# 4.0 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section identifies a broad range of removal action alternatives to be examined against the RAO for Hangar 1 as presented in Section 3.0. The removal action alternatives are described and evaluated in this section based on two of the three EE/CA criteria, implementability and effectiveness, taking into consideration site-specific conditions. The Navy is aware of the public interest in Hangar 1 and has also identified and evaluated a broad range of historic mitigation measures that would comply with the substantive provisions of the NHPA and 36 C.F.R., Part 800. At the conclusion of this section, the alternatives that are determined to have a reasonable chance of success in achieving the RAO are retained for a comparative analysis in Section 5.0, which addresses the third of the three EE/CA criteria, cost.

## 4.1 ADDITIONAL REGULATORY CONSIDERATIONS

The NCP (40 C.F.R., Part 300.430[a]) sets forth the following goals, management principles, and expectations to assist in the identification and evaluation of appropriate remedial action alternatives. They were considered in this EE/CA in order to ensure that the selected removal 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.

The following expectations, applicable to the removal action for Hangar 1, were used to help identify various alternatives:

- Treatment should be used to address the principal contaminant threats wherever practicable. This is most applicable where highly contaminated areas occur or areas where highly mobile materials are present.
- Engineering controls such as contaminant containment should be used when the waste presents a relatively low long-term threat or where treatment is impracticable.
- Innovative technologies should be considered when such technologies offer the potential for comparable or superior treatment performance or implementability.

The above goals and expectations provided a basis for identifying a broad range of the removal action alternatives for Hangar 1 presented in Section 4.3.

## 4.2 ALTERNATIVE EVALUATION CRITERIA

Alternatives listed in Section 4.3 are subjected to a detailed evaluation in terms of implementability and effectiveness criteria, along with specific components of these criteria that affect the ultimate selection of an appropriate response for Hangar 1. Sections 4.2.1 and 4.2.2 define the evaluation criteria and their specific components. Section 4.5 describes and evaluates 13 removal actions for Hangar 1. Coating options for addressing the interior components for Hangar 1 are evaluated in Section 4.7 and used as common costs for removal action alternatives that are retained for comparative analysis in Section 5.0 (for applicable alternatives).

Recognizing the significant concerns relating to the cultural and historic value of Hangar 1, and to meet the substantive requirements of NHPA and 36 C.F.R., Part 800, a range of historic mitigation measures are discussed in this section for the 13 alternatives, with the historic measures tailored to the specific alternatives. At the conclusion of this section, the alternatives that are determined to have a reasonable chance of success in achieving the RAO are retained for a comparative analysis in Section 5.0. Cost, the third of the three EE/CA evaluation criteria, is also addressed in Section 5.0.

### 4.2.1 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 four 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 removal 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; adequacy and availability of off-site treatment, storage, and disposal capacity; 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).

**Community Acceptance**

Assessment of each alternative in accordance with this evaluation criterion will be based upon consideration of public comments received after this EE/CA is published and made available for public comment. A previous version of this EE/CA was published on May 5, 2006. Comments received during the comment period for that version were evaluated and incorporated into this revised EE/CA, where appropriate. The assessment of each alternative in this revised version will require determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. The assessment cannot be completed until public comments have been considered.

### 4.2.2 Effectiveness

The effectiveness of an alternative refers to its ability to meet the RAO within the scope of the removal action. In considering the effectiveness of an alternative, the NCP details the five elements described below.

**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.

**Compliance with ARARs**

Alternatives shall be assessed to determine whether or not they attain ARAR requirements under federal and state environmental laws.

**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 the workers, environmental impacts, and time until the RAO is achieved.

**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 from untreated waste or treatment residuals remaining at

the conclusion of the removal action, and the adequacy and reliability of controls that are necessary to manage waste, which may remain in place.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

The degree to which an alternative employs treatment that reduces toxicity, mobility, or volume is assessed. Considered important are 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 removal action; and the degree to which treatment reduces the inherent hazards posed by principal threats at the site.

## 4.3 HANGAR 1 REMOVAL ACTION ALTERNATIVE ANALYSIS

The selection of removal action alternatives identified for evaluation in this EE/CA was based upon whether the alternatives would satisfy the Hangar 1 RAO, and the ARARs presented in Section 3.5. The range of these alternatives also considered the NCP goals and expectations for these alternatives discussed in Section 4.1. Accordingly, the following 13 removal action alternatives are selected for a detailed evaluation:

- Alternative 1: Enclose entire hangar inside another structure
- Alternative 2: Cover with rubberized material
- Alternative 3: Coat with asphalt-emulsion
- Alternative 4: Coat with acrylic coating
- Alternative 5: Coat with plasma-sprayed oxide
- Alternative 6: Cover with new visually similar siding
- Alternative 7: Media blast contaminated surfaces
- Alternative 8: Neutralize PCBs using emulsified bimetallic extraction
- Alternative 9: Remove contaminants by chemical stripping and coating
- Alternative 10: Remove siding and coat exposed surfaces
- Alternative 11: Demolish and remove hangar
- Alternative 12: Collect stormwater runoff and treat on site
- Alternative 13: Collect stormwater runoff and treat/dispose off site

The above alternatives generally fall into three groups. The first group includes alternatives that offer covering or coating the Hangar 1 exterior without removal of COCs (Alternatives 1, 2, 3, 4, and 6). The second group consists of alternatives that involve removal and/or treatment of the COCs (Alternatives 5, 7, 8, 9, 10, and 11). The third and final category includes alternatives that

address the Hangar 1 COCs indirectly through capture and control of contaminant migration (Alternatives 12 and 13).

Additionally, two other coating alternatives were researched based on community interest: one using silicone coating and another based on epoxy coating. These were evaluated for the exterior surface in concert with material suppliers and were not found to be compatible with the Hangar 1 exterior siding. Therefore, they were not carried forward for comparative analysis. Typically, silicone paints are applied to smooth indoor surfaces, not a coarse substrate such as asphalt-emulsion. Vendors that supply exterior silicone paints do not consider asphalt-emulsion to be a good substrate, and therefore they recommend stripping the siding down to the metal or covering the siding with aluminum flashing or siding panels prior to applying the silicone paint. Epoxy coatings have excellent adhesion properties to coarse surfaces and have been widely used for environmental and industrial applications. A drawback of using epoxy coating as an exterior coating for the siding is that when weathered, it begins to appear "chalky," which would negatively affect the visual impact of the hangar. Weathered epoxy, coupled with the curvature and flexibility of the siding, can become brittle and begin to crack and peel. A more detailed discussion on the effectiveness of silicone and epoxy coatings is provided in Appendix D, Response to General Comment 7A.

