

DRAFT FINAL

**FOCUSED FEASIBILITY STUDY
INSTALLATION RESTORATION SITE 29 (HANGAR 1)
FORMER NAVAL AIR STATION MOFFETT FIELD, CALIFORNIA**

Prepared for:



Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:



RORE, Inc.
5151 Shoreham Place, Suite 260
San Diego, California 92122

Prepared under:

Contract Number: N62473-09-D-2620
Task Order: 0006
Document Control Number: RORE-2620-0006-0003

May 2013

This page intentionally left blank

DRAFT FINAL

**FOCUSED FEASIBILITY STUDY
INSTALLATION RESTORATION SITE 29 (HANGAR 1)
FORMER NAVAL AIR STATION MOFFETT FIELD, CALIFORNIA**

Contract Number: N62473-09-D-2620
Task Order: 0006
Document Control Number: RORE-2620-0006-0003

May 2013



Daniel Lohr, P.G.
Technical Lead
RORE, Inc.

5/16/13

Date



Dakshana Murthy Ph.D., P.E., D.GE
Principal Engineer
RORE, Inc.

5/16/13

Date



Luis Rivero, P.E., P.M.P
Program Manager
RORE, Inc.

5/16/13

Date

This page intentionally left blank

Executive Summary

This Focused Feasibility Study (FFS) is follow-up documentation to a Non-Time Critical Removal Action (NCTRA) that was performed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at Installation Restoration (IR) Site 29 (Hangar 1), located at the former Naval Air Station (NAS) Moffett Field near Mountain View, California. Because polychlorinated biphenyls (PCBs) and lead will remain in place encapsulated under an epoxy coating placed upon the hangar structure at Site 29 as an engineering control (EC) as part of the NCTRA, it is necessary to evaluate the implementation of institutional controls (ICs) to ensure the protectiveness of the NCTRA. This FFS has been prepared as a follow-up documentation to the Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum (AM) because those documents did not fully evaluate the implementation of ICs in support of the long-term management for Alternative 10. This FFS is an evaluation of IC options to support site closure by ensuring the protectiveness of the NCTRA. This FFS Report follows the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) for facilities subject to the CERCLA, related United States Environmental Protection Agency (USEPA) technical guidance, and the Navy Environmental Restoration Program Manual (Navy, 2006).

The overall objectives of this FFS are to:

- Develop and evaluate potential IC alternatives for the long-term management of Hangar 1 that permanently and significantly reduce the threat to public health, welfare, and the environment;
- Select a cost-effective alternative that mitigates the threat(s); and
- Achieve consensus among the U.S. Department of the Navy (Navy), USEPA, and state and local authorities regarding the selected action.

Former NAS Moffett Field is a Federal airfield located 30 miles southeast of San Francisco and 10 miles northwest of San Jose, near Mountain View, California. 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 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, concrete electrical vaults and a concrete floor.

A NCTRA was conducted from June 2010 to December 2012 to remove the hangar's interior structures, remove the corrugated siding and roof, to clean and prepare surfaces and apply an epoxy coating to encapsulate the remaining contaminated surfaces. All building materials were deconstructed or demolished and the waste materials were disposed or recycled as part of the NCTRA, leaving only the steel frame, door operating mechanisms, concrete electrical vaults and concrete slab in the present condition.

The Chemicals of Concern (COC) at the site are PCBs which were present in the hangar roof, siding, interior buildings and as a component of the residual paint on interior structural steel and certain concrete structures (e.g. electrical vaults). The NTCRA was conducted in order to mitigate PCBs remaining at Hangar 1 in the building materials and to eliminate/reduce the potential for negative impact to human health and the environment from these materials. During the NTCRA, the Hangar roof and siding and interior buildings were removed and the structural steel and certain concrete structures were encapsulated with Carbomastic® 15 (CM15) epoxy coating. The CM15 coating has an effective warranty of 12 years; therefore additional actions are required to maintain the CM15 coating to ensure protectiveness of the action.

The following two remedial alternatives were considered for screening in this FFS:

- Alternative 1: No Action
- Alternative 2: Implementation of Institutional Controls (ICs)

These alternatives are being evaluated against the following requirements:

- Be protective of human health and the environment
- Comply with Applicable or Relevant and Appropriate Requirements (ARARs), unless a waiver is justified
- Be cost-effective
- Use permanent solutions, treatment technologies, or resource recovery technologies to the maximum extent practicable
- Satisfy the preference for treatment as a principal element, or provide an explanation as to why the preference was not met

To satisfy these requirements, each remedial action alternative was evaluated against the following nine criteria defined in the NCP at 40 Code of Federal Regulations (CFR) § 300.430(e)(q)(iii):

- Threshold criteria
 - Overall protection of human health and the environment
 - Compliance with ARARs
- Primary balancing criteria
 - Long-term effectiveness and permanence
 - Reduction of toxicity, mobility, or volume through treatment
 - Short-term effectiveness
 - Implementability
 - Cost

The following two modifying criteria are briefly discussed in this FFS. These criteria will be evaluated in consideration of regulatory agency comments received on this FFS, and on public comments received on the preferred remedial alternative presented in the Proposed Plan (PP):

- Modifying Criteria
 - State acceptance

- Community acceptance

A green and sustainable remediation (GSR) assessment was also conducted on each retained alternative. This evaluation was performed following Navy guidance using the Navy's GSR tool SiteWise™, version 2.0.

A comparative analysis of the remedial action alternatives was conducted to evaluate the potential advantages and disadvantages of each alternative relative to other alternatives using the nine NCP evaluation criteria. Evaluation of modifying criteria (state acceptance and community acceptance) will be documented in the Record of Decision (ROD) once regulatory agency comments have been received on this FFS Report, and comments from the public are received on the Final PP.

Of the alternatives that were evaluated, Alternative 2 was rated lower in sustainability, but higher overall in satisfying the balancing criteria.

This page intentionally left blank

TABLE OF CONTENTS

1.0 INTRODUCTION	1-1
1.1 Purpose	1-1
1.2 FFS Scope	1-1
1.3 Organization.....	1-2
2.0 SITE CHARACTERIZATION	2-1
2.1 Site Description and Background.....	2-1
2.2 Previous Investigations and Decisions.....	2-2
2.3 Condition of Site at Completion of Removal Action.....	2-2
3.0 IDENTIFICATION OF REMEDIAL ACTION OBJECTIVES	3-1
3.1 Statutory Framework	3-1
3.2 Chemicals of Concern	3-1
3.3 Potential Receptors and Exposure Pathways	3-1
3.4 ARARs.....	3-1
3.5 Remedial Action Objectives	3-2
4.0 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES	4-1
4.1 Alternative 1 - No Action.....	4-1
4.2 Alternative 2 - Implementation of Institutional Controls	4-2
4.3 Screening of Alternatives	4-3
5.0 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES	5-1
5.1 National Contingency Plan Evaluation Criteria	5-2
5.1.1 Overall Protection of Human Health and the Environment.....	5-2
5.1.2 Compliance with Applicable or Relevant and Appropriate Requirements.....	5-2
5.1.3 Long-Term Effectiveness and Permanence	5-2
5.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment	5-2
5.1.5 Short-Term Effectiveness	5-3
5.1.6 Implementability	5-3
5.1.7 Cost.....	5-3
5.1.8 State Acceptance.....	5-3
5.1.9 Community Acceptance.....	5-3
5.2 Detailed Analysis of Alternative 1: No Action.....	5-4
5.2.1 Description of Alternative.....	5-4
5.2.2 Evaluation by Threshold Criteria	5-4
5.2.2.1 Overall Protection of Human Health and the Environment.....	5-4

5.2.2.2	Compliance with Applicable or Relevant and Appropriate Requirements	5-4
5.2.3	Evaluation by Balancing Criteria.....	5-4
5.2.3.1	Long-Term Effectiveness and Permanence.....	5-4
5.2.3.2	Reduction of Toxicity, Mobility, or Volume through Treatment....	5-4
5.2.3.3	Short-Term Effectiveness.....	5-5
5.2.3.4	Implementability	5-5
5.2.3.5	Cost.....	5-5
5.3	Detailed Analysis of Alternative 2: Implementation of Institutional Controls	5-5
5.3.1	Description of Alternative	5-5
5.3.1.1	Long-term Management and Coating Maintenance	5-5
5.3.1.2	Sediment Sampling.....	5-6
5.3.1.3	Five Year Reviews and Reporting.....	5-6
5.3.2	Evaluation of Alternative 2 by Threshold Criteria.....	5-6
5.3.2.1	Overall Protection of Human Health and the Environment	5-6
5.3.2.2	Compliance with Applicable or Relevant and Appropriate Requirements	5-6
5.3.3	Evaluation of Alternative 2 by Balancing Criteria	5-6
5.3.3.1	Long-Term Effectiveness and Permanence.....	5-7
5.3.3.2	Reduction of Toxicity, Mobility, or Volume through Treatment....	5-7
5.3.3.3	Short-Term Effectiveness.....	5-7
5.3.3.4	Implementability	5-7
5.3.3.5	Cost.....	5-7
6.0	COMPARATIVE ANALYSIS OF ALTERNATIVES.....	6-1
6.1	Overall Protection of Human Health and the Environment.....	6-1
6.2	Compliance with ARARs.....	6-1
6.3	Long-Term Effectiveness and Permanence	6-1
6.4	Reduction of Toxicity, Mobility, or Volume through Treatment	6-1
6.5	Short-Term Effectiveness	6-1
6.6	Implementability	6-2
6.7	Cost	6-2
6.8	State Acceptance.....	6-2
6.9	Community Acceptance.....	6-2
6.10	Conclusions.....	6-2
7.0	REFERENCES.....	7-1

FIGURES

Figure 1	Location of Hangar 1 at Moffett Field, California
Figure 2	Location of Epoxy-Coated Structures and Schedule of Inspection Requirements

TABLES

Table 1	Comparative Analysis Summary for Removal Action Alternatives
---------	--

APPENDICES

Appendix A	Applicable or Relevant and Appropriate Requirements (ARARs)
Appendix B	Sustainability Assessment
Appendix C	Cost Development Summaries
Appendix D	Response to Comments on Draft Focused Feasibility Study

This page intentionally left blank

Acronym List

AM	Action Memorandum
ARARs	Applicable or relevant and appropriate requirements
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CM15	Carbomastic® 15
CMU	Concrete masonry unit
COC	Contaminants of concern
DTSC	Department of Toxic Substances Control
EC	Engineering control
EE/CA	Engineering Evaluation/Cost Analysis
FFS	Focused Feasibly Study
GHG	Greenhouse gas
GSR	Green and sustainable remediation
IC	Institutional control
IR	Installation Restoration
LTMgmt Plan	Long Term Management Plan
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOx	Oxides of nitrogen
NTCRA	Non-Time Critical Removal Action
O&M	Operation & maintenance
PCB	Polychlorinated biphenyls
PM10	Particulates less than 10 micrometers
PMO	Program Management Office
PP	Proposed Plan
RACER	Remedial Action Cost Engineering Software
RAO	Remedial action objective
RAP	Remedial Action Plan

RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SO _x	Oxides of sulfur
TCRA	Time Critical Removal Action
TSCA	Toxic Substances Control Act
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

1.1 Purpose

This Focused Feasibility Study (FFS) is follow-up documentation to a Non-Time Critical Removal Action (NCTRA) that was performed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at Installation Restoration (IR) Site 29 (Hangar 1), located at the former Naval Air Station (NAS) Moffett Field near Mountain View, California. Because polychlorinated biphenyls (PCBs) and lead will remain in place encapsulated under an epoxy coating placed upon the hangar structure at Site 29 as an engineering control (EC) as part of the NCTRA, it is necessary to evaluate the implementation of institutional controls (ICs) to ensure the protectiveness of the NCTRA. This FFS Report follows the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) for facilities subject to the CERCLA, related United States Environmental Protection Agency (USEPA) technical guidance, and the Navy Environmental Restoration Program Manual (Navy, 2006).

1.2 FFS Scope

The overall objectives of the FFS are to:

1. Develop and evaluate potential IC alternatives for the long-term management of Hangar 1 that permanently and significantly reduce the threat to public health, welfare, and the environment;
2. Select a cost-effective alternative that mitigates the threat(s); and
3. Achieve consensus among the U.S. Department of the Navy (Navy), USEPA, and state and local authorities regarding the selected action.

The FFS methodology is summarized below and further detailed in subsequent sections of this FFS Report. The FFS methodology includes the following steps (EPA, 1988):

- Establish remedial action objectives (RAOs)
 - Identify applicable or relevant and appropriate requirements (ARARs)
 - Establish response objectives for environmental media of concern
- Identify general response actions, including no action, to meet RAOs for each medium of concern
- Assemble remedial alternatives to meet RAOs, based on technical considerations
- Screen assembled alternatives, considering effectiveness, implementability, and cost
- Evaluate retained alternatives against the following nine criteria specified in the NCP
 - Threshold criteria
 - Overall protection of human health and the environment
 - Compliance with ARARs
 - Balancing Criteria
 - Long-term effectiveness and permanence
 - Reduction of toxicity, mobility, or volume through treatment
 - Short-term effectiveness
 - Implementability
 - Cost

-
- Modifying criteria
 - Support agency acceptance
 - Community acceptance
 - Perform a comparative analysis of alternatives

This FFS Report does not identify or recommend a preferred alternative. Comments made during reviews by regulatory agencies and the public will be evaluated and considered during the remedy-selection process. As required by the NCP and EPA guidance (USEPA, 1988), a Proposed Plan (PP) will be prepared, presenting the preferred alternative for public comment. Comments received on the PP will be considered in the remedy selection process, and documented in the Record of Decision (ROD).

1.3 Organization

This FFS Report is organized as follows:

Section 1.0 - Introduction presents the purpose and scope of the FFS

Section 2.0 - Site Characterization provides site description and background, previous investigations and decisions, and conditions of the site at the completion of the most recent removal action

Section 3.0 - Identification of Remedial Action Objectives identifies the statutory framework, chemicals of concern (COCs), potential receptors and exposure pathways, potential ARARs, and objectives for additional remedial actions remaining at Hangar 1

Section 4.0 - Development and Screening of Remedial Alternatives presents remedial action alternatives considered

Section 5.0 - Detailed Analysis of Remedial Alternatives provides a discussion of alternatives evaluated and retained in Section 4.0 relative to the threshold and balancing criteria

Section 6.0 - Comparative Analysis of Alternatives compares the alternatives and provides a discussion of the findings of the FFS

Section 7.0 - References lists the references cited in this FFS Report

Appendix A presents a discussion of potential ARARs for Hangar 1 alternatives

Appendix B presents the details of a green and sustainable remediation (GSR) assessment performed on active alternatives

Appendix C presents cost development summaries for alternatives

2.0 SITE CHARACTERIZATION

2.1 Site Description and Background

Former NAS Moffett Field is a Federal airfield located 30 miles southeast of San Francisco and 10 miles northwest of San Jose, near Mountain View, California. The facility is currently operated by the 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.

2.2 Previous Investigations and Decisions

In 1991, NASA completed construction of a storm water settling basin (settling basin) approximately 2,000 feet northwest of Hangar 1 to limit sediment transport to IR Site 25, which includes the Eastern Diked Marsh, Storm water Retention Pond, and the Midpeninsula Regional Open Space District property. This settling basin also reduces contaminant migration from Hangar 1 to Site 25. The settling basin receives storm water runoff from the western portion of former NAS Moffett Field. In 1997, during routine cleanout and sampling activities conducted by NASA, a relatively uncommon PCB mixture, Aroclor-1268, was discovered in sediment in the settling basin (AMEC, 2013).

In 1999, PCBs (Aroclors 1260 and 1268) 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 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 applying a temporary coating (asphalt emulsion) to the hangar’s corrugated siding 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 long-term alternatives to mitigate PCB releases from Hangar 1. The results of this evaluation were presented in the EE/CA dated July 30, 2008 (Navy, 2008a). Alternative 10 (Remove Siding and Coat Exposed

Surfaces) was selected as the recommended NTCRA alternative with agency concurrence and documented in the Action Memorandum (AM) issued by the Navy's Base Realignment and Closure (BRAC) Program on December 31, 2008 (Navy, 2008b).

The NTCRA, performed from June 2010 to December 2012, consisted of the complete removal of the siding, deconstruction of interior structures, removal of debris to appropriate off-site disposal or recycling facilities, cleaning by high-pressure washing and preparation of steel and/or concrete surfaces, and application of an epoxy coating system to the hangar's remaining structural steel frame and certain concrete structures to encapsulate residual PCBs.

The objective of the NTCRA was to mitigate known PCB contamination at Hangar 1, thereby eliminating/reducing the potential for negative impact to human health and the environment from these materials.

2.3 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. Over-coated structures where PCBs remain encapsulated include:

- Structural steel frame
- Concrete masonry unit (CMU) walls surrounding the six electrical vaults
- CMU walls surrounding the former hazardous materials storage room
- CMU walls that were part of the former restrooms
- Door operating mechanisms (trucks/bolsters, motor housing, electrical vaults and drive gear housing)

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

At the request of NASA and for hangar 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. They 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 or replaced. 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 NASA's facility maintenance (AMEC, 2013).

The After Action Completion Report for Hangar 1 will describe the removal of the hangar siding, the disassembly of the interior structures, pressure washing of surfaces, and sealing of the remaining structural components.

For additional details on the condition of Hangar 1, please see Figure 4 - Representative Photos of Epoxy-Coated Structures, in the Long Term Management Plan (LTMgmt Plan) (AMEC, 2013).

This page intentionally left blank

3.0 IDENTIFICATION OF REMEDIAL ACTION OBJECTIVES

This section presents RAOs for control of PCBs remaining at Hangar 1. RAOs are site-specific goals for protecting human health and the environment. The NCP stipulates that RAOs identify COCs, exposure pathways, receptors, and an acceptable chemical concentration or range of concentrations for each exposure pathway. RAOs must also comply with Federal or state ARARs.

3.1 Statutory Framework

Pursuant to the regulatory guidance (USEPA, 1993), this FFS identifies the proposed remedial action alternatives for Hangar 1 by evaluating potentially applicable alternatives for the site. The FFS complies with the requirements of CERCLA; the Superfund Amendments and Reauthorization Act (SARA); the NCP at 40 CFR; the DERP at 10 United States Code (U.S.C.) Section 2701, et seq; and Executive Order 12580. The NCP details the expectations for remedy selection in 40 CFR 300.430(a)(1)(iii). The RAOs for Hangar 1 were developed in general accordance with these expectations.

The Navy is the lead agency for this FFS. As such, the Navy will present the preferred alternative for public comment in the PP. Responses to public comments on the PP will be presented in the responsiveness summary in the ROD. The BRAC Program Management Office (PMO) manages the Navy's BRAC CERCLA program, and is responsible for implementation of the selected alternative.

3.2 Chemicals of Concern

The COC at the site are PCBs which were present in the hangar roof, siding, interior buildings and as a component of the residual paint on interior structural steel and certain concrete structures (e.g. electrical vaults). As described in Section 2.3, during the NTCRA the hangar roof and siding were removed and the structural steel was encapsulated with CM15 epoxy coating. For long-term management purposes, the portions of the site where residual paint remained in place beneath the CM15 epoxy coating encapsulation were delineated. Figure 2 (Location of Epoxy-Coated Structures and Schedule of Inspection Requirements) identifies these areas.

3.3 Potential Receptors and Exposure Pathways

Identified potential receptors are site workers and ecological risks. Currently there are no identified complete pathways for COCs to migrate from the source material to the environment at the site. However, if the epoxy coating on the steel frame breaks down in the future, potential exposure could occur. The threat to receptors is through a food chain that has worms and other small animals that live in sediments ingesting PCBs and then in turn being eaten by other animals, including birds. This results in the bioaccumulation of PCBs in the tissue of these animals. The identified future potential exposure pathways are: dermal contact, inhalation, direct and indirect ingestion and human or ecological exposure to contaminated sediment and surface water runoff at NASA's eastern diked marsh and storm water retention ponds. If the CM15 epoxy coat breaks down in the future, additional action may be needed to prevent the release of COCs.

3.4 ARARs

Section 121(d)(1) of CERCLA (Title 42 U.S.C. § 9621[d]) states that response actions on CERCLA sites must attain (or the decision document must justify the waiver of) any Federal

or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate. Details of the ARAR evaluation are presented in Appendix A.

3.5 Remedial Action Objectives

RAOs typically address either an exposure pathway or a contaminant concentration (or both) in a given medium because protectiveness may be achieved in two ways: limiting or eliminating the exposure pathway, or reducing contaminant concentrations (USEPA 1988). Remedial action alternatives that address these strategies are evaluated in this FFS. The NCP details the expectations for remedy selection in 40 CFR 300.430(a)(1)(iii). The RAOs for Hangar 1 were developed in general accordance with these expectations.

The previous removal action was conducted in order to mitigate PCB contamination at Hangar 1 by reducing their release to the environment, thereby reducing human health and environmental concerns associated with potential exposure pathways (Section 3.3). As described in Sections 2.2 and 2.3, the COCs are PCBs which were present in the hangar roof, siding, and interior components. During the NTCRA, the Hangar roof and siding were removed and the structural steel encapsulated with CM15 epoxy coating. The CM15 epoxy coating encapsulates the PCBs on the structural steel frame. Additional actions are required to maintain the protectiveness of the epoxy coating.

Based on CERCLA and the NCP, the RAO is to prevent unacceptable exposure to PCBs at Hangar 1 by limiting dermal contact, inhalation of dust particles, and incidental ingestion, thereby minimizing risks to human health and also to prevent unacceptable exposure to ecological receptors from contaminated sediment and surface water runoff.

The RAO will provide a basis for evaluation of remedial action alternatives and recommendation of the most viable alternative for Hangar 1. The remedial action alternatives, evaluation, and recommended alternative are presented in Sections 4.0, 5.0, and 6.0.

In addition, the NCP (40 CFR 300.430[a]) sets forth the following goals, management principles, and expectations to assist in the identification and evaluation of appropriate remedial alternatives. They were considered in this FFS in order to ensure that the selected remedial action will be consistent with and support long-term remedial goals. The subject goals include selecting alternatives that meet three principles:

- The remedy must be protective of human health and the environment.
- The remedy must maintain that protection over time.
- The remedy must minimize untreated waste.

4.0 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

Based on the type of area impacted, this FFS does not present a screening of technologies, but rather presents proposed alternatives that were assembled based on engineering judgment and experience at this site and other similar sites. This section presents the proposed remedial alternatives that were identified to meet the RAO developed for the site. Potential remedial technologies or approaches are identified through previous documents prepared for the site, USEPA guidance documents, literature review, and experience at other sites. Each proposed remedial alternative was screened against short- and long-term aspects of three broad criteria: effectiveness, implementability, and cost. The following are brief descriptions of these three screening criteria.

Effectiveness: Both short- (construction and implementation period) and long-term (period after remedial action implementation) effectiveness in protecting human receptors are considered for each alternative.

Implementability: Technical and administrative feasibility of operating and maintaining the remedial alternatives are considered in assessing implementability. Technical feasibility is the ability to construct, operate, and meet regulatory expectations until the remedial action is complete, including operation and maintenance (O&M). Administrative feasibility is the ability to obtain regulatory approval, availability of storage/disposal and availability of specific equipment and technical specialists. Implementability also includes implementation-related risks associated with specific remedial actions.

