONTROL ACT

All components of this product are listed on the TSCA inventory.

This product contains the following chemical substances subject to the reporting requirements of TSCA 12(B) if exported from the United States:

No TSCA 12(B) Substances exist in this product

U.S. STATE REGULATIONS AS FOLLOWS:

NEW JERSEY RIGHT-TO-KNOW

The following materials are non-hazardous, but are among the top five components in this product.

PENNSYLVANIA RIGHT-TO-KNOW

The following non-hazardous ingredients are present in the product at greater than 3%.

CALIFORNIA PROPOSITION 65

Warning: The following ingredients present in the product are known to the state of California to cause Cancer:

Chemical Name	CAS Number
FORMALDEHYDE	50-00-0

Warning: The following ingredients present in the product are known to the state of California to cause birth defects, or other reproductive hazards:

No California Proposition 65 Reproductive Toxins exist

INTERNATIONAL REGULATIONS AS FOLLOWS:

CANADIAN WHMIS

This MSDS has been prepared in compliance with Controlled Product Regulations except for the use of the 16 headings.

CANADIAN WHMIS CLASS: D2B

Section 16 - Other Information

HMIS Ratings
Health: 3 **Flammability:** 1 **Reactivity:** 1 **Personal Protection:** X

VOLATILE ORGANIC COMPOUNDS, GR/LTR MIXED (UNTHINNED): 24

REASON FOR REVISION: Changes made in Section(s): 1 and 3

Legend: N.A. - Not Applicable, N.E. - Not Established, N.D. - Not Determined

The information contained herein is, to the best of our knowledge and belief accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations

product data

carboline®

Carbozinc® 859

Selection & Specification Data

Generic Type Organic Zinc-Rich Epoxy

Description Low VOC organic zinc epoxy steel primer with extremely fast cure-to-topcoat characteristics for in-shop applications and quick turnaround requirements in the field. Carbozinc 859 has less than 3.0 lbs/gallon VOC (thinned) and is used extensively in virtually all industrial markets.

Features

- Meets Class B slip co-efficient and creep testing criteria for use on faying surfaces
- Rapid cure. Dry to recoat in 30 minutes at 75°F (24°C) and 50% relative humidity.
- Complies with SSPC Paint 20 (Type II)
- Low temperature cure down to 35°F (2°C)
- Excellent adhesion
- Protects against undercutting corrosion
- Available in ASTM D520, Type II zinc version
- Field proven primer that applies well by spray methods
- Excellent touch-up primer by brush or roll for small areas.
- VOC compliant to current AIM regulations

Color Green (0300)

Finish Flat

Primers Self Priming

Topcoats Can be topcoated with Epoxies, Polyurethanes, Acrylics and others as recommended by your Carboline sales representative. Under certain conditions, a mist coat is required to minimize topcoat bubbling.

Dry Film Thickness 3.0-5.0 mils (75-125 microns). Dry film thickness in excess of 10.0 mils (250 microns) per coat is not recommended.

Solids Content* By Volume: 66% ± 2%
*Tested in accordance with ASTM D2697

Zinc Content By Weight: 81% ± 2% in dry film

Theoretical Coverage Rate 1,059 mil ft^2 (24.0 m^2/l at 25 microns)
353 ft^2 at 3.0 mils (8.0 m^2/l at 75 microns)
Allow for loss in mixing and application

VOC Values

As Supplied:	2.72 lbs./gal (326 g/l)
Thinned:*	
13 oz/gal w/ #2:	3.12 lbs./gal (374 g/l)
13 oz/gal w/ #33:	3.15 lbs./gal (378 g/l)

These are nominal values.
*Use Thinner #76 for projects requiring non-photochemically reactive solvents.

Dry Temp. Resistance

Continuous:	400°F (204°C)
Non-Continuous:	425°F (218°C)

Substrates & Surface Preparation

General Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

Steel SSPC-SP6 with a 1.0-3.0 mil (25-75 micron) surface profile.
SSPC-SP2 or SP3 for touch-up.

Performance Data

Test Method	System	Results	Report #
ASTM D4541 Adhesion	A. Carbozinc 859 B. 859 / Polyurethane C. 859/Epoxy/ Polyurethane	A. 841 psi Pneumatic B. 1,100 min. psi Pneumatic C. 602 psi Elcometer	03343 03343 03390
ASTM D522 Flexibility	A. 859 B. 859 / Polyurethane	A. > 6% B. > 5%	03343
ASTM D2794 Impact	A. 859 B. 859 / polyurethane Gardner Impact Tester,Direct (intrusion), inch-pounds, over 1/8" steel	A. 160 B. 100 min.	03343
Slip Co-Efficient	Carbozinc 859 A-490 bolt spec; 6 mils dry film maximum, 10% max. thinning	Meets requirements for class B rating	03617
ASTM D970 Immersion	A. Carbozinc 859/Epoxy/ Polyurethane Salt Water (5% sodium chloride) at 75°F,30 days B. 859 / Epoxy / Polyurethane Fresh water at 75°F,30 days	A & B had no rusting in the scribe; and no blistering, softening or discoloration with either environment	03390

Test reports and additional data available upon written request.

Application Equipment

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.
General Guidelines:

Spray Application (General) The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco. Keep material under mild agitation during application.

Conventional Spray Agitated pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.

Airless Spray

Pump Ratio:	30:1 (min.)*
GPM Output:	3.0 (min.)
Material Hose:	3/8" I.D. (min.)
Tip Size:	.017-.023"
Output PSI:	2000-2200
Filter Size:	60 mesh

*Teflon packings are recommended and available from the pump manufacturer.

Brush/Roller For small areas and touch-up only. Preferred method for large areas is spray application.

October 2006 replaces August 2003

0486

Carbozinc® 859

Mixing & Thinning

Mixing Power mix Part A completely. Then slowly sift in the zinc filler under agitation. Power mix Part B separately and add slowly to the mixture. Pour mixture through a 30 mesh screen. DO NOT MIX PARTIAL KITS.
Tip: Sifting zinc through a window screen will aid in mixing process by breaking up or catching dry zinc lumps.

	.80 Gal Kit	4.00 Gal. Kit
Ratio	Part A: .35 gallons	1.77 gallons
	Part B: .20 gallons	1 gallon
	Zinc Filler: 14.6 lbs	73 lbs

Thinning Normally not required but may be thinned up to 13 oz/gal (10%) with Thinner #2 or Thinner #76. In hot or windy conditions, may be thinned up to 13 oz/gal with Thinner #33. Use of thinners other than those supplied by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

Carboline Thinner #236E may also be used to thin this product to minimize HAP and VOC emissions. Consult Carboline Technical Service for guidance.

Pot Life 4 Hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

Cleanup & Safety

Cleanup Use Thinner #2 or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. In addition to ensuring proper ventilation, appropriate respirators must be used by all application personnel.

This product contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	60°-85°F (16°-29°C)	60°-90°F (16°-32°C)	60°-90°F (16°-32°C)	0-90%
Minimum	40°F (4°C)	35°F (2°C)	35°F (2°C)	0%
Maximum	90°F (32°C)	120°F (49°C)	110°F (43°C)	95%

Industry standards are for the substrate temperatures to be 5°F (3°C) above the dew point. This product simply requires the substrate temperature to be above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel and interfere with proper adhesion to the substrate. Special application techniques may be required above or below normal application conditions.

Curing Schedule

Surface Temp. & 50% Relative Humidity	Dry to Handle	Dry to Topcoat
35°F (2°C)	8 Hours	6 Hours
50°F (10°C)	5 Hours	2 Hours
75°F (24°C)	2 Hours	30 Minutes
100°F (32°C)	1 Hour	30 Minutes

These times are based on a 3.0 mil (75 micron) dry film thickness. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure. **Specific topcoat products can be used in a much shorter re-coat interval. Consult Carboline for recommendations and test results.**
Maximum Recoat: Unlimited. Must have a clean, dry surface for topcoating. “Loose” chalk or salts must be removed in accordance with good painting practice. Consult Carboline Technical Service for specific information.

Packaging, Handling & Storage

Shipping Weight (Approximate)	.80 Gallon Kit 22 lbs (10 kg)	4.00 Gallon Kit 105 lbs (48 kg)
Flash Point (Setaflash)	Part A: 49°F (9°C) Part B: 38°F (3°C) Zinc Filler: NA	
Storage (General)	Store Indoors.	
Storage Temperature & Humidity	40° – 110°F (4° - 43°C). 0-95% Relative Humidity	
Shelf Life	Part A: Min. 36 months at 75°F (24°C) Part B: Min. 24 months at 75°F (24°C) Part C: 24 months at 75°F (24°C)	

***Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.**

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An RPM Company

October 2006 replaces August 2003

Product Data Sheet
Edition: 01/2013
Version no: 0006

Sikaflex® - 1a

Overview:

Sikaflex-1a is a premium-grade, high-performance, moisture-cured, one-component polyurethane-based, non-sag elastomeric sealant used in certain Sika Sarnafil roofing or waterproofing system flashing details. Typical applications include wall, curb drain terminations, pipe pentrations and under certain metals. It can also be used as a pitch pocket sealant.

Composition:

See Material Safety Data Sheet for Composition. Sikaflex-1a cures to a light gray or white color with a smooth texture.
VOC Content: 40 g/L

Features:

Sikaflex-1a bonds well to Sika Sarnafil PVC membranes and to common building materials. It is easy to apply and has excellent workability characteristics.

Sikaflex-1a is USDA-approved, NSF-approved for potable water contact, jet fuel resistant and has high elasticity curing to a tough, durable, flexible consistency with exceptional cut and tear resistance. It meets Federal Specification TT-S-0023C, Type II, Class A. It is paintable with water-, oil- and rubber-based paints.

Sikaflex-1a is VOC compliant in California and has excellent weatherability and resistance to degradation by ultraviolet light.

Packaging:

Sikaflex-1a (in light gray) is packaged in 10.3 fluid oz (305 ml) disposable cartridges (24 per case). A cartridge covers approximately 12.4 linear ft (3.8 m) based on a 1/2 in (12.7 mm) bead. The actual coverage rate will vary depending on the size of the bead. A case weighs 25 lbs (11.3 kg). The shelf life is 12 months in an unopened cartridge.

Sikaflex-1a (in white) is packaged in 20 fluid oz (604 ml) uni-pac sausage seals (20 per case). A sausage covers approximately 24 linear ft (7.3 m) based on a 1/2 in (12.7 mm) bead. The actual coverage rate will vary depending on the size of the bead. A case weighs 45 lbs (20.4 kg). The shelf life is 12 months in an unopened cartridge.

Installation:

The recommended application temperature for Sikaflex-1a is between 40°F (4°C) and 100°F (38°C). For cold weather applications, condition cartridges at approximately 70°F (21°C) and maintain that temperature until just prior to use.

Do not apply over damp surfaces as this will affect adhesion and may lead to bubbling within the sealant. Clean all surfaces. Substrate must be sound, clean, dry, frost-free, and free of oil and grease.

Use with adequate ventilation. Sikaflex-1a is easy to apply with conventional caulking equipment. Avoid air entrapment when applying sealant. Do not tool with detergent or soap solutions.