## 4.4 HISTORIC MITIGATION

Historic mitigation measures will be performed to substantively comply with the NHPA and while not an ARAR, the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68) will also be utilized to provide mitigation guidance. In addition, the Navy has met and consulted with OHP, ACHP, and other stakeholders throughout the CERCLA process and in the evaluation of the following historic mitigation measures that will be considered:

- Level 1 Historic American Engineering Record (HAER) documentation
- Oral histories of individuals who worked in the hangar during different eras
- Virtual Hangar 1 interactive compact disk (CD)
- Inventory-catalogue of Hangar 1 collections contained in Moffett Field Museum
- Preservation of Hangar 1 man-cranes
- Matching or replacing Hangar 1 exterior features with coatings or materials similar in color and appearance to the original hangar
- Coating the exposed steel frame with a protective coating similar in color to the former siding

Level 1 HAER documentation will include a combination of information to record the historic property and to provide historic context for public interpretation and enrichment. The documentation will include recording the property itself, and its relation to the Historic District,

through development of measured drawings prepared to HAER documentation standards. Measured drawings will include plans, elevations, sections, and detail drawings along with a cover sheet, site plan, and written information. The HAER documentation will also include archival quality, large format, black and white photographs of Hangar 1 prepared according to HAER photographic specifications.

The oral history archive will be developed as a historic record. It will include interviews with individuals who worked in the hangar during the Dirigible Era, Army Era, Blimp Era, Jet Fighter Era, and P-3 Orion Era. The oral histories will be given to the Moffett Field Museum. As described below, they will also be included in a virtual Hangar 1 interactive compact disk that will be distributed to various interested parties.

The virtual Hangar 1 interactive CD will include a three-dimensional interactive representation of the hangar in each historic era designed for a wide age range of the interested public. It will include a narrative description and photographs of the hangar, portions of the oral histories, materials collected and developed by the HAER efforts, and video clips. The CD will be distributed to the Moffett Field Museum, historic preservation societies, veterans groups, schools, libraries, RAB members, other interested parties, and will be available for purchase at the NASA gift shop.

An inventory of the Hangar 1 collections contained in the Moffett Field Museum will be performed. These collections include Hangar 1 photographs, artifacts, models, drawings, and publications. The Moffett Field Museum is open to the public.

Man-cranes, which were part of the original Hangar 1 installation made to travel along overhead rails running the length of the hangar, will be removed as part of the removal action. Upon removal, the man-cranes will be preserved and may be donated to the Moffett Field Museum.

Alternatives that cover or coat the siding of the building will use materials that match, as closely as possible, the original colors of the hangar. This would be done to minimize the visual changes caused by the implementation of alternatives that affect the character-defining architectural features of Hangar 1.

Alternatives that remove the siding, decking, and roofing, but leave the underlying steel frame, will have the steel frame coated with protective coating colored to match the original hangar's former siding. This will result in a ghosting effect reminiscent of the original Hangar 1. The steel frame will provide a sense of scale and will suggest the dominance on the landscape once held by Hangar 1 within the context of the Historic District. Replacing the siding with a material similar in color and appearance to the original hangar siding to minimize the visual changes caused by the implementation of this alternative is also considered in the EE/CA.

The Hangar 1 removal action analysis in Section 4.5 identifies mitigation measures discussed above that were considered for each removal action alternative evaluated in that section.

## 4.5 HANGAR 1 REMOVAL ACTION ANALYSIS

This section identifies 13 removal action alternatives for the Hangar 1 exterior based on the RAO identified in Section 3.0. The removal action alternatives are described and evaluated in this section based on two of the three EE/CA criteria, implementability and effectiveness, taking into consideration site-specific conditions. The third EE/CA criterion, cost, is retained for comparative analysis in Section 5.0.

### 4.5.1 ALTERNATIVE 1: ENCLOSE ENTIRE HANGAR INSIDE ANOTHER STRUCTURE

Alternative 1 includes enclosing the entire hangar inside another superstructure such as a tent, an aluminum structure, or other types of architectural membrane. The hangar's existing siding would not be removed or replaced. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.1.1 Description (Alternative 1: Enclose Entire Hangar Inside Another Structure)

This alternative provides encapsulation of Hangar 1 by enclosing it inside another structure with impermeable walls. The structure would be designed and engineered to meet the required building construction guidelines for loading, winds, earthquakes, and other pertinent standards. The structure is expected to include a metal frame that would provide additional support for the structural shell and would be tied to Hangar 1 for additional support using fasteners. A detailed analysis and design of the existing Hangar 1 structure would be required. Routine inspection and maintenance of the structure would be required.

#### 4.5.1.2 Implementability (Alternative 1: Enclose Entire Hangar Inside Another Structure)

**Technical Feasibility**

The design, engineering, and installation of the structure would create complexity and difficulties considering the size and location of the structure, and is unprecedented. A new enclosure for Hangar 1 would have to be taller and larger in size and would create an increased obstruction to airfield operations; therefore, this alternative would not be technically feasible.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

This alternative requires elaborate engineering design and planning. The alternative uses standard construction equipment, material, and expertise. Skilled construction workers are available. Sediment, rinsate, and construction debris waste generated during the removal action would be disposed at an approved off-site disposal facility. A properly licensed waste-hauling company would provide transportation of the contaminated waste to the selected facility. Approved facilities located in both California and Nevada have sufficient capacity to manage the expected amount of waste.

#### 4.5.1.3 Effectiveness (Alternative 1: Enclose Entire Hangar Inside Another Structure)

**Overall Protection of Public Health and the Environment**

This alternative would provide adequate protection of public health and the environment, provided the cover material for the structure is routinely inspected and repaired throughout its life span. The structure would control any release of PCBs by providing total enclosure of the hangar and eliminating any direct exposure to the atmosphere. During installation of the structure, the work area would be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California state ARARs, as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. This alternative would comply with air quality ARARs with the proper air monitoring during implementation. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. All wastes generated in the course of the removal action would be characterized, managed, and disposed of properly in compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs.