Cost: Major cost items are identified for each of the remedial alternatives. Cost items are identified on the basis of costing data, vendor information, engineering judgment, and by utilizing Remedial Action Cost Engineering Software (RACER).

The Navy has considered remedial alternatives that may have applicability to address the PCBs remaining at Hangar 1. The following two remedial alternatives were considered for this FFS and are screened in this section.

- Alternative 1: No Action
- Alternative 2: Implementation of Institutional Controls (ICs)

These two alternatives are intended to present options for decision makers to consider in the remedy selection process. Alternative 2 would be consistent with the planned future use of the property.

The purpose of this screening is to assess alternatives early on in the FFS process, and only retain those that are effective and implementable at reasonable cost. Retained alternatives will subsequently undergo a more thorough and extensive analysis in Section 5.0 using the nine NCP criteria.

4.1 Alternative 1 - No Action

This alternative would leave PCBs present at Hangar 1 in their existing state, with no requirement for follow-up inspections or maintenance of the existing epoxy coating to prevent unacceptable exposure to COCs in the future. No future actions to prevent release

of PCBs would be performed, and any future releases would not be mitigated or monitored under this alternative.

The NCP requires that the no-action alternative be carried through the detailed analysis of alternatives because it provides a baseline comparison with the other remedial alternatives (40 CFR § 300.430(e)(6)). Under this alternative, no additional actions would be taken.

Effectiveness: Potentially unacceptable risk to human receptors posed by PCBs at Hangar 1 would exist if the existing epoxy coating were to degrade. By itself, this alternative would not preclude incidental exposure in that case. Potential risks associated with current and future site use are exposure to COCs underlying the epoxy if the coating were to chip or otherwise degrade.

Implementability: There are no engineering measures required to implement the No Action alternative. Therefore, this alternative is considered technically feasible.

Cost: There are no costs associated with this alternative.

Conclusion: This alternative provides a baseline for comparing other remedial alternatives. The evaluation of the no action alternative is required per NCP under CERCLA.

4.2 Alternative 2 – Implementation of Institutional Controls

ICs are non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for exposure to contamination and/or protect the integrity of a response action. ICs typically are designed to work by providing information that guides human behavior at a site or by limiting land and/or resource use. ICs may also include educational media to inform the public of the hazards associated with a particular site. This media may be in the form of fact sheets and notices distributed to the public, formal educational seminars, and press releases.

This alternative would include implementation of actions necessary to achieve the remedial objectives at Hangar 1 by maintaining the protectiveness of the NCTRA. An epoxy coating inspection and maintenance program would be developed and implemented to prevent deterioration of the CM15 epoxy coating that provides encapsulation of the underlying PCB-contaminated paint at Hangar 1. The CM15 coating would be inspected and maintained as part of the long-term management program.

The specific remedial objectives would be identified in the ROD, and the details of the ICs would be developed in the implementation stage. For FFS purposes, potential ICs at Hangar 1 may include, but are not limited to, the following measures:

- Installation and maintenance of signs notifying of the potential exposure hazard
- Administrative arrangements for access for future monitoring/maintenance
- Property owner and tenant commitment to inspection and maintenance of the CM15 epoxy coating
- Sediment sampling to ensure that the coating remains effective
- Regulatory agency review of site development and land use changes
- Regulatory agency approval of any building modifications that might damage the remedy components

- Administrative commitment to incorporate appropriate proprietary restrictions necessary for long-term management and coating maintenance in any property transfer agreements

The site owner and tenant would be responsible for implementing, inspecting, maintaining, reporting, and enforcing ICs under this remedial alternative. In addition, 5-year reviews and reporting would be necessary.

Effectiveness: This remedial alternative would be effective and provide active measures to inspect and maintain the CM15 epoxy coating at Hangar 1. The effectiveness of this alternative is dependent on the administration of site control through the facility management process.

Implementability: ICs are considered implementable.

Cost: Administrative costs would include salaries and legal fees. Additional costs would include periodic inspection and maintenance of the new coating, periodic sediment sampling and 5-year reviews for an assumed duration of 30 years.

Conclusion: This alternative is retained for detailed analysis in Section 5.0. It is considered a viable remedy to reduce risk to site workers and ecological receptors. It would meet RAO, but would not remove all COCs at Hangar 1.

4.3 Screening of Alternatives

For this FFS, all of the Alternatives are retained for detailed analysis in Section 5.0.

This page intentionally left blank

5.0 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

Detailed analyses of remedial alternatives provide decision makers with relevant information to compare the alternatives, select a remedy, and demonstrate satisfaction of the remedy selection requirements. Each remedial alternative considered for detailed analysis was assessed against the following requirements under CERCLA:

- Be protective of human health and the environment
- Comply with ARARs, unless a waiver is justified in the ROD
- Be cost-effective
- Use permanent solutions, treatment technologies, or resource recovery technologies to the maximum extent practicable
- Satisfy the preference for treatment as a principal element, or provide an explanation in the ROD as to why the preference was not met

To satisfy these requirements, each remedial alternative was evaluated against the following criteria defined in the NCP at 40 CFR § 300.430(e)(q)(iii):

- Threshold criteria
 - Overall protection of the environment
 - Compliance with ARARs
- Primary balancing criteria
 - Long-term effectiveness and permanence
 - Reduction of toxicity, mobility, or volume through treatment
 - Short-term effectiveness
 - Implementability
 - Cost

The following two modifying criteria are briefly discussed in this FFS Report. These criteria will be evaluated in consideration of regulatory comments received on this FFS, and on public comments on the preferred remedial alternative presented in the PP:

- Modifying criteria
 - State acceptance
 - Community acceptance

The following sections describe each of these nine criteria as they relate to the detailed analyses of the remedial alternatives being considered herein for PCBs at Hangar 1.

As part of the comparative analysis with respect to the nine CERCLA criteria, a GSR evaluation for Alternative 2 is also included. USEPA currently defines “green” remediation as “the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions.” USEPA guidance regarding green remediation is provided in the documents entitled *Principles for Greener Cleanups* (USEPA, 2009), *DRAFT Methodology for Understanding and Reducing a Project’s Environmental Footprint* (USEPA, 2012), and *Superfund Green Remediation Strategy* (USEPA, 2010b).

USEPA's guidance states that green remediation must still meet threshold requirements for protectiveness and other site-specific cleanup objectives (i.e., the nine criteria discussed below). Thus, green remediation is intended to decrease the environmental footprint of the cleanup action rather than trade cleanup objectives for other environmental objectives.

State of California Department of Toxic Substances Control (DTSC) guidance also describes the importance of considering sustainability in addition to the nine CERCLA criteria (DTSC, 2009). DTSC guidance also describes the importance of considering sustainability in addition to the nine CERCLA criteria as follows:

Notwithstanding its absence in the list of criteria, sustainability should be considered as one of several factors to be examined in evaluating the environmental impact of a remedy. Some of these factors may compete with sustainability, and trade-offs may become necessary to achieve the best approach or most acceptable solution for the stakeholders.

The Navy's GSR evaluation tool known as SiteWise™ was used to perform the GSR assessment in this FFS report and is included in Appendix B. SiteWise™ was developed jointly in 2010 by the U.S. Army Corps of Engineers and the Navy for use on remediation projects to calculate the environmental footprint for various metrics.

5.1 National Contingency Plan Evaluation Criteria

5.1.1 Overall Protection of Human Health and the Environment

The NCP mandates that alternatives shall be assessed to determine whether they could adequately protect human health and the environment in both the short- and long-term from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially short- and long-term effectiveness and compliance with ARARs.

5.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternatives shall be assessed to determine whether or not they meet state and Federal ARARs. Detailed information is included in Appendix A.

5.1.3 Long-Term Effectiveness and Permanence

Alternatives are assessed for the long-term effectiveness they afford, along with the degree of certainty that the alternative would prove to be successful. Factors that are considered include the magnitude of residual risk remaining and the adequacy and reliability of controls that are necessary to manage waste, which remains in place.

Also considered in this category are greenhouse gas (GHG) emissions and total energy consumed as a result of the long-term implementation of an alternative. GSR assessment details for Alternative 2 are included in Appendix B.

5.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

The degree to which an alternative employs treatment to reduce toxicity, mobility, or volume is assessed. The following factors are considered under this criterion: the amount of contaminants that would be destroyed or removed; the degree to which it could be expected that contaminants would be destroyed or treated; the degree to which treatment is irreversible; the type and quantity of residuals that may remain following the remedial

action; and the degree to which treatment reduces the inherent hazards posed by principal threats at the site.

5.1.5 Short-Term Effectiveness

The short-term effectiveness of an alternative is evaluated by addressing the effects of the alternative during implementation. The following factors are considered when evaluating short-term effectiveness: protection of the community, protection of workers during remedy implementation, environmental impacts, and time until the RAO is achieved.

The following GSR metrics are also considered in this category: particulates less than 10 micrometers (PM10), oxides of sulfur (SOx) and oxides of nitrogen (NOx) emissions, total water used and consumed, and worker safety risks as a result of selecting the alternative. These have been included in the short-term criterion due to their immediate localized impacts.

5.1.6 Implementability

Implementability addresses the technical and administrative feasibility of implementing the alternative, as well as the availability of various services and materials required during its implementation along with community acceptance. Implementability is assessed through the three elements described below.

- **Technical Feasibility:** Technical feasibility covers several factors, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, the ability to monitor the effectiveness of a remedy, and the ease of undertaking additional remedial actions if the remedy is not effective.
- **Administrative Feasibility:** Administrative feasibility involves the necessity for coordinating with other offices and agencies and the ability and time required to obtain any necessary approvals or permits (for off-site actions). Availability of funds and funding sources for specific types of actions are part of the administrative considerations.
- **Availability of Services and Materials:** This is influenced by the availability of personnel and technology suitable to perform the action; ability to procure services and materials; and the potential effectiveness of prospective technologies at the site (i.e., are bench-scale tests required prior to implementation).

5.1.7 Cost

A detailed summary of the cost elements and assumptions are included in Appendix C.

5.1.8 State Acceptance

This criterion evaluates remedial alternatives with respect to meeting the concerns of state regulatory agencies. The state of California will review and comment on this FFS report and the PP; state responses will be considered when revising this FFS Report and when selecting the proposed remedy in the PP. The state acceptance criterion is briefly assessed in Section 6.0.

5.1.9 Community Acceptance

This criterion assesses issues of concern to the community for each remedial alternative. Comments will be solicited from community members during the public review period for

the PP. These comments will be considered in the remedy-selection process. A summary of public comments and responses will be included in the responsiveness summary in the ROD. Although community acceptance will be evaluated after the public comment period for the PP, this criterion is briefly assessed in Section 6.0.

5.2 Detailed Analysis of Alternative 1: No Action

Per the NCP (40 CFR § 300.430[e][6]), the No Action alternative is evaluated in the same manner as the other remedial alternatives considered in this FFS Report.

5.2.1 Description of Alternative

Under this alternative No Action would be performed at the site. The No Action alternative provides a baseline against which other remedial alternatives are compared. Alternative 1 involves no engineered remediation measures, ICs, or monitoring for COCs at Hangar 1. This alternative would not include any activities to prevent potentially unacceptable exposure to PCBs at Hangar 1. If implemented, this alternative would be considered a final remedy for the site. No monitoring or periodic reviews would be conducted to verify the protectiveness of this alternative.

5.2.2 Evaluation by Threshold Criteria

The following sections compare the No Action alternative against the threshold criteria of the NCP.

5.2.2.1 Overall Protection of Human Health and the Environment

Overall, this alternative is not considered protective of human health and the environment. No restrictions on land use would be implemented, so actions that could potentially damage the epoxy coating would not be restricted. Remaining PCBs at Hangar 1 could become exposed to humans and the environment over time, as this alternative has no mechanisms to prevent unacceptable exposure to PCBs.

5.2.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

ARARs do not apply to the No Action alternative; according to CERCLA Section 121, the requirement to meet ARARs applies only when a response action is taken. A detailed ARARs discussion is included in Appendix A.

5.2.3 Evaluation by Balancing Criteria

The following sections compare the No Action alternative against the balancing criteria of the NCP.

5.2.3.1 Long-Term Effectiveness and Permanence

Alternative 1 is not considered effective in the long-term. Concentrations of PCBs would remain at Hangar 1, with no controls to prevent damage or require repair to the epoxy coating or unacceptable exposure. This alternative requires no maintenance, long-term management, or other actions.

5.2.3.2 Reduction of Toxicity, Mobility, or Volume through Treatment

This alternative does not reduce the toxicity, mobility or volume, as no active treatment would be performed for Alternative 1. The mobility of COCs would be reduced while the encapsulating layer remained intact. Over time, the encapsulating layer could degrade, and the underlying COCs would no longer have restricted mobility.

5.2.3.3 *Short-Term Effectiveness*

Alternative 1 would not involve any active remedial measures, and the proposed RAO would not be met. There would be no adverse short-term impacts to site workers, surrounding land uses, or the environment associated with this alternative. Because there are no remedial measures designed to address the RAO, or any measures such as ICs or monitoring to assess effectiveness, the time required to achieve proposed RAO cannot be assessed.

5.2.3.4 *Implementability*

Alternative 1 would be easy to implement because it requires no action. However, no measures would be included to monitor the effectiveness of this alternative.

5.2.3.5 *Cost*

There are no direct costs associated with the No Action alternative.

5.3 **Detailed Analysis of Alternative 2: Implementation of Institutional Controls**

Alternative 2 would involve implementation of ICs to protect the integrity of the NTCRA and minimize the potential for release of PCBs from Hangar 1 to the environment by imposing requirements for implementation of an epoxy coating inspection and maintenance program to prevent deterioration of the CM15 epoxy coating that provides encapsulation of the underlying PCB-contaminated paint at Hangar 1. Components of Alternative 2 are described below.

5.3.1 *Description of Alternative*

Alternative 2 consists of the following three components, described below:

- Long-term management and coating maintenance
- Sediment sampling
- Five-year reviews and reporting

5.3.1.1 *Long-term Management and Coating Maintenance*

A long-term management program would be implemented to inspect, maintain, and repair the epoxy coating on the steel and certain concrete structures at Hangar 1. Areas where PCB-containing paint remain in place beneath the CM15 epoxy coating encapsulation are generally shown on Figure 2 (Location of Epoxy-Coated Structures and Schedule of Inspection Requirements). Actions during the long-term management phase are briefly described in sections below.

Long-term management would continue until site closeout has been obtained. Long-term management would be implemented in accordance with a long-term management plan.

An epoxy coating inspection and maintenance program would be developed and implemented to prevent deterioration of the CM15 epoxy coating that provides encapsulation of the underlying PCB-contaminated paint at Hangar 1. The CM15 coating would be inspected and maintained as part of the long-term management program.

The actual ICs to be implemented would be established in the post-ROD Remedial Design documentation, and implemented by the property owner. For the purposes of this FFS, the ICs are assumed to include administrative and legal controls to assure effective implementation of an epoxy coating inspection and maintenance program to prevent

deterioration of the CM15 epoxy coating that provides encapsulation of the underlying PCB-contaminated paint at Hangar 1. Potential ICs, for FFS purposes, are described in Section 4.2. ICs would remain in place in perpetuity unless it is determined that the presence of residual COCs at Hangar 1 no longer presents an unacceptable risk to human health or the environment.

In the event that the property is transferred in the future, the property owner would need to include appropriate land use restrictions in the conveyance documents.

5.3.1.2 Sediment Sampling

A sediment monitoring program would be implemented to evaluate the effectiveness of the remedial action during the long-term management period. The monitoring program would begin approximately one year after completion of the NTCRA (CM15 epoxy coating encapsulation was completed). Since the NTCRA is encapsulation of PCB-containing paint, a breach in the protectiveness of the NTCRA would be detected through the transport of contaminated paint chips or corrosion particulates in storm water runoff. Although lead is not a COC for the NTCRA, the sample will also be analyzed for lead and compared to the trigger level as detailed in the LTMgmt Plan (AMEC, 2013).

For FFS costing purposes, the following sediment sampling assumptions were developed. A final sampling plan will be required to assess the potential release of COCs from the site. A sediment sample would be collected annually from manhole SD-107 (immediately “downstream” from the hangar). If sample results exceed the trigger levels, then samples will be collected at: a) confirmatory sample at manhole SD-107, b) additional samples at the four quadrants of the perimeter trench at CB463D, CD447A, CD443B and CB454D, and c) additional samples at upstream manholes SD-116 and SD-442.

5.3.1.3 Five Year Reviews and Reporting

A Sediment Monitoring Report would be prepared annually and a Long-Term Management Report, which includes a General Coating Condition report, would be prepared every three years by the entity responsible for implementing the LTMgmt Plan at Hangar 1 as part of this alternative. Also six 5-year reviews would be prepared for the 30 years which is assumed for costing purposes. All reports would be submitted to the appropriate regulatory agencies and stakeholders.

5.3.2 Evaluation of Alternative 2 by Threshold Criteria

The following sections compare Alternative 2 (Implementation of ICs) against the threshold criteria of the NCP.

5.3.2.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment would be maintained by developing and implementing ICs relating to long-term management activities. For Alternative 2, the epoxy coating inspection and maintenance program would ensure that the epoxy coating remains protective in the encapsulation of PCBs on the structural steel frame and thereby reducing future risks to human and ecological receptors. A sediment monitoring program will be implemented to evaluate the effectiveness of the removal action during the long-term management period. The monitoring program will begin one year after NTCRA completion. 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 sediment sample will be collected and analyzed for PCBs to evaluate the removal action. Although lead is not a COC for the NTCRA, the sample will also be analyzed for lead and compared to the trigger level as detailed in the LTMgmt Plan (AMEC, 2013).

5.3.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 2 is expected to meet ARARs. A detailed analysis of potential ARARs associated with remedial action at Hangar 1 is included in Appendix A.

5.3.3 Evaluation of Alternative 2 by Balancing Criteria

The following sections compare Alternative 2 (Implementation of ICs) against the balancing criteria of the NCP.

5.3.3.1 Long-Term Effectiveness and Permanence

As long as the epoxy inspections and maintenance are performed as scheduled, and ICs are implemented and followed, the long-term effectiveness of Alternative 2 is high. The encapsulating materials require periodic coating maintenance in order to remain protective. Alternative 2 would result in the generation of GHGs, primarily as a result of transportation of personnel and equipment, and operation of heavy equipment during epoxy coating inspections and maintenance consumables and residual handling. GHGs would also be generated during IC inspections and sediment monitoring. A detailed GSR evaluation for this alternative is included in Appendix B. A sediment monitoring program will be implemented to evaluate the effectiveness of the removal action during the long-term management period. The monitoring program will begin one year after NTCRA completion. 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. Sediment sample will be collected and analyzed for PCBs to evaluate the removal action. Although lead is not a COC for the NTCRA, the sample will also be analyzed for lead and compared to the trigger level as detailed in the LTMgmt Plan (AMEC, 2013).

5.3.3.2 Reduction of Toxicity, Mobility, or Volume through Treatment

The mobility of PCBs is reduced by the CM15 epoxy coating encapsulation. However, there are no active treatment processes associated with Alternative 2.

5.3.3.3 Short-Term Effectiveness

Alternative 2 could be put in place in a timely manner to prevent unacceptable exposure to PCBs at Hangar 1. Implementation of Alternative 2 would achieve protection and achieve RAO in a short period of time. Implementation of this alternative would not be expected to have adverse effects on onsite workers, the surrounding community, or the environment.

This alternative would require the use of fuel for vehicles and equipment. No significant amounts of potable water would be used. Emissions of NO_x, SO_x, and PM₁₀ would be generated by transportation of equipment and personnel, and by residual handling. Increased risk of injury to or fatality of workers would be caused primarily by transportation of personnel and equipment to and from the site. Alternative 2 would not result in the use of topsoil. This alternative would result in consumption of hazardous waste

landfill space. Alternative 2 would include the creation of approximately 23 tons of hazardous landfill waste consisting of debris generated and collected during the surface preparation of the CM15 during coating maintenance activities. A detailed GSR evaluation for this alternative is included in Appendix B.

5.3.3.4 *Implementability*

There are no challenges to implementation this alternative. All technologies (inspection and maintenance of coating, ICs and sediment monitoring) required to implement this alternative are commonly implemented at similar sites, and can be procured readily, and should not be incompatible with the current and anticipated site use.

5.3.3.5 *Cost*

The present-value cost for implementation of Alternative 2 is \$5,938,000 (See Appendix C for a detailed cost breakdown and assumptions). Major cost components for this alternative are associated with inspection and maintenance of the epoxy coating, implementation of ICs, monitoring of sediment, and reviews and reporting. For cost-estimating purposes, it is assumed that the duration of the alternative is 30 years. Appendix C provides supporting details and costing assumptions.

6.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents a comparative analysis of the remedial alternatives presented and evaluated in Section 5.0. The purpose of this section is to compare the potential advantages and disadvantages of each remedial alternative to one another in relation to the nine NCP evaluation criteria. Table 1 summarizes the comparative analysis against the five balancing criteria. The two modifying criteria (state and community acceptance) are also briefly discussed in this section. Evaluation of these modifying criteria will be documented in the responsiveness summary of the ROD once agency comments have been received on this FFS Report and public comments have been received on the PP.

6.1 Overall Protection of Human Health and the Environment

Alternative 1 is not considered protective of human health and the environment. No restrictions on land use would be implemented, so actions that could potentially damage the epoxy coating would not be restricted.

Alternative 2 is considered protective of human health and the environment.

A sediment monitoring program will be implemented to evaluate the effectiveness of the removal action during the long-term management period. The monitoring program will begin one year after NTCRA completion. 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. Sediment samples will be collected and analyzed for PCBs to evaluate the removal action. Although lead is not a COC for the NTCRA, the sample will also be analyzed for lead and compared to the trigger level as detailed in the LTMgmt Plan (AMEC, 2013).

6.2 Compliance with ARARs

ARARs are not applicable to Alternative 1, the No Action alternative. As discussed in Appendix A, Alternative 2 would meet identified potential chemical-, location-, and action-specific ARARs.

6.3 Long-Term Effectiveness and Permanence

Alternative 1 is not considered effective in the long-term, due to the lack of preventative measures to prevent damage or require repair to the epoxy coating.

Alternative 2 would implement measures to prevent damage or require repair to the epoxy coating and it includes inspection and maintenance of the epoxy coating on areas as needed.

Based on SiteWise™ model outputs, calculated GHG emissions and total energy consumed are higher for Alternative 2, as a result of transportation and site work that is performed under this alternative. The calculated risks to workers under Alternative 2 are higher than the other alternative due to the amount of active onsite work.

A sediment monitoring program will be implemented to evaluate the effectiveness of the removal action during the long-term management period. The monitoring program will begin one year after NTCRA completion. 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. Sediment samples will be collected and analyzed for PCBs to evaluate the removal action.

Although lead is not a COC for the NTCRA, the sample will also be analyzed for lead and compared to the trigger level as detailed in the LTMgmt Plan (AMEC, 2013).

6.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 2 is rated high under this criterion because it would reduce the mobility of PCBs. Alternative 1 is rated low because this alternatives does not involve a coating maintenance component. There are no active treatment processes included in either of the alternatives that would reduce the toxicity or volume of COCs at Hangar 1.