Material becomes tack free in about 3-4 hours*. Final cure is achieved in 4-7 days depending on temperature and humidity*. Avoid contact with alcohol and other solvent cleaners during cure.

Use open cartridges the same day. Store the material in a dry area between 40°F (4°C) and 95°F (35°C).

*Longer cure times when used as a pitch pocket sealant.

Sika®

Sarnafil®

Availability:

Sikaflex-1a is available directly from Sika Sarnafil Authorized Applicators when used within a Sika Sarnafil Roofing or Waterproofing System. Contact Sika Sarnafil or visit our website usa.sarnafil.sika.com for further information.

Warranty:

Sika Sarnafil will replace defective Sikaflex-1a material provided the defect is identified by the Sika Sarnafil Authorized Applicator and acknowledged by Sika Sarnafil during the time of original installation and application. Maintenance of this sealant or of any other sealant after original installation and application is not covered by Sika Sarnafil's Warranty.

Maintenance:

Sikaflex-1a must be maintained. Sika Sarnafil recommends that the Owner or Owner's designated representative inspect the sealant at least twice a year and after each storm.

Technical:

Sika Sarnafil provides technical support. Technical staff is available to advise applicators as to the proper installation method.

Technical Data:

Material and curing conditions @ 73°F (23°C) and 50% R.H.

Shelf Life		12 months
Service Range		-40°F (-40°C) to 170°F (77°C)
Curing Rate	Tack-free Time	4 hours
	Tack-free to Touch	3 hours
	Final Cure	4 to 7 days
Tear Strength	ASTM D-624	55 lb/in (9.6 N/mm)
Shore A Hardness	ASTM D-2240	40±5 @ 21 days
Tensile Properties	ASTM D-412	Tensile Stress @ 21 days 175 psi (1.21 MPa)
Elongation at Break		550%
Chemical Resistance		Good resistance to water and diluted acids and alkalines

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APPENDIX E

CM15 EPOXY COATING WARRANTY

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12 YEAR COATING WARRANTY

PROJECT NAME: Moffett Field Hangar #1

OWNER: US Federal Government

LOCATION: California

CONTRACTOR: CL Industrial Coatings Inc.

1. **CARBOLINE COATING SYSTEM (The "SYSTEM")**

   A. Surface Preparation: Pressure wash @ 2,500-4,000 psi with clean potable water, and hand or power tool clean rusty substrates as necessary. Substrate will be free of loose contaminants and dry prior to coating.

   B. Coating Products: Bare metal areas will be primed with Carbomastic 15 @ 3.0-5.0 mils DFT, all surfaces will be coated with a full coat of Carbomastic 15 @ 4.0-6.0 mils DFT.

If Carboline's System is applied over existing protective coating, Warranted Carboline System will adhere to previously coated surface. Disbondment of the previously existing coating from the substrate is not a Carboline System Failure and is excluded from this warranty.

2. **WARRANTY**: Carboline Company, hereinafter called "Carboline", warrants for twelve (12) years that the Coating Products if applied in accordance with Carboline's specification, will prevent corrosion and if corrosion of any contiguous area exceeds two percent (2.0%) per annum on a cumulative basis of the warranty period Carboline will provide replacement material as outlined in Paragraph 7. The obligation of Carboline under this Warranty is limited as set forth below. The warranty period will not be extended for any event or occurrence including, but not limited to, repairs.

3. **CONDITIONS TO BE CONSIDERED AS NORMAL MAINTENANCE**: During the third, sixth and ninth year of this warranty, corrosion not greater than the allowable percentage set forth in Paragraph 2 or other coating related issues related to the project shall be considered normal maintenance, correction of which shall be the responsibility of the Owner.

4. **APPLICATION OF SYSTEM**: Surface preparation and application of the System to all coated and related surfaces must be done in strict accordance with Carboline's then current Application Instructions.

5. **CONDITIONS**: This Warranty is conditioned upon and will be invalidated by failure to strictly comply with the following conditions:

a) A PRE-JOB conference, was attended by the Owner, the Engineer, the site General Contractor, the selected Painting Contractor, and Carboline, which was held to ensure that all parties understood the written specification.

b) Only Carboline products, including thinners, were used as components of the System.

c) The cure period required for the System was conformed to in all material respects with the time, temperature and humidity stipulation of Carboline as set forth in its Product Data Sheets.

d) A Carboline representative was permitted at any and all such times as was requested, to observe any and all aspects of the surface preparation and system application work.

e) The surface on which the System was applied was of a quality necessary for the System to provide the protection required.

f) The Contractor has signed this Warranty which confirms the surface was prepared and the System was applied in strict accordance with Carboline's recommendations and Application Instructions.

g) The Owner has signed this Warranty accepting the work as completed.

h) Carboline must be notified within ten (10) days of the date Coating Problems are observed and must be afforded opportunities to inspect any such areas, at such times as Carboline may reasonably request.

i) Carboline has received full and timely payment of all Carboline invoices both for materials supplied to the project and for any services rendered by Carboline.

j) After a claim has been made, the complainant has notified Carboline about the environment to which all areas covered by this Warranty have been exposed since the initial application including surface treating, washing and cleaning procedures, heating cycles and other data to re-construct the services history of the project.

6 **EXCLUSIONS**: In addition to limitations and exclusions set forth in other provisions, this Warranty shall not apply to areas which have resulted from damage from physical or mechanical abuse or from the failure to perform the normal maintenance, normal wear and tear, from welding, interior heating, or war, fire, explosion, catastrophe, or other acts of God, harmful chemicals, fuels or vapors, any event or service beyond a reasonable term of usage, or surface areas which because of their physical shape, characteristics or configuration, present special coverage difficulties.

7. **CARBOLINE'S OBLIGATIONS**: In the event the System does not provide the protection referred to in Paragraph 2 and was proven to be the result of coating that was defectively manufactured, Carboline's sole obligation shall be to provide coating to repair the affected area, by providing such Carboline coating materials for up to a period of twelve (12) years as may be necessary to correct the affected area, PROVIDED, HOWEVER, that Carboline shall not be obligated to provide replacement coating materials having an aggregate value in excess of one hundred percent (100%) of the total sales price of the coating materials initially applied. At such time, if any, as Carboline shall have supplied replacement coating material(s) with an aggregate value equal to one hundred percent (100%) of the total sales price of the coating materials initially applied, Carboline's obligation under this Warranty shall be deemed to have been completely fulfilled. Repairs performed under this Warranty shall neither extend the term of this Warranty nor affect the allowable percentage specified herein.

8. **LIMITATIONS OF COVERAGE**: This Warranty constitutes the sole and exclusive warranty given by Carboline with respect to the System; all warranties and obligations not

expressly set forth herein are excluded. By way of illustration and not limitation, any and all liabilities and obligations for consequential and incidental damages, including, but not limited to, damages for injuries to persons or to property, or breach of contract, or breach of implied covenant of good faith and dealing, or negligence, or strict liability, or for labor costs, or material costs not specifically provided for herein, or for other costs of repair work, or for loss of use or time or revenues or profits, or for any claims by third parties are expressly excluded from this Warranty.

9. **ARBITRATION**: The parties hereto agree that all disputes and differences arising under this Warranty shall be resolved by binding arbitration in State of California in accordance with the rules of the American Arbitration Association. The decision of the arbitrators shall be final. It may be enforced in any court having competent jurisdiction. The cost of arbitration shall be borne equally by the parties hereto.

10. **GOVERNING LAW**: This Warranty shall be interpreted and construed under and in accordance with the laws of the State of California.

THIS WARRANTY IS THE SOLE WARRANTY AND CONSTITUTES THE EXCLUSIVE REMEDY OF CONTRACTOR AND OWNER IN CONNECTION WITH THE SYSTEM.

THIS WARRANTY IS SUBJECT TO THE LIMITATIONS AND CONDITIONS DESCRIBED ABOVE AND SHALL NOT BE DEEMED TO INCLUDE ANY WARRANTY OF FITNESS OR MERCHANTABILITY WHETHER EXPRESSED OR IMPLIED, WHICH ARE HEREBY DISCLAIMED, AND CARBOLINE COMPANY SHALL HAVE NO LIABILITY EXCEPT AS SPECIFICALLY EXPRESSED HEREIN.

THIS WARRANTY IS ISSUED TO THE OWNER ONLY AND IS NOT TRANSFERABLE OR ASSIGNABLE. PRESENTATION OF AN EXECUTED WARRANTY COPY TO CARBOLINE AT THE TIME OF CLAIM IS A CONDITION OF THIS WARRANTY.

THIS WARRANTY CONTAINS A BINDING ARBITRATION PROVISION WHICH MAY BE ENFORCED BY THE PARTIES.

CARBOLINE COMPANY

BY: _____

DATE: _____

_____ **DATE:** _____

Authorized Contractor Signature
(Work performed in accordance with Carboline recommendations)

_____ **DATE:** _____

Authorized Government Representative Signature
(Work accepted as applied)

APPENDIX F

EXAMPLE COATING INSPECTION FORM

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COATING INSPECTION FORM

Inspector Name:
Inspector Firm:
Inspector Phone/Email:
Structure:

Date:
Describe Overall Environment[1]:

Visual Observations									Physical Testing		
Component (Describe and photograph each component inspected)	Assessment Location (Column and Level)	Describe Local Environment[2]	Rust SSPC-VIS 2[3]	Peeling[4]	Blistering ASTM D 714[5]	Cracking/ Checking ASTM D 660/ D 661[6]	Chalking ASTM D 4214[7]	Wildlife Observations (droppings, nesting, etc.)	Level of Salt Contamination[8]	Film Thickness SSPC-PA 2 or ASTM D 4138 (mils)	Adhesion ASTM D 3359 or ASTM D 4541[9] (psi)

Notes:
1 mil = 0.001 inch = 25.4 micrometers

[1] Describe the conditions of the general site area such as ambient temperature, humidity, and wind.

[2] Describe observations such as water, oil, chemicals, or dust on the coated surface, or potential for impacts to the coating.

[3] Enter value and units in accordance with SSPC-VIS2.

[4] Describe extent of any peeling of the coating.

[5] Enter value and units in accordance with ASTM D 714.

[6] Enter value and units in accordance with ASTM D 660 or D 661.

[7] Enter value and units in accordance with ASTM D 4214.

[8] Specify the method used and note the measurement and units.

[9] Enter measurement in accordance with ASTM D 4541.