**Historic Mitigation**

This alternative would have an adverse effect on Hangar 1 and would affect the Historic District because it would completely cover the hangar, thus obscuring its character-defining features. The alternative would specifically affect the character-defining architectural features that make this building distinctive under Criterion C. The following aspects of the hangar's historic integrity and that of the Historic District would be affected: location, design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and application of a coating on the structure that would be colored to match, as closely as possible, the original colors of the hangar in order to minimize the visual changes caused by the implementation of this removal action alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected primarily through controlling access to the project site and by conducting air monitoring and runoff control during implementation. Disposal of project-related wastes, such as construction debris and decontamination water, at a CERCLA-approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using proper PPE as designated in specific activity hazards analyses. The required construction equipment and procedures would conform to Occupational Safety and Health Administration (OSHA) specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

The alternative would be effective over the long term for as long as the integrity of the new structure would be preserved. This would require routine inspection and maintenance of the new structure. The RAO would be achieved by complying with the ARARs and enclosing the PCB source, but the structure component materials would eventually deteriorate with time and need to be replaced in the future.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity or volume of the contaminants through treatment. Reduction of mobility at the site is addressed by isolating the siding from the atmosphere and controlling it from releasing contaminants to the environment.

#### 4.5.1.4 Summary (Alternative 1: Enclose Entire Hangar Inside Another Structure)

Alternative 1, enclosing Hangar 1 within another superstructure, is not a viable alternative. The alternative is not technically feasible because the structure would present an added obstruction to airfield operations due to its proximity to the existing runways, and is unprecedented. The alternative is administratively feasible. The required services and material for implementation of this alternative would be available. This alternative would provide adequate protection of public and the environment, as long as the integrity of the structure material is preserved. The alternative, in combination with the proposed historic mitigation measures, would be in compliance with ARARs. The alternative is effective in the short term. The alternative is effective in the long term but is subject to routine maintenance and repair or replacement of damaged material. The mobility of the PCBs may be reduced, but the volume and toxicity would be unaffected.

### 4.5.2 ALTERNATIVE 2: COVER WITH RUBBERIZED MATERIAL

This alternative includes covering the exterior surface of Hangar 1 with a protective rubberized material and, thereby, controlling the release of PCBs to the environment. The siding would not be removed or replaced. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.2.1 Description (Alternative 2: Cover with Rubberized Material)

This alternative, similar to an approach taken on a maintenance project performed on a similar hangar in Akron, Ohio, provides containment of PCBs in the siding and the roof of Hangar 1 by installation of a “black” rubberized material. The siding is first covered with a layer of plywood. Then the black rubberized material is installed over the outer structure, including the clamshell doors. The hangar windows and access doors would not be covered since they would be replaced. The black rubber is a 60-mil membrane, untalced, and unreinforced that comes in 54-inch by 100-foot rolls. A fastening rail system is attached to the plywood and is used to hold the rubber in place against the plywood surface. The rail system and the membrane would run perpendicular to the ground. The rails would be spaced 48 inches apart to allow for at least 6 inches of overlap of the rubber. The end laps of the rolls would be glued upon installation and secured with fasteners. The installation requires use of fasteners, caulking, and sealant throughout and at all rubber termination points. This would provide maximum encapsulation of the surface for as long as the integrity of the rubber material is preserved. Routine inspection and maintenance of the rubber material would be required. The hangar windows and access doors would not be covered since they would be replaced.

#### 4.5.2.2 Implementability (Alternative 2: Cover with Rubberized Material)

**Technical Feasibility**

This alternative is technically feasible and has been implemented at a similar facility in Akron, Ohio.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

This alternative uses standard construction equipment, material, and expertise. Skilled construction workers would also be available. An approved off-site disposal facility would be used to dispose of contaminated wastes and debris from the site. A properly licensed waste-hauling company would provide transportation of the contaminated waste to the selected facility. Approved facilities located in both California and Nevada have sufficient capacity to manage the anticipated amount of waste.

#### 4.5.2.3 Effectiveness (Alternative 2: Cover with Rubberized Material)

**Overall Protection of Public Health and the Environment**

This alternative would provide adequate protection of public health and the environment, provided the rubber material is routinely inspected and repaired throughout its life span, which is estimated to be 30 years. The rubber material would control any release of PCBs by providing enclosure of the siding and eliminating any direct exposure to the atmosphere. During installation of the rubber material, the work area must be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California state ARARs, as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Air quality ARARs would be complied with during implementation of this alternative, although there is low potential for dust generation. This alternative would comply with air quality ARARs with the proper air monitoring during application. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. Sediment, rinsate, and other wastes generated in the course of the rubber material installation would be characterized, managed, and disposed of properly in compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs.

### Historic Mitigation

This alternative would have an adverse effect on Hangar 1 and the Historic District because it would completely cover the hangar with material that is not consistent with the construction materials used in 1932 and would not meet the Secretary of the Interior's Standards for Treatment of Historic Properties for Rehabilitation. Similar to Alternative 1, this alternative would obscure Hangar 1's character-defining features and would cause an adverse visual effect to the Historic District. The character-defining architectural features of the hangar under Criterion C would be affected. The following aspects of the hangar's historic integrity and that of the Historic District would be affected: design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and application of a coating on the structure that would be colored to match, as closely as possible, the original colors of the hangar in order to minimize the visual changes caused by the implementation of this removal action alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

### Short-term Effectiveness

Public health would be protected primarily through controlling access to the project site and by conducting air monitoring and runoff control during implementation. Disposal of project-related wastes, such as construction debris and decontamination water, at a CERCLA-approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using proper PPE as designated in specific activity hazard analyses. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative would effectively contain the PCBs that remain in place over the long term for as long as the integrity of the rubberized material is preserved. This would require routine annual inspection and maintenance of the membrane. In addition, the rubber material would eventually deteriorate with time and may need to be replaced approximately every 30 years depending on conditions. Accordingly, the RAO would be achieved by complying with the ARARs and encapsulating the PCB source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity or volume of the contaminants through treatment. Reduction of mobility on the site is addressed by isolating the siding from the atmosphere and controlling it from releasing PCBs to the environment.

#### 4.5.2.4 Summary (Alternative 2: Cover with Rubberized Material)

Alternative 2, covering the Hangar 1 surface with rubberized material, is technically and administratively feasible. The required services and material for implementation of this alternative would be available. This alternative would provide adequate protection of the public and the environment, as long as the integrity of the rubberized material is preserved. The alternative, in combination with the proposed historic mitigation measures, is in compliance with the ARARs. The alternative is effective in the short term. Long-term effectiveness for containing the PCBs that remain in place is subject to routine maintenance, repair, or replacement of damaged material. The mobility of the PCBs would be reduced, but the volume and toxicity would be unaffected.