6.5 Short-Term Effectiveness

Alternative 1 is rated high in short-term effectiveness because it there are no worker or community exposures. Alternative 2 is rated high in this criterion because there will be minimal short-term impacts to site workers, the local community, dust, and transportation impacts. Based on SiteWise™ model outputs, calculated emissions of NOx, SOx, and PM10 are higher for Alternative 2, due primarily to transportation-related emissions. The calculated risks to workers for Alternative 2 is also higher due to active site work to maintain the epoxy coating.

6.6 Implementability

Alternative 1 is rated high in implementability because it involves no action. Alternative 2 is rated medium in implementability because of the procedures required to implement ICs, maintenance and monitoring of the epoxy coating and sediment monitoring, which all require planning documents, field work, and annual reporting.

6.7 Cost

The estimated costs for the remedial alternatives are summarized in Appendix C, Table C-2. Cost estimates are conceptual and are presented solely for the purpose of comparing alternatives in this FFS Report; they should not be used for budgetary or planning purposes because actual costs may change based on comments received during the PP.

Alternative 1 is rated high under the cost criterion, as no costs are incurred. The total cost of Alternative 2 is rated medium under the cost criterion.

6.8 State Acceptance

This criterion evaluates remedial alternatives with respect to meeting the concerns of state regulatory agencies. The State of California will review and comment on this FFS and the Draft PP. Responses to state comments will be included in the draft final and final versions of the FFS. State comments will also be considered when revising this report and when presenting the proposed remedy in the PP.

6.9 Community Acceptance

This criterion assesses issues of concern to the community for each remedial alternative. Comments will be solicited from community members during the public review period for the PP. These comments will be considered in the remedy-selection process. A summary of public comments and responses will be included in the responsiveness summary in the ROD.

6.10 Conclusions

Alternative 2 meets the threshold criteria, while Alternative 1 does not. Of the alternatives that were evaluated, Alternative 2 is rated lower in sustainability, but higher overall in satisfying the balancing criteria.

This page intentionally left blank

7.0 REFERENCES

AMEC Environment & Infrastructure, Inc. (AMEC). 2013. *Draft 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*, February.

AMEC Environment & Infrastructure, Inc. (AMEC). 2011. *Final Biological Hazard Abatement 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*, May.

AMEC. 2011. *Final Biological Hazard Abatement Plan for Non-Time Critical Removal Action for PCB Contamination at IR Site 29, Hangar 1 Former NAS Moffett Field, Moffett Field, California*, May.

Base Realignment and Closure (BRAC), Program Management Office West. 2010. *Moffett Field – Hangar One, Information Update*, January.

BRAC, Program Management Office West. 2008. *Action Memorandum, Non-Time-Critical Removal Action for PCB Contamination at Installation Restoration Site 29 (Hangar 1) at Former Naval Air Station Moffett Field, California*, December.

Department of the Navy. 2008. *Engineering Evaluation/Cost Analysis Revision 1, Installation Restoration Site 24, Hangar 1, Former Naval Air Station Moffett Field, Moffett Field, California*, Base Realignment and Closure Program Management Office West, July 30.

Department of the Navy. 2006. *Environmental Restoration Program Manual*, August.

Department of Toxic Substances Control (DTSC). 2009. *Interim Advisory for Green Remediation*. California Environmental Protection Agency, December.

Tetra Tech. 2008. *Engineering Evaluation / Cost Analysis Revision 1, for Installation Restoration Site 29 (Hangar 1) at Former Naval Air Station Moffett Field, California*, June 30.

U.S. Department of Defense and United States Environmental Protection Agency (USEPA). 2003. *Principles and Procedures for Specifying Monitoring, and Enforcement of Land Use Controls and other Post-ROD Actions*.

USEPA. 2012. *Methodology for Understanding and Reducing a Project's Environmental Footprint*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Office of Superfund Remediation Technology Innovation, February.

USEPA. 2009. *Principles for Greener Cleanups*. USEPA Office of Solid Waste and Emergency Response, August 27.

USEPA. 1993. *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA*. EPA/540-R-93-057, Publication 9360.0-32, PB93-963402.

USEPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. OSWER Directive 9355.3 01. EPA/540/G-89/004*. Office of Emergency and Remedial Response, Interim Final, October.

This page intentionally left blank

FIGURES

This page intentionally left blank



P:\NAV\FAC SW\12 PROJECTS\2620.06_Hangar 1 Site 29 Moffett Field\Figures\Figure 1.dwg, DWG To PDF.pcb



SITE LOCATION MAP

IR SITE 29 (HANGAR 1)
 FOCUSED FEASIBILITY STUDY
 CONTRACT NO N62473-09-D-2620 CTO 0006
 MOFFETT FIELD, CALIFORNIA



FIGURE 1

RORE PROJECT No.
 2620.06

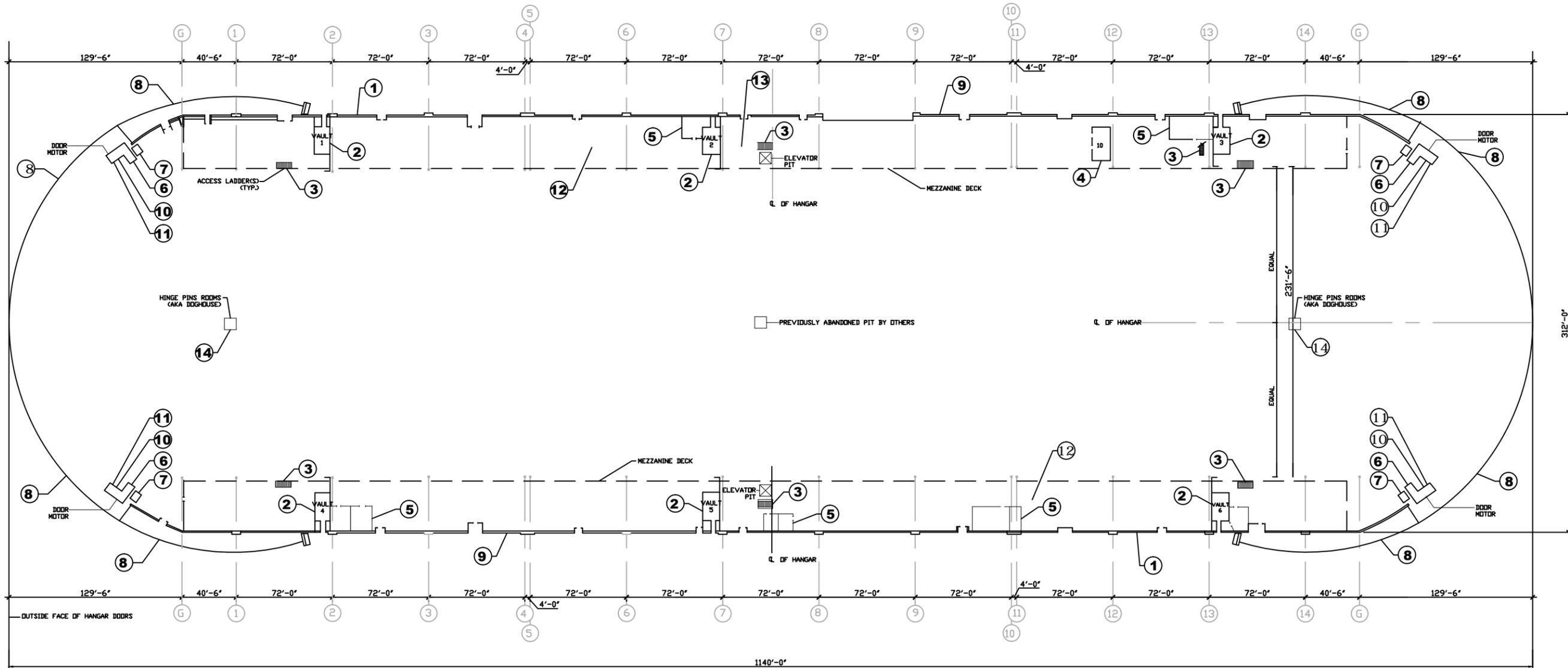
MAY 2013



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 LTGMT INSPECTIONS.
2	CMU WALLS SURROUNDING ELECTRICAL VAULTS	NEW CM15 OVERCOAT ON CMU. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTGMT 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 LTGMT 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 LTGMT INSPECTIONS.
5	FORMER TOILETS	NEW CM15 OVERCOAT ON CMU. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTGMT INSPECTIONS.
6	DOOR MOTOR HOUSING	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTGMT INSPECTIONS.
7	DOOR MOTOR ELECTRICAL VAULT	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTGMT INSPECTIONS.
8	DOOR TRUCKS (BOLSTERS)	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH CONTAINS PCBS.	INSPECT AND REPAIR CM15 COATING DURING LTGMT INSPECTIONS.
9	CONCRETE STEMWALLS SURROUNDING HANGAR PERIMETER	ORIGINAL PAINT REMOVED COMPLETELY. CONCRETE SEALED WITH CARBOGUARD 1340 SEALER.	NO LTGMT INSPECTIONS NEEDED. OWNER IS RESPONSIBLE FOR MAINTENANCE OF SEALER.
10	DOOR MOTOR DRIVE GEAR (CHAIN AND ROLLERS)	NOT OVERCOATED WITH CM15.	NO LTGMT 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 LTGMT INSPECTIONS.
12	TOP AND BOTTOM SURFACES OF MEZZANINE DECKS	NEW CM15 OVERCOAT ON STEEL. ORIGINAL PAINT BENEATH REMOVED COMPLETELY.	NO LTGMT 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 LTGMT 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 LTGMT INSPECTIONS.



MULTI-LEVEL FLOOR PLAN
NOT TO SCALE

REFERENCE:
HANGAR 1 LONG TERM
MANAGEMENT PLAN (AMEC, 2013)

FIGURE 2

LOCATION OF EPOXY-COATED STRUCTURES AND
SCHEDULE OF INSPECTION REQUIREMENTS
IR SITE 29 (HANGAR 1)
FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION MOFFETT FIELD



RORE PROJECT No. 2620.06

MAY 2013

TABLES

This page intentionally left blank

Table 1 - Comparative Analysis Summary for Removal Action Alternatives

	Criteria	Alternative	
		1 No Action	2 ICs
Effectiveness	Overall protection of human health and the environment ^a	No	Yes
	Compliance with ARARs ^a	NA ^c	Yes
	Long-term effectiveness and permanence ^b	○	●
	Reduction of toxicity, mobility, or volume through treatment ^b	○	●
	Short-term effectiveness ^b	●	●
Implementability	Technical and administrative feasibility ^b	◐	●
	State acceptance ^d	NA	NA
	Community acceptance ^e	NA	NA
Cost	Cost ^{b, f}	\$0	\$5.94 M

Notes:

^a Threshold criterion (must be satisfied for a remedial alternative to be eligible for selection unless an ARAR waiver applies)

^b Primary balancing criterion

^c Alternative is not considered protective of human health and the environment

^d To be evaluated after agency comments

^e To be evaluated after the public comment period

^f On the basis of net present value

ARAR - applicable or relevant and appropriate requirement

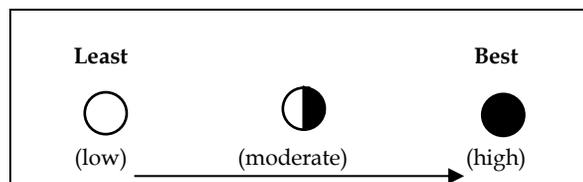
IC - institutional control

M - estimated cost in millions

NA - not applicable for this evaluation

Key:

**Relative Performance in Satisfying National Oil and Hazardous Substances
Pollution Contingency Plan Criteria**



This page intentionally left blank

Appendix A

Applicable or Relevant and Appropriate Requirements (ARARs)

This page intentionally left blank

Contents

1.0	INTRODUCTION.....	A1-1
1.1	Summary of CERCLA and NCP Requirements	A1-1
1.2	Methodology Description.....	A1-3
1.2.1	General	A1-3
1.2.2	Identifying and Evaluating Federal ARARs	A1-4
1.2.3	Identifying and Evaluating State ARARs.....	A1-4
1.2.3.1	Solicitation of State ARARs Under NCP	A1-4
1.2.3.2	Chronology of Efforts To Identify State ARARs	A1-4
2.0	CHEMICAL-SPECIFIC ARARS.....	A2-1
2.1	Summary of ARARS Conclusions by Medium.....	A2-1
2.1.1	Groundwater ARARs Conclusions	A2-1
2.1.2	Surface Water ARARs Conclusions.....	A2-1
2.1.3	Soil ARARs Conclusions.....	A2-1
2.1.4	Sediment ARARs Conclusions.....	A2-1
2.1.5	Air ARARs Conclusions.....	A2-1
2.2	Detailed discussion of ARARS by medium	A2-2
2.2.1	Air ARARs	A2-2
2.2.1.1	Federal	A2-2
2.2.1.2	State.....	A2-2
2.2.2	Sediment ARARs	A2-2
2.2.2.1	Federal	A2-2
2.2.2.2	State.....	A2-2
3.0	LOCATION-SPECIFIC ARARS.....	A3-1
3.1	Summary of location-specific ARARS	A3-1

3.1.1	Cultural Resources ARARs Conclusions.....	A3-1
3.1.2	Wetlands Protection and Floodplain Management Conclusions.....	A3-1
3.1.3	Hydrologic Resources Conclusions.....	A3-1
3.1.4	Biological Resources Conclusions	A3-1
3.1.5	Coastal Resources Conclusions.....	A3-1
3.1.6	Geologic Characteristics Conclusions	A3-1
3.2	Detailed Discussion of ARARS	A3-1
3.2.1	Cultural Resources ARARs	A3-1
3.2.2	Biological Resources ARARs	A3-2
3.2.2.1	Federal.....	A3-2
3.2.2.2	State.....	A3-2
4.0	ACTION-SPECIFIC ARARS	A4-4
4.1	Alternative 1 - No Action.....	A4-1
4.2	Alternative 2 - Implementation of Institutional Controls.....	A4-1
5.0	SUMMARY	A5-1
6.0	REFERENCES	A6-1

TABLES

2-1	Summary of Potential Federal Chemical-Specific ARARs
2-2	Summary of Potential State Chemical-Specific ARARs
3-1	Summary of Potential Federal Location-Specific ARARs
3-2	Summary of Potential State Location-Specific ARARs
4-1	Summary of Potential Federal Action-Specific ARARs
4-2	Summary of Potential State Action-Specific ARARs

Acronym List

ARAR	applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
Basin Plan	Water Quality Control Plan (RWQCB Region) Basin
CAA	Clean Air Act
Cal. Civ. Code	California Civil Code
Cal. Code Regs.	California Code of Regulations
Cal/EPA	California Environmental Protection Agency
Cal. Fish & Game Code	California Fish and Game Code
Cal. Water Code	California Water Code
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ch.	chapter
CTR	California Toxics Rule
CWA	Clean Water Act
Fed. Reg.	Federal Register
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
IC	Institutional Control
IR	Installation Restoration
µg	microgram
µg/L	micrograms per liter
MBTA	Migratory Bird Treaty Act
MOU	memorandum of understanding
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
OSWER	Office of Solid Waste and Emergency Response
PCB	polychlorinated biphenyl

pt.	part
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
ROD	record of decision
RWQCB	(California) Regional Water Quality Control Board
§	section
SIP	State Implementation Plan
SWDIV	Southwest Division Naval Facilities Engineering Command
SWRCB	(California) State Water Resource Control Board
TBC	to be considered
TSCA	Toxic Substances Control Act
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WDR	waste discharge requirement
WQCP	Water Quality Control Plan
WQO	water quality objective

1.0 Introduction

This appendix identifies and evaluates potential federal and State of California applicable or relevant and appropriate requirements (ARARs) from the universe of regulations, requirements, and guidance and sets forth the U.S. Department of the Navy (Navy) determinations regarding those potential ARARs for each response action alternative retained for detailed analysis in this Focused Feasibility Study (FFS) Report for Installation Restoration (IR) Site 29, Hangar 1 (Hangar 1), Former Naval Air Station Moffett Field, California.

This evaluation includes an initial determination of whether the potential ARARs actually qualify as ARARs and a comparison for stringency between the federal and state regulations to identify the controlling ARARs. The identification of ARARs is an iterative process. The final determination of ARARs will be made by the Navy in the record of decision (ROD), after public review, as part of the response action selection process.

1.1 Summary of CERCLA and NCP Requirements

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 *United States Code* [42 U.S.C.] Section [§] 9621[d]), as amended, states that remedial actions on CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address circumstances at a CERCLA site. The requirement is applicable if the jurisdictional prerequisites of the standard show a direct correspondence when objectively compared to the conditions at the site. An applicable federal requirement is an ARAR. An applicable state requirement is an ARAR only if it is more stringent than federal ARARs.

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed response action and are well suited to the conditions of the site (USEPA 1988a). A requirement must be determined to be both relevant *and* appropriate to be considered an ARAR.

The criteria for determining relevance and appropriateness are listed in 40 CFR § 300.400(g)(2) and include the following:

- the purpose of both the requirement and the CERCLA action
- the medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site
- the substances regulated by the requirement and the substances found at the CERCLA site
- the actions or activities regulated by the requirement and the response action contemplated at the CERCLA site
- any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site

-
- the type of place regulated and the type of place affected by the release or CERCLA action
 - the type and size of structure or facility regulated and the type and size of structure or facility affected by the release or proposed in the CERCLA action
 - any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resources at the CERCLA site

According to CERCLA ARARs guidance (USEPA 1988a), a requirement may be “applicable” or “relevant and appropriate,” but not both. ARARs must be identified on a site-specific basis and involve a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is both relevant and appropriate. It is important to explain that some regulations may be applicable or, if not applicable, may still be relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (USEPA 1988a).

Tables included in this appendix present each potential ARAR with an initial determination of ARAR status (i.e., applicable, relevant and appropriate, or not an ARAR). For the determination of relevance and appropriateness, the pertinent criteria were examined to determine whether the requirements addressed problems or situations sufficiently similar to the circumstances of the release or response action contemplated, and whether the requirement was well suited to the site. A negative determination of relevance and appropriateness indicates that the requirement did not meet the pertinent criteria. Negative determinations are documented in the tables of this appendix and are discussed in the text only for specific cases.

To qualify as a state ARAR under CERCLA and the NCP, a state requirement must be:

- a state law or regulation
- an environmental or facility siting law or regulation
- promulgated (of general applicability and legally enforceable)
- substantive (not procedural or administrative)
- more stringent than federal requirements
- identified in a timely manner
- consistently applied

To constitute an ARAR, a requirement must be substantive. Therefore, only the substantive provisions of requirements identified as ARARs in this analysis are considered to be ARARs. Permits are considered to be procedural or administrative requirements. Provisions of generally relevant federal and state statutes and regulations that were determined to be procedural or non-environmental, including permit requirements, are not considered to be ARARs. CERCLA Section 121(e)(1), 42 U.S.C. § 9621(e)(1), states, “No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section.” The term *on-site* is defined for purposes of this ARARs discussion as “the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action” (40 CFR § 300.5).

Non-promulgated advisories or guidance issued by federal or state governments are not legally binding and do not have the status of ARARs. Such requirements may, however, be useful and are “to be considered” (TBC). TBC requirements (40 CFR § 300.400[g][3]) complement ARARs but do not override them. They are useful for guiding decisions regarding cleanup levels or methodologies when regulatory standards are not available.

Pursuant to USEPA guidance (USEPA 1988a), ARARs are generally divided into three categories: chemical-, location-, and action-specific requirements. This classification was developed to aid in the identification of ARARs; some ARARs do not fall precisely into one group or another. ARARs are identified on a site-specific basis for remedial actions where CERCLA authority is the basis for cleanup.

As the lead federal agency, the Navy has primary responsibility for identifying federal ARARs at Hangar 1. Potential federal ARARs that have been identified for the FFS are discussed in Section A1.2.2. The term “on-site” is defined for purposes of this ARAR discussion as “the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the removal action” (40 CFR, Part 300.5).

Identification of potential state ARARs was initiated through Navy requests that the California Environmental Protection Agency (Cal/EPA) California Regional Water Quality Control Board San Francisco Bay Region (RWQCB) identify potential state ARARs, an action described in more detail in Section 1.2.3. Potential State ARARs that have been identified for Hangar 1 are discussed below.

1.2 Methodology Description

The process of identifying and evaluating potential federal and state ARARs is described in this subsection.

1.2.1 General

As the lead federal agency, the Navy has primary responsibility for identification of potential ARARs for Hangar 1. In preparing this ARARs analysis, the Navy undertook the following measures, consistent with CERCLA and the NCP:

- Identified federal ARARs for each response action alternative addressed in the FFS, taking into account site-specific information for Hangar 1
- Reviewed potential ARARs identified by the state to determine whether they satisfy CERCLA and NCP criteria that must be met in order to constitute state ARARs
- Evaluated and compared federal ARARs and their state counterparts to determine whether state ARARs are more stringent than the federal ARARs or are in addition to the federally required actions
- reached a conclusion as to which federal and state ARARs are the most stringent and/or “controlling” ARARs for each alternative

As outlined in Section 3.5 of this FFS Report, the remedial action objectives (RAO) for Hangar 1 goals include selecting alternatives that meet three principles:

- The remedy must be protective of human health and the environment.
- The remedy must maintain that protection over time.
- The remedy must minimize untreated waste.

Remedial action alternatives retained for detailed analysis in this FFS are designed to accomplish the RAO. The Hangar 1 remedial action alternatives considered for detailed analysis, and for which an ARARs analysis is presented in this appendix, are as follows (see FFS text for a detailed analysis:

- Alternative 1 - No Action

-
- Alternative 2 - Implementation of Institutional Controls (ICs)

1.2.2 Identifying and Evaluating Federal ARARs

The Navy is responsible for identifying federal ARARs as the lead federal agency under CERCLA and the NCP. The final determination of federal ARARs will be made when the Navy issues the ROD. The federal government implements a number of federal environmental statutes that are the source of potential federal ARARs, either in the form of the statutes or regulations promulgated thereunder. Examples include the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Toxic Substances Control Act (TSCA), and their implementing regulations. See NCP preamble at 55 *Federal Register* (Fed. Reg.) 8764–8765 (1990) for a more complete listing.

The Navy reviewed the proposed response action and alternatives against all potential federal ARARs, including but not limited to those set forth at 55 Fed. Reg. 8764–8765 (1990), in order to determine whether they were applicable or relevant and appropriate using the CERCLA and NCP criteria and procedures for ARARs identification by lead federal agencies.

1.2.3 Identifying and Evaluating State ARARs

The process of identifying and evaluating potential state ARARs by the state and the Navy is described in this subsection.

1.2.3.1 Solicitation of State ARARs under NCP

The Navy followed the process set forth in 40 CFR § 300.515 and Section 7.6 of the Federal Facilities Agreement (FFA) for remedial actions in seeking state assistance with identification of state ARARs.

1.2.3.2 Chronology of Efforts to Identify State ARARs

The following chronology summarizes the Navy's efforts to obtain state assistance with identification of state ARARs for the response action at Hangar 1. Key correspondence between the Navy and the state agencies relating to this effort has been included in the Administrative Record for this site.

The Navy requested state chemical-, action-, and location-specific ARARs for Hangar 1 on October 8, 2004. The Navy sent a letter to the SWRCB soliciting ARARs based on potential cleanup scenarios proposed by the Navy.

The Navy received a letter from the SWRCB providing its chemical-, action-, and location-specific ARARs on November 2, 2004 (SWRCB, 2004).