APPENDIX G

RESPONSE TO COMMENTS ON DRAFT LONG-TERM MANAGEMENT PLAN

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EPA reviewer providing comment: Yvonne Fong

Review Comments on Draft Long Term Management Plan (dtd October 9, 2012); AMEC; PERMAC N62473-08-D-8816; CTO #005

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
1.	Yvonne Fong	General	NA	EPA will continue to work with the Navy, rather than NASA, to achieve protectiveness through the Hangar 1 removal action.	Comment noted.
2.	Yvonne Fong	1-1	Section 1.1 Purpose and Scope of Long Term Management Plan	LTMgmt Plan cites a series of correspondence between the Navy and NASA. Please include copies of these letters in the LTMgmt Plan.	Copies of the correspondence will be added in an Appendix to the LTMgmt Plan.
3.	Yvonne Fong	1-1	Section 1.1 Purpose and Scope of Long Term Management Plan	The first sentence of the last paragraph states that there are two former observation towers located east of the hangar. For reference, please indicate the location of these towers on a figure.	The observation towers will be added to a figure in the LTMgmt Plan.
4.	Yvonne Fong	1-7	Section 1.5.2 Condition of Site at Completion of Removal Action	The last bullet on the page states that the top sides of the risers and handrails for stairs leading from the ground to the mezzanine deck have been remediated completely. Please clarify the final condition of the bottom side of the stairs and whether they were originally impacted by PCBs.	The bottom sides of the stairs were impacted by PCBs contained in the original paint. However these surfaces (bottom sides) have been completely overcoated with the new CM15 coating to meet the removal action objectives. The topside treads and handrails of the stairways leading from the ground floor to the mezzanine deck level were abated by blasting to remove all underlying PCB paint because those surfaces would get wear during any future use and complete abatement of the underlying PCBs was undertaken to minimize the need for touchup and maintenance. The bottom of the stairs will not get such wear so were not abated, but were still overcoated. The handrails and treads on the stairways leading from the mezzanine deck to the roof were also not abated because they are intended for limited use by maintenance staff that need to access the roof to maintain the FAA beacons. The handrails on the roof catwalk were never painted with PCB paint, so these were not abated either, but were nonetheless coated with a new overcoat of CM-15. The text in this section will be revised to provide clarification.
5.	Yvonne Fong	1-8	Section 1.6 Post Completion Removal Action Inspection and Acceptance	The last paragraph of this section states that results of confirmation sampling and post-completion inspections are documented in the After Action Completion Report. Please include a summary statement in the LTMgmt Plan that describes whether the sampling data show that the cleanup goals have been met.	The statement will be added as suggested.
6.	Yvonne Fong	3-1	Section 3.0, Inspection and Maintenance	The first paragraph states that the inspection and maintenance procedures comply with the manufacturer's product specifications and warranty terms; however, the LTMgmt Plan does not address what contingencies will be implemented if inspections determine that the warranty has been voided or additional coating for repairs cannot be obtained. Please revise the LTMgmt Plan to address these situations.	If the warranty terms are voided or cannot be met, the entity responsible for Long-Term Management of Hangar 1 will proceed with the necessary repairs to meet the removal action objectives regardless of the warranty terms. This may result in a cost impact; however there will be no impact on the effectiveness of the removal action. In this case, the entity responsible for Long-Term Management of Hangar 1 would continue to make the repairs using the CM15 epoxy coating product and qualified coating contractors. If the coating manufacturer is no longer in business or the CM15 product is no longer available, there are numerous other epoxy mastic coating

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					products that are compatible with CM15 and would provide an equivalent level of protection to the underlying steel. In the event that a product other than CM15 is needed during the LTMgmt phase, a new coating condition survey would be conducted to confirm the effectiveness of the new product in meeting removal action objectives. The text in this section will be revised to provide clarification.
7.	Yvonne Fong	3-2	Section 3.1.2.2 Detailed Visual Assessment	This section states that the number and location of inspection points for the detailed visual assessment will be determined based on the general condition assessment described in Section 3.1.2.1. However, since the hangar includes approximately 2 million square feet of coated surface area, it will be difficult to assess the coating's overall condition without a certain number of inspection points. Please specify a minimum number of inspection points that could be considered representative of the condition of the hangar's overall surface area.	The text in sections 3.1.2.2 and 3.1.2.3 will be revised to specify the minimum requirements for visual inspection points and physical testing frequency as follows. These minimum requirements are consistent with the initial coating condition survey performed at the beginning of the removal action: 3.1.2.2 - The visual assessment will at a minimum be designed to evaluate representative coating locations from Level 1 to Level 9 at support Column 14 to Column 1 (i.e., every level and every column in the hangar). 3.1.2.3 - Physical tests, including adhesion tests and coating thickness measurements, will be performed at a minimum of eight (8) representative locations.
8.	Yvonne Fong	3-3	Section 3.2 Coating Maintenance	This section describes various instances where spot maintenance, overcoating or full recoating of the structure may be necessary; however, there is no discussion in the LTMgmt Plan about any additional or increased frequency of inspections in areas that previously required actions to repair the coating. Please explain why these areas shown to have a reduced permanence would not require more frequent inspections after repair.	Section 3.1.2.2 will be revised to address this comment. The detailed visual inspections will consider whether or not any previous coating maintenance repairs have been made, and if so, then the subsequent inspections will specifically evaluate the effectiveness and integrity of the previous repairs.
9.	Yvonne Fong	3-4	Section 3.2.1 Maintenance Coating Methods	In cases where coating maintenance is necessary, surface preparation of the hangar may require environmental controls to ensure contaminants are not being released to the environment. The controls would likely include storm water pollution prevention measures which this section indicates are described in Section 1.5.1. Section 1.5.1, however, does not appear to address storm water pollution prevention measures. Please clarify what/where these requirements are specified.	The storm water pollution prevention measures are discussed in section 1.5.1, page 1-5, last paragraph as follows: *"Storm Water pollution prevention measures were designed and installed to ensure that storm water was not impacted during the pressure washing activity. Storm water protection Best Management Practices (BMPs) included installation of environmental controls (containment sheeting) around the active washing areas, construction of berms on the hangar floor, installation of inflatable packers in the hangar perimeter storm drain trench, and placement of sediment filters over catch basins and storm drains surrounding the hangar. "* These same BMPs, or equivalent measures, will be included in the contract documents for the coating maintenance work. The text in section 3.2.1 will be revised to clarify these storm water pollution

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					prevention measures rather than referring back to section 1.5.1.
10.	Yvonne Fong	3-4 and 3-5	Section 3.3 and Table 3-1, Inspection and Maintenance Schedule,	The LTMgmt Plan indicates that maintenance coating repairs could occur every three years; however, no timeframe is given for completion of any necessary repairs. Please establish a maximum length of time before the coating must be repaired. Please also describe what measures will be taken if coating repairs cannot be completed in a timely fashion, for example, if temperature or weather prohibits coating repair.	The text in this section will be revised to include the following additional information: Any coating maintenance repairs that may be required will be completed within 60 days of the inspection that identified the need for repair. Depending on the severity of corrosion at the repair location, temporary protective measures may need to be put in place If coating repairs cannot be completed within 60 days. Temporary measures may include wrapping or covering the damaged area with a plastic containment and/or installing storm water pollution prevention measures as described above in the response to comment 9.
11.	Yvonne Fong	3-4 and 3-5	Section 3.3 and Table 3-1, Inspection and Maintenance Schedule	The last sentence of Section 4.5.10.1 of the Hangar 1 EE/CA (July 2008) states that the structural steel coating would be subject to touch-ups every 5 years and recoating every 10 years. The LTMgmt Plan does not appear to include any regular schedule for touchups or recoating. Please explain this discrepancy and include any other regularly scheduled maintenance that is necessary to ensure the protectiveness of the coating.	The EE/CA was prepared before the coating condition survey was completed and before the eventual coating product was selected. Based on the coating condition survey results and Carboline's recommendations for maintenance of the CM15 coating system, inspection every three years is adequate. If the inspections determine the need for repairs, then the touchups would be performed within 60 days of the inspection results (see comment #10 above). So touchups would be performed every three years if needed, which is more frequent than what the EE/CA specifies. There is no other regularly scheduled maintenance required for the coating other than what is contained in the LTMgmt Plan.The service life of a CM-15 coating on steel structures is generally much longer than 10 years and, with proper maintenance, can extend many decades without the need for a complete recoating.
12.	Yvonne Fong	3-4 and 3-5	Section 3.3 and Table 3-1, Inspection and Maintenance Schedule	As described on page 1-8, plastic wrap that has been placed around the bolsters is a temporary measure to shield the bolsters from rain and minimize transport of oils offsite. The LTMgmt Plan does not appear to include any regular schedule for inspecting, repairing or addressing releases of oils from the bolsters. Please revise the LTMgmt Plan to address these maintenance needs.	Oils are not a COC for this removal action, so they have not been addressed in this LTMgmt Plan. The inspection of the bolsters and control of potential oil releases is an Owner (NASA) facility maintenance responsibility as discussed in sections 1.1 and 2.0 of the plan.
13.	Yvonne Fong	3-4 and 3-5	Section 3.3 and Table 3-1, Inspection and Maintenance Schedule	As stated in Section 2.1, reports of LTMgmt activities are to be submitted to the regulatory agencies. Please include dates for submission of the various reports that will be generated to document LTMgmt activities.	Section 7.0 "Record Keeping and Reporting" will be revised to include a list of reports that will be prepared and submitted to the agencies as well as the schedule for submitting these reports. Reports will include the following: · Storm Water Monitoring Report (annual) · Coating Inspection Reports (every three years) · Coating Maintenance and Repair Reports (after each event) · CERCLA Five Year Review Reports (every five years)
14.	Yvonne Fong	4-2 and 4-3	Table 4-1	The performance/acceptance criteria for sediment samples is stated as 1000 µg/kg based on CFR 761.61; however, as this removal action	It should first be noted that this concentration is being considered a trigger level and not necessarily an action level for PCBs in storm water. If concentrations of PCBs are detected in storm water or sediment samples

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				was undertaken to remove a continuing source of contamination to Site 25, the performance/ acceptance criteria should be consistent with the final condition of Site 25. The Site 25 Record of Decision selected a not-to-exceed goal of 210 µg/kg for Total PCBs. Please explain why the 1000 µg/kg limit was selected.	above the trigger levels as part of this LTMgmt. Plan, the entity responsible for Long-Term Management of Hangar 1 will provide the appropriate notifications to discuss a path forward. Text will be added to Section 4.1 to indicate this. The 1000 µg/kg trigger level for PCB concentrations in sediment was established and accepted by the agencies as part of the Storm Water Pollution Prevention Plan and Sampling and Analysis Plan for Hangar 1 (Site 29). Furthermore, and with concurrence from the agencies, NASA has established 1000 ug/kg for all upland PCB sites for surface soil. Based on this precedence, the same limit was adopted in the LTMgmt Plan as a trigger level for sediment as indicated above. NASA is responsible for the base-wide storm drain system and performs annual clean-out and NPDES compliance sampling (including PCB analysis) of catch basins across the base (composite sample) and the settling basin (discreet and effluent samples).
15.	Yvonne Fong	4-3	Section 4.2, Sampling and Analysis	This section indicates that sediment and storm water samples will be evaluated to assess the potential release of PCBs from the site. Please explain why samples will not be evaluated for lead.	Since lead has been historically sampled at Hangar 1, the Navy will continue to sample for lead and revise the LTMgmt Plan to add lead analysis. However, since lead is not a COC for this removal action, there is no trigger level concentration (lead to be provided for comparison data only). NASA is responsible for the base-wide storm drain system and performs annual clean-out and NPDES compliance sampling (including lead analysis) of catch basins across the base (composite sample) and the settling basin (discreet and effluent samples).
16.	Yvonne Fong	6-1	Section 6.0, Considerations for Reuse	This section provides a discussion of potential institutional controls to ensure protection of the remedy and prevent exposure to waste left in place. This section should indicate that the selection of institutional and/or engineering controls will be done in a Record of Decision.	The text in this section will be revised to state that the selection of institutional and/or engineering controls will be done in a Record of Decision.
17.	Yvonne Fong	NA	Figures 2 and 3	These figures are titled “Epoxy-Coated Areas Requiring Inspection and Maintenance” and include notes with numbered lists of various features. These numbered lists, however, appear to contain some features that do require inspection and maintenance and others that do not. Please revise the titles and/or notes of these figures to accurately and clearly depict which features do or do not require inspection and maintenance.	The figures will be revised to more clearly depict which features require inspection and maintenance and which do not.
18.	Yvonne Fong	2-1	Section 2.1, Responsibility for Long Term Management	Revise the fifth bullet to state that “preparing reports of LTMgmt activities, including evaluation of LUC effectiveness, and providing them to the facility owner/operator and regulatory agencies	The text in this section will be revised exactly as requested in the comment.