### 4.5.3 ALTERNATIVE 3: COAT WITH ASPHALT-EMULSION

This alternative includes coating the exterior surface of Hangar 1 with an asphalt-emulsion to control the release of PCBs to the environment. The siding would not be removed or replaced. The alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.3.1 Description (Alternative 3: Coat with Asphalt-Emulsion)

The hangar would be coated with an asphalt-emulsion to control the release of PCBs to the environment. This asphalt-emulsion was applied to the hangar as a TCRA in 2003 as an interim removal action. The asphalt-emulsion would consist of two different coatings. Henry #107, or equivalent, asphalt-emulsion would be applied to the black upper walls and roof of the hangar. Henry #107, manufactured by the Henry Company, is a solvent-free material made from asphalt emulsified with bentonite clay and water. It is waterproof and does not crack, run, or sag under extreme weather conditions. The silver lower walls of the hangar would be coated with Henry #229, or equivalent. Henry #229 is a heavy-bodied, non-fibered, water-based aluminum coating. It

is formulated with aluminum pigment blended into a clay-type asphalt-emulsion. The coatings would be applied with power-brooms after surface preparation by power washing.

#### 4.5.3.2 Implementability (Alternative 3: Coat with Asphalt-Emulsion)

**Technical Feasibility**

This alternative is not technically feasible as a reliable long-term exterior coating even though it was successfully executed during the Navy TCRA in October 2003 as part of an interim removal action. Coating the hangar exterior with an asphalt-emulsion as part of a removal action would require the application of several emulsion layers, along with bi-annual touch ups, as part of the long-term operation and maintenance (O&M) regimen. The additional layers of emulsion will cause additional stresses on the substrate and in turn will accelerate the degradation of the siding.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

The materials and the services for this alternative would be available. The previous supplier (Henry Company; note that other equivalent suppliers would be available) of the materials is a large company that has been in business since 1933. An approved off-site disposal facility would be used to dispose of wastes and debris from the site. A properly licensed waste-hauling company would provide transportation of waste to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the anticipated amount of waste.

#### 4.5.3.3 Effectiveness (Alternative 3: Coat with Asphalt-Emulsion)

**Overall Protection of Public Health and the Environment**

This alternative has a warranty of 3 to 5 years; therefore, it would not be effective over the long term for protection of public health and the environment. The asphalt emulsion would temporarily control any releases of PCBs by providing an interim encapsulation of the siding. Weathering of the siding, along with additional layers of asphalt emulsion, will cause the siding to peel and crack, therefore exposing the siding and potentially causing future releases of PCBs. Recent evidence of minor cracking and peeling has been observed on the layer of asphalt emulsion placed as part of the 2003 interim removal action. The O&M program for Alternative 3 entails routine touch up and recoating of the siding, but as additional weathering of the siding continues and additional coatings are applied, the degradation rate of the siding will accelerate.

### Compliance with ARARs

This alternative would comply with federal and California state ARARs, as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Air quality ARARs would be complied with during implementation of this alternative, although there is low potential for dust generation. This alternative would comply with air quality ARARs with the proper air monitoring during application. VOC emissions from the coatings are quite limited, and asphalt-emulsion is compliant with air quality ARARs. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. Wastes generated in the course of the asphalt emulsion installation would be characterized, managed, and disposed of properly in compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs.

### Historic Mitigation

This alternative would have an adverse effect on Hangar 1 and may affect the Historic District. Even though the materials would not be consistent with those used in 1932 for the original construction, choosing colors for the asphalt-emulsion that would be compatible with the hangar's current colors as well as applying the Secretary of the Interior's Standards for Treatment of Historic Properties for Rehabilitation could lessen the effect of this alternative to the level of no adverse effect. Careful treatment would preserve the hangar's integrity of design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and choosing the colors of the asphalt-emulsion coating to match, as closely as possible, the original colors of the hangar. This would minimize the visual changes caused by the implementation of this alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

### Short-term Effectiveness

Public health would be protected primarily through controlled access to the project site and by conducting air monitoring and runoff control during implementation. Disposal of project-related wastes at a CERCLA-approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using standard PPE. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination

reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative does not effectively contain PCBs in the siding for the long-term, since additional layers of emulsion will increase the stresses on the existing substrate and further accelerate the failure of the coating over the siding. The RAO would be partially achieved because the alternative complies with the ARARs and encapsulates the source, but the removal action does not address the source in the long term.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity or volume of the contaminants through treatment. Reduction of mobility on the site is addressed by isolating the siding from the atmosphere and controlling it from potentially releasing contaminants to the environment.

#### 4.5.3.4 Summary (Alternative 3: Coat with Asphalt-Emulsion)

Alternative 3, covering the Hangar 1 surface with an asphalt-emulsion coating, is not a viable alternative. The alternative is not technically feasible because weathering of the siding, along with additional layers of asphalt emulsion, will decrease the integrity of the siding. This alternative is administratively feasible. The required services and material for implementation of this alternative would be readily available, and skilled workers with directly related experience are available as well. This alternative cannot provide adequate long-term protection to the public and the environment even if the coating is routinely maintained. The alternative, in combination with the proposed historic mitigation measures, is in compliance with ARARs. The mobility of the PCBs would be reduced, but the volume and toxicity would be unaffected.

### 4.5.4 ALTERNATIVE 4: COAT WITH ACRYLIC COATING

This alternative is a more flexible and elastic version of the Belzona ceramic cladding coating that was evaluated in the May 5, 2006, EE/CA. In this section, acrylic coating refers to the material covering the hangar exterior and includes a flexible acrylic coating that is highly adhesive to the existing hangar siding. Two types of acrylic coating were evaluated; the first is manufactured by Belzona and consists of a high-strength polyester-webbed reinforcing sheet embedded in the coating system. The other type of acrylic coating is manufactured by Sherwin Williams and is a non-reinforced acrylic coating that has been tested on a similar hangar in Akron, Ohio. Acrylic coatings would minimize the release of contaminants to the environment.

The existing siding would not be removed or replaced. The alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.4.1 Description (Alternative 4: Coat with Acrylic Coating)

The Belzona 3111 Flexible Membrane System is a flexible and elastic acrylic system embedded with a tough, flexible, and elastic polymeric film (Belzona 9311). The Sherwin Williams acrylic coating system consists of a Loxon® Acrylic Primer overlaid with a Uniflex® Elastomeric coating that is sprayed directly over the siding. The hangar windows and access doors would not be coated since they would be replaced.

Acrylic coatings are flexible and can tightly follow the exterior contours. The coatings would provide seamless, long-term weather- and water-proofing for the hangar exterior and offer excellent protection against infrared and ultra-violet radiation and natural and industrial pollutants. Acrylic coatings are impermeable to water and would control the release of PCBs to the environment. They are ideally suited for joints, seams, flashings, and complex roof and dome designs.