2.0 Chemical-specific ARARS

Chemical-specific ARARS are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a cleanup level. Many potential ARARS associated with particular response alternatives (such as closure or discharge) can be characterized as action-specific but include numerical values or methodologies to establish them; therefore, they fit into both categories (chemical- and action-specific). To simplify the comparison of numerical values, most action-specific requirements that include numerical values are included in this chemical-specific section and, if repeated in the action-specific section, the discussion refers back to this section.

This section presents the ARARS determination conclusions that address chemical-specific ARARS for Hangar 1. Although PCBs, specifically the mixture of congeners comprising Aroclor 1260 and Aroclor 1268 are the chemical of concern, there are no affected media since the site has already undergone a removal action. However, this FFS addresses PCB contaminants on the Hangar 1 frame that were encapsulated as part of the removal action.

2.1 Summary of ARARS Conclusions by Medium

Groundwater, surface water, soil, sediment, and air are not being addressed by this remedial action. However, sampling and analysis of sediments are included in one of the alternatives.

2.1.1 Groundwater ARARS Conclusions

Groundwater is not a medium of concern for this remedial action. No groundwater ARARS were identified.

2.1.2 Surface Water ARARS Conclusions

Surface water monitoring is not included in the remedial action alternatives. Therefore, potential surface water ARARS were not evaluated.

2.1.3 Soil ARARS Conclusions

Perimeter soil areas were cleaned up as part of the removal action and is not a medium of concern for this remedial action. No soil ARARS were identified.

2.1.4 Sediment ARARS Conclusions

Although sediment was cleaned up as part of the removal action, there is the potential for PCBs associated with the Hangar 1 frame to be exposed to rain and potentially accumulate in storm water sediment. Therefore, sediment sampling is part of the remedial action alternative and sediment ARARS were identified. The substantive provisions for the TSCA PCB cleanup levels are potentially relevant and appropriate for the sediment sampling to evaluate the effectiveness of the remedial action during the long-term management period.

2.1.5 Air ARARS Conclusions

Air is not a medium of concern for this remedial action. However, air may be affected by the maintenance application of encapsulating materials that is included as part of long term management alternative. Therefore, air ARARS were evaluated and the following ARARS were identified for this application of encapsulating materials.

2.2 Detailed discussion of ARARS by Medium

The following subsections provide a detailed discussion of federal and state ARARs by medium.

2.2.1 Air ARARs

ICs are part the remedial action alternative.

2.2.1.1 Federal

The Clean Air Act (CAA) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) air emission requirements are discussed below.

Clean Air Act. The CAA establishes the National Ambient Air Quality Standards (NAAQS) in 40 CFR § 50.4–50.12. NAAQS are not enforceable in and of themselves; they are translated into source-specific emissions limitations by the state (USEPA 1990). Substantive requirements of the Bay Area Air Quality Management District (BAAQMD) rules that have been approved by USEPA as part of the State Implementation Plan (SIP) under the CAA are potential federal ARARs for air emissions (CAA Section 110). The SIP includes rules for emissions restrictions for particulates, organic compounds, and hazardous air pollutants, as well as standards of performance for new sources.

Since it is approved as part of the SIP, BAAQMD Rule 8-3-301 was identified as a potentially applicable federal ARAR for the ICs. This requirement regulates the volatile organic compound (VOC) content of architectural coatings.

2.2.1.2 State

No additional state ARARs were identified as potential ARARs.

2.2.2 Sediment ARARs

Sediment sampling is part of the remedial action alternative.

2.2.2.1 Federal

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) regulates the storage and disposal of PCBs. These requirements have both action- and chemical-specific aspects and address storage and disposal activities based on PCB concentrations. Under TSCA, U.S. EPA has promulgated 40 C.F.R. § 761.61 PCB remediation waste requirements that provide cleanup and disposal options for PCB remediation waste. The options include: a) self-implementing on-site cleanup and disposal, b) performance-based disposal, and c) risk-based disposal. The self-implementing cleanup provisions are not binding on cleanups conducted under other authorities, including actions conducted under Sections 104 or 106 of CERCLA. Therefore, they are not applicable to actions at CERCLA sites. However, in the preamble of the final rule for 40 C.F.R. pt. 761, U.S. EPA indicated that it anticipates that the final rule “will be a potential ARAR at CERCLA sites where PCBs are present.” U.S. EPA expects that “CERCLA cleanups would typically comply with the substantive requirements of one of the three options, provided by § 761.61, upon completion of the cleanups” (63 Fed. Reg. 35407, 29 June 1998). Therefore, substantive provisions at 40 C.F.R. § 761.61(a)(4), (b), and (c) are potentially relevant and appropriate for sediment sampling at Hangar 1.

2.2.2.2 State

No additional state ARARs were identified as potential ARARs.

3.0 Location-specific ARARS

Potential location-specific ARARs are identified and discussed in this section. The discussions are presented based on various attributes of the site location, such as whether it is within a floodplain.

3.1 Summary of Location-specific ARARS

Biological and cultural resource categories relating to location-specific requirements are potentially affected by the Hangar 1 remedial action. The conclusions for ARARs pertaining to these resources are presented in the following sections.

3.1.1 Cultural Resources ARARs Conclusions

Hangar 1 at Hangar 1 is eligible for inclusion on the National Register of Historic Places (National Register). Substantive provisions at 16 U.S.C. § 470–470x-6 and 36 CFR pt. 800 are potentially applicable.

3.1.2 Wetlands Protection and Floodplain Management Conclusions

No wetlands or floodplains are potentially affected by this remedial action.

3.1.3 Hydrologic Resources Conclusions

No hydrologic resources are potentially affected by this remedial action.

3.1.4 Biological Resources Conclusions

No endangered or threatened species are potentially affected by this remedial action. Substantive provisions at 16 U.S.C. § 703 of the Migratory Bird Treaty Act are potentially relevant and appropriate. The long term management alternative includes reapplication of the encapsulation material which could affect protected species. Therefore, proper measures will be implemented during the reapplication to prevent the take of species protected by 16 U.S.C. § 703.

3.1.5 Coastal Resources Conclusions

No coastal resources are potentially affected by this remedial action.

3.1.6 Geologic Characteristics Conclusions

No geologic resources are potentially affected by this remedial action.

3.2 Detailed Discussion of ARARS

A more detailed discussion of the cultural and biological resource ARARs is included in this section.

3.2.1 Cultural Resources ARARs

Hangar 1 is a potential historical resource.

National Historic Preservation Act of 1966, as Amended. Pursuant to Sections 106 and 110(f) of the National Historic Preservation Act (NHPA) (16 U.S.C. § 470–470x-6, and its implementing regulations [36 CFR pt. 800]) as amended, CERCLA remedial actions are required to take into account the effects of remedial activities on any historic properties included on or eligible for inclusion on the National Register <http://tps.cr.nps.gov/nhl/>. The National Register is a list of

amended, requires that before approval of any federal undertaking that may directly and adversely affect any National Historic Landmark, the head of the responsible federal agency will, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to the landmark, and will afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.

Substantive provisions at 16 U.S.C. § 470–470x-6 and 36 CFR pt. 800 are potentially applicable.

3.2.2 Biological Resources ARARs

3.2.2.1 Federal

Federal requirements evaluated as potential ARARs for biological resources are discussed in the subsections below.

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703–712) protects migratory bird species. The substantive provisions at 16 U.S.C. § 703 prohibit at any time, using any means or manner, the pursuit, hunting, capturing, and killing or the attempt to take, capture, or kill any migratory bird. The MBTA also prohibits the possession, sale, export, and import of any migratory bird or any part of a migratory bird, as well as nests and eggs. A list of migratory birds for which this requirement applies is found at 50 CFR § 10.13. It is the Navy’s position that this act is not legally applicable to Navy actions; however, the Department of Defense recently signed (July 2006) a Memorandum of Understanding (MOU) with the United States Fish and Wildlife Service. The MBTA will continue to be evaluated as a potentially relevant and appropriate requirement for Navy CERCLA response actions.

Because the response action may potentially affect migratory birds as prohibited by the MBTA, substantive provisions at 16 U.S.C. § 703 are potentially relevant and appropriate for this FFS.

3.2.2.2 State

The State identified Cal. Fish & Game Code §3005 as a potential ARAR. Cal. Fish & Game Code § 3005 states, “It is unlawful to take birds or mammals with any net, pound, cage, trap, set line or wire, or poisonous substance, or to possess birds or mammals so taken, whether taken within or without this state.”

Cal. Fish & Game Code Section 3005 is not applicable because the United States of America has not waived sovereign immunity in the federal Endangered Species Act for this State of California requirement. Pursuant to 40 CFR § 300.400(g)(2) of the NCP, the Navy has determined that this requirement is not “relevant and appropriate” because it does not address problems or situations sufficiently similar to the circumstances of the release or CERCLA response action and is not well-suited to the site based upon the pertinent provisions of Subsections 300.400(g)(2)(i) and (iv) of the NCP. CERCLA response actions are intended to respond to releases of hazardous substances in order to protect human health and the environment including environmental receptors. In contrast, the purpose of this State requirement is to regulate and set forth conditions for the “taking” of the species addressed by those requirements. Moreover, that purpose is achieved through the regulation of intentional conduct directed at the species as opposed to incidental “take” (or possession, etc.) of species in the course of lawful activity such as CERCLA remedial action. The focus on intentional conduct is not well-suited to the circumstances at CERCLA sites. In summary, the purposes of this State requirement and the actions that it regulates do not include responding to releases of hazardous substances. Therefore, it is not “relevant and appropriate” based upon the pertinent provisions of Subsections 300.400(g)(2)(i) and (iv) of the NCP.

Although this requirement is not an ARAR, the Navy will coordinate with other natural resource trustees throughout the CERCLA remedial action process. The Navy's ecological risk assessment process takes into account representative environmental receptors for the site and final remediation/cleanup goals will ensure that they are adequately protected from exposure to CERCLA hazardous substances that present unacceptable risk. In addition, any species that are present and are federal and/or state endangered, threatened, or fully protected species will be addressed by ARARs related to those designations.

This page intentionally left blank

4.0 Action-specific ARARS

This FFS Report evaluated the following remedial action alternatives for Hangar 1 at Former Naval Air Station Moffett Field, California:

- Alternative 1: No Action
- Alternative 2: Implementation of ICs

These alternatives are the basis of this ARAR analysis. Detailed descriptions of the remedial alternatives are provided in the main text of this FFS Report.

Tables 4-1 and 4-2 at the end of this section present and evaluate federal and state potential action-specific ARARs for Hangar 1, respectively. A discussion of the requirements determined to be pertinent to each alternative being evaluated for the Hangar 1 action is presented in this section. A discussion of how the alternative complies with each identified ARAR is also provided.

4.1 Alternative 1 – No Action

There is no need to identify ARARs for the no action alternative because ARARs apply to “any removal or remedial action conducted entirely on-site” and “no action” is not a removal or remedial action (CERCLA Section 121[e], 42 U.S.C. § 9621[e]). CERCLA Section 121 (42 U.S.C. § 9621) cleanup standards for selection of a Superfund remedy, including the requirement to meet ARARs, are not triggered by the no action alternative (USEPA 1991b). Therefore, a discussion of compliance with action-specific ARARs is not appropriate for this alternative.

4.2 Alternative 2 – Implementation of Institutional Controls

The ICs alternative would require controls to be placed on the potential uses of the site. The controls would include mandatory restrictions in the short term to prevent the exposure of the PCB paints. Example Short Term restrictions could be: hazard notification signs, owner approval of all building modifications, and restriction on construction methods. This alternative includes sediment sampling to determine the effectiveness of the long-term management. Chemical-specific ARARs were identified for the sampling in Section 2.2.

No federal ARARs were identified for institutional controls.

The state has identified Cal. Water Code §13307(c). After evaluation, Cal. Water Code §13307(c) was not determined to be an ARAR in itself because it is not a cleanup standard, standard of control, or other substantive environmental protection requirement, criteria, or limitation. It prohibits the SWQCB from approving a cleanup action for restricted use under certain circumstances. However, Cal. Water Code §13307(c) refers to Cal. Civil Code §1471 which is further evaluated as a potential ARAR.

Navy has accepted substantive provisions of the Cal. Civ. Code § 1471 as ARARs for implementing institutional controls and entering into an Environmental Restriction Covenant and Agreement for sites that are transferring to a non-federal entity.

The substantive provisions of Cal. Civ. Code § 1471 are the following general narrative standard: “. . . to do or refrain from doing some act on his or her own land . . . where . . . : (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials, as defined in Section 25260 of the Health and Safety Code.” This narrative standard would be implemented through incorporation of restrictive environmental covenants in the deed at the

time of transfer. These covenants would be recorded with the environmental restriction covenant and agreement and run with the land.

Hangar 1 is not being transferred to a non-federal entity in the immediate foreseeable future. If and when a federal entity transfers Hangar 1 to a non-federal entity, an environmental restriction covenant and agreement will be required. Until then, the federal owner of the land will provide land use controls using and the Long Term Management Plan.

5.0 Summary

Controlling ARARs have been identified in the text of this appendix for each medium, location, and proposed remedial action.

The substantive provisions of the following requirements were identified as potential chemical-specific ARARs for this remedial action.

- Substantive provisions at 40 C.F.R. § 761.61(a)(4), (b), and (c) for the selected option are potentially relevant and appropriate federal ARARs for sediment sampling.
- Substantive requirements at BAAQMD regulation 8, Rule 8-3-301 required VOC content for the epoxy coating are potentially applicable state ARARs for dust emissions during the remedial action.

Substantive provisions at 16 U.S.C. § 470-470x-6 and 36 CFR pt. 800 are potentially applicable for protecting the historical Hangar 1. The purpose of this remedial action includes maintaining the Hangar 1 structure and expected to comply with these requirements.

Substantive provisions of the Migratory Bird Treaty Act at 16 U.S.C. § 703 were identified as potentially relevant and appropriate federal ARARs and measures will be implemented to prevent take of protected birds.

There are no ARARs for No Action.

No federal ARARs were identified for ICs. Cal. Civil Code §1471 were identified as potentially relevant and appropriate State ARARs if the land is transferred to a non-federal entity. Although transfer to a non-federal entity that is not expected in the immediate foreseeable future, the ICs requirements were identified for Hangar 1 in case it is transferred in the future. The ICs will be documented in the Long Term Management Plan.

This page intentionally left blank

6.0 References

California Regional Water Quality Control Board San Francisco Bay Region. 2011. *Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) as amended*. 31 December.

— — —. 2004. *Letter to Navy Regarding: Response to Request for Applicable, Relevant and Appropriate Requirements (ARARs) for Hangar 1, Former NAS Moffett Field, Mountain View California*, November.

Federal Register.

RWQCB. *See California Regional Water Quality Control Board*.

SWDIV. *See Southwest Division Naval Facilities Engineering Command*.

SWRCB. *See California State Water Resources Control Board*.

Tetra Tech EC, Inc. 2008. *Engineering Evaluation/Cost Analysis Revision 1 Installation Restoration Site 29, Hangar 1 Former Naval Air Station Moffett Field, California*, July 30.

United States Environmental Protection Agency. 1988a. *CERCLA Compliance with Other Laws Manual, Draft Guidance (Part I)*. EPA/540/G-89/006, Office of Emergency and Remedial Response, Washington, DC, August.

— — —. 1988b. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*. OSWER Directive 9355.3-01, -02. EPA/540/G-89/004, October.

— — —. 1989a. *CERCLA Compliance with Other Laws Manual: Part II – Clean Air Act and Other Environmental Statutes and State Requirements*, EPA/540/G-89/009, OSWER Directive 9234.1-02, Office of Solid Waste and Emergency Response, Washington, DC, August.

— — —. 1990a. *National Ambient Air Quality Standards (NAAQS)*.

USEPA. *See United States Environmental Protection Agency*.

This page intentionally left blank

TABLES

This page intentionally left blank

HANGAR 1 FOCUSED FEASIBILITY STUDY TABLE 2-1
SUMMARY OF POTENTIAL FEDERAL CHEMICAL-SPECIFIC ARARS^a

Requirement	Prerequisite	Citation ^b	ARAR Determination	Comments
Clean Air Act (42 U.S.C. §§ 7401-7671)				
This rule states that architectural coatings must meet standards for maximum VOC content, and lists specific VOC content for each type of coating.		BAAQMD Regulation 8, Rule 8-3-301	Potentially Applicable	Potentially applicable for application of encapsulating material.
Toxic Substances Control Act (15 U.S.C., ch. 53, §§ 2601-2692)				
Regulates storage and disposal of PCB remediation waste.		40 C.F.R. § 761.61(a)(4), (b), and (c)	Relevant and appropriate	Substantive provisions are potentially relevant and appropriate for the sediment sampling.

Notes:

^a Many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARARs table.

^b Only the substantive provisions of the requirements cited in this table are potential ARARs.

Abbreviations and Acronyms:

ARAR - applicable or relevant and appropriate requirement

BAAQMD - Bay Area Air Quality Management District

CFR - Code of Federal Regulations

VOC - volatile organic compound

HANGAR 1 FOCUSED FEASIBILITY STUDY TABLE 2-2
SUMMARY OF POTENTIAL STATE CHEMICAL-SPECIFIC ARARs^a

Requirement	Prerequisite	Citation ^b	ARAR Determination	Comments
State and Regional Water Quality Control Boards				
Authorizes the SWRCB and RWQCB to establish in water quality control plans beneficial uses and numerical and narrative standards to protect both surface water and groundwater quality. Authorizes regional water boards to issue permits for discharges to land or surface or groundwater that could affect water quality, including NPDES permits, and to take enforcement action to protect water quality.		California Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Act)	Potentially Applicable	The Navy accepts the substantive provisions of §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act enabling legislation, as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the Basin Plan for the San Francisco Bay Region, as potential ARARs.
		California Water Code, div. 7, § 13304	Not an ARAR	California Water Code, Section 13304 was provided by the Water Board as an ARAR for Hangar 1. However, Section 13304 does not constitute an ARAR because it does not itself establish or contain substantive environmental “standards, requirements, criteria or limitations” (CERCLA Section 121) and is not in itself directive in intent. In addition, Section 13304 is not more stringent than the substantive requirements of the potential state and federal ARARs identified in this table.
Describes the water basins in the San Francisco Bay Region, establishes beneficial uses of groundwater and surface water, establishes WQOs, including narrative and numerical standards, establishes implementation plans to meet WQOs and protect beneficial uses, and incorporates statewide water quality control plans and policies.		Comprehensive Water Quality Control Plan for the San Francisco Bay (Basin Plan) (California Water Code Section 13240)	Potentially Applicable	Substantive requirements pertaining to beneficial uses, WQOs, and certain statewide water quality control plans are potential state ARARs for impacts to surface water during this removal action.

Notes:

- ^a Many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARARs table.
- ^b Only the substantive provisions of the requirements cited in this table are potential ARARs.
- ^c Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only pertinent substantive requirements of specific citations are considered potential ARARs.

Abbreviations and Acronyms:

ARAR – applicable or relevant and appropriate requirement
 CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
 RWQCB – Regional Water Quality Control Board

SWRCB – State Water Resources Control Board
 WQO – Water Quality Objectives

HANGAR 1 FOCUSED FEASIBILITY STUDY TABLE 3-1
SUMMARY OF POTENTIAL FEDERAL LOCATION-SPECIFIC ARARS

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
National Historic Preservation Act of 1966, as Amended (16 U.S.C. § 470-470x-6)^b					
Historic project owned or controlled by federal agency	Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing on the National Register of Historic Places.	Property included in or eligible for the National Register of Historic Places.	16 U.S.C. § 470-470x-6, 36 CFR, Pt. 800	Potentially Applicable	Hangar 1 is individually eligible for listing in the National Register and is a contributing element of the U.S. Naval Air Station Sunnyvale Historic District, which is listed on the National Register. This remedial action will maintain the current structure of Hangar 1.
Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703-712)					
Migratory bird area	Protects almost all species of native migratory birds in the U.S. from unregulated "take," which can include poisoning at hazardous waste sites.	Presence of migratory birds.	16 U.S.C. §703	Potentially Relevant and Appropriate	Except as permitted by regulations, it is unlawful to pursue, hunt, take, capture, offer to sell, barter, purchase, or deliver any migratory bird, nest, or egg. It is the Navy's position that this act is not legally applicable to Navy actions. However, substantive portions of the Migratory Bird Treaty Act are considered a potentially relevant and appropriate requirement for this remedial action. The remedial design process will identify measures necessary to prevent an unregulated "take" of protected bird species. A biological survey will be conducted prior to starting any intrusive work, and the impacts on nesting/roosting raptors will be minimized.

Notes:

^a Only the substantive provisions of the requirements cited in this table are potential ARARs.

Abbreviations and Acronyms:

ARAR – applicable or relevant and appropriate requirement

U.S.C. – United States Code

HANGAR 1 FOCUSED FEASIBILITY STUDY TABLE 3-2

SUMMARY OF POTENTIAL STATE LOCATION-SPECIFIC ARARS

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
California Endangered Species Act (Cal. Fish & Game Code §§ 2050-2116)					
Drainage from site	It is unlawful to take birds or mammals with any net, pound, cage, trap, set line or wire, or poisonous substance, or to possess birds or mammals so taken, whether taken within or without this state.	Actions impacting birds or mammals.	Cal. Fish and Game Code § 3005(a)	Not an ARAR	Cal. Fish & Game Code Section 3005 is not applicable because the United States of America has not waived sovereign immunity in the federal Endangered Species Act for this State of California requirement. Pursuant to 40 CFR § 300.400(g)(2) of the NCP, the Navy has determined that this requirement is not “relevant and appropriate” because it does not address problems or situations sufficiently similar to the circumstances of the release or CERCLA response action and is not well-suited to the site based upon the pertinent provisions of Subsections 300.400(g)(2)(i) and (iv) of the NCP. CERCLA response actions are intended to respond to releases of hazardous substances in order to protect human health and the environment including environmental receptors. In contrast, the purpose of this State requirement is to regulate and set forth conditions for the “taking” of the species addressed by those requirements. Moreover, that purpose is achieved through the regulation of intentional conduct directed at the species as opposed to incidental “take” (or possession, etc.) of species in the course of lawful activity such as CERCLA remedial action. The focus on intentional conduct is not well-suited to the circumstances at CERCLA sites. In summary, the purposes of this State requirement and the actions that it regulates do not include responding to releases of hazardous substances. Therefore, it is not “relevant and appropriate” based upon the pertinent provisions of Subsections 300.400(g)(2)(i) and (iv) of the NCP. Although this requirement is not an ARAR, the Navy will coordinate with other natural resource trustees throughout the CERCLA remedial action process. The DON’s ecological risk assessment process takes into account representative environmental receptors for the site and final remediation/cleanup goals will ensure that they are adequately protected from exposure to CERCLA hazardous stances that present unacceptable risk. In addition, any species that are present and are federal and/or state endangered, threatened, or fully protected species will be addressed by ARARs related to those designations.

Notes:

^a Only the substantive provisions of the requirements cited in this table are potential ARARs.

Abbreviations and Acronyms:

ARAR – applicable or relevant and appropriate requirement

Navy – U.S. Department of the Navy

**HANGAR 1 FOCUSED FEASIBILITY STUDY TABLE 4-1
SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
No federal action-specific ARARs have been identified.					

Notes:

^a Only the substantive provisions of the requirements cited in this table are potential ARARs.