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			Activities	are among the duties that must be completed to implement the LTMgmt Plan.	
19.	Yvonne Fong	3-1	Section 3.1, Coating Inspection	The Coating Condition Survey which documents the initial condition of the coating should be included as an appendix to the After Action Completion Report.	The Coating Condition Survey will be included as an appendix to the After Action Report as requested in the comment.
20.	Yvonne Fong	4-2 and 4-3	Table 4-1	Revise item 3 of Step 2 to state "Do the concentrations of PCBs in the storm water or sediment samples indicate that additional inspection and repair of the coating is necessary or that the remedy has failed or is no longer protective?"	The text in table 4-1 will be revised exactly as stated in the comment.
21.	Yvonne Fong	4-5	Section 4.3, Data Evaluation	Revise the second to last sentence of the paragraph that begins on page 4-5 to state "the Navy will consult with the Water Board and/or EPA on this action."	The text in this section will be revised to indicate that the entity responsible for Long-Term Management of Hangar 1 will coordinate with the Water Board and/or EPA.
22.	Yvonne Fong	9-1	Section 9.0, Contact Information	The telephone number listed for Yvonne Fong is incorrect. The correct number is 415-947-4117.	The telephone number will be corrected.

EPA reviewer providing comment: Charles W. Duff, II

Review Comments on Draft Long Term Management Plan (dtd October 9, 2012); AMEC; PERMAC N62473-08-D-8816; CTO #005

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1.	Charles W. Duff, II	General comment	NA	NASA, the current Owner/Operator, has not agreed to accept responsibility for management of the NTCRA once the Navy's ROD has been accepted by the regulatory agencies. NASA is not a party to the ROD. Instead, the Navy would need to negotiate a separate interagency agreement with NASA for those responsibilities that NASA determines it will assume.	In a letter dated May 26, 2009 to the Navy, NASA stated that "To enable Navy's planning for ultimately ending direct involvement in environmental activities at Moffett Field, NASA will assume responsibility for the operations and maintenance of remaining Moffett Field remediation sites after remedial actions are completed at each of those sites as determined by EPA Region 9." The Navy has been relying on NASA's commitment as stated in its May 26, 2009 letter in advancing the environmental cleanup program at former NAS Moffett Field toward the O&M stage. Navy senior leadership will be approaching NASA Headquarters in early 2013 to establish a concrete plan for NASA's assumption of environmental responsibility for environmental sites, including Site 29 - Hangar One, at former NAS Moffett Field to NASA.
2.	Charles W. Duff, II	General comment	NA	NASA expects that the Navy include the remediation of the Hangar I floor and subsurface as part of the remediation of Site 29. NASA comments that the ROD for Site 29 is incomplete if it does not include the Hangar I floor, tunnels, and subsurface soil contamination.	The scope of the removal action was defined in the EE/CA and Action Memorandum for Site 29. Section 3.3 of the EE/CA states: *"The scope of this NTCRA is to reduce the risks to human health and the environment associated with the release of COCs identified in the building components of Hangar 1. Specifically, the proposed removal action should control the migration of contaminants from Hangar 1 by controlling the source of contaminants released from the structure.* *This NTCRA addresses the PCB contamination from the surface of the interior concrete floor slab, the building interior, and the exterior face of the hangar siding. It should also be noted that this removal action is not addressing 1) potential releases to groundwater, because data previously collected indicate there have been no impacts on groundwater; 2) adjacent structures and soils, because they are outside the scope of this NTCRA; 3) contamination in or below the concrete foundation, because the foundation will be left in place and there are no indications that it is contaminated; or 4) institutional controls, because they are outside the scope of this NTCRA."* Furthermore, in May 2003, NASA prepared a Report and Summary of Hangar 1 Environmental Sampling (DMJMH+N, 2003). In this report, NASA concluded that the floors could be cleaned to acceptable levels if the source of contamination is removed. The NTCRA has removed the primary source of contamination at Hangar 1 and has encapsulated the residual contamination in the silver paint on the remaining structural steel and few concrete areas (e.g. electrical vaults). The concrete floors will be cleaned and sampled to ensure that residual contamination is removed to acceptable levels that are consistent with the anticipated future use of the hangar as an industrial/commercial facility and the applicable NASA Lead Management Plan clearance levels for interior surfaces.
3.	Charles W. Duff, II	1-2	Section 1.2, Site Location and General Description	The Navy comments that the surface of the concrete floor was decontaminated to certain levels; however, waste remains in place. NASA	Please see comment #2 responses regarding the scope of the Removal Action.

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				notes that the concrete is porous and has not been sealed, and that the concrete curbs have not been cleaned. NASA requests that the Navy address contamination in the concrete floor and the subsurface as part of the Site 29 remedial action. NASA also asks the Navy to remove the curbing as it is not required for structural integrity, Hangar reuse, or historic preservation.	The concrete curbs have been abated of all PCB-contamination and this will be reported in the After Action Completion Report. Please note that the concrete floor was evaluated previously for PCB contamination when core samples were collected and analyzed in 2003. Section 2.2.1 of the EE/CA summarizes the results of the concrete sample analyses as follows: *"Core samples were obtained from the floor in 2003. A core sample was analyzed for PCBs; Aroclor-1268 was reported at 0.0949 µg/kg and Aroclor-1260 was below the detection limit (see Table 2-1). Various depths of this sample were analyzed to determine if PCBs were penetrating the floor surface to any degree. The analysis indicated that PCBs were not penetrating the floor surface to any degree (DMJMH+N, 2003). The core samples were also analyzed for lead, and the results indicated that the concentration of lead (from any source) within the interior of the concrete floor slab ranges from 4.4 to 5.0 mg/kg (see Table 2-1). A Synthetic Precipitation Leaching Procedure performed on this concrete indicated lead was below the detection limit (DMJMH+N, 2003). Results indicate that the hangar-related PCB and lead contamination is limited to the surface of the floor slab (DMJMH+N, 2003) (see Table 2-1). Because PCBs present in dust do not migrate through concrete, as would liquid PCBs, subsurface contamination is not likely. There are no indications from the previous investigations, available historical records, or visible staining that liquid PCB spills occurred."* The Navy removal action addresses the removal and/or control of contaminants (PCBs), but does not include cosmetic or facility improvement measures; therefore the demolition of the concrete curbs was not been included in the contract for implementing the removal action.
4.	Charles W. Duff, II	1-3	Section 1.4, Removal Action Objectives and Cleanup Levels	NASA requests independent confirmation that the concrete floor has been cleaned of hazardous material. NASA requests post-cleanup data demonstrating that the concrete floor has been cleaned and that the Removal Action Objective was achieved.	The concrete floors will be cleaned and sampled to ensure that residual contamination is removed to acceptable levels that are consistent with the anticipated future use of the hangar as an industrial/commercial facility and the applicable NASA Lead Management Plan clearance levels for interior surfaces. The post cleanup data will be provided to NASA and the agencies in the After Action Completion Report. The means for demonstrating that the concrete floor has been cleaned to meet removal action objectives is described in detail in the Sampling and Analysis Plan for IR Site 29. Samples will be analyzed by an independent and EPA certified laboratory.
5.	Charles W. Duff, II	1-3	Section 1.4, Removal Action Objectives and Cleanup Levels	NASA requests that the Navy remove the concrete curbing due to the presence of hazardous materials and the potential trip hazard.	The concrete curbing will not be removed by the Navy. . Demolition of the concrete curbs is a cosmetic or facility improvement that is not within the scope of the CERCLA response action.. Per the OMB decision, NASA is responsible for items related to facility re-use.
6.	Charles W.	1-5	Section 1.5.1, Summary of Work	NASA, the Navy's Restoration Advisory Board (RAB), and the California State Historic	Upon review of past RAB meeting minutes and comments provided to the Navy for the EE/CA and Action Memorandum, the Navy is unaware of such

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	Duff, II		Performed	Preservation Officer (SHPO) on multiple occasions informed the Navy that pressure washing would be insufficient and recommended wet sandblasting. If the Navy had used wet sandblasting, inspection and maintenance would not be required. NASA should, therefore, not be responsible for maintenance due to the choices made by the Navy.	recommendation from NASA or the Navy's RAB. In the responsiveness summary for Revision 1 to the EE/CA, the SHPO did provide a comment asking why sandblasting the metal frame is not an option (Comment #5S.5). However, as stated in the response to comment, due to the numerous connections between the structural steel members and the number of joints, effective removal of all of the PCB-contaminated paint from the structure would be difficult to achieve. Since media blasting involves the removal of paint containing lead and PCBs, complete isolation of the work space and added worker protection would be necessary to comply with safety and environmental requirements. This media blasting is different from that used for bridges or ships since the blasting is part of a CERCLA response action not just a paint recoating process. While media blasting is technically feasible, the structural steel would still require coating to contain the remaining PCB contaminated paint that could not be removed. Because coating of the steel is still required, media blasting would result in a significant added cost with little benefit. Therefore, media blasting was eliminated, and pressure washing and coating selected. Furthermore, the original EE/CA document was revised upon significant community concern and NASA's commitment to preserving and finding a reuse for the hangar. In this revised EE/CA document, additional alternatives were evaluated and developed with public participation, including NASA, and were ultimately approved by the regulatory agencies. The selected alternative was removal of siding and coat exposed surfaces. Prior to implementation of the selected alternative, a Coating Condition Survey was performed, which demonstrated that pressure washing is sufficient to prepare the hangar steel structure for overcoating. The Coating Condition Survey included patch tests that evaluated the adhesion of the new epoxy coating to the underlying paint and steel. These patch tests utilized pressure washing as the coating preparation method and the results indicated that the washing and coating methods that have been used provide excellent adhesion.
7.	Charles W. Duff, II	1-7	Section 1.5.2, Condition of Site at Completion of Removal Action	See comments on Sections 1.2 and 1.4 above regarding concrete floor and curbs.	See responses to comments on sections 1.2 and 1.4 above.
8.	Charles W. Duff, II	1-8	Section 1.6, Post-Completion Removal Action and Acceptance	The rust depicted in the enclosed photographs (Enclosure 2) of the beam on the catwalk under the beacon light may bleed through the coating without proper preparation, i.e., wet sandblasting, causing the coating will fail. Power washing is insufficient to address rust. Please provide additional information.	The beam under the roof catwalk was touched up and the coating in this area has been inspected and accepted by the NACE III inspector. Please note that the beacon mounting plate itself was not overcoated, since it was never painted with PCB paint, and rust stains that originate from the beacon mounting plate are not an indication of deficiencies in the coating nor a release of contaminants to the environment. In regard to wet sandblasting versus power washing, see the response to comment #6 above.