The Belzona acrylic coating is sprayed on a reinforcing sheet that is positioned directly over the siding with a bonding agent. The reinforcing sheet gives the coating additional adhesion, prevents localized cracking/peeling, and ensures that the product is applied at a constant thickness. This system has been used for many industrial applications and is proven to last in all environmental conditions.

The Sherwin Williams acrylic coating was successfully tested on the exterior siding of a similar hangar in Akron, Ohio. The testing was performed in August of 2006 and proved the Robertson Protected Metal to be a compatible substrate for this acrylic coating system.

#### 4.5.4.2 Implementability (Alternative 4: Coat with Acrylic Coating)

**Technical Feasibility**

This alternative is technically feasible. An acrylic coating has been successfully applied to many types of surfaces in the past including painted surfaces, stucco, cement, steel, stone, and brickwork. In the past, acrylic coatings have been applied to surfaces similar to Hangar 1.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

The materials and the services for application and ongoing O&M would be available. Both acrylic coating suppliers are established companies that have proven track records in the coating and roofing industries. The procedures for applying the acrylic coating would be similar to those for the asphalt-emulsion coating that was successfully applied to Hangar 1 for the Navy's TCRA in 2003. An approved off-site disposal facility would be used for disposal of wastes and debris from the site. A properly licensed waste-hauling company would provide transportation of the waste to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the anticipated amount of waste.

#### 4.5.4.3 Effectiveness (Alternative 4: Coat with Acrylic Coating)

**Overall Protection of Public Health and the Environment**

The alternative would provide adequate protection of public health and the environment with proper application and O&M. The acrylic coating is flexible and the elastic material would control any release of PCBs by providing encapsulation of the siding and eliminate any direct exposure to the atmosphere. The alternative would require long-term O&M activities to preserve the integrity of the impermeable layer. During application of the acrylic coating, the work area would be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California state ARARs as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Air quality ARARs would be complied with during implementation of this alternative, although there is a low potential for dust generation. This alternative would comply with air quality ARARs with the proper air monitoring during application. These acrylic coatings are compliant with air quality ARARs. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. Wastes generated in the course of the acrylic coating installation would be characterized, managed, and disposed of properly in compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs.

**Historic Mitigation**

This alternative would have an adverse effect on Hangar 1 and may affect the Historic District. Even though the materials would not be consistent with those used in 1932 for the original construction, choosing colors for the acrylic coating that would be compatible with the hangar's original colors as well as applying the Secretary of the Interior's Standards for Treatment of Historic Properties for Rehabilitation could lessen the effect of this alternative to the level of no adverse effect. Careful treatment would preserve the hangar's integrity of design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate

potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and choosing the colors of the proposed acrylic coating to match, as closely as possible, the original colors of the hangar. This would minimize the visual changes caused by the implementation of this alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected primarily through controlled access to the project site and by conducting air monitoring and runoff control during implementation. Disposal of project-related wastes at an approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using standard PPE during application of the coating. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative would effectively contain the PCBs that remain in place. The alternative would be effective over the long term for as long as the integrity of the acrylic coating is preserved. This would require inspections and touch-ups every 5 years and recoating after 15 years from application for the Belzona coating and inspections and touch-ups at years 1, 3, and 5, and a recoat at years 10 and 20 for the Sherwin Williams coating. The RAO would be achieved because the alternative complies with the ARARs and encapsulates the source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity or volume of the contaminants through treatment. Reduction of mobility on the site is addressed by isolating the siding from the atmosphere and controlling it from potentially releasing contaminants to the environment.

#### 4.5.4.4 Summary (Alternative 4: Coat with Acrylic Coating)

Alternative 4, covering the Hangar 1 surface with acrylic coating, is technically and administratively feasible. The required services and material for implementation of this alternative would be readily available, and skilled workers with related experience would be available as well. This alternative would provide adequate protection of the public and the environment, as long as the integrity of the acrylic coating is preserved. The alternative, with the proposed historic mitigation measure, is in compliance with ARARs. The alternative is effective in the short term. Long-term effectiveness for containing the contamination that remains in place is subject to inspections and touch-ups every 5 years and recoating after 15 years from application for the Belzona coating and inspections and touch-ups at years 1, 3, and 5, and a recoat at years 10 and 20 for the Sherwin Williams coating. The mobility of the PCBs would be reduced, but the volume and toxicity would be unaffected.

### 4.5.5 ALTERNATIVE 5: COAT WITH PLASMA-SPRAYED OXIDE

This alternative includes coating the surface of Hangar 1 with a plasma-sprayed oxide to minimize the release of PCBs to the environment. The siding would be removed, stripped of the existing coatings, coated, and reattached. The alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.5.1 Description (Alternative 5: Coat with Plasma-Sprayed Oxide)

The plasma spray process involves the spraying of molten or heat-softened material (usually a metal compound) typically onto a metal or ceramic surface to provide a coating. Material in the form of powder is injected into a very high temperature plasma flame (argon, nitrogen, hydrogen, or helium), typically about 30,000 degrees Fahrenheit (°F), where it is rapidly heated and accelerated to a high velocity. The hot material impacts the substrate surface at a temperature of about 300 °F and rapidly cools, forming a coating. The powder is so rapidly heated and accelerated that spray distances can be on the order of 25 to 150 millimeters. The plasma spray process is usually used in industry to coat metal or ceramic parts with a resistant metal coating to increase hardness and longevity. In addition, worn parts are sprayed to repair the parts instead of replacing them.

This process entails the removal, packaging, and transportation of the removed siding panels to a plasma spraying facility because the process cannot be performed at the project site. Because the detached siding is a RCRA/TSCA waste, the transportation would be subject to RCRA and TSCA regulations. Also, the facility that treats the siding needs to be a permitted facility to dispose of both RCRA and TSCA waste. The surface to be coated must be clean and rough to maximize the surface area to allow for good adhesion. This is typically done by media blasting the surface prior to application. The stripped material would be disposed of at an appropriate approved facility.