Abbreviations and Acronyms:

ARAR -applicable or relevant and appropriate requirement

**HANGAR 1 FOCUSED FEASIBILITY STUDY TABLE 4-2
SUMMARY OF POTENTIAL STATE ACTION-SPECIFIC ARAR**

Action	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
	If the state board or the regional board finds that the property is not suitable for unrestricted use and that an institutional control is necessary for the protection of public health, safety, or the environment, then the state board and the regional boards may not issue a closure letter, or make a determination that no action is required, unless a land use restriction is recorded or required to be recorded pursuant to Section 1471 of the Civil Code.	Restricted land use	California Water Code § 13307.1(c)		Not an ARAR in itself. However, it refers to Cal. Civil Code §1471 which is evaluated separately below.
Institutional controls	Provides conditions under which land-use restrictions will apply to successive owners of land.	Transfer property from the federal agency to a nonfederal agency.	Cal. Civil Code §1471		Generally, Cal. Civ. Code § 1471 allows an owner of land to make a covenant to restrict the use of land for the benefit of a covenantee. The covenant runs with the land to bind successive owners, and the restrictions must be reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials, as defined in Cal. Health & Safety Code § 25260. Substantive provisions are the following general narrative standard: “to do or refrain from doing some act on his or her own land . . . where (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence of hazardous materials, as defined in Section 25260 of the California Health and Safety Code.” This narrative standard would be implemented through incorporation of restrictive covenants in the deed and Environmental Restriction and Covenant Agreement at the time of transfer.

Notes:

^a Only the substantive provisions of the requirements cited in this table are potential ARARs.

Abbreviations and Acronyms:

ARAR – applicable or relevant and appropriate requirement

Appendix B

Sustainability Assessment

This page intentionally left blank.

Contents

Section	Page
Acronyms and Abbreviations	iii
B1 Introduction	B1-1
B2 Remedial Alternatives Assessment	B2-1
B2.1 Alternative 1 - No Action	B2-1
B2.1.1 Alternative 1 Greenhouse Gas Emissions.....	B2-1
B2.1.2 Alternative 1 Additional GSR Metrics	B2-1
B2.2 Alternative 2 - Implementation of Institutional Controls.....	B2-1
B2.2.1 Alternative 2 Greenhouse Gas Emissions.....	B2-2
B2.2.2 Alternative 2 Additional GSR Metrics	B2-2
B2.3 Comparative Analysis of Alternatives.....	B2-2
B2.3.1 Comparative Analysis of Alternatives for Greenhouse Gas Emissions.....	B2-2
B2.3.2 Comparative Analysis of Alternatives for Additional GSR Metrics	B2-2
B3 References	B3-1

Attachment

B-1	SiteWise™ Assessment Results Summary
-----	--------------------------------------

This page intentionally left blank.

Acronyms and Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CM15	Carbomastic® 15
DTSC	California Department of Toxic Substances Control
FFS	Focused Feasibility Study
GHGs	Greenhouse gas emissions
GSR	Green and sustainable remediation
HDPE	High-density polyethylene
IC	Institutional control
IR	Installation Restoration
NAVFAC	Naval Facilities Engineering Command
NO _x	Oxides of nitrogen
PCB	polychlorinated biphenyl
PM ₁₀	Particulate emissions less than 10 microns diameter
RAO	Remedial action objective
RI	Remedial Investigation
SO _x	Oxides of sulfur
USEPA	United States Environmental Protection Agency



This page intentionally left blank.

B1 Introduction

RORE, Inc. has prepared this sustainability assessment appendix to the Focused Feasibility Study (FFS) Report for Installation Restoration (IR) Site 29 (Hangar 1), which estimates the greenhouse gas emissions (GHGs) and green and sustainable remediation (GSR) metrics for remedial alternatives considered for mitigating environmental impacts at former Naval Air Station Moffett Field near Mountain View, California. This appendix assesses alternatives considered for Hangar 1, hereinafter referred to as the site. Work will be performed for Naval Facilities Engineering Command (NAVFAC) Southwest, Contract Number N62473-09-D-2620, under Contract Task Order Number 0006.

Two remedial alternatives were considered for the site. These include:

- Alternative 1: No Action
- Alternative 2: Implementation of Institutional Controls

In addition to the comparative analysis of remedial alternatives considered in the FFS, an evaluation of the sustainability of Alternatives 1 and 2 is included. The United States Environmental Protection Agency (USEPA) currently defines green remediation as “the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions.” USEPA guidance regarding green remediation is provided in *Principles for Greener Cleanups* (USEPA, 2009) and *Methodology for Understanding and Reducing a Project’s Environmental Footprint* (USEPA, 2012).

USEPA’s guidance states that green remediation must meet threshold requirements for protectiveness and other site-specific cleanup objectives (i.e., the nine criteria discussed below [USEPA, 1988]). Thus, green remediation is intended to decrease the environmental footprint of the cleanup action rather than trade cleanup objectives for other environmental objectives.

The California Department of Toxic Substances Control (DTSC) guidance also describes the importance of considering sustainability in addition to the nine Comprehensive Environmental Resources Conservation and Liability Act (CERCLA) criteria (DTSC, 2009). DTSC guidance describes the importance of considering sustainability in addition to the nine CERCLA criteria as follows:

“Notwithstanding its absence in the list of criteria, sustainability should be considered as one of several factors to be examined in evaluating the environmental impact of a remedy. Some of these factors may compete with sustainability, and trade-offs may become necessary to achieve the best approach or most acceptable solution for the stakeholders.”

A green and sustainable remediation evaluation tool known as SiteWise™, was used to perform the sustainability assessment, which was developed jointly in 2010 by the United States Army Corps of Engineers and the U.S. Department of the Navy to calculate the environmental footprint for various metrics (Naval Facilities Engineering Command, 2011). Input values to SiteWise™ are broken down into four phases of work: remedial investigation (RI), remedial action construction, remedial action operation, and long-term monitoring. Within each work phase, the input values are further divided into categories

including material production, transportation, equipment use, and residual handling. Detailed input values to SiteWise™ included, but were not limited, to estimated vehicle miles for personnel and equipment, amount of epoxy coating (i.e., Carbomastic 15® [CM15] epoxy) required, equipment to be operated including type of fuel used, and additional materials used. The eight sustainability factors evaluated include GHG emissions, total energy used, water impacts, oxides of nitrogen (NO_x) emissions, oxides of sulfur (SO_x) emissions, particulate matter with particle sizes of 10 microns or smaller (PM₁₀), accident risk (fatality), and accident risk (injury).

For the purposes of this evaluation, use of standard equipment was assumed with conventional fuels (diesel or gasoline), with no particulate filters fitted to diesel-powered machinery. Local travel to and from the site was assumed for each of each phase of work (approximately 50 miles round trip). The sustainability assessment output from SiteWise™ for Alternative 2 is included in Attachment B-1. This includes an assessment of each of the sustainability factors and calculated values for each of the sustainability categories.

The following five green remediation elements are listed in the USEPA's guidance documents and are relevant to selection of a GSR alternative for the site:

- Minimize total energy use and maximize renewable energy use;
- Minimize air pollutants and GHG emissions;
- Minimize water use and impacts to water resources;
- Reduce, reuse, and recycle materials and waste; and
- Minimize land use and protect ecosystems.

USEPA guidance for reducing a project's environmental footprint (USEPA, 2012) includes the following steps:

Step 1 - Collect information about the remedy design, construction, and operation. This step includes an accounting of numerous parameters, including the remedial alternatives, conceptual design, well networks, injection points, discharge points, backfill material, types of equipment needed for construction of the alternative, and the types of equipment to be installed.

Step 2 - Quantify materials to be used from offsite and wastes that will be generated. Materials from offsite may include well casings, grout, piping, granular activated carbon, ionic resins, injectants, concrete, and others. This step accounts for recycle content of materials, and waste types and quantities.

Step 3 - Estimate the quantity of water that will be used onsite, including potable water, groundwater, storm water, and reclaimed water.

Step 4 - Estimate the energy required and air emissions associated with each alternative, including personnel transportation, equipment and materials transportation to the site, and equipment use.

Step 5 - Qualitatively describe the affected ecosystems.

Each step is captured in the SiteWise™ GSR tool, with the exception of the qualitative assessment performed in Step 5.

This page intentionally left blank.

B2 Remedial Alternatives Assessment

This section describes the key components of the remedial alternatives and site-specific assumptions and parameters used for sustainability assessment. Assumptions for each alternative are described in the body of the FFS.

B2.1 Alternative 1 - No Action

Alternative 1 will leave the polychlorinated biphenyls (PCBs; Aroclor-1260 and Aroclor-1268) present at Hangar 1 in their existing state, with no further removal measures (i.e., maintenance of the existing epoxy coating) or institutional controls (ICs) to prevent unacceptable exposure to Aroclor-1260 and Aroclor-1268. No active remediation, inspections, reviews, or groundwater monitoring will be performed under this alternative.

The No Action alternative provides a baseline against which other remedial alternatives are compared. This alternative will not include any activities to achieve remedial action objectives (RAOs). If implemented, this alternative will be considered a final remedy for the sites listed above. No monitoring or periodic reviews will be conducted to verify the protectiveness of the No Action alternative.

B2.1.1 Alternative 1 Greenhouse Gas Emissions

The No Action alternative will not generate GHG emissions.

B2.1.2 Alternative 1 Additional GSR Metrics

The No Action alternative will not require the use of energy or water; will not result in the generation of NO_x, SO_x, or PM₁₀; and will not cause increased risks to workers during implementation.

B2.2 Alternative 2 - Implementation of Institutional Controls

Alternative 2 includes the following components that are relevant to the overall sustainability footprint:

- Transportation of personnel to and from the site
- Transportation of materials and equipment by truck (crane and lifts)
- Long term monitoring - includes visual inspections and physical surveys for 30 years
- Maintenance of the existing epoxy coating system on the hangar's structural steel frame
- Onsite personnel hours were used as an overall estimate of potential accident risk

Onsite personnel hours and the number of transportation trips were estimated using the following assumptions: from 4 to 27 workers onsite for 8 hours per day, with a duration ranging from 2 to 40 days. Preparation of work plans, designs, and reports was not included in this analysis.

It should be noted that GHG emissions information for the manufacture of CM15 epoxy was not available for this sustainability assessment. As a result, it was assumed that GHG emissions during the manufacture of CM15 epoxy were similar to the manufacture of high-density polyethylene (HDPE). Detailed assumptions used in the SiteWise™ model are provided in Attachment B-1.

B2.2.1 Alternative 2 Greenhouse Gas Emissions

This alternative has the potential to generate approximately 778 metric tons of GHGs, primarily as a result of transportation of personnel and equipment, and manufacturing of CM15 epoxy. Transportation of personnel and equipment, and equipment use, contributed to approximately 95 percent of the total potential GHG emissions.

A summary of GHG emissions results is included in Attachment B-1.

B2.2.2 Alternative 2 Additional GSR Metrics

This alternative will require the use of energy to fuel vehicles to transport personnel and equipment, to fuel the construction equipment, and to manufacture the epoxy coating. Approximately 9,160 million British Thermal Units of energy will be required to implement this alternative. Approximately 121,000 gallons of water will be consumed primarily for pressure washing activities. Emissions of approximately 4.8 metric tons of NO_x, 0.1 metric ton of SO_x, and 0.4 metric ton of PM₁₀ will occur because of transportation of materials and use of equipment. In addition, 22 hours lost time due to injury is estimated from onsite labor activities and vehicle accident risks, and 23 metric tons of hazardous landfill waste consisting of debris generated and collected during the surface preparation of the CM15 during coating maintenance activities will be consumed during this alternative.

GSR metrics for implementation of Alternative 2 are included in Attachment B-1.

B2.3 Comparative Analysis of Alternatives

A comparative evaluation of sustainability assessment results for remedial alternatives is presented in this section. Alternative 1 will have no overall footprint, whereas Alternative 2 will, due to travel and equipment use.

B2.3.1 Comparative Analysis of Alternatives for Greenhouse Gas Emissions

Alternative 1 will not result in GHGs, whereas Alternative 2 will, primarily due to transportation of personnel and use of equipment.

B2.3.2 Comparative Analysis of Alternatives for Additional GSR Metrics

A comparison of GSR parameters is presented below:

- **Total energy used.** Alternative 1 will not require any energy use, whereas Alternative 2 will.

- **Water impacts.** Alternative 1 will not require the use of water, whereas Alternative 2 will, for pressure washing activities.
- **Nitrogen oxide emissions.** Alternative 1 will not result in NO_x emissions, whereas Alternative 2 will, primarily due to a need for transportation and equipment use.
- **Sulfur oxide emissions.** Alternative 1 will not result in SO_x emissions, whereas Alternative 2 will, primarily due to a need for transportation and equipment use.
- **Particulate emissions.** Alternative 1 will not generate PM₁₀ emissions, whereas Alternative 2 will, primarily due to a need for transportation and equipment use.
- **Accident risk – fatality.** Alternative 1 will not result in increased risk to site workers, whereas Alternative 2 will, primarily due to the number of onsite labor hours during construction-type activities and operation of construction equipment on the site.
- **Accident risk – injury.** Alternative 1 will not result in increased risk to site workers, whereas Alternative 2 will, primarily due to transportation of personnel, the number of onsite labor hours during construction-type activities, and operation of construction equipment on the site.

Of the GSR factors evaluated, Alternative 2 ranked least favorably in the eight evaluation factors. The greatest overall impacts for Alternative 2 are related to transportation of personnel and equipment, operation of construction equipment on site, and impacts from the manufacturing of the consumables required (primarily for GHG and energy use).

Additional sustainability metrics considered by SiteWise™ include hazardous waste landfill space used, and lost hours due injury of site workers. Comparison of these alternatives, with respect to these additional sustainability metrics, is discussed below:

- **Non-hazardous waste landfill space used.** Alternatives 1 and 2 will not consume non-hazardous landfill space.
- **Hazardous waste landfill space used.** Alternative 1 will not consume hazardous landfill space, whereas Alternative 2 will.
- **Topsoil consumption.** Alternatives 1 and 2 will not require the use of topsoil.
- **Lost Hours Injury.** Alternative 1 will not result in lost time due to injury, whereas Alternative 2 will.

Some uncertainties are inherent within the SiteWise™ model; for example, the type of equipment assumed in the alternatives could affect the overall evaluation significantly. Varying the assumptions built into the FFS, such as the overall duration of alternatives, and the frequency of operations and maintenance, will have a substantial effect on the results of the SiteWise™ model.

The use of proxy data such as HDPE for CM15 epoxy may under or over-estimate the actual impacts of the consumable. Additionally, SiteWise™ only accounts for the GHG and total energy of consumable manufacturing and may be underestimating impacts in the other GSR categories.

This page intentionally left blank.

B3 References

Department of Toxic Substances Control (DTSC). 2009. *Interim Advisory for Green Remediation*. California Environmental Protection Agency. December

Naval Facilities Engineering Command, 2011. *User Guide UG-2092-ENV, SiteWise™ Version 2 User Guide*. June.

United States Environmental Protection Agency (USEPA). 2012. *Methodology for Understanding and Reducing a Project's Environmental Footprint*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Office of Superfund Remediation Technology Innovation. February.

United States Environmental Protection Agency (USEPA). 2009. *Principles for Greener Cleanups*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. August 27.

United States Environmental Protection Agency (USEPA). 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. OSWER Directive 9355.1. EPA/540/G-89/004*. Office of Emergency and Remedial Response. Interim Final. October.

This page intentionally left blank.

Attachment



This page intentionally left blank.

Remedial Alternatives	GHG Emissions	Total energy Used	Water	NO _x emissions	SO _x Emissions	PM ₁₀ Emissions	Accident Risk Fatality	Accident Risk Injury
	metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Alternative 2	777.67	9.16E+03	1.21E+05	4.76E+00	5.66E-02	4.34E-01	2.95E-02	2.79E+00

Additional Sustainability Metrics

Remedial Alternatives	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Final Cost with Footprint Reduction
	tons	tons	cubic yards	\$		\$
Alternative 2	0.00	2.29E+01	0.00E+00	0.00E+00	2.24E+01	0.00E+00

Relative Impact

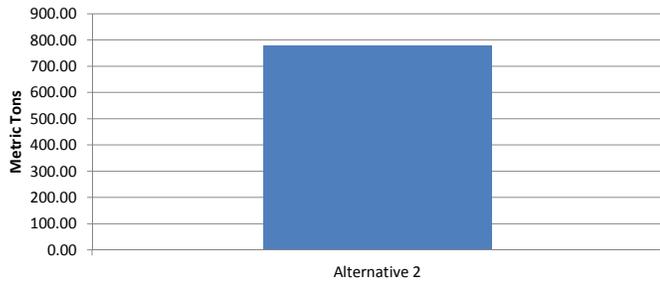
Remedial Alternatives	GHG Emissions	Energy Usage	Water Usage	NOx emissions	SOx Emissions	PM10 Emissions	*Accident Risk Fatality	*Accident Risk Injury	Community Impacts	Resources Lost
Alternative 2	High	High	High	High	High	High	High	High	user select	user select

Relative Impact (User Override)

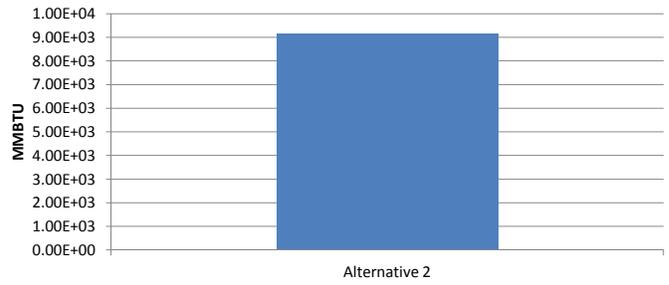
Remedial Alternatives	GHG Emissions	Energy Usage	Water Usage	NOx emissions	SOx Emissions	PM10 Emissions	*Accident Risk Fatality	*Accident Risk Injury	Community Impacts	Resources Lost
Alternative 2	High	High	High	High	High	High	High	High	user select	user select

*Accident Risk is an estimate of how many accidents may occur. This risk is not the same as Cancer Risk, which is the probability (for a single person) of getting cancer. Accident risk is not comparable to Cancer Risk due to inherent fundamental differences.

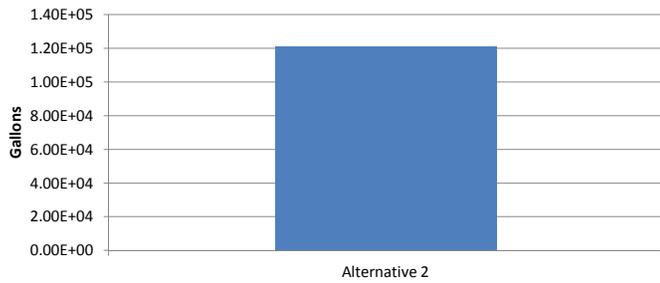
GHG Emissions



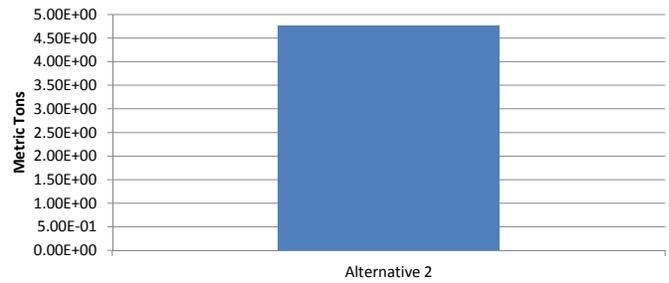
Total Energy Used



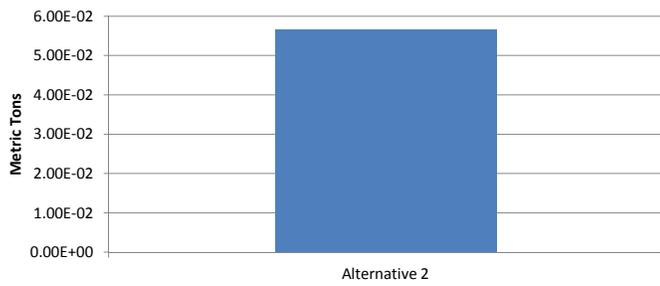
Water Impacts



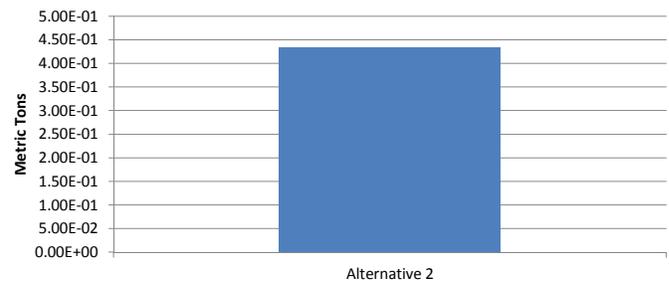
NO_x Emissions



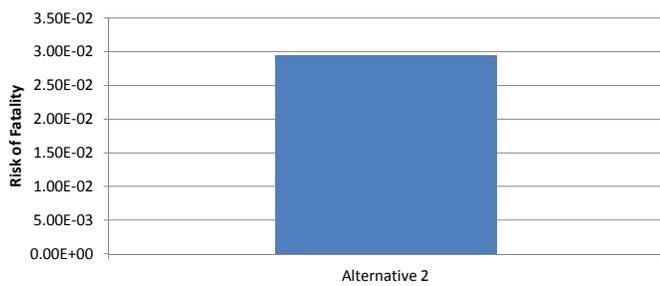
SO_x Emissions



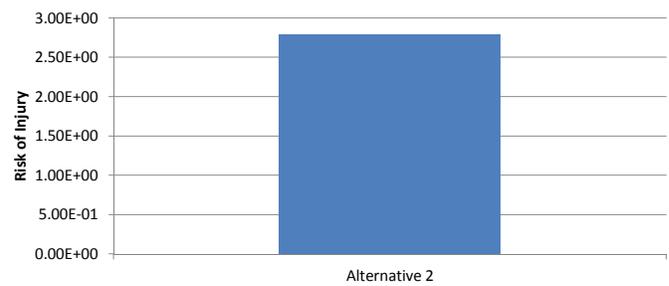
PM₁₀ Emissions



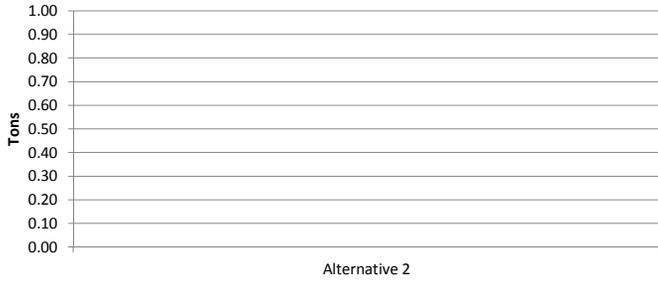
Accident Risk Fatality



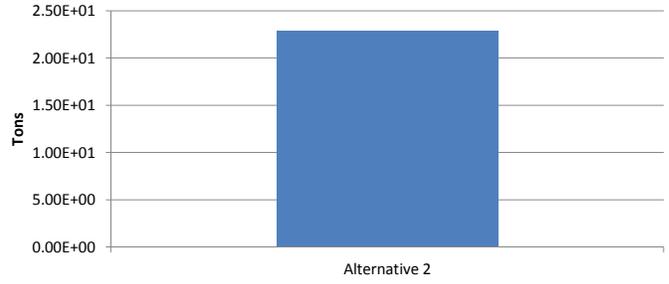
Accident Risk Injury



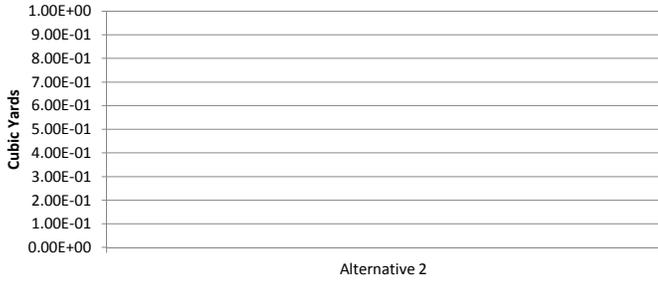
Non-Hazardous Waste Landfill Space



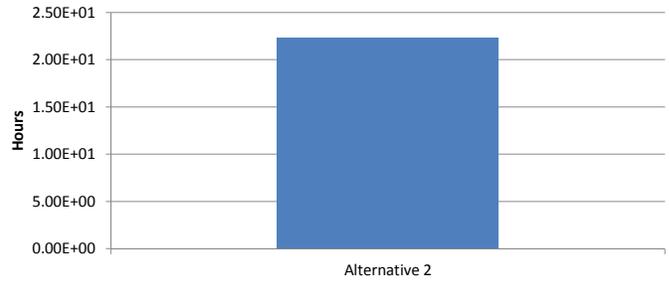
Hazardous Waste Landfill Space



Topsoil Consumption



Lost Hours - Injury



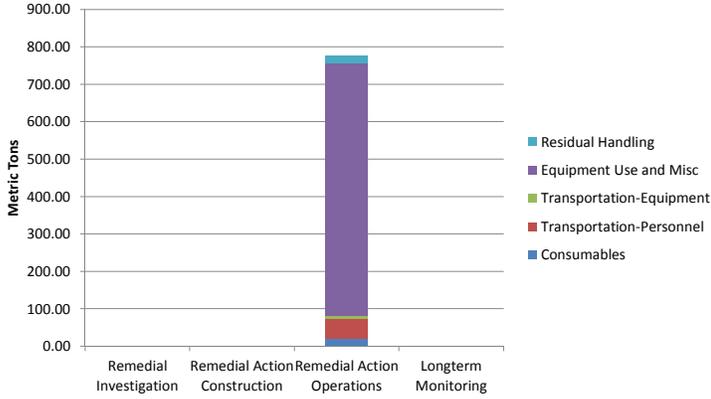
Sustainable Remediation - Environmental Footprint Summary
Alternative 2