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9.	Charles W. Duff, II	2-1	Section 2.1, Responsibility for Long Term Management Activities	NASA commented on each of the bullet points in Section 2.1, regarding responsibility for long term management activities. NASA, the current Owner/Operator, does not agree to accept responsibility for all aspects of management of the NTCRA.	Please see the response to comment #1 above.
10.	Charles W. Duff, II	2-2	Section 2.3, Site Access Control	In section 2.3, the Navy states: "The Owner/Operator will also be responsible for ensuring that site operations do not impact the integrity of the NTCRA remedy." NASA disagrees that this responsibility as stated is an element of "controlling access," and in light of the discussion in section 6.0 recommends deleting the sentence and substituting the following sentence: "The site Owner/Operator is responsible for coordinating site access to Hangar 1 for implementing LTMgmt operations by the Navy and its contractors, but is not responsible for assuring that the operations of the Navy or its contractors do not impact the integrity of the NTCRA remedy. Until the Navy negotiates an agreement with the site Owner/Operator to accept responsibility for implementing certain LTMgmt operations, the Owner/Operator (currently NASA) is not responsible for damage to the coating by the actions of the Navy or its contractors. The Owner/Operator is responsible for controlling access for purposes of carrying out its routine maintenance of the facility and taking due care to ensure through its regulations, policies and procedures that its tenants, permittees, contractors, and guests do not damage the coating."	The Navy does not concur. The entity responsible for Long-Term Management of Hangar 1 will conduct the routine inspection and touchups in accordance with the LTMgmt. Plan. However, as the current site Owner/Operator, NASA is responsible for implementing these controls for its tenants, permittees, contractors, and guests. Therefore, Section 2.3 will be revised as follows: The site Owner/Operator is responsible for providing and controlling access to Hangar 1 for implementation of LTMgt. operations. Through the implementation of Institutional Controls, the Owner/Operator will also be responsible for ensuring that if facility maintenance items or future site operations impact the integrity of the NTCRA coating, the Owner/Operator or its tenants will be responsible for the appropriate inspections and touchups in accordance with this LTMgmt. Plan. This includes providing the necessary measures to ensure that the coating is repaired if damaged (e.g., scratched, cut, cracked, abraded, drilled through, exposed to oils or contaminants, or otherwise compromised). These measures are further discussed in Section 6.0 (Institutional Controls) below.
11.	Charles W. Duff, II	3-1	Section 3.0, Inspection and Maintenance	NASA, the SHPO, and the Navy's RAB recommended wet sandblasting. If the Navy had followed this recommendation, a coating would not have been required and the need for inspection and maintenance of a coating would have been avoided. NASA expects the Navy to carry out inspection and maintenance of the coating as it committed to in its Work Plan.	The entity responsible for Long-Term Management of Hangar 1 will carry out inspection and maintenance of the coating as specified in the Work Plan and this LTMgmt Plan. The Work Plan (*Final Work Plan for Non-Time-Critical Removal Action for Polychlorinated Biphenyl Contamination at IR Site 29, Hangar 1; approved June 2010*) discusses coating maintenance and inspection in section 6.1 as follows: "*The new coating will require periodic inspection and maintenance, which will be scheduled by the Navy. The maintenance program will be developed to meet the coating manufacturer's warranty requirements. Inspection every*

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					three years is recommended. Touch-up recoating may be required after each inspection. Post-construction monitoring and maintenance will be addressed in an Operations and Monitoring Plan, which will be a separate document prepared after the NTCRA." This LTMgmt Plan is the Operations and Monitoring Plan and is consistent with the Work Plan. In regard to wet sandblasting, see the response to comment #6 above.
12.	Charles W. Duff, II	3-2	Section 3.1.2.2, Detailed Visual Assessment	NASA understands that it will need to inform prospective tenants and permittees that the Navy and its contractors will require access to conduct the detailed visual assessment and maintain the coating.	NASA will need to inform prospective tenants and permittees that the entity responsible for Long-Term Management of Hangar 1 will require access to conduct the detailed visual assessment and maintain the coating.
13.	Charles W. Duff, II	3-2	Section 3.1.2.2, Detailed Visual Assessment	No booms are known to be tall enough to reach the roof area to conduct a detailed visual assessment and testing. Alternative measures will be needed.	The roof area can be accessed using the permanent stairway and rooftop catwalk access that was constructed for beacon maintenance. If necessary, cranes can also be mobilized on site to access the highest portions of the hangar. These measures are already mentioned in section 3.1.2.2 in addition to the boomlifts. Additional features for access can be incorporated by NASA with its reuse plan so long as these features meet the requirements of this LTMgmt Plan.
14.	Charles W. Duff, II	3-3	Section 3.2, Coating Maintenance ("Spot Maintenance" and "Spot Maintenance and Overcoating")	The Draft LTMgmt Plan does not provide assurance that the steel structure has been sufficiently cleaned such that rust, such as shown in the enclosed photos of the beam under the catwalk to the beacon, will not bleed through. See also comment on section 3.2, bullet 4, below.	All coating activities, including the cleaning of the steel prior to coating, were performed in accordance with the project Work Plan and Construction Quality Control Plan. Steel cleaning and coating activities were inspected continuously throughout the project by QC staff of AMEC, the Navy, the coating contractor, the coating manufacturer, and an NACE III inspector. The results of these inspections have been documented and will be included in the After Action Completion Report.
15.	Charles W. Duff, II	3-3	Section 3.2, Coating Maintenance ("Complete Recoat of the Structure")	NASA, the SHPO, and the Navy's RAB recommended wet sandblasting, which would have eliminated the need for a coating and associated coating maintenance. Navy is also responsible for the remedy as long as waste remains in place. NASA expects the Navy to carry out maintenance, including spot repair and recoating, as it committed to in its Work Plan:	The entity responsible for Long-Term Management of Hangar 1 will carry out maintenance, including spot repair of the coating, as specified in the Work Plan and this LTMgmt Plan. See also response to comment # 6 and 11 above.
16.	Charles W. Duff, II	3-5	Section 3.4, Preventive Maintenance	NASA disagrees that in its August 6 letter it agreed to "these routine facility maintenance activities once the NTCRA is complete and the Navy demobilizes from the site." NASA only agreed to maintain the following specific items that were retained or rebuilt to allow for reuse, historic preservation, and protection of airfield safety: The new galvanized walkway to the beacon and star, two (2) clam shell door hinge	In assuming responsibility for the facility maintenance items (permanent access and new galvanized walkway to the FAA beacon and lights, two (2) clam shell door hinge pins, thirty-six (36) clam shell door trucks, four (4) clam shell door gear motors, and the electrical vaults, with the exception of Electrical Vault 5, and to resume Bird Airstrike Hazard (BASH) management in the vicinity of the Hangar), the site Owner/Operator will need to ensure that if these facility maintenance items impact the integrity of the NTCRA coating, the Owner/Operator will be responsible for the appropriate inspections and touchups in accordance with this LTMgmt Plan.

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				pins, thirty-six (36) clam shell door trucks, four (4) clam shell door gear motors, and the electrical vaults, with the exception of Electrical Vault 5, and to resume Bird Airstrike Hazard (BASH) management in the vicinity of the Hangar.	
17.	Charles W. Duff, II	3-5	Section 3.4, Preventive Maintenance	The Navy has stated that the routine facility maintenance it is expecting NASA to carry out is what NASA did before the Navy's NTCRA. NASA did not clean out the elevator shafts prior to the Navy's NTCRA. Further, see comment on section 3.2, bullet 4 (Complete Recoat of the Structure). If the Navy had used wet sandblasting, removal of water and other chemicals that might compromise the coating would not be required. Thus, removal of water and chemicals from crevices and other areas vulnerable to corrosion is the Navy's responsibility.	The Navy does not concur. The Navy's intention was to inform NASA of certain areas of the hangar that may require routine management of storm water while the hangar is not sided. Storm water management is a facility responsibility under the facilities general National Pollutant Discharge Elimination System (NPDES) permit. Furthermore, re-siding the hangar following the Navy's demobilization from the site will eliminate this issue.
18.	Charles W. Duff, II	4-1	Section 4.0, Storm Water and Sediment Sampling (to ensure that the new coating is providing the required encapsulation)	The Navy is responsible for the storm water· and sediment monitoring and reporting program in a manner acceptable to the U.S. Environmental Protection Agency and Regional Water Quality Control Board for the purpose of detecting a failure of its remedy until if and when an interagency agreement is negotiated with the NASA, the current Owner/Operator, to assume this responsibility. No agreement has been negotiated with NASA. See also comments on sections I, 2, and 3 above.	The entity responsible for Long-Term Management of Hangar 1 will implement a storm water and sediment monitoring and reporting program at Hangar 1, as stated in section 4.0 of the LTMgmt Plan. The storm water monitoring program will comply with U.S. Environmental Protection Agency and Regional Water Quality Control Board requirements to assess potential releases of PCBs from Hangar 1. Please also see response to comment #1.
19.	Charles W. Duff, II	6-1	Section 6.0, Considerations for Reuse	The Navy is responsible for five-year reviews as long as PCBs remain in place. No interagency agreement has been negotiated by the Navy with NASA for specific Institutional or Engineering Controls, including LUCs. NASA in separate correspondence has only agreed to maintain the following specific items NASA requested be retained or rebuilt to provide for reuse of the Hangar, historic preservation, and airfield safety: The new galvanized walkway to the beacon and star, two (2) clam shell door hinge pins, thirty-six (36) clam shell door trucks, four (4) clam shell door gear motors, and the electrical vaults, with the exception of Electrical Vault 5, and to resume Bird Airstrike Hazard (BASH) management in the	The entity responsible for Long-Term Management of Hangar 1 will also be responsible for five-year review documents. Please also see response to comment #1.

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
				vicinity of the Hangar.	
20.	Charles W. Duff, II	6-1	Section 6.0, Considerations for Reuse	NASA, or future Owner/Operator, will need to include in Requests for Proposals for reuse of the Hangar requirements to allow access by the Navy and its contractors to conduct inspection and maintenance.	A sentence will be added to section 6.0 as follows: *"NASA, or future Owner/Operator, will need to include in Requests for Proposals for reuse of the hangar requirements to allow access by the entity responsible for Long-Term Management of Hangar 1 (and/or its contractors) to conduct inspection and maintenance."*
21.	Charles W. Duff, II	6-1	Section 6.0, Considerations for Reuse	NASA will also review its Hangar I Reuse Guidelines, prepared pursuant to the National Historic Preservation Act, sec. 106 Programmatic Agreement associated with the NASA Ames Development Plan, to determine if an addendum to the Reuse Guidelines is needed to incorporate restrictions on impacting the coating and requirements to allow access for inspection and maintenance of the coating by the Navy and its contractors. The Hangar I Reuse Guidelines are available at: http://historicproperties.arc.nasa.gov/map reuse/reuse guidelines.htmI	Section 6.0 will be revised to include these comments requiring NASA review and amendment of the Hangar 1 Reuse Guidelines as necessary.
22.	Charles W. Duff, II	7-1	Section 7.0, Record Keeping and Reporting	NASA non-concurs with the Navy's statement that "This responsibility will ultimately be transferred to the facility owner upon completion and acceptance of the Record of Decision." No interagency agreement has been negotiated with NASA, nor can an interagency agreement be negotiated until the terms and conditions of the ROD are finalized. See comments on sections I and 2 above.	Please see response to comment #1.
23.	Charles W. Duff, II	8-1	Section 8.0, Other Plans and Reports	NASA has agreed in separate correspondence to resume BASH management for purposes of protecting pilots and aircraft using the Moffett Federal Airfield, but not to removing guano that may build up on the coating. The purpose of BASH management is not to protect the coating.	Section 8.0 only requires NASA to implement the BASH measures that were agreed to in the correspondence dated August 6, 2012.
24.	Charles W. Duff, II	9-1	Section 9.0, Contact Information	Remove Janet Beegle and substitute: Roy Williams, Chief, Airfield Operations Division, Roy.A.Williams@nasa.gov 650-604-5 050. Add after "NASA Ames Research Center" "MS 158-1". Update Rocci Caringello's address to include	Section 9 will be revised as indicated in the comment.