#### 4.5.5.2 Implementability (Alternative 5: Coat with Plasma-Sprayed Oxide)

**Technical Feasibility**

This alternative is not feasible for a number of reasons. This technology is typically used to treat metal or ceramic surfaces. The necessary equipment would not allow for the coating of the siding panels in place; instead, panels would have to be removed, sent to a coating facility, coated, and then reinstalled on the hangar. Removal/reinstallation of existing siding is not feasible. The siding panels are attached to the structure with fasteners in such a manner that the fasteners and the siding would be damaged if removal were attempted. In addition, each panel is glued to the underlying panel with a tar material. The siding would bend, crack, and possibly break off in pieces during removal attempts and could not be reinstalled. The surface of the siding panels would have to be media blasted down to the steel core prior to coating because of the hot process of application and to increase the surface area to maximize adhesion. The waste from the media blasting would have to be collected, transported, and disposed of at a proper facility.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

The services and materials would be available for this alternative, although not for this type of application. Plasma spraying technology has been available since the late 1950s, and facilities to apply the coating have been available since that time. Skilled construction workers would be available for the removal and reinstallation of the siding panels after being coated. An approved off-site disposal facility would be used for disposal of wastes and debris from the site and the coating facility. A properly licensed waste-hauling company would provide transportation of the wastes to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the anticipated amount of waste.

#### 4.5.5.3 Effectiveness (Alternative 5: Coat with Plasma-Sprayed Oxide)

**Overall Protection of Public Health and the Environment**

The alternative would provide adequate protection of public health and the environment with the proper application. The removal of the existing covering and addition of a plasma-oxide coating would control any release of PCBs by providing encapsulation of the siding and eliminating any direct exposure to the atmosphere. The alternative would require long-term O&M activities to ensure the integrity of the impermeable layer. During the removal and reapplication of the siding panels at the site, the work area must be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

### Compliance with ARARs

This alternative would comply with federal and California state ARARs, as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Air quality ARARs would be complied with during implementation of this alternative. The media blasting of the siding panels would take place in a controlled environment at a plasma-oxide spraying facility. Because of the potential for dust generation, as a result of taking down the siding panels, several BAAQMD regulations would potentially apply. Visible emissions, emission limit rates for particular matter, lead emissions, and requirements for asbestos management would all be potentially applicable to this alternative. Implementing engineering controls such as adequately wetting the siding prior to dismantling and carefully lowering the siding panels to the ground would limit emissions during the siding removal. With the implementation of engineering controls and appropriate air monitoring, this alternative would comply with air quality ARARs. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. Storage and decontamination requirements would comply with appropriate RCRA and TSCA ARARs. Assumptions were made regarding waste classification for the purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly. Wastes generated in the course of the plasma-oxide application would be characterized, managed, and disposed of properly in compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs.

### Historic Mitigation

This alternative would have an adverse effect on Hangar 1 and may affect the Historic District. The materials would not be consistent with those used in 1932 for the original construction, and because the color of the plasma-sprayed oxide coating cannot be selected, this alternative may not meet the Secretary of the Interior's Standards for Treatment of Historic Properties for Rehabilitation. Careful treatment would preserve the hangar's integrity of design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and matching the surface coating, as closely as possible, to the original colors of the hangar to minimize the visual changes caused by the implementation of this alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected primarily through controlled access to the project site and by conducting air monitoring and runoff control during implementation. Disposal of project-related wastes at a CERCLA-approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using standard respiratory protection and protective clothing worn during the removal of the siding panels, the media blasting of the siding panels, the application of the plasma-oxide coating, and the replacement of the panels. The required construction equipment and procedures would conform to OSHA specifications. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative would be effective in the long-term for Hangar 1 because the Hangar 1 siding is media blasted down to the steel core prior to coating with the plasma-sprayed oxide. The RAO would be achieved because the alternative eliminates the source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of the contaminants through treatment. Reduction of toxicity, mobility, and volume on site is achieved by removing PCBs from the siding, and controlling it from potentially releasing contaminants to the environment.

#### 4.5.5.4 Summary (Alternative 5: Coat with Plasma-Sprayed Oxide)

Alternative 5, covering the Hangar 1 surface with a plasma-oxide coating, is not a viable alternative because the technology is typically used on metal or ceramic surfaces. The siding panels would have to be removed and sent to a plasma-coating facility for treatment, and the surface of the siding panels would have to be media blasted down to the steel core prior to coating because of the hot process of application. The alternative is not technically feasible. The siding could not be removed without damaging the fasteners and the siding panels. The siding would bend, crack, or possibly break off in pieces and could not be re-installed due to this damage incurred during removal. The alternative is administratively feasible. The required services and material for implementation of this alternative would be readily available, and skilled workers with directly related experience would be available as well. This alternative would provide adequate protection of the public and the environment. The alternative, in combination with historic mitigation measures, is in compliance with ARARs. The alternative is effective in the short term and long term. The on-site toxicity, mobility, and volume of PCBs would be reduced by removing contaminants from the siding.

### 4.5.6 ALTERNATIVE 6: COVER WITH NEW VISUALLY SIMILAR SIDING

This alternative includes covering the surface of Hangar 1 with a visually similar siding to minimize the release of PCBs to the environment. The existing siding would not be removed or replaced. The new siding would be placed directly over the original siding. The alternative is described below and evaluated for effectiveness and implementability.

#### 4.5.6.1 Description (Alternative 6: Cover with New Visually Similar Siding)

The hangar would be covered with a visually similar siding material. The material to be used would be DURO SPAN corrugated series 80 wall panels manufactured by Enduro Composite Systems, or an equivalent. The panels would be attached to the hangar using screw-type fasteners at every other rib. Butyl lap tape sealer would be used at locations where the panels overlap. Impervious sheeting would be used as an underlayment to ensure the system is watertight. The hangar windows and access doors would not be covered since they would be replaced.

#### 4.5.6.2 Implementability (Alternative 6: Cover with New Visually Similar Siding)

**Technical Feasibility**

This alternative is technically feasible. The siding could be installed over the existing siding using standard building practices.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

The materials and the services for application would be available. The supplier of the materials (Enduro Composite Systems) has been in business for over 30 years. The services for the installation of the siding would be readily available in the area. An approved off-site disposal facility would be used for disposal of wastes and debris from the site. A properly licensed waste-hauling company would provide transportation of the wastes to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the waste.

#### 4.5.6.3 Effectiveness (Alternative 6: Cover with New Visually Similar Siding)

**Overall Protection of Public Health and the Environment**

The alternative would provide adequate protection of public health and the environment with the proper installation. The new siding would control any release of the PCBs by providing total coverage of the existing siding and eliminating any direct exposure to the atmosphere. The alternative would require minor long-term O&M activities to ensure the integrity of the siding.

During application of the visually similar siding, the work area must be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California State ARARs as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Air quality ARARs would be complied with during implementation of this alternative. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. Wastes generated in the course of the siding installation would be characterized, managed, and disposed of properly in compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs.