Phase	Activities	GHG Emissions	Total energy Used	Water Consumption	NOx emissions	SOx Emissions	PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Operations	Consumables	21.24	7.1E+02	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	52.22	6.6E+02	NA	2.2E-02	6.8E-04	3.1E-03	2.7E-02	2.2E+00
	Transportation-Equipment	7.19	9.4E+01	NA	2.3E-03	4.0E-05	2.0E-04	3.7E-05	3.0E-03
	Equipment Use and Misc	676.15	7.4E+03	1.2E+05	4.7E+00	5.5E-02	4.3E-01	2.4E-03	6.1E-01
	Residual Handling	20.88	2.7E+02	NA	8.1E-03	9.7E-04	5.1E-03	7.8E-05	6.3E-03
	Sub-Total	777.67	9.16E+03	1.21E+05	4.76E+00	5.66E-02	4.34E-01	2.95E-02	2.79E+00
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		7.8E+02	9.2E+03	1.2E+05	4.8E+00	5.7E-02	4.3E-01	3.0E-02	2.8E+00

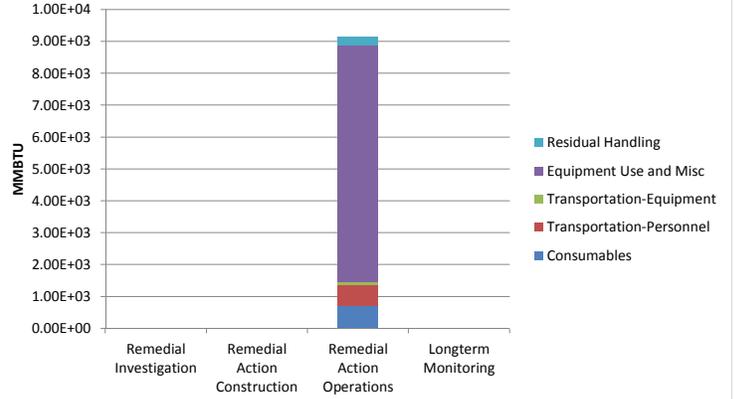
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury
	tons	tons	cubic yards	\$	
Remedial Investigation	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Remedial Action Construction	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Remedial Action Operations	0.0E+00	2.3E+01	0.0E+00	0	2.2E+01
Longterm Monitoring	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Total	0.0E+00	2.3E+01	0.0E+00	\$0	2.2E+01

Total Cost with Footprint Reduction
\$0

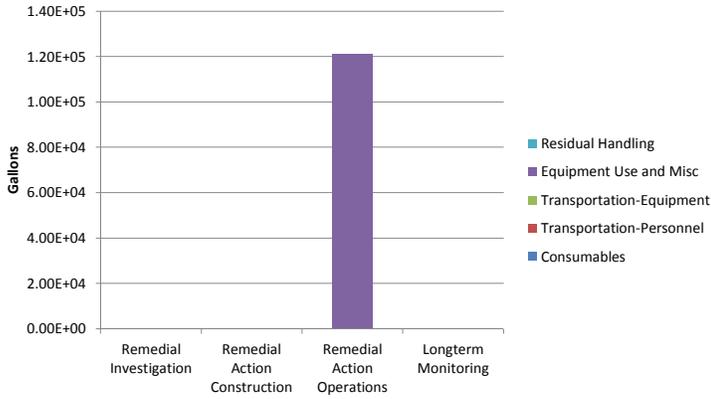
GHG Emissions



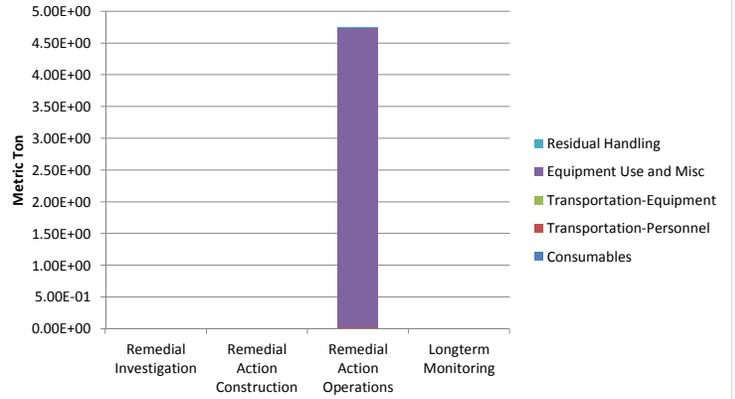
Total Energy Used



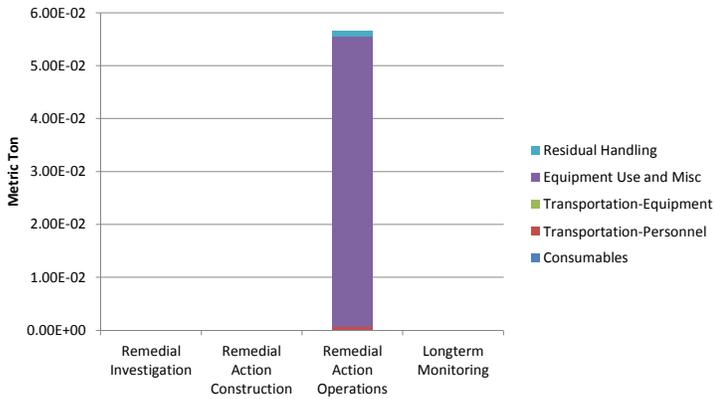
Water Consumption



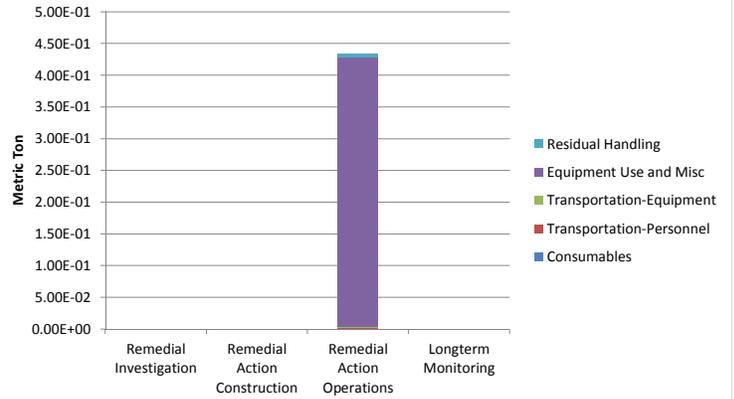
NOx Emissions



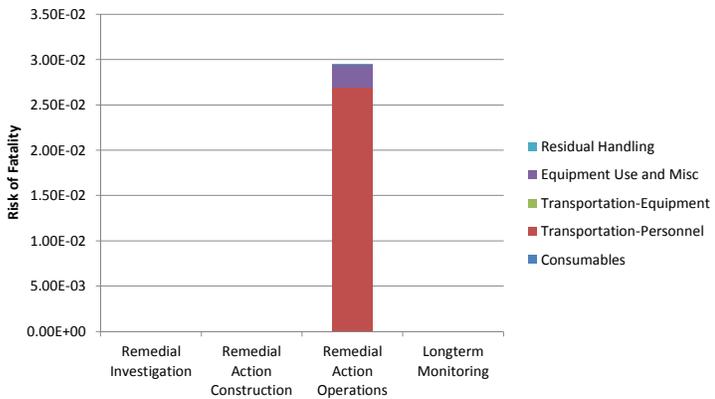
SOx Emissions



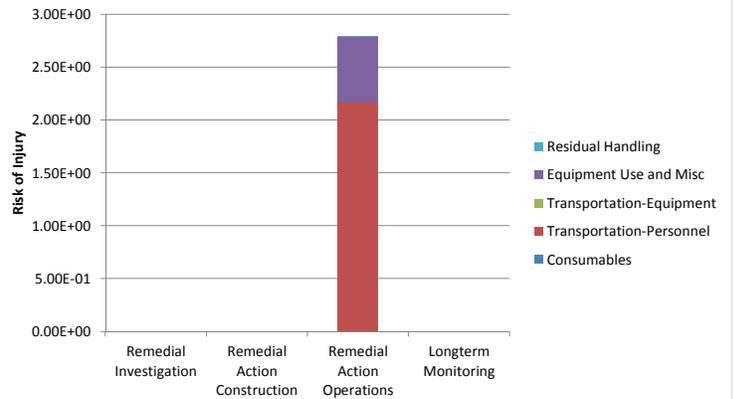
PM₁₀ Emissions



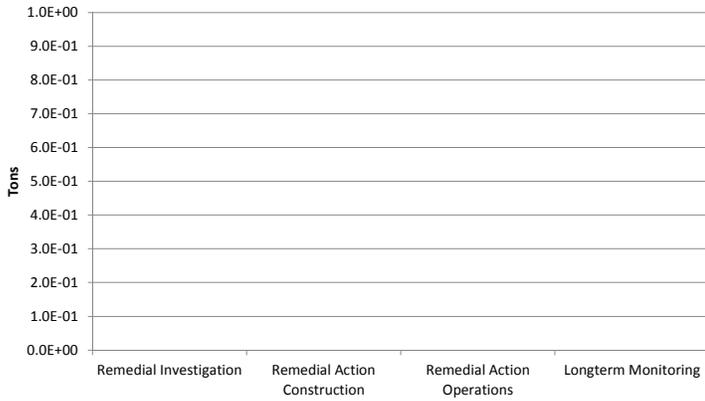
Accident Risk - Fatality



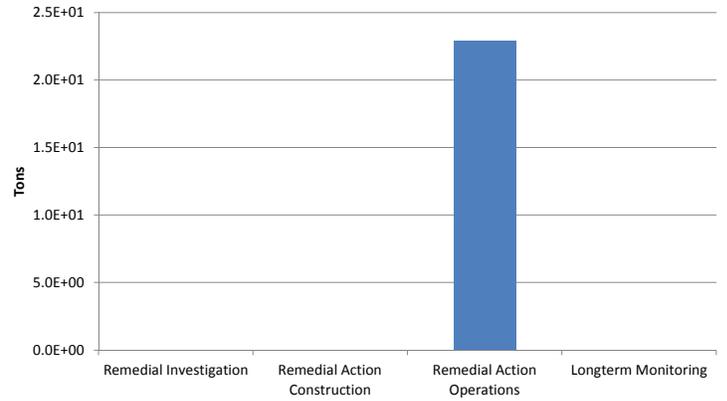
Accident Risk - Injury



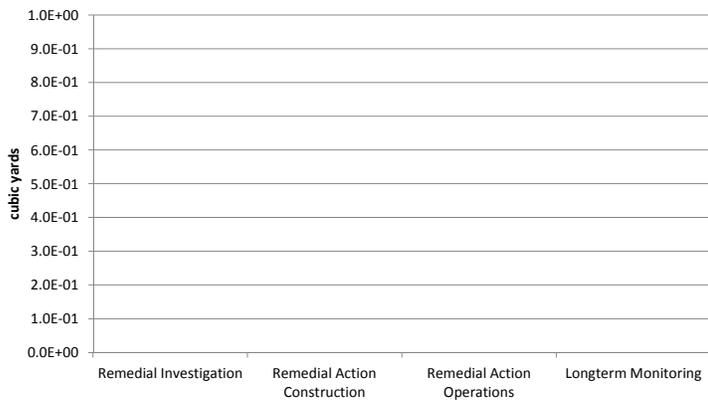
Non-Hazardous Waste Landfill Space



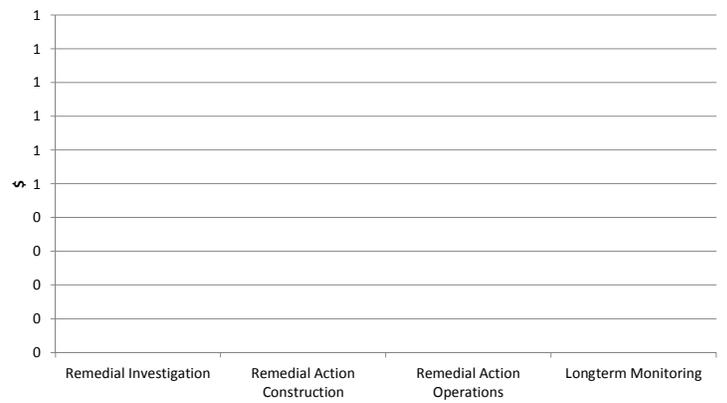
Hazardous Waste Landfill Space



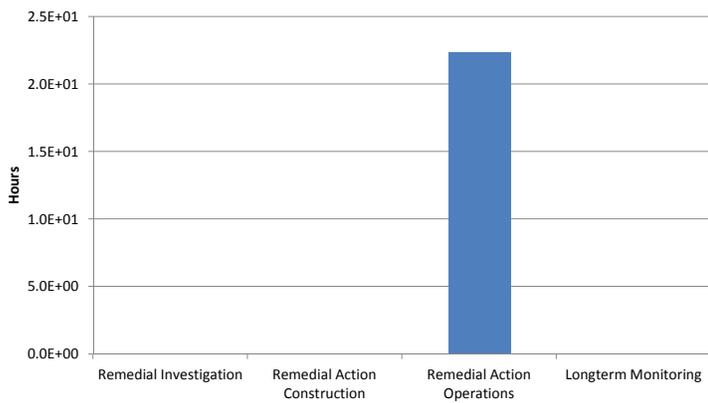
Topsoil Consumption



Costing



Lost Hours - Injury



Appendix C

Cost Development Summaries

This page intentionally left blank.

Contents

Acronyms and Abbreviations.....	iii
C1 Methodology	C1-1
C1.1 Cost Estimate Components	C1-1
C1.1.1 General Coating Conditions Assessment.....	C1-1
C1.1.2 Detailed Visual Inspection.....	C1-1
C1.1.3 Coating Maintenance	C1-2
C1.1.4 Sampling Program.....	C1-2
C1.2 Description of RACER	C1-2
C1.3 Present Value	C1-3
C1.4 General Assumptions	C1-3
C2 Cost Estimates	C2-1
C2.1 Alternative 2 – Implementation of Institutional Controls	C2-2
C3 References.....	C3-1

Tables

C-1	Cost Estimate Assumptions
C-2	Cost Estimate Details for Alternative 2 – Implementation of Institutional Controls

This page intentionally left blank.

Acronyms List

APP/SSHP	Accident Prevention Plan/Site Safety and Health Plan
FFS	focused feasibility study
FS	feasibility study
IC	Institutional control
IR	Installation Restoration
LTMgmt Plan	Long Term Management Plan
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTCRA	Non-Time Critical Removal Action
OMB	Office of Management and Budget
PCB	polychlorinated biphenyl
PW	present worth
QC	quality control
RACER	Remedial Action Cost Engineering and Requirements (Software)
RAO	remedial action objectives
RI	remedial investigation
SAP	Sampling and Analysis Plan
SSPC	Society for Protective Coatings
US	United States
USEPA	United States Environmental Protection Agency



This page intentionally left blank.

C1 Methodology

This appendix documents the development of cost estimates for the long term maintenance and institutional controls (ICs) to ensure the protectiveness of the Non-Time Critical Removal Action (NTCRA) that has been performed at Installation Restoration (IR) Site 29 (Hangar 1) which is located at former Naval Air Station (NAS) Moffett Field near Mountain View, California. The short and long term cost estimates are used in the evaluation of alternatives in this Focused Feasibility Study (FFS) Report. The No Action alternative (Alternative 1) has no associated costs and therefore is not discussed in this appendix.

At the Feasibility Study (FS) stage, the costs for the long term maintenance and ICs are conceptual and not detailed design cost estimates. The cost estimates presented herein, and summarized in the FFS Report, are developed to be consistent with the expected accuracy for FS-level estimates, as described in United States Environmental Protection Agency (USEPA) Remedial Investigation (RI) and FS technical guidance (USEPA, 1988 and 2000).

Cost estimates for the FFS Report were prepared following USEPA RI and FS technical guidance (USEPA, 1988 and 2000) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The costs for the coating maintenance or unique line items were estimated based on a combination of manufacturer recommendation, vendor quotes and engineering judgment. The Remedial Action Cost Engineering and Requirements Software (RACER) was also used to cost data for sampling, monitoring and reporting. Microsoft Excel spreadsheets were used to tabulate estimated costs on an annual basis for the assumed duration of each alternative and calculate present values in January 2013 United States (US) Dollars.

C1.1 Cost Estimate Components

Cost estimates, depending on the alternative evaluated, were determined for long term maintenance and the monitoring program in support of the FFS were derived from the Draft Long Term Management Plan (LTMgmt Plan) for Non-Time Critical Removal Action for PCB Contamination at IR 29 (Hangar 1) (AMEC, 2013). A description of each sampling component is provided below.

C1.1.1 General Coating Conditions Assessment

The LTMgmt describes the general coating condition assessment as a qualitative visual survey to assess the general condition of the coated surfaces, including rusting or degradation of the coating that is performed every 3 years. This assessment is assumed to be conducted from the ground and other available access points. During the NTCRA a catwalk system running the length of the hangar roof was upgraded and can be used to access the condition of the upper portion of the coating. The general coating condition assessment will be performed by a Society for Protective Coatings (SSPC) inspector who possesses a QP5 certification. The inspector would assign a qualitative rating of the overall condition of the coating (i.e., good, fair, or poor). This information is used to plan the detailed visual assessment described below.

C1.1.2 Detailed Visual Inspection

Based on the information gathered during the general coating conditions assessment, a detailed visual assessment will be performed on areas where the coating exhibits evidence of corrosion and areas with a higher potential for coating degradation. The detailed visual inspection will require high reach equipment (i.e., man lift, boom, and/or crane access) and will be conducted by a SSPC QP5 certified inspector. The equipment used to perform the detailed visual inspection will be subsequently used to perform the coating maintenance as required.

C1.1.3 Coating Maintenance

Based on the information gathered during the general coating conditions assessment, coating maintenance consisting of either spot maintenance, or spot maintenance and overcoating will be conducted as described in the LTMgmt and in accordance with SSPC standards. The same high reach equipment used to perform the detailed visual inspection will be used and will be performed by a contractor that possesses SSPC QP1 and QP2 certifications.

C1.1.(Sampling Program

A sediment monitoring program will be conducted on an annual basis to evaluate the effectiveness of the removal action during the LTMgmt period. To assess the potential release of PCBs from the site, a sediment sample would be collected annually from manhole SD-107 (immediately “downstream” from the hangar). If sample results exceed the trigger levels, then samples will be collected at: a) confirmatory sample at manhole SD-107, b) additional samples at the four quadrants of the perimeter trench, and c) additional samples at upstream manholes SD-116 and SD-442. Although lead is not a COC for the NTCRA, the sample will also be analyzed for lead and compared to the trigger level as detailed in the LTMgmt Plan (AMEC, 2013).

C1.2 Description of RACER

RACER cost models are based on generic engineering solutions for environmental projects, technologies, and processes. The engineering solutions were derived from historical project information, government laboratories, construction management agencies, vendors, contractors, and engineering analyses. The software used for estimating cost, RACER Version 10.3 (December 2009), incorporates the most up-to-date engineering practices and procedures to accurately reflect current removal/remediation processes and pricing. When an estimate is developed in RACER, generic engineering solutions are customized by adding site-specific parameters to reflect project-specific conditions and requirements. The tailored plan is then translated into specific work items, priced using the current cost data. RACER incorporates and summarizes costs by the code of accounts that was developed by the interagency Cost Estimating Group for Hazardous, Toxic, and Radiological Waste Remediation.

Estimates for professional labor support to the remedial action are included in the capital costs developed by RACER. This labor support is calculated based on the technology employed and includes construction oversight and preparation of work plans (e.g., health and safety, sampling, and quality control). Indirect cost estimates for the remedial action include items such as sales tax on purchased items, contractors’ overhead, contractors’ profits, bonds, and insurance costs. Engineering, another indirect cost item, varies for each alternative depending on the complexity of the remedial action.

The cost estimates presented herein have been developed in the detailed analysis of alternatives stage as summarized in the FFS Report. Cost estimates have a stated accuracy of +50 percent to -30 percent, consistent with EPA RI and FS technical guidance (EPA, 1988 and 2000). It is important to note that costs prepared at the FS stage of a project can increase or decrease during implementation, as the implementation becomes more complete and the cost estimates become more definitive. Such changes in costs are usually a result of scope changes that cannot be explicitly defined due to a lack of complete, accurate, and detailed information when the FS Report is prepared. A 20 percent contingency allowance has therefore been added all costs to cover increases that may occur as a result of scope-related uncertainties. The size of the contingency allowance would be expected to decrease as cost estimates are prepared during subsequent phases of design, after a remedial alternative has been selected and is proceeding toward implementation.

C1.3 Present Value

Present value is calculated using present worth analysis, a method of evaluating alternative remedial action solutions when expenditures occur over different time periods. The costs for the various remedial action alternatives can be compared on the basis of a single figure for each alternative by discounting all future costs to a common year. This single figure, the present value, represents the amount of money which, if invested in the initial year of a remedial action and disbursed as needed, would be sufficient to cover all the stated costs associated with that alternative.