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
				"MS 213-8". Update Ann Clarke's title to "Assistant Director of Center Operations" and add "MS 200-9" to address. Insert: Don Chuck, Chief, Environmental Management Division, NASA, 650-604-0237, NASA Ames Research Center (MS 204-15), P.O. Box 1, Moffett Field, CA 94035, Donald.m.chuck@nasa.gov. Keith Venter, Historic Preservation Officer, Facility Engineering Planning Group, NASA, 650-604-6408, NASA Ames Research Center (MS 213-8), P.O. Box I, Moffett Field, CA 94035, keith.venter@nasa.gov	

RAB reviewer providing comment: Peter Strauss

Review Comments on Draft Long Term Management Plan (dtd October 9, 2012); AMEC; PERMAC N62473-08-D-8816; CTO #005

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
1.	Peter Strauss	General comment	NA	There has been some concern on the part of some RAB members that during the preparation of the metal frame and coating, microscopic pin holes may be present and perhaps provide a point of weakness for the coating and/or increased degradation.	Comment noted. While it is possible that microscopic pinholes might be present and therefore not visible to the naked eye during implementation of LTMgmt, it is extremely unlikely that the release of residual PCBs would occur from a pinhole in the coating. Any residual contamination on the metal frame is embedded within the matrix of the old silver paint and is already extremely immobile. The Carbomastic 15 overcoat provides another layer of protection to essentially eliminate mobility. If microscopic pinholes provide a point of weakness to the extent where they increase in size and become noticeable during LTMgmt inspections, those areas will be touched up within 60 days of inspection. Furthermore, in accordance with this LTMgmt Plan, storm water and sediment sampling will be completed around the perimeter of Hangar 1 as another means of ensuring the continued effectiveness of the coating.
2.	Peter Strauss	Page 4-5	Section 4.3 Data Evaluation	With regard to reducing or eliminating the monitoring requirements as part of the 5-year review process, a RAB member and the Technical Advisor to CPEO would like to see the monitoring extend for approximately 5-10 years beyond the warranty of the coating. This comment applies to inspection of stormwater and sediment. (The LTM states: "If PCB concentrations in storm water and sediment have not exceeded the regulatory limits at the first Five Year Review, then consideration will be given to reducing or eliminating the monitoring requirements as part of the review process.") In addition, as the RWQCB stated, it is unclear why the Navy used the regulatory standard of 1,000 ppb, while the cleanup standard for Site 25 is 210 ppb. Regarding responsibility for monitoring requirements should the Hangar be recovered, I believe that any responsibility for requirements should be part of a written agreement between the Navy and the owner/operator of the Hangar.	Comment noted. At this time it would be imprudent to set a timeline for conducting, reducing or eliminating monitoring requirements. The 5-year review process provides a means of evaluating the effectiveness of the NTCRA, including monitoring requirements. Ultimately, any changes to the monitoring program will be accomplished in coordination with the regulatory agencies. The 1000 µg/kg acceptance criteria for PCB concentrations in sediment was established and accepted by the agencies as part of the Storm Water Pollution Prevention Plan and Sampling and Analysis Plan for Hangar 1 (Site 29). Furthermore, and with concurrence from the agencies, NASA has established 1000 ug/kg for all upland PCB sites for surface soil. Based on this precedence, the same limit was adopted in the LTMgmt Plan as a trigger level for sediment as indicated above. Regarding the future responsibility of LTMgmt at Hangar 1, including monitoring requirements, any agreements will be appropriately documented and coordinated with the various stakeholders.

San Francisco Bay Regional Water Quality Control Board reviewer providing comment: Elizabeth K. Wells

Review Comments on Draft Long Term Management Plan (dtd October 9, 2012); AMEC; PERMAC N62473-08-D-8816; CTO #005

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
1.	Elizabeth K. Wells	General comment	NA	Regional Water Board staff understands the Navy is in discussions with NASA about which agency will have ultimate responsibility for long-term monitoring and maintenance of the remedy. Until a formal agreement is in place, the Navy is responsible for long-term monitoring and maintenance of its remedy.	Comment Noted.
2.	Elizabeth K. Wells	1-1	Section 1.0	Include excavation of contaminated soil and fiber board in the list of actions included in the NTCRA.	Section 1.0 will be modified to add excavation of contaminated soil and fiber board to the description of the NTCRA activities.
3.	Elizabeth K. Wells	1-1	Section 1.1	Include copies of referenced NASA and Navy letters in the LTMP. In addition, include these letters in the reference list in Section 10.0.	Copies of the correspondence will be added in an Appendix to the LTMgmt Plan and the correspondence will be included in the reference section.
4.	Elizabeth K. Wells	1-4	Section 1.5.1	Include excavation of contaminated soil and fiber board in the description of actions performed as part of the NTCRA. In addition, include a description of the stormwater pollution prevention measures referenced in Section 3.2.1.	Section 1.5.1 will be modified to add excavation of contaminated soil and fiber board to the description of the NTCRA activities. The storm water pollution prevention measures are discussed in section 1.5.1, page 1-5, last paragraph as follows: *"Storm Water pollution prevention measures were designed and installed to ensure that storm water was not impacted during the pressure washing activity. Storm water protection Best Management Practices (BMPs) included installation of environmental controls (containment sheeting) around the active washing areas, construction of berms on the hangar floor, installation of inflatable packers in the hangar perimeter storm drain trench, and placement of sediment filters over catch basins and storm drains surrounding the hangar. "*
5.	Elizabeth K. Wells	3-1	Section 3.1.1	State why the top and bottom sides of the mezzanine deck will not be inspected.	The top and bottom of the mezzanine deck, along with the topside treads and handrails of the stairways leading from the ground floor to the mezzanine deck level were abated by blasting to remove all underlying PCB paint because those surfaces either required such actions due to the coating condition survey or would get wear during any future use and complete abatement of the underlying PCBs was undertaken to minimize the need for touchup and maintenance. The bottom of the stairs will not get such wear so were not abated, but were still overcoated. The handrails and treads on the

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
					stairways leading from the mezzanine deck to the roof were also not abated because they are intended for limited use by maintenance staff that need to access the roof to maintain the FAA beacons. The handrails on the roof catwalk were never painted with PCB paint, so these were not abated either, but were nonetheless coated with a new overcoat of CM-15.Text in this section will be revised to provide clarification.
6.	Elizabeth K. Wells	3-2	Section 3.1.2.1	Provide more detail about how the general survey will be performed. Clarify what areas will be visually inspected as part of this survey, and how areas likely to degrade more quickly (as a result of exposure, bird roosting/guano, etc.) will be emphasized. Discuss how conducting the survey from solely "the ground or other available access points" will provide sufficient coverage of the structure to be representative of the entire structure. Provide definitions for the qualitative ratings of "good, fair, or poor" for the overall condition of the coating. These ratings are subjective and unless the same individual performs all the inspections, varying opinions on what is meant by "good, fair, or poor" will be recorded.	All of the planned inspection methods, including the General Coating Condition Survey, are derived from the Society of Protective Coatings guidance contained in SSPC Paint Application Guide No. 5. *"Guidance to Maintenance Coating of Steel Structures in Atmospheric Service."* SSPC is the internationally-recognized organization responsible for developing standards for the coatings industry. SSPC requirements for the General Coating Condition Survey are as follows: *"5.3.1 General Coating Condition Assessment: In this assessment, usually only one or two parameters are rated (e.g., general condition or rusting). The structure is normally observed from the ground (i.e., without scaffolding). The assessment is at best a qualitative rating of the condition (e.g., good, fair, poor). …… This type of assessment is usually done in a few hours or less and is suitable for identifying the overall condition of the coating."* So, SSPC intends that the first step in the coating inspection process, the General Assessment, be a very preliminary assessment which forms the basis for planning the more rigorous Detailed Visual Assessment described in section 3.1.2.2. The Detailed Visual Assessment provides quantitative coating condition ratings based on standard inspection methods (e.g. SSPC VIS2 and ASTM D 610 methods for evaluating and quantifying the degree of rust).The qualitative terms (good, fair, poor) are not defined in the SSPC Guide 5 itself; however the inspectors will be required to meet SSPC QP1 level of training and certification and therefore the inspectors will be trained in the consistent use of these terms. Also, the General Coating Condition Assessment and the subsequent Detailed Visual Assessment will generally be performed by the same inspector, providing consistency between the two phases of inspection. Additional discussion will be provided in both section 3.1.2.1 and 3.1.2.2 to better describe the areas requiring special attention during the inspections. Observation for paint flakes on the ground will also be included as part of the general assessment requirements in section 3.1.2.1.
7.	Elizabeth K. Wells	3-2	Section 3.1.2.2	Regional Water Board staff do not disagree with the proposed approach for the detailed assessment to focus on "areas ... that are representative of the various conditions within the hangar" giving "special consideration to areas with a higher potential for coating degradation." However, using the general assessment to	Section 3.1.2.2 will be revised to add the suggested details to identify the areas with higher potential for coating degradation and known areas of concern (e.g., due to weather, exposure, bird activity, etc.). In addition, the text in sections 3.1.2.2 and 3.1.2.3 will be revised to specify the minimum requirements for visual inspection points and physical testing as follows:

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
				determine the "number and location of inspection points" is not appropriate. Based on its description in Section 3.1.2.1 of the Draft LTMP, the general assessment is not a rigorous inspection, but merely "a visual survey to assess the general condition of the coated surfaces." Therefore, it will not provide sufficient detail to identify the areas with higher potential for coating degradation. Regional Water Board staff suggest identifying known areas of concern (e.g., due to weather, exposure, bird activity, etc.) in the LTMP that will be inspected as part of the detailed assessment with the option to add more locations based on the results of the general assessment. Observation for paint flakes on the ground should be part of the general assessment.	3.1.2.2 - The visual assessment will at a minimum be designed to evaluate representative coating locations from Level 1 to Level 9 at support Column 14 to Column 1 (i.e., every level and every column in the hangar). 3.1.2.3 - Physical tests, including adhesion tests and coating thickness measurements, will be performed at a minimum of eight (8) representative locations. These minimum requirements are consistent with the initial coating condition survey performed at the beginning of the removal action:
8.	Elizabeth K. Wells	3-4	Section 3.2.1	See comment 3, above. The text incorrectly states that stormwater pollution prevention measures are described in Section 1.5.1. Discuss what contingencies will be put into place if necessary Carboline products are discontinued or the company goes out of business. The LTMP states "only Carboline- approved products may be used during maintenance coating." Because the remedy must last into perpetuity, a contingency in the event that Carboline products are no longer available should be in place.	The storm water pollution prevention measures are discussed in section 1.5.1, page 1-5, last paragraph as follows: *"Storm Water pollution prevention measures were designed and installed to ensure that storm water was not impacted during the pressure washing activity. Storm water protection Best Management Practices (BMPs) included installation of environmental controls (containment sheeting) around the active washing areas, construction of berms on the hangar floor, installation of inflatable packers in the hangar perimeter storm drain trench, and placement of sediment filters over catch basins and storm drains surrounding the hangar. "* If the coating manufacturer is no longer in business or the CM15 product is no longer available, there are numerous other epoxy mastic coating products that are compatible with CM15 and would provide an equivalent level of protection to the underlying steel. In the event that a product other than CM15 is needed during the LTMgmt phase, a new coating condition survey would be conducted to confirm the effectiveness of the new product in meeting removal action objectives. The text in this section will be revised to provide clarification.
9.	Elizabeth K. Wells	3-4	Section 3.3	Provide the rationale for using 3 years as the coating inspection frequency.	The rationale for inspections at 3-year intervals is based on the coating condition survey results and Carboline's recommendations for maintenance of the CM15 coating system. Clarification will be added to the discussion in section 3.3.

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
10.	Elizabeth K. Wells	4-2	Section 4.1	Include what actions will be taken to confirm recontamination of Site 25 has not occurred if elevated concentrations of polychlorinated biphenyls (PCBs) are detected in stormwater and/or sediment samples.	If concentrations of PCBs are detected in storm water or sediment samples above the trigger levels as part of this LTMgmt. Plan, the entity responsible for Long-Term Management of Hangar 1 will provide the appropriate notifications to discuss a path forward. Text will be added to Section 4.1 to indicate this. In addition, NASA is responsible for the base-wide storm drain system and performs annual clean-out and NPDES compliance sampling of catch basins across the base (composite sample) and the settling basin (discreet and effluent samples).
11.	Elizabeth K. Wells	4-2	Section 4.1, Table 4-1, Step 6	a. Provide the rationale for using the California Toxics Rule (CTR) criteria as the action level for PCBs in stormwater. Confirm the proposed action level is consistent with NASA's NPDES1 industrial stormwater permit discharge limits and the Basin Plan, and will not impact Site 25, the receiving point of the stormwater discharge. b. Provide the rationale for using 1000 micrograms per kilogram (µg/kg) of PCBs as the action level for sediment. The receiving point of the discharge, Site 25, has a not-to- exceed cleanup level of 210 µg/kg for PCBs. Allowing 1000 µg/kg of PCBs in sediment to travel from the Hangar 1 site to ultimately discharge into Site 25 will result in recontamination and a risk to the environment. c. Provide action levels for lead in stormwater and sediment. Lead is present in paint remaining on the hangar and is a chemical of concern at Site 25.	a) It should first be noted that this concentration is being considered a trigger level and not necessarily an action level for PCBs in storm water. Please see response to comment #10 above for notification of a trigger level exceedence as part of the LTMgmt. Plan. NASA is permitted under the Industrial General NPDES permit for storm water discharge and there are no facility-specific discharge limits incorporated in the NASA permit. The current Storm Water Pollution Prevention Plan (SWPPP) for the Hangar 1 Non-Time-Critical Removal Action (NTCRA) establishes a trigger level of 0.03 µg/L for PCBs. This PCB action level is based on the numerical objectives promulgated under the California Toxic Rule (CTR), and is applicable to San Francisco Bay marine waters south of the Dumbarton Bridge as stated in Chapter 3, Table 3-3 of the San Francisco Bay Basin Plan. The numerical objectives specified in the CTR represent the maximum amount of pollutants that can remain in the water column in the bay without causing any adverse effect on organisms using the aquatic system as habitat. Since the CTR numerical objectives represent maximum concentrations in the ambient water column in the bay, they are not directly applicable to storm water discharge from Hangar 1. Currently, no storm water at Moffett Field has a direct connection to the San Francisco Bay. Additionally, no receptors exist between the catch basins at Hangar 1 and along the storm water conveyance system to NASA's Storm Water Settling Basin (SWSB) and ultimately the Storm Water Retention Pond. Therefore, the Navy recently proposed to the Water Board and EPA that a more appropriate PCB trigger level of 1.24 µg/L be adopted for future storm water monitoring events at Hangar 1. This trigger level is derived from calculations that consider the quantity of runoff from the hangar foundation (8 acres) relative to the runoff from the NASA Western Drainage Area surrounding Hangar 1, which is approximately 760 acres. This trigger level will ensure protectiveness of the CTR numerical objective of 0.03 µg/L at NASA's SWSB. If approved by the Water Board and EPA, this revised trigger level will be adopted in the LTMgmt Plan. b) It should first be noted that this concentration is being considered a trigger level and not necessarily an action level for PCBs in sediment. Please see

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
					response to comment #10 above for notification of a trigger level exceedence as part of this LTMgmt. Plan. The 1000 µg/kg acceptance criteria for PCB concentrations in sediment was established and accepted by the agencies as part of the Storm Water Pollution Prevention Plan and Sampling and Analysis Plan for Hangar 1 (Site 29). Furthermore, and with concurrence from the agencies, NASA has established 1000 ug/kg for all upland PCB sites for surface soil. Based on this precedence, the same limit was adopted in the LTMgmt Plan as a trigger level for sediment as indicated above. c) Lead is not a COC for this removal action, so there is no trigger level concentration. However, lead analysis will be added for comparison only. NASA is responsible for the base-wide storm drain system and performs annual clean-out and NPDES compliance sampling (including lead analysis) of catch basins across the base (composite sample) and the settling basin (discreet and effluent samples).
12.	Elizabeth K. Wells	4-3	Section 4.2	Include analysis for lead (and other relevant metals) in the sampling and analysis program. Lead-based paint remains on the hangar structure and lead is a chemical of concern at Site 25.	Since lead has also been historically sampled at Hangar 1, the Navy will continue to sample for lead and revise the LTMgmt Plan to add lead analysis. However, since lead is not a COC for this removal action, there is no trigger level concentration (provided as comparison data only). NASA is responsible for the base-wide storm drain system and performs annual clean-out and NPDES compliance sampling (including lead analysis) of catch basins across the base (composite sample) and the settling basin (discreet and effluent samples).
13.	Elizabeth K. Wells	Appendix B	Appendix B	Include product data sheets for all coating materials used on the structure. According to the Draft LTMP, Sikaflex 1A, CM15, Carboguard 1340®, and Carbozinc 859® were used. Data sheets for only CM15 and Carboguard 1340® are included in the appendix	Product data sheets for Sikaflex 1A (caulk) and Carbozinc 859® will be added to the appendix.
14.	Elizabeth K. Wells	Appendix D	Appendix D, Coating Inspection Form	a. Clarify how the inspected location is identified on the form. b. Clarify the meaning of “Describe Overall Environment” and “Describe Local Environment.” c. Include observations of wildlife affects (e.g., bird guano, nesting, evidence of scraping, etc.). d. In general, clarify if the form is asking for	a) The form will be modified to add a column for location (i.e., column and level). b) Footnotes will be added to the form to define these terms. c) The form will be modified to add a column for wildlife aspects. d) Footnotes will be added to the form to clarify the type of input required for each column. e) The form will be modified to add this information.

Comment #	Reviewer	Page #	Section/Figure/ Table/Appendix	Comment	Response by AMEC
				yes/no responses, measurements (include units), or visual observations. e. Include the name of the firm for which the inspector works and contact information of the inspector.	

RESPONSE TO COMMENTS ON

DRAFT FINAL

LONG TERM MANAGEMENT PLAN FOR

NON-TIME-CRITICAL REMOVAL ACTION FOR PCB CONTAMINATION

Installation Restoration Site 29 (Hangar 1) at Former Naval Air Station
Moffett Field, California

Appendix G to DCN: AMEC-8816-0005-0132

Comments by:	Responses by:
Elizabeth K. Wells, P.E. Water Resource Control Manager San Francisco Bay RWQCB 1515 Clay St., Suite 1400 Oakland, CA 94612	AMEC Environment & Infrastructure, Inc.

Page Number		Section/Figure/Table/Appendix	Comments	Responses (Contractor)
General Comments				
1			Regional Water Board staff concur with implementing a monitoring and sampling program to assess the effectiveness of the non-time critical removal action in reducing discharge of chemicals of concern (polychlorinated bi phenols [PCBs] and lead) from the hangar into the storm drain system, and ultimately to Site 25. The chemicals of concern, if present, are expected to adhere to sediment carried in stormwater exiting the hangar area. Therefore, Regional Water Board staff suggest the monitoring program focus on sampling and analysis of sediment downstream of the hangar for PCBs and lead. As such, modify tithe Draft Final LTMP to describe the sediment sampling,	The Final LTMgmt Plan will be revised so that the storm water monitoring program is based on sediment sampling. Section 4.0 and its subsections will be revised accordingly and a flow chart of the approach will be included with the revised text. The monitoring approach will include the following steps: 1) Collect annual sediment sample from manhole SD-107 (immediately downstream of Hangar 1). The sample will be collected prior to the

			analysis, and reporting program for PCBs and lead.	beginning of the wet season in September of each year. 2) Analyze the sediment sample for lead and PCBs. 3) If sample results exceed the trigger levels, then collect a) confirmatory sample at SD-107, b) additional samples at catch basins located in the four quadrants of the perimeter trench (CB-463D, CB-447A, CB-443B, CB-454D) , and c) additional samples at upstream catch basin CB-107F and manhole SD-442. 4) Coordinate with agencies to evaluate results of additional sampling and determine appropriate action(s) based on analytical results. Proposed sediment trigger levels are: a) PCB = 1.0mg/kg as agreed in the Response to Comments on the Draft LTMP. b) Lead = 320 mg/kg based on the RWQCB Environmental Screening Level (ESL) for soil (Commercial/Industrial