**Historic Mitigation**

This alternative would have an adverse effect on Hangar 1 because it would completely cover the hangar with material that is not consistent with the construction materials used in 1932 and would not meet the Secretary of the Interior's Standards for Treatment of Historic Properties for Rehabilitation. Similar to Alternative 2, this alternative would obscure Hangar 1's character-defining features and would cause an adverse visual effect to the Historic District. The character-defining architectural features of the hangar under Criterion C would be affected. The following aspects of the hangar's historic integrity and that of the Historic District would be affected: design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and matching the new siding applied to the structure, as closely as possible, to the original colors of the hangar to minimize the visual changes caused by the implementation of this alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected primarily through controlled access to the project site and by conducting air monitoring and runoff control during implementation. Disposal of project-related wastes at an approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using standard respiratory protection and

protective clothing worn during the installation of the siding. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative would effectively contain the PCBs that remain in place over the long term for as long as the integrity of the new siding is preserved. This would require bi-annual inspections of the siding. The RAO would be achieved because the alternative complies with the ARARs and encapsulates the source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of the contaminants through treatment. Reduction of mobility on the site is addressed by isolating the siding from the atmosphere and controlling it from potentially releasing PCBs to the environment.

#### 4.5.6.4 Summary (Alternative 6: Cover with New Visually Similar Siding)

Alternative 6, covering the Hangar 1 surface with visually similar siding, is technically and administratively feasible. The required services and material for implementation of this alternative would be readily available, and skilled workers with directly related experience would be available as well. This alternative would provide adequate protection of the public and the environment, as long as the integrity of the new siding is preserved. The alternative, in combination with historic mitigation measures, is in compliance with ARARs. The alternative is effective in the short term. Long-term effectiveness for containing the PCBs that remain in place is subject to routine maintenance, repair, and/or replacement of damaged material. The mobility of the PCBs would be reduced but the volume and toxicity would be unaffected.

### 4.5.7 ALTERNATIVE 7: MEDIA BLAST CONTAMINATED SURFACES

This alternative includes media blasting Hangar 1 to remove the existing coating layers from interior and exterior surfaces of the siding down to the steel core and cover the steel with a protective coating. The siding would be removed, media blasted, reattached, and coated. The alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.7.1 Description (Alternative 7: Media Blast Contaminated Surfaces)

Hangar 1 would be media blasted using standard media blasting technologies to remove the outer layers of the siding down to the steel core. The siding would have to be removed to be media blasted. The siding would be media blasted to the metal core in an appropriate enclosure. The siding would then be reinstalled on the hangar and coated to protect the steel from oxidizing.

#### 4.5.7.2 Implementability (Alternative 7: Media Blast Contaminated Surfaces)

**Technical Feasibility**

This alternative is not technically feasible. It is not feasible to remove and reinstall the siding. The siding panels are attached to the structure with fasteners in such a manner that the fasteners and the siding would be damaged if removal were attempted. The siding would bend, crack, or possibly break off in pieces during removal attempts and could not be reinstalled.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

The services and materials would be available for this alternative. Media blasting is a standard technology, and many companies are able to perform the service at their facility. Removing the siding panels is not possible without damaging them since the siding panels are riveted onto the structural frame. If required, an approved off-site disposal facility would be used for disposal of wastes and debris from the site. A properly licensed waste-hauling company would provide transportation of the wastes to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the waste.

#### 4.5.7.3 Effectiveness (Alternative 7: Media Blast Contaminated Surfaces)

**Overall Protection of Public Health and the Environment**

Although not technically feasible, this alternative is an effective long-term and permanent action for Hangar 1 because the hangar siding would be media blasted down to the steel core. Once the siding was removed, proper use of negative pressure, as well as media blasting facilities with proper sealing and exhaust mechanisms, would protect public health and the environment. On-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California state ARARs, as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Air quality ARARs would be complied

with during implementation of this alternative. A substantial amount of dust would be generated by the media blasting. Because of the potential for dust generation, as a result of taking down the siding panels, several BAAQMD regulations would potentially apply. Visible emissions, emission limit rates for particulate matter, lead emissions, and requirements for asbestos management would all be potentially applicable to this alternative. Implementing engineering controls such as adequately wetting the siding prior to dismantling and carefully lowering the siding panels to the ground would limit emissions during the siding removal. With the implementation of engineering controls and appropriate air monitoring, this alternative would comply with air quality ARARs. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. Storage and decontamination requirements would comply with appropriate TSCA ARARs. Wastes generated in the course of the media blasting would be characterized, managed, and disposed of properly in compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs.

**Historic Mitigation**

This alternative would have an adverse effect on Hangar 1 and may affect the Historic District. Existing side panels would be damaged during removal and media blasting of historic materials, which would not meet the Secretary of the Interior's Standards for Treatment of Historic Properties for Rehabilitation. This alternative may alter character-defining features of the hangar and may have an adverse visual effect on the Historic District. The following aspects of the hangar's historic integrity would be affected: design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and covering the surface with a coating that matches, as closely as possible, the original colors of the hangar to minimize the visual changes caused by the implementation of this alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected primarily through controlling access to the project site. Disposal of project-related wastes at a CERCLA-approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using proper PPE as designated in specific activity hazards analyses. The required construction equipment and

procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite, and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone. Engineering controls would limit dust during removal of the siding. The siding panels would be transported to a qualified faciltiy or media blasted on site in a special structure that would control dust migration.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative is an effective long-term action for Hangar 1 because the hangar siding would be media blasted down to the steel core. The RAO would be achieved because the alternative eliminates the PCB source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of the contaminants through treatment. However, on site, the toxicity, mobility, and volume would be reduced because the source is removed to an approved facility where it could be properly managed to control further release to the environment.

#### 4.5.7.4 Summary (Alternative 7: Media Blast Contaminated Surfaces)

Alternative 7, media blast contaminated surfaces, is not a viable alternative. Although the alternative is administratively feasible, it is not technically feasible. The siding could not be removed without damaging the fasteners and the siding panels. The siding would bend, crack, or possibly break off in pieces and could not be reinstalled properly. The required services and material for implementation of this alternative would be readily available, and skilled workers with directly related experience would be available as well. The alternative would protect public health and the environment, in combination with historic mitigation, maintain compliance with the ARARs, and provide long-term effectiveness. Although it does not use treatment to reduce toxicity, mobility, or volume at the site, it reduces the toxicity, mobility, and volume of PCBs.

### 4.5.8 ALTERNATIVE 8: NEUTRALIZE PCBs USING EMULSIFIED BIMETALLIC EXTRACTION

This alternative is an effective long-term action for Hangar 1 because the materials on the hangar siding would be removed down to the steel core. The Hangar 1 siding would have to be removed, treated, and reinstalled. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.8.1 Description (Alternative 8: Neutralize PCBs Using Emulsified Bimetallic Extraction)

This alternative is based on using emulsified bimetallic extraction, an innovative technology that is under laboratory development by researchers at NASA's Kennedy Space Center and the University of Central Florida. Emulsified bimetallic extraction uses an emulsion containing a solvent (e.g., d-limonene) to penetrate the asphalt-emulsion placed during the 2003 Navy TCRA and a carrier to distribute micro-scale bimetallic particles to extract PCBs and chemically break them down into harmless by-products. NASA performed a laboratory experiment with a small piece of the Hangar 1 siding. They immersed a piece of siding in a bimetallic emulsion using toluene as the carrier. Within 48 hours, all the layers of the siding had sloughed off and settled to the bottom of the container leaving only the steel core of the siding. The settled material was periodically sampled and analyzed for PCBs. There was 99 percent destruction of the PCBs within 49 days. Asbestos and lead were unaffected by this process.

This process would generate a waste stream containing asbestos and lead that would require disposal. In addition, the siding would have to be removed, packaged, and transported to the facility to be treated and then reinstalled. Because the detached siding is a RCRA/TSCA waste, the transportation would be subject to RCRA and TSCA regulations. Also, the facility that treats the siding needs to be a permitted facility to dispose of both RCRA and TSCA waste. Assumptions were made regarding waste classification for purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly.

#### 4.5.8.2 Implementability (Alternative 8: Neutralize PCBs Using Emulsified Bimetallic Extraction)

**Technical Feasibility**

This alternative is not technically feasible. The siding would have to be removed to soak the individual siding panels in the emulsion. It is not feasible to remove and reinstall the siding. The siding panels are attached to the frame with fasteners in such a manner that the fasteners and the siding would be damaged if removal were attempted. In addition, the siding would bend, crack, or possibly break off in pieces during removal attempts and could not be reinstalled properly.

In addition, the alternative is not a proven technology for the hangar. Additional full-scale studies would need to be performed and data evaluated prior to using the technology for the hangar.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

The materials and part of the services for emulsified bimetallic extraction currently are not commercially available. If required, an approved off-site disposal facility would be used for disposal of wastes and debris from the site. A properly licensed waste-hauling company would provide transportation of the wastes to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the waste.

#### 4.5.8.3 Effectiveness (Alternative 8: Neutralize PCBs Using Emulsified Bimetallic Extraction)

**Overall Protection of Public Health and the Environment**

This alternative would provide adequate protection of public health and the environment. The siding panels would be removed and the bimetallic emulsion process would remove all layers from the steel core of the siding (Figure 2-5). The siding panels would then be reinstalled on the hangar with the PCBs removed. During emulsified bimetallic extraction, the work area must be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California state ARARs, as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. This alternative would comply with air quality ARARs with the proper air monitoring during application of the bimetallic emulsion. Because of the potential for dust generation, as a result of taking down the siding panels, several BAAQMD regulations would potentially be applicable. Visible emissions, emission limit rates for particular matter, lead emissions, and requirements for asbestos management would all be potentially applicable to this alternative. Implementing engineering controls such as adequately wetting the siding prior to dismantling and carefully lowering the siding panels to the ground would limit emissions during the siding removal. With the implementation of engineering controls and appropriate air monitoring, this alternative would comply with air quality ARARs. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. Storage and decontamination requirements would comply with appropriate TSCA ARARs. Wastes generated in the course of the siding removal and bimetallic treatment would be characterized, managed, and disposed of properly in compliance with RCRA, TSCA, and state non-RCRA-hazardous waste ARARs.

**Historic Mitigation**

This alternative would have an adverse effect on Hangar 1 and may affect the Historic District. Existing side panels would be damaged during removal and bimetallic extraction may not meet the Secretary of the Interior's Standards for Treatment of Historic Properties for Rehabilitation. This alternative may alter character-defining features of the hangar and may have an adverse

visual effect on the Historic District. The following aspects of the hangar's historic integrity would be affected: design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, preservation of Hangar 1 man-cranes, and covering the surface with a coating that matches, as closely as possible, the original colors of the hangar to minimize the visual changes caused by the implementation of this alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected primarily through controlling access to the project site. Disposal of project-related wastes at a CERCLA-approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using proper PPE as designated in specific activity hazards analyses. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite, and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative is effective in the long term for Hangar 1 because the layers of the Hangar 1 siding would be removed down to the steel core. The RAO would be achieved because the alternative eliminates the source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative reduces the toxicity, mobility, and volume of PCBs through treatment.

#### 4.5.8.4 Summary (Alternative 8: Neutralize PCBs Using Emulsified Bimetallic Extraction)

Alternative 8, using emulsified bimetallic extraction to remove PCBs, is not a viable alternative. The alternative is not technically feasible because the siding would need to be removed for treatment and the technology has not been tested on a representative full-scale level. The alternative is administratively feasible. The required materials and part of the services for this alternative are not commercially available. The alternative protects public health and the environment, maintains compliance with ARARs when applied in combination with historic mitigation measures, and provides both short- and long-term effectiveness. The alternative addresses the toxicity and volume of PCBs through treatment and, because the PCBs would be destroyed, reduces mobility.

### 4.5.9 ALTERNATIVE 9: REMOVE CONTAMINANTS BY CHEMICAL STRIPPING AND COATING

This alternative includes the use of a chemical paint stripper to remove PCBs from the painted surface of the hangar. The Hangar 1 siding would not be removed or replaced. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.9.1 Description (Alternative 9: Remove Contaminants by Chemical Stripping and Coating)

This alternative is based on using a chemical paint stripper to remove the PCBs in the outermost layers of the existing coating on the outer face of the siding. This process would be applied in a paint-on, scrape-off process without dismantling the siding. This process would generate a RCRA/TSCA waste in the form of paint sludge and stripper containing PCBs and lead that would require disposal. Assumptions were made regarding waste classification for purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly. The surface would then be recoated to control the PCBs in the layers closest to the steel core from being exposed and released to the environment. Several layers in the siding are potentially porous. The use of chemical paint stripper to remove PCBs from porous surfaces is not a USEPA-approved, TSCA, self-implementing cleanup method.

#### 4.5.9.2 Implementability (Alternative 9: Remove Contaminants by Chemical Stripping and Coating)

**Technical Feasibility**

This alternative is technically feasible. Chemical stripping of painted surfaces is a common practice. The chemical paint stripping