The present worth of expenditures occurring over the life of a remedial action is determined using the formula:

$$PW = \sum_{t=1}^n \frac{x_t}{(1+i)^t}$$

Where:

<i>PW</i>	=	Present worth
<i>x_t</i>	=	Escalated expenditures for the remedial action in year <i>t</i> (the escalation rate is assumed to be zero [0] percent per year for the FS)
<i>i</i>	=	Annual interest or discount rate
<i>t</i>	=	Number of years in which each expenditure occurs following start of construction
<i>n</i>	=	Number of years following start of construction

The present value is calculated by adding the capital costs to the present worth of the annual expenditures and periodic costs priced as of December 2012 (including contingency allowances). Because the alternative may be completed at different times, the present value was calculated on the basis of a real discount rate of 1.1 percent per year for Alternative 2 (using real discount rates [adjusted for inflation] from Office of Management and Budget [OMB] Circular A-94) (OMB, 2013).

C1.4 General Assumptions

Assumptions that influence the cost of implementing the remedial alternative for Hangar 1 were based on general engineering practices and the requirements of RACER, when appropriate. The following general assumptions were used to develop cost estimates for the alternative in the FS Report.

- Total costs were calculated using a cost base of December 2012 US Dollars
- A single comprehensive Work Plan (including the Sampling and Analysis Plan [SAP], Accident Prevention Plan/Site Safety and Health Plan [APP/SSHP], Quality Control [QC] Plan) will be prepared for all phases of work in the Year One (coating assessment, coating maintenance, monitoring program). A Work Plan Addendum (with revised SAP, APP/SSHP, and QC Plan) will be prepared every 3 years.
- A Sediment Monitoring and IC Enforcement Report will be prepared on an annual basis.

-
- A Long Term Management Report, which includes the General Coating Assessment Report will be prepared every three years following each General Coating Condition Assessment.
 - Contingency allowances are 20 percent of capital costs, O&M costs, and periodic costs.

C2 Cost Estimates

This section describes the key components of the remedial alternative and site-specific assumptions and parameters used to estimate costs for Alternative 2. Cost estimating assumptions for the alternative are described in detail in Table C-1 at the end of this Appendix. The yearly costs and the present value for Alternative 2 are provided in detail in Tables C-2.

Sensitivity analyses were performed as part of the development of long term management cost estimates. Sensitivity analysis is a type of uncertainty analysis that assesses the impact of changing one or more input values. In the development of cost estimates for remedial alternatives, a sensitivity analysis was considered for factors that, based on engineering judgment, may have a relatively-high degree of uncertainty and that, with only a small change in their value, could significantly affect the overall cost of the alternative. This type of analysis was considered separate from a “cost growth” or “cost risk” analysis used to determine the amount of contingency to apply to the cost estimate.

Factors considered in the cost sensitivity analyses for the remedial alternatives included:

- **Nature and Extent of Contamination.** Estimated volumes of contaminated media or material and degree of contamination (i.e., concentrations) are dependent on assumptions about site conditions.
- **Remedy Failure/Effective Life of Technology.** The potential failure of a remedy or components thereof would require substantial additional costs for replacement of the remedy or its components. This factor is particularly relevant for technologies or processes whose effectiveness is less certain, or that are unproven and lack sufficient performance history.
- **Project Duration.** The time required for a remedial action, or components thereof, to achieve remedial action objectives can be a major factor, particularly for those actions requiring many years of long term management.
- **Discount Rate.** Although the real discount rates found in OMB Circular A-94 dated January 2013 (OMB, 2013), which are also used in the President’s annual budget submission to Congress and are based on interest rates from Treasury notes and bonds, were used to compare alternatives, for cost estimates that have large future year expenditures, the real discount rates could be uncertain with regard to future economic conditions.

The sensitivity analyses were used as part of the basis for development of alternatives, and to predict time for each alternative to achieve proposed remedial action objectives (RAO). The durations of alternatives stated in the FFS Report rely on cost estimating assumptions. If the cost estimating assumptions change, the estimated costs of alternatives will change. However, the cost estimates presented herein are considered appropriate for FS purposes, consistent with the expected accuracy (EPA, 1988 and 2000). During implementation of the selected alternative, sampling may be conducted to assess the effectiveness of the remedial action

C2.1 Alternative 2 – Implementation of Institutional Controls

Institutional controls (ICs) are non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for exposure to contamination and/or protect the integrity of a response action. ICs typically are designed to work by providing information that guides human behavior at a site or by limiting land and/or resource use. ICs may also include educational media to inform the public of the hazards associated with a particular site. This media may be in the form of fact sheets and notices distributed to the public, formal educational seminars, and press releases.

This alternative would include implementation actions necessary to achieve the remedial objectives at Hangar 1 by maintaining the protectiveness of the NCTRA. An epoxy coating inspection and maintenance program would be developed and implemented to prevent deterioration of the CM15 epoxy coating that provides encapsulation of the underlying PCB-contaminated paint at Hangar 1. The CM15 coating would be inspected and maintained as part of the long term management program.

Alternative 2 consists of the following components, described in detail in Section 5.3 in the body of the FFS Report:

- Long term management and coating maintenance
- Sediment sampling
- Five-year reviews and reporting

The assumed duration of this alternative for cost estimating purposes is 30 years. However, ICs may be required in perpetuity unless the U.S. Department of the Navy and regulatory agencies agree that the site no longer presents an unacceptable risk to human health or the environment. Cost estimating assumptions for this alternative are described in detail in Table C-1. The remedial action cost estimate for Alternative 2 is presented in Table C-3.

The primary cost uncertainty associated with Alternative 2 is the time to meet the RAOs. If long term management may be required in perpetuity, it could affect the predicted duration of this alternative.

C3 References

AMEC. 2013. *Draft 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*. February.

Office of Management and Budget. 2013. *Discount Rates For Cost-Effectiveness, Lease Purchase, and Related Analyses*. Revised December 2012.

United States Environmental Protection Agency (EPA). 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. OSWER Directive 9355.0-75. Washington, DC. July.

United States Environmental Protection Agency (EPA). 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*. OSWER Directive 9355.1. EPA/540/G-89/004. Interim Final. October.

This page intentionally left blank.

TABLES

This page intentionally left blank.

TABLE C-1
Cost Estimate Assumptions
Focused Feasibility Study Report, IR Site 29 (Hangar 1)
Former NAS Moffett Field, Moffett Field, California

ACTIVITY	COMPONENTS	ASSUMPTIONS
Alternative 1 - No Action		
None	None	None
Alternative 2 - Implementation of Institutional Controls		
Institutional Controls (ICs)	IC Remedial Design ICs enforcing and reporting	<ul style="list-style-type: none"> • 2 Days of Field Work
Documentation	Work Plan (includes SAP, APP/SSHIP), and Work Plan Addendum. Long Term Management Reports Storm Water Sediment Monitoring Reports 5-Year Reviews	<ul style="list-style-type: none"> • Work Plan/Work Plan Addendum, Long Term Management Reports and Storm Water Sediment Monitoring Reports to be submitted to regulators • Long Term Management Reports (every 3 years, 10 reports total) • Storm Water Monitoring Reports (annually, 30 reports total)
General Coating Condition Assessment	Coating inspector (SSPC QP5 certified) Quality Control Manager SSHO/Site Superintendent	<ul style="list-style-type: none"> • 2 Days of Field Work • Every 3 years • Includes a General Coating Conditions Report
Field Management Team (Coating Maintenance)	QP5 Inspector Site Superintendent SSHO	<ul style="list-style-type: none"> • Present during Detailed Visual Assessment, Surface Preparation • Coating Maintenance and final inspection activities (full time)
Detailed Visual Inspection	Interior Detailed Visual Inspection by QP1 & QP2 Certified Contractor: <ul style="list-style-type: none"> • 80-foot snorkel lift and crew for lower inspections • 135-foot snorkel lift and crew for mid-level inspections • 235-foot truck mounted boom lift and crew for upper-level inspections 	<ul style="list-style-type: none"> • Concurrent with exterior Detailed Visual Inspection
	Exterior Detailed Visual Inspection by QP1 & QP2 Certified Contractor: <ul style="list-style-type: none"> • 80-foot snorkel lift and crew for lower inspections • 135-foot snorkel lift and crew for mid-level inspections • 300-foot crane with manbasket for upper-level inspections 	<ul style="list-style-type: none"> • Concurrent with interior Detailed Visual Inspection

Surface Preparation	<p>Interior Surface Preparation by QP1 & QP2 Certified Contractor:</p> <ul style="list-style-type: none"> • 80-foot snorkel lift and crew for lower Surface Preparation • 135-foot snorkel lift and crew for mid-level Surface Preparation • 235-foot truck mounted boom lift and crew for upper-level Surface Preparation 	<ul style="list-style-type: none"> • Concurrent with exterior Surface Preparation • 2% (40,000 square feet) Surface Preparation years 3, 6, 9 • 10% (200,000 square feet) Surface Preparation year 12 • Residing of hangar before year 12 • Less than 1% Surface Preparation years 15, 18, 21, 24, 27, 30 • Only 135-foot snorkel lift and 235-foot boom truck to be used after year 12 • To be performed during summer months to prevent wastewater generation • Includes Surface Preparation equipment (pressure washers, scrubbers)
	<p>Exterior Surface Preparation by QP1 & QP2 Certified Contractor</p> <ul style="list-style-type: none"> • 80-foot snorkel lift and crew for lower Surface Preparation • 135-foot snorkel lift and crew for mid-level Surface Preparation • 300-foot crane with manbasket for upper-level Surface Preparation 	<ul style="list-style-type: none"> • Concurrent with interior Surface Preparation until year 12 • 2% (40,000 square feet) Surface Preparation years 3, 6, 9 • 10% (200,000 square feet) Surface Preparation year 12 • Residing of hangar before year 12 • No exterior Surface Preparation will be conducted following residing
Coating Maintenance	<p>Interior Coating Maintenance by QP1 & QP2 Certified Contractor:</p> <ul style="list-style-type: none"> • 80-foot snorkel lift and crew for lower inspections • 135-foot snorkel lift and crew for mid-level inspections • 235-foot truck mounted boom lift and crew for upper-level inspections • Final inspection of the coating will be conducted concurrently 	<ul style="list-style-type: none"> • Concurrent with exterior Surface Preparation • 2% (40,000 square feet) Surface Preparation years 3, 6, 9 • 10% (200,000 square feet) Surface Prep year 12 • Residing of hangar before year 12 • Less than 1% Surface Preparation years 15, 18, 21, 24, 27, 30 • Only 135-foot snorkel lift and 235-foot boom truck to be used after year 12 • Includes materials (Carbomastic 15) and coating equipment • Includes debris collection, characterization and disposal

<p>Coating Maintenance, Cont'd</p>	<p>Exterior Coating Maintenance by QP1 & QP2 Certified Contractor</p> <ul style="list-style-type: none"> • 80-foot snorkel lift and crew for lower inspections • 135-foot snorkel lift and crew for mid-level inspections • 300-foot crane with manbasket for upper-level inspections <p>Final inspection of the coating will be conducted concurrently</p>	<ul style="list-style-type: none"> • Concurrent with interior Surface Preparation until year 12 • 2% (40,000 square feet) Surface Preparation years 3, 6, 9 • 10% (200,000 square feet) Surface Preparation year 12 • Residing of hangar before year 12 • No exterior Surface Preparation will be conducted following residing • Includes materials (Carbomastic 15) and coating equipment • Includes debris collection, characterization and disposal
<p>Monitoring Program</p>	<p>Sample collection:</p> <ul style="list-style-type: none"> • a total of 9 storm water sediment samples will be collected to account for initial and resampling of downstream manhole, perimeter sampling, two upstream locations, and a QC sample) • Sample analysis for sediment for PCBs (EPA 35250b/8082) and Lead (EPA 6020) • Data Validation and reporting • Sampling equipment 	<ul style="list-style-type: none"> • Samples to be collected on an annual basis per the Long Term Management Plan

Notes:

APP – Accident Prevention Plan

EPA – U.S. Environmental Protection Agency

IC – Institutional Control

IR – Installation Restoration

NAS – Naval Air Station

PCB – polychlorinated biphenyl

QP – qualified person

SSHO – Site Safety and Health Officer

SAP – Sampling and Analysis Plan

SSHP – Site Safety and Health Plan

This page intentionally left blank.

TABLE C-2
Cost Estimate Details for Alternative 2 - Implementation of Institutional Controls
Focused Feasibility Study Report, IR Site 29 (Hangar 1)
Former NAS Moffett Field, Moffett Field, California

Technology Name	Calendar Year 1	Calendar Year 2	Calendar Year 3	Calendar Year 4	Calendar Year 5	Calendar Year 6	Calendar Year 7	Calendar Year 8	Calendar Year 9	Calendar Year 10	Calendar Year 11	Calendar Year 12	Calendar Year 13	Calendar Year 14	Calendar Year 15	Calendar Year 16	Calendar Year 17	Calendar Year 18	Calendar Year 19	Calendar Year 20	Calendar Year 21	Calendar Year 22	Calendar Year 23	Calendar Year 24	Calendar Year 25	Calendar Year 26	Calendar Year 27	Calendar Year 28	Calendar Year 29	Calendar Year 30	Row Total
Institutional Controls (ICs)																															
ICs Remedial Design	\$68,743																														\$69,000
ICs enforcement and reporting	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$17,152	\$515,000
Documentation																															
Work Plan / Work Plan Addendum (includes SAP, APP/SSHP)	\$84,613		\$10,922			\$10,922			\$10,922			\$10,922			\$10,922			\$10,922			\$10,922			\$10,922			\$10,922			\$10,922	\$194,000
Long Term Management Reports			\$18,691			\$18,691			\$18,691			\$18,691			\$18,691			\$18,691			\$18,691			\$18,691			\$18,691			\$18,691	\$187,000
Storm Water Sediment Monitoring Reports	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$9,159	\$275,000
5-Year Reviews					\$20,469					\$20,469					\$20,469					\$20,469					\$20,469			\$20,469			\$123,000
Long Term Coating Maintenance																															
General Coating Condition Assessment			\$5,061			\$5,061			\$5,061			\$5,061			\$5,061			\$5,061			\$5,061			\$5,061			\$5,061			\$5,061	\$51,000
General Coating Condition Report			\$11,380			\$11,380			\$11,380			\$11,380			\$11,380			\$11,380			\$11,380			\$11,380			\$11,380			\$11,380	\$114,000
Field Management Team (Coating Maintenance)			\$51,576			\$51,576			\$51,576			\$116,045			\$18,051			\$18,051			\$18,051			\$18,051			\$18,051			\$18,051	\$379,000
Detailed Visual Assessment			\$98,787			\$98,787			\$98,787			\$98,787			\$13,346			\$13,346			\$13,346			\$13,346			\$13,346			\$13,346	\$475,000
Coating Maintenance																															
Interior/Exterior Surface Preparation			\$141,339			\$141,339			\$141,339			\$457,816			\$23,416			\$23,416			\$23,416			\$23,416			\$23,416			\$23,416	\$1,022,000
Interior/Exterior Spot Coating and Overcoating			\$275,813			\$275,813			\$275,813			\$728,533			\$34,349			\$34,349			\$34,349			\$34,349			\$34,349			\$34,349	\$1,762,000
Storm Water Sediment Monitoring																															
Sediment Sampling and Laboratory Analysis	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$13,490	\$405,000
Subtotal (With Markups)	\$193,157	\$39,801	\$653,370	\$39,801	\$60,270	\$653,370	\$39,801	\$39,801	\$653,370	\$60,270	\$39,801	\$1,487,036	\$39,801	\$39,801	\$195,487	\$39,801	\$39,801	\$175,018	\$39,801	\$60,270	\$175,018	\$39,801	\$39,801	\$175,018	\$60,270	\$39,801	\$175,018	\$39,801	\$39,801	\$195,487	\$5,571,000
Contingency (20 Percent)	\$38,631	\$7,960	\$130,674	\$7,960	\$12,054	\$130,674	\$7,960	\$7,960	\$130,674	\$12,054	\$7,960	\$297,407	\$7,960	\$7,960	\$39,097	\$7,960	\$7,960	\$35,004	\$7,960	\$12,054	\$35,004	\$7,960	\$7,960	\$35,004	\$12,054	\$7,960	\$35,004	\$7,960	\$7,960	\$39,097	\$1,114,000
Subtotal (With Contingency and Markups)	\$231,788	\$47,761	\$784,043	\$47,761	\$72,324	\$784,043	\$47,761	\$47,761	\$784,043	\$72,324	\$47,761	\$1,784,443	\$47,761	\$47,761	\$234,584	\$47,761	\$47,761	\$210,021	\$47,761	\$72,324	\$210,021	\$47,761	\$47,761	\$210,021	\$72,324	\$47,761	\$210,021	\$47,761	\$47,761	\$234,584	\$6,685,000
Escalation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Cost	\$231,788	\$47,761	\$784,043	\$47,761	\$72,324	\$784,043	\$47,761	\$47,761	\$784,043	\$72,324	\$47,761	\$1,784,443	\$47,761	\$47,761	\$234,584	\$47,761	\$47,761	\$210,021	\$47,761	\$72,324	\$210,021	\$47,761	\$47,761	\$210,021	\$72,324	\$47,761	\$210,021	\$47,761	\$47,761	\$234,584	\$6,685,000
NET PRESENT VALUE FACTOR ¹	1.000000	0.989120	0.978358	0.967713	0.957184	0.946769	0.936468	0.926279	0.916201	0.906232	0.896372	0.886620	0.876973	0.867431	0.857993	0.848658	0.839424	0.830291	0.821257	0.812322	0.803483	0.794741	0.786094	0.777541	0.769081	0.760713	0.752437	0.744250	0.736152	0.728143	
NET PRESENT VALUE	\$231,788	\$47,241	\$767,075	\$46,219	\$69,227	\$742,308	\$44,727	\$44,240	\$718,341	\$65,542	\$42,812	\$1,582,122	\$41,885	\$41,429	\$201,271	\$40,533	\$40,092	\$174,379	\$39,224	\$58,750	\$168,748	\$37,958	\$37,545	\$163,300	\$55,623	\$36,332	\$158,028	\$35,546	\$35,159	\$170,811	\$5,938,000

Notes:

- The net present value of future cash flows was calculated using a real discount rate of 1.1 percent per year. (adjusted for inflation) from Office of Management and Budget Circular A-94 Appendix C, revised January 2013.
 IR = Installation Restoration
 IC = Institutional Control
 NAS = Naval Air Station

Appendix D

Responses to Comments on Draft Focused Feasibility Study

This page intentionally left blank.

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: March 29, 2013

The following are responses to comments provided by Yvonne Fong, USEPA

#	Reference	USEPA Comment	Response
General Comments			
1	General	<p>Responsibility for Implementation of Institutional Controls: The FFS generally describes what possible institutional controls (ICs) might be necessary at Hangar 1. As with the Long Term Management (LTMgmt) Plan for Hangar 1, the FFS notes that the “site Owner or Operating Agency (Owner/Operator), which is currently NASA” would be responsible for implementing, inspecting, maintaining, reporting, and enforcing ICs. These long term responsibilities continue to be negotiated between the Navy and NASA and as indicated by a February 28, 2013 letter from NASA’s Deputy Director of Center Operations, James Alwyn, agreement has not been reached on this issue. Until there is a formal transfer of responsibility for these activities or EPA has an enforceable agreement with NASA, EPA will continue to work with the Navy to ensure the protectiveness provided by the Hangar 1 removal action.</p>	<p>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.</p>
2	General	<p>Objectives and Scope of ICs: Section 4.2 of the FFS indicates that, for Alternative 2, the “specific remedial objectives would be identified in the ROD and details of the ICs would be developed in the implementation stage.” Possible ICs that may be necessary are included in a bulleted list and seem to encompass many of the measures that might be necessary. While the exact ICs</p>	<p>Concur, the Record of Decision (ROD) will include the ICs outlined in EPA’s concurrence on the Action Memorandum dated May 11, 2009. The inclusion of these ICs within the ROD is to solely control future activities by the property owner and tenants. The only known contamination underneath Hangar 1 is associated with the regional groundwater plume and there is no indication that Hangar 1 has impacted groundwater. As part of the NTCRA the surface of</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: March 29, 2013

The following are responses to comments provided by Yvonne Fong, USEPA

#	Reference	USEPA Comment	Response
		<p>for Hangar 1 do not need to be specified in the FFS, EPA urges the Navy to consider ICs that fully encompass the issues identified in EPA's May 11, 2009 concurrence letter for the Hangar 1 NTCRA Action Memorandum. EPA expressed concerns that ICs may be necessary for 1) ensuring future users are not impacted by potential contamination beneath the Hangar; 2) ensuring appropriate sampling and disposal protocols related to future disposal of the concrete pad and 3) land use controls limiting future use.</p>	<p>the concrete slab was remediated and no further action by the Navy is required. NASA, as the property owner will be responsible for implementing ICs and land use controls (LUCs) for future use of Hangar 1, as well as developing a Rehabilitation Work Plan, which would likely include a waste management plan for disposal of any materials.</p>
3	General	<p>Sediment and Stormwater Sampling: Alternative 2 presented in the FFS includes a long-term sampling program which involves regular monitoring of stormwater from five locations surrounding the Hangar and of sediment from one manhole. The Navy and the agencies have had several discussions over the nature of an appropriate long-term monitoring program. As Hangar was a source of contaminants in downstream sediments at the Navy's Site 25, a sampling program focusing on impacts to sediments is appropriate. EPA understands that the San Francisco Bay Regional Water Quality Control Board (Water Board) will be issuing comments on the LTMgmt Plan and FFS in the near future with suggestions for the Hangar 1 sampling program. EPA and the Water Board have discussed the nature of the Water Board's recommended sampling program, focusing on sediments only and including analysis for lead. EPA concurs with the Water Board's</p>	<p>Concur, the proposed sampling program and cost estimate was revised as follows:</p> <ul style="list-style-type: none"> • To revise the sampling strategy to be consistent with the Draft Final Long Term Management (LTMgmt) Plan. • To add lead into the sampling program per comments made by the San Francisco Bay Regional Water Quality Control Board (Water Board) to the LTMgmt Plan. • To include the cost associated with changing the LTMgmt reporting requirement from every three years, to an annual requirement.