				Land Use).
2			Although the Draft Final LTMP states "The facility owner will assume responsibility for the operations and maintenance of remaining Moffett Field remediation sites after remedial actions are completed," it does not appear that NASA Ames has agreed to take on this responsibility. In its February 28, 2013, letter to the Navy, NASA Ames states it will not perform inspection and maintenance of the coating, sampling to monitor the effectiveness of the coating, or prepare the five-year review reports. Until the responsibilities of monitoring and maintenance for the hangar have been formally transferred and agreed to by NASA Ames, we consider the Navy responsible to ensure the protectiveness of the Hangar 1 removal action.	Comment noted. However, in a letter dated May 26, 2009 to the Navy, NASA stated that "To enable Navy's planning for ultimately ending direct involvement in environmental activities at Moffett Field, NASA will assume responsibility for the operations and maintenance of remaining Moffett Field remediation sites after remedial actions are completed at each of those sites as determined by EPA Region 9." The Navy has been relying on NASA's commitment as stated in its May 26, 2009 letter in advancing the environmental cleanup program at former NAS Moffett Field toward the O&M stage. Furthermore, on April 8, 2013, the Director of BRAC PMO responded to NASA's letter of February 28, 2013, reiterating the importance of NASA assuming long term responsibilities for Hangar 1 as committed in NASA's May 26, 2009 letter and that these responsibilities are properly addressed in NASA's Request for Proposal and any lease agreement for the hangar.
Specific Comments				
1		Sections 1.4 and 1.6	Modify the text to reflect recent discussions with the regulatory agencies regarding the lead clearance level for	The text in sections 1.4 and 1.6 will be modified to reflect the agreement reached in the March 22, 2013

			surface contamination on the floor. Because the Navy is proposing to use a clearance of 400 micrograms per square foot (µg/ft^2), which is different than the level agreed to prior to implementation of the removal action (40 µg/ft^2), the technical basis for this level must be included in the Draft Final LTMP. .	conference call with the agencies. The wipe sample data (i.e., the final sample collected at each grid location) will be used to calculate a geometric mean for comparison to the residential clearance level of 40 ug/ft^2.
2		Section 1.5.1	Confirm that residual sediment, from pressure washing the storm drain system surrounding the hangar, was disposed of off site.	Confirmed, residual sediment, from pressure washing the storm drain system surrounding the hangar, was disposed of off site. The final text in section 1.5.1 will state this.
3		Table 4-1, Step 6	Specify what actions, in addition to notifying the regulatory agencies, the Navy will take if the trigger levels for PCBs and/or lead are exceeded in sediment samples (see General Comment 1, above).	The specific actions that will be taken depend on the upstream sampling results (see response to comment #1). If the source of the contaminants is determined to be from offsite sources and not related to Hangar 1, then NASA or the agency responsible for managing Moffett Field will be responsible for identifying the source and taking appropriate action. If the source of the contaminants is determined to be the Hangar, then the following actions may be appropriate: 1) Conduct a coating inspection for the affected quadrant(s) of the hangar in accordance with section 3.1.2 of the LTMgmt Plan. 2) Conduct coating maintenance or repairs if required in accordance with section 3.2 of the LTMgmt Plan.

				3) Consider recommendations for increased monitoring frequency and/or monitoring locations.
4		Section 6.0	Confirm that NASA has agreed to review its Hangar 1 reuse guidelines and the schedule for completing the review and preparing any necessary addenda to the guidelines.	Confirmed. This information was provided directly by NASA (see NASA RTC comments #20 and #21).
5		Appendix G. Response to Comments	Modify the response to Regional Water Board Specific Comment 11 as appropriate to address General Comment 1 and Specific Comment 3 above.	The earlier comments and responses should not be modified, since they provide a record of the chain of agency review. However both the original comments/responses for the Draft LTMgmt Plan and these additional comments/responses on the Draft Final will be included in Appendix G. This will provide a complete record of comments received on the LTMgmt Plan.

RESPONSE TO COMMENTS ON

DRAFT FINAL

LONG TERM MANAGEMENT PLAN FOR

NON-TIME-CRITICAL REMOVAL ACTION FOR PCB CONTAMINATION

Installation Restoration Site 29 (Hangar 1) at Former Naval Air Station
Moffett Field, California

Appendix G to DCN: AMEC-8816-0005-0132

Comments by*:	Responses by:
Yvonne Fong, US EPA 75 Hawthorne Street San Francisco, CA 94105 *Comments provided in verbal communication with Bryce Bartelma, Navy RPM.	AMEC Environment & Infrastructure, Inc.

Page Number		Section/Figure/Table/Appendix	Comments	Responses (Contractor)
Specific Comments				
1		Section 1.5.2 – List of Bullets	Add bullet for bottom sides of stairs and handrails to roof (areas that still have contaminated paint beneath CM15).	Bullet will be added to this section as noted in the comment.
2		Section 2.1 – new bullet that was added	Delete text "are among the duties that must be completed to implement the LTMgmt Plan". First part of bullet is all that needs to be included.	Text will be deleted as noted in the comment.
3		Section 4.3, page 4-6	Second paragraph that starts with: "Validated PCB sediment data…" Delete the "/or" in the second to last sentence. Need to coordinate with both the Water Board and EPA.	Text will be revised as noted in the comment.
4		Figure 5	Revise this according to new sampling plan.	Figure 5 will be revised to reflect the new sampling approach in response to Water Board comments. A flow chart will be included along with revised text in this section to

				further clarify the sampling plan. The monitoring approach will include the following steps: 1) Collect annual sediment sample from manhole SD-107 (immediately downstream of Hangar 1). The sample will be collected prior to the beginning of the wet season in September of each year. 2) Analyze the sediment sample for lead and PCBs. 3) If sample results exceed the trigger levels, then collect a) confirmatory sample at SD-107, b) additional samples at catch basins located in the four quadrants of the perimeter trench (CB-463D, CB-447A, CB-443B, CB-454D) , and c) additional samples at upstream catch basin CB-107F and manhole SD-442. 4) Coordinate with agencies to evaluate results of additional sampling and determine appropriate action(s) based on analytical results.
5		Appendix G. Response to Comments	Need to revise original #4 to be consistent with new #1 above.	The earlier comments and responses should not be modified, since they provide a record of the chain of agency review. However both the original

				comments/responses for the Draft LTMgmt Plan and these additional comments/responses on the Draft Final will be included in Appendix G. This will provide a complete record of comments received on the LTMgmt Plan.
6		Appendix G. Response to Comments	Need to revise original EPA comment #14 to be consistent with new Water Board comment.	The earlier comments and responses should not be modified, since they provide a record of the chain of agency review. However both the original comments/responses for the Draft LTMgmt Plan and these additional comments/responses on the Draft Final will be included in Appendix G. This will provide a complete record of comments received on the LTMgmt Plan.

7		Appendix G. Response to Comments	Would like the Navy to revise original #15 and remove text regarding lead is not a COC.	Lead is not a contaminant of concern for IR Site 29. However, while PCBs were the regulatory driver for the Navy's Non-Time Critical Removal Action (NTCRA), asbestos and lead were also present in interior and exterior Hangar 1 building materials. Therefore, in the course of addressing the PCB contamination at Hangar 1, it was necessary to take into account health and safety issues associated with handling and working in the vicinity of materials containing asbestos and lead and to comply with requirements for proper management, abatement, or disposal of asbestos and lead as hazardous materials. It should be noted that, as detailed in the *After Action Completion Report* (AMEC 2013), the primary source of contaminants (interior buildings and Robertson Protected Metal siding) were completely removed from Hangar 1. Based on the Coating Condition Survey, some areas of structural steel paint (lead-based paint with PCBs) were abated to near white metal to remove all

				contamination. The remaining structural steel paint and certain painted concrete structures that were in good condition were left in place and prepared for overcoating with Carbomastic 15, an epoxy coating. The *Long-Term Management (LTMgmt) Plan for NTCRA PCB Contamination* (AMEC 2013) addresses the requirements for the continued protectiveness of the epoxy coating. This includes triennial coating inspections and touch-ups (as necessary) as well as annual storm drain sediment sampling for PCBs and lead, which will ensure the long-term protectiveness of the final remedy. Reports of LTMgmt activities will be provided to all project stakeholders. Finally, it should be noted that the facility owner has instituted standard procedures for managing lead-based paint for all buildings and structures at Moffett Field, as detailed in the *NASA Ames Health and Safety Manual, Chapter 35, Lead Management Plan*.
8		Appendix G. Response to Comments	Need to revise original #18 to be consistent with new #2 above.	The earlier comments and responses should not be modified, since they provide a record of the chain of agency review. However both the original comments/responses for the

				Draft LTMgmt Plan and these additional comments/responses on the Draft Final will be included in Appendix G. This will provide a complete record of comments received on the LTMgmt Plan.

June 10, 2013 Sent via Electronic Mail

Department of the Navy
Base Realignment and Closure Program
Management Office West
Attn. Mr. Scott Anderson
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San Diego, CA 92108
scott.d.anderson@navy.mil

Subject: EPA and Regional Water Board Conditional Concurrence and Comments on Navy's *Revised Draft Final Long Term Management Plan for Non-Time-Critical Removal Action for PCB Contamination*, Installation Restoration Site 29 (Hangar 1), Former Naval Air Station Moffett Field, California

Dear Mr. Anderson:

The U.S. Environmental Protection Agency (EPA) and California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) have reviewed the May 2013 *Revised Draft Final Long Term Management Plan for Non-Time-Critical Removal Action for PCB Contamination* (Revised Draft Final LTMP) and associated responses to agency comments (RTCs) received via email on May 28, 2013. EPA and Regional Water Board staff concur with the Revised Draft Final LTMP on the condition that the comments presented below are addressed in the Final LTMP.

Comments on Revised Draft Final LTMP

1. Section 1.1, 1st paragraph: Delete "storm water and" in the third item of the list of actions.
2. Section 1.4: Delete "geometric mean," which was added to the text.
3. Section 1.6, 2nd paragraph: Clarify that the project-specific clearance level of 40 micrograms per square foot (µg/ft^2) was "achieved as a geometric mean" rather than stating the lead concentrations are "within the acceptance limit" of 40 µg/ft^2 for the lead.
4. Section 2.1: Add the monitoring program to the list of duties.
5. Section 4.3: Change the trigger levels for polychlorinated biphenyls (PCBs) and lead in sediment to 0.21 and 93.8 milligrams per kilogram (mg/kg), which are the remediation goals for Site 25. Sediment from the hangar, if discharged, travels through the storm drain system to the storm water settling basin (SWSB). Because sediment can potentially be released from the SWSB, the ultimate point of exposure is Site 25. At the same time, the Hangar 1 removal action should result in minimal PCB and lead discharge. As such, the regulatory agencies require the Navy take action if these trigger levels are exceeded in the sediment samples.

Comment on RTCs

1. Along with EPA's General Comment 1 from November 8, 2012, General Comment 2 from the Regional Water Board, while "noted" by the Navy, stands. Until NASA has formally agreed to take on the responsibilities of monitoring and maintenance of the hangar, we consider the Navy responsible for performing these actions and ensuring the protectiveness of the remedy. Further, the Navy states in its response that "these responsibilities are properly addressed in NASA's Request for Proposal and any lease agreement for the hangar." However, the Request for Proposals (RFP)[1] distributed by NASA Ames does not adequately address these responsibilities. The RFP states only that the preferred selected lessee "may be required to comply with the final remedy."

Please contact Yvonne Fong at 415-947-4117 or fong.yvonnew@epa.gov or Elizabeth Wells at 510-622-2440 or ewells@waterboards.ca.gov if you have questions.

Sincerely,

Yvonne Fong
EPA Project Manager

Elizabeth Wells, P.E.
Water Board Project Manager

cc (via email only):
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[1] Request for Proposals, Rehabilitation and Adaptive Reuse of Hangar One and Management of Moffett Airfield, NASA Ames Research Center, Mountain View, CA, May 28, 2013.