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: March 29, 2013

The following are responses to comments provided by Yvonne Fong, USEPA

#	Reference	USEPA Comment	Response
		suggested approach to long-term monitoring.	
4	Specific	Section 2.3, Condition of Site at Completion of Removal Action, page 2-2: The FFS includes information on the condition of the Hangar. The LTMgmt Plan includes some helpful photos of the Hangar that provide additional detail. Please include the photos in the FFS or provide a reference to the LTMgmt Plan.	Concur, the text in Section 2.3 was revised as follows: For additional details on the condition of the Hangar 1, please see Figure 4 – Representative Photos of Epoxy-Coated Structures, in the Long Term Management Plan (LTMgmt Plan) (AMEC, 2013).
5	Specific	Section 4.2, Alternative 2 – Implementation of Institutional Controls, Conclusion, page 4-3: Alternative 2 is considered to be a “viable remedy to reduce risk to site workers.” While administrative ICs are generally considered ineffective at addressing potential ecological risks, coating maintenance and monitoring activities could minimize or prevent ecological risks. Please revise the FFS to discuss the impact of these types of ICs on ecological risk.	Effectiveness of the ICs to protect human health and the environment is co-dependent on the inspection and maintenance program of the CM15 epoxy coating at Hangar 1. This process is described in Section 3.0 Identification of Remedial Action Objectives. Alternative 2 is summarized in Section 5.3.2.1 Overall Protection of Human Health and the Environment. In response to specific comment 5, Section 4.2, Alternative 2 – Implementation of Institutional Controls, Conclusion, page 4-3 has been revised to read: Conclusion. This alternative is retained for detailed analysis in Section 5. It is considered a viable remedy to reduce risk to site workers and ecological receptors . It would meet RAOs, but would not remove all COCs at Hangar 1.
6	Specific	Sections 5.3.2.1 and 5.3.3.1, Overall Protection of Human Health and the Environment and Long-Term Effectiveness and Permanence, pages 5-6 and 5-7: These sections discuss overall protectiveness and long-	Concur, Sections 5.3.2.1, 5.3.3.1, 6.1 and 6.3 have been revised to discuss the aspects of the sampling program (i.e. collection of upstream/ downstream and perimeter trench samples) and how they relate to overall protectiveness and long-term effectiveness of the

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: March 29, 2013

The following are responses to comments provided by Yvonne Fong, USEPA

#	Reference	USEPA Comment	Response
		term effectiveness of the epoxy coating and the coating's maintenance program; however, they do not include a discussion of these aspects of the sampling program. Revise the FFS to include a discussion of these aspects of the sampling program. Also address these in Sections 6.1 and 6.3 of the FFS.	epoxy coating and the coating's maintenance program.
7	Specific	Section 5.3.3.3 and Appendix B2.2.2, Short-Term Effectiveness and Alternative 2 Additional GSR Metrics, pages 5-7 and B2-2: These sections indicate that Alternative 2 would result in consumption of non-hazardous waste landfill space of approximately 23 metric tons. It is not clear based on the information presented in the FFS what the sources of non-hazardous wastes are. Please include a discussion of what non-hazardous waste would be generated through the implementation of Alternative 2.	Alternative 2 would include the creation of approximately 23 tons of hazardous landfill waste consisting of debris generated and collected during the surface preparation of the CM15 during coating maintenance activities. Section 5.3.3.3 was revised as there was a discrepancy since the waste would be <u>hazardous</u> , not non-hazardous. Section 5.3.3.3 Short-Term Effectiveness and the last sentence in Appendix B Section B2.2.2, Alternative 2 Additional GSR Metrics were revised to clarify the hazardous waste being generated consists of debris generated and collected for surface preparation of the CM15 during coating maintenance activities.
8	Specific	Figure 1: The figure is an aerial photograph of the Hangar prior to implementation of the removal action. Revise the figure to show the current condition of the Hangar.	Figure 1 has been revised to show the most current Hangar 1 aerial photograph available on Google Earth.

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: March 29, 2013

The following are responses to comments provided by Yvonne Fong, USEPA

#	Reference	USEPA Comment	Response
9	Specific	<p>Appendix C Tables, Table C-1, Cost Estimate Assumptions: In Row 2 of the Table, the “Documentation” activity includes a total of 10 Long Term Management Reports, one every three years. The assumptions do not appear to include costs associated with other reports. According to Section 7.0 of the LTMgmt Plan, a summary report will be prepared “at the completion of each LTMgmt program event,” including inspections, repairs, and monitoring. As the monitoring program is an annual program, the assumptions should include the costs associated with summary reports for the annual monitoring events. Please revise the cost assumptions and cost estimate for Alternative 2.</p>	<p>Concur, the cost assumptions for alternative 2 and documentation has been revised to include annual Storm Water Sediment Monitoring Reports.</p>
10	Minor	<p>Section 4.0, Development and Screening of Remedial Alternatives, page 4-1: This section starts with the phrase “In light of the limited area impacted.” It is unclear what is meant by this phrase and it should be revised. Generally, a reader could interpret “area” to mean a geographical or spatial area which in the context of the Hangar would not be considered “limited.”</p>	<p>Concur, Section 4.0. First sentence was revised to the following: Based on the type of area impacted, this FFS does not present a screening of technologies, but rather presents proposed alternatives that were assembled based on engineering judgment and experience at this site and other similar sites.</p>
11	Minor	<p>Section 5.3.1.3, Five Year Reviews and Reporting, page 5-6: The first sentence indicates that annual compliance reports will be prepared. Please indicate the party responsible for preparing these reports for submission.</p>	<p>Section 5.3.1.3 has been revised as follows: The annual Storm Water Sediment Monitoring Reports will be prepared by the entity responsible for implementing the LTMgmt Plan at Hangar 1 as part of this alternative.</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: March 29, 2013

The following are responses to comments provided by Yvonne Fong, USEPA

#	Reference	USEPA Comment	Response
12	Minor	Section 5.3.2.1, Overall Protection of Human Health and the Environment, page 5-6: There is a typographical error in the first sentence. "Environmental" should be changed to "environment."	Section 5.3.2.1. First sentence. The word "Environmental" was replaced by "environment."

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: April 9, 2013

The following are responses to comments provided by Elizabeth K. Wells, Water Board

#	Reference	Water Board Comment	Response
General Comments			
1	General	<p>Preventing unacceptable exposure to lead (by limiting dermal contact, inhalation of dust particles, and incidental ingestion) by humans and ecological receptors should be included as a remedial action objective. It is the Navy's responsibility to reduce the risk of exposure to chemicals remaining in place. Lead, in addition to polychlorinated biphenyls (PCBs), is present at elevated concentrations in the paint that was over coated during the non-time critical removal action. Therefore, both lead and PCBs pose a potential risk to receptors and should be addressed in the feasibility study.</p>	<p>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.</p> <p>It should be noted that, as detailed in the <i>After Action Completion Report</i> (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.</p> <p>The <i>Long-Term Management (LTMgmt) Plan for NTCRA PCB Contamination</i> (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</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: April 9, 2013

The following are responses to comments provided by Elizabeth K. Wells, Water Board

#	Reference	Water Board Comment	Response
			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 <i>NASA Ames Health and Safety Manual, Chapter 35, Lead Management Plan</i> .
2	General	Modify the proposed sampling program included in Alternative 2 as suggested in the Regional Water Board's comments on the Draft Final Long Term Management Plan. ¹	Concur, the proposed sampling program and cost estimate have been revised per comments made by the San Francisco Bay Regional Water Quality Control Board (Water Board) to the Draft Final Long Term Management Plan (LTMgmt).
3	General	Review the attached state ARARs to confirm that those evaluated and included in the Draft FFS (Appendix A) are current. The Navy uses information from 2004 in its ARARs evaluation. In addition, confirm with the California Department of Fish and Wildlife that the ARARs included in the Draft FFS are current.	<p>The Navy has confirmed that the applicable relevant and appropriate requirements (ARARs) included in the Draft FFS are current with the ARARs provided by the Water Board, and with the California Department of Fish and Wildlife (CDFW).</p> <p>Note that groundwater, surface water, soil, sediment, and air are not being addressed by this remedial action. However, sampling and analysis of surface water runoff and sediments were included for Alternative 2 so ARARs for PCBs in surface water were evaluated for the Draft FFS version. Based on comments from the Water Board on the LTMgmt, only sediments will be sampled as part of the sampling program, therefore FFS Appendix A (ARARs) were revised to exclude surface water ARAR.</p>

¹ San Francisco Bay Regional Water Quality Control Board, 2013, Review of Draft 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, Santa Clara County, April 8.

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
General Comments			
1	General	<p>Non-Time Critical Removal Action (NTCRA) Not Complete. The Navy's NTCRA of removing the siding and then power washing and coating the Hangar frame is a short-term action until a longer term Remedial Action is selected by the Navy and EPA. Until the coating has been proven to be functioning properly and operating as designed, Navy cannot verify that the risk to human health and the environment has been reduced to required limits. The coating has yet to be exposed to the varying environmental conditions known to occur in the South San Francisco Bay area and to the structural stresses known to be inherent in the Hangar's design. NASA believes that although the Navy has applied an epoxy coating as an NTCRA, the Navy has not demonstrated, and will not be able to demonstrate that the coating is operating as designed for at least the period of the warranties if not for at least the first 30 years of exposure (six five-year review cycles) or longer. NASA, therefore, does not agree that the Removal Action has been completed or that the Remedial Action should be defined as the NTCRA plus Institutional Controls (see comments below).</p>	<p>The NTCRA is complete because the primary source of contamination (the Robertson Protected Metal corrugated siding) has been removed and properly disposed of in accordance with the selected removal action alternative. In addition, the structural steel surfaces that were identified as potential sources of residual contamination have been coated and inspected by National Association of Corrosion Engineers (NACE)-certified inspectors and Society for Protective Coatings (SSPC) qualified personnel.</p> <p>The NTCRA alternatives were carefully considered and evaluated with coordination and involvement from NASA, state and federal agencies and the community. This has been documented in the Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum, which is a CERCLA decision document. As detailed in the EE/CA, sampling of building materials was completed for Hangar 1 and the analytical data clearly demonstrates that the primary source of contamination originated in the corrugated siding and to a lesser degree the building materials (roofing sealant, interior buildings, etc.). As previously stated, all of these materials were removed and properly disposed of as part of the NTCRA. The only residual contamination is fixed within the matrix of interior paint on the structural steel and a few concrete surfaces that remain at Hangar 1. These areas have been encapsulated using Carbomastic 15 (CM15), which is the proven industry standard for this type of application. Although CM15 is a weather resistant epoxy coating, the longevity and protectiveness of the NTCRA would be enhanced</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
			<p>if NASA promptly resides the hangar for reuse.</p> <p>As with all buildings at Moffett Field, the facility owner/operator is responsible for routine maintenance of buildings, which includes maintaining coated surfaces. With the implementation of institutional controls (ICs), which includes compliance with the <i>Long-Term Management (LTMgmt) Plan for NTCRA PCB Contamination at IR Site 29</i>, as the final remedial action, the CM15 coating should provide long term protectiveness of human health and the environment.</p>
2	General	<p>Inadequate Public Involvement: The Navy, by creating only two alternatives in the Focused Feasibility Study of No Action and Alternative 2 (exclusively Institutional Controls), appears to have misidentified the short-term Removal Action as the longer-term Remedial Action, but fails to make this assumption explicit. This omission is misleading. By not being explicit, the Navy has failed to provide fair notice that will allow meaningful interagency and public comment. The Navy must make the function of the Removal Action as a critical part of the Remedial Action explicit.</p>	<p>The public has been well informed and the Navy has received active public participation throughout the IR Site 29 (Hangar 1) CERCLA process. The CERCLA framework allows for removal actions selected in an Action Memorandum to act as a final remedial action. In such cases, the removal action is the basis for a determination of "Response Complete" (RC) upon the distribution of the final After Action Completion Report. If the removal action achieves RC but requires LTMgmt, the LTMgmt requirements should be documented in a Record of Decision (ROD).</p> <p>Since residual contamination remains on interior structural steel paint and a few concrete surfaces, requirements for appropriate long-term management of the epoxy coating will need to be implemented through ICs. Because ICs were not evaluated in the EE/CA or Action Memorandum for the NTCRA, these controls are being analyzed in a focused Feasibility Study, which will ultimately lead to a Proposed Plan and documentation in a ROD.</p> <p>The function of the FFS as related to the NTCRA is indeed explicitly</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
			<p>stated in draft FFS itself:</p> <p>“This Focused Feasibility Study (FFS) is follow-up documentation to a Non-Time Critical Removal Action (NCTRA) that was performed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at Installation Restoration (IR) Site 29 (Hangar 1), located at the former Naval Air Station (NAS) Moffett Field near Mountain View, California. Because polychlorinated biphenyls (PCBs) and lead will remain in place within the hangar structure at Site 29, it is necessary to implement land use controls (LUCs) to ensure the protectiveness of the NTCRA. This FFS is an evaluation of LUC options to support site closure by ensuring the protectiveness of the NTCRA. This FFS Report follows the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) for facilities subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), related United States Environmental Protection Agency (USEPA) technical guidance, and the Navy Environmental Restoration Program Manual (Navy, 2006).” (Draft FFS, Section 1.1).</p>
3	General	<p>Lack of Remedial Action and Associated "Shakedown". Since no Remedial Action (the longer-term Response Action) has been selected, the requisite "shakedown" of the Remedial Action has not occurred. The National Contingency Plan, 40 CFR 300.435(f)(2), states " A remedy becomes 'operational and functional ' either one year after construction is complete, or when the remedy is determined concurrently by EPA and the State to be</p>	<p>The cited NCP regulation is implementation guidance for Superfund-financed cleanups, and is not germane to the Navy's CERCLA authority. The formalities established by the NCP for distinguishing between "remediation" and "Operation and Maintenance" are important for Fund-financed cleanups because USEPA is generally not allowed to use the Fund for conducting O&M, and States are generally responsible for O&M for Fund-financed cleanups. The concept of "shakedown" and requirement</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
		functioning properly and is performing as designed, whichever is earlier. EPA may grant extensions to the one-year period, as appropriate." The Fact Sheet goes on to state: "This period is often referred to as "shakedown," when the construction contractor makes minor adjustments as necessary to ensure the remedy is operating as designed."	for a formal "operational and functional" determination applies to Fund-financed cleanups because the O&F determination dictates when USEPA turns over a remedy to a State for O&M. The Hangar 1 cleanup project is a PRP-lead and PRP funded cleanup, and 40 CFR 300.435(f)(2) is not germane to NASA's assumption of O&M responsibilities.
4	General	No Five-Year Review: Further, even in the case of a long-term Remedial Action, where a Remedial Action is defined as involving the actual construction or implementation of a cleanup, if a hazardous substance will remain at the site, a review of the Remedial Action is required five (5) years after implementation of the remedy. This review evaluates the protectiveness of the Remedial Action and, for long-term Remedial Actions, the effectiveness of the technology and specific performance levels. It is irresponsible for the Navy under its proposed Alternative 2, to rely strictly on Institutional Controls to be carried out by the landowner (in this case NASA) or a NASA tenant to determine whether the Navy's Remedial Action implemented by the Navy's subcontractor is protective.	<p>For remedies that include implementation of ICs, the "trigger" date for five-year reviews is the ROD signature date, which is currently planned for distribution in April 2014.</p> <p>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.</p> <p>The entity responsible for the implementation of ICs, which includes the LTMgmt Plan for NTCRA PCB Contamination at IR Site 29, will also be responsible for completing five-year reviews.</p>
5	General	Warranty Periods Have Not Run: According to the sample warranties included in the draft Long-Term	The warranty was provided by the manufacturer in the unlikely event of a defect in the product (CM15). As with any coated surface

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
		<p>Management Plan, the warranty periods are for 12 years, and have yet to run. The very existence of the warranties suggests that there is a risk of failure of the NTCRA. Moreover, within the warranty period, only two (2) five-year reviews would have been submitted which would not be sufficient to determine whether the coating is working to remediate the risk to human health and the environment from the residual PCBs and lead, or a different removal action, such as wet sandblasting, is required. The Navy should remain responsible for the inspecting and maintaining the coating, conducting sediment and storm water sampling, and preparing and submitting five-year reports during the warranty periods. Where the Navy has noticed that the coating has been misapplied (is chipping and flaking), the Navy coating contractor has reapplied the coating. There is no certainty that all of the three (3) trillion square inches of coating on the 1 0-story, 3-football field-long Hangar were properly applied and will not chip or flake within the warranty period. If there was certainty, the warranties would not be needed.</p>	<p>on any building, structure, or installation, these surfaces must be inspected and touched-up, as necessary. Although CM15 is a weather resistant epoxy coating, the longevity and protectiveness of the NTCRA would be enhanced if NASA promptly resides the hangar for reuse. See also RTCs #1 through #4 above.</p>
6	General	<p>Lack of Enforceability of Warranties: NASA does not have the authority to enforce the Navy's contract upon the coating subcontractor to enforce the warranties. This should be the Navy's job since it is the Navy's contract and subcontract. NASA would not have the ability to</p>	<p>The warranty was provided by the manufacturer in the unlikely event of a defect in the product (CM15). The warranty is issued to the United States Federal Government.</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
		<p>require the Navy's coating subcontractor to return and fix or replace the coating if NASA accepted responsibility for inspection and maintenance of the coating and sampling of the storm water and sediment (other than that normally conducted by NASA to maintain its storm water permit) and the Removal Action failed during the warranty periods. The Navy would likely deny responsibility for the failure of the Removal/Remedial Action. This would put NASA and EPA in an untenable position when it is the Navy that should be responsible for either fixing the coating or substituting a different Removal/Remedial Action. NASA, thus, is not willing during the period of the warranties to accept responsibility for inspection and maintenance of the coating, storm water sampling, and annual and 5-year reviews as identified in Alternative 2 of the Focused Feasibility Study (FFS). The Navy should remain responsible for these actions.</p>	
7	General	<p>NTCRA Covers Up But Does Not Remove Contamination, Exposure Risk, and Liability. The Navy in the draft FFS has not fairly explained to the public that the residual contamination will likely need to be removed to attract prospective users who would use the Hangar. The proposed reuse has been identified as a covered structure consistent with the Hangar 1 Reuse Guidelines prepared under the NASA Ames Development Plan (NADP) Programmatic</p>	<p>As detailed in RTC #1, the primary source of contamination was removed and properly disposed of as part of the NTCRA. With implementation of ICs, the residual contamination will not require removal; rather it will require maintenance, as described in the LTMgmt Plan. Beyond the above details and LTMgmt Plan for Hangar 1, the procedures for dealing with lead-based paint surfaces as described in the <i>NASA Ames Health and Safety Manual, Chapter 35, Lead Management Plan</i> would apply. As with any similar project, generated waste would need to be stored, transported and disposed</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
		<p>Environmental Impact Statement (PEIS) and Record of Decision (ROD) for compliance with the National Historic Preservation Act (NHP A) Programmatic Agreement among NASA, the Advisory Council on Historic Preservation, and the California Historic Preservation Officer, to mitigate adverse effects to historic properties. If a prospective user wishes to reside the Hangar, they or their contractors and future occupants and guests will be at risk for exposure to the residual PCBs and lead paint due to disturbance of the coating. Further, in disturbing the coating, the prospective user will likely generate hazardous waste that will need to be disposed of in a Class 1 landfill, for which there would be significant cost and continuing liability. The Navy should in its revisions to the draft FFS and Long-Term Management Plan clarify these implications. The Navy should retain responsibility for the increased exposure associated with having only conducted a NTCRA rather than a conventional Remedial Action, for conducting a subsequent Remedial Action, and for the liability associated with the eventual disposal of the residual PCBs and lead paint.</p>	<p>of in accordance with all applicable regulations.</p>
8	General	<p>If NASA, a transferee, or a prospective user proposes a change in use of the Hangar (and the Navy, EPA, and the Water Board have received notice), the NTCRA may no longer be effective for the proposed new use. In either instance, the continuing responsibility to conduct</p>	<p>The Navy considered future reuse when selecting the removal action alternative. As detailed in RTC #1, the primary source of contamination was carefully removed and properly disposed of and a reliable coating was applied to the residual contamination remaining on the structure. As stated in NASA's May 26, 2009 letter,</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
		<p>an effective NTCRA for the new use should be the Navy' s, not NASA's, the transferee's or the prospective user' s.</p>	<p>it is understood that NASA will assume responsibility for the operations and maintenance of remaining Moffett Field remediation sites. If NASA, a transferee, or a prospective user proposes a change in the use of the hangar, it will be the responsibility of the facility owner to ensure that the land use change is in accordance with the ICs and to make any necessary revisions to the LTMgmt Plan to ensure the continued protectiveness of the CERCLA response actions or take any additional response actions necessary for a change in use.</p>
9	General	<p>NASA will agree to implement the following institutional Controls. These controls are limited to the following items, which are actions that only the property owner may take and are currently under NASA's sole control.</p> <ul style="list-style-type: none"> • Installation and maintenance of perimeter signs and/or notification of potential exposure hazards. If the Navy requests specialized fencing and signage for the Hangar itself, NASA requests that the Navy enter into a Interagency Agreement with NASA to reimburse NASA for the additional cost. • Providing access to the Navy and/or its contractor for inspection and maintenance of the CM15 epoxy. • Providing access to the Navy and/or its contractor for storm water and sediment sampling to ensure that the coating remains effective. • Coordinating regulatory (Navy, EPA and the Water 	<p>Please see RTC #4. The Navy is pleased that NASA agrees to implement ICs. However, implementation of ICs includes the LTMgmt Plan for NTCRA PCB Contamination at IR Site 29.</p>

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
		<p>Board) review and approval of any building modifications that might damage the remedy components.</p> <ul style="list-style-type: none"> • Providing commitments or, where GSA has the sole authority, asking GSA to provide commitments to incorporate appropriate proprietary restrictions necessary for long-term management and coating maintenance in any property transfer and/or lease agreements. • Conducting other actions that may be necessary to ensure that redevelopment of the property does not impact the remedy. Examples include providing information to inform the building permit process, environmental review process, updates to the reuse guidelines, Master Plan 5-year update process, and well permit application process. <p>Institutional Controls do not include the following activities that are considered monitoring and/or maintenance items and, as such, are not institutional controls and not the responsibility of the Property Owner/tenant.</p> <ul style="list-style-type: none"> • Inspection and maintenance of the CM15 epoxy coating. • Sampling storm water and sediment to ensure that the coating remains effective. 	

Response to Comments
Draft Focused Feasibility Study for Installation Restoration (IR) Site 29 (Hangar 1)
Former Naval Air Station (NAS) Moffett Field, Moffett Field CA

Report Dated: January 2013

Comments Dated: February 28, 2013

The following are responses to comments provided by James D. Alwyn, NASA

#	Reference	NASA Comment	Response
		<ul style="list-style-type: none"> • Five-year reviews, which are the responsibility of the Navy at this time in accordance with its FF A with the EPA 	
10	General	<p>Risk to Site 25 and AOI 14 Remains: Until the NTCRA and the subsequent longer-term Remedial Action are demonstrated over time to be functioning properly and operating as designed (see comments above), the risk of re-contaminating Navy Site 25 and NASA Area of investigation 14 (Peninsula Soils) remains. Further, the land on which AOI 14 is situated was acquired by United States for the Navy in 1959 and the Navy transferred the land to NASA in 1965. Since no determination has been made as to when contamination from the Hangar began to enter the area, thus, it is possible that the Site 25 contamination from the Hangar exists under NASA AOI 14. The Navy should remain responsible for Site 25 contamination as well and investigate potential contamination from the Hangar under AOI 14.</p>	<p>NASA is responsible for and manages the storm water conveyance system and storm water settling basin (SWSB) at Moffett Field. The Navy has completed the NTCRA at Hangar 1, the Remedial Action at IR Site 25 and has remediated all potential sources of upland PCB sites associated with past Navy activities. Therefore, any current or future contamination observed at the SWSB, IR Site 25, or AOI 14 could be attributed to contamination originating from uncharacterized NASA activities or inadequate facility management. Since the Navy does not manage the facility, it is not responsible for any potential current or future contamination. Implementation of ICs at Hangar 1, which includes the LTMgmt Plan for NTCRA PCB Contamination at IR Site 29, will ensure the continued protectiveness of the NTCRA at Hangar 1.</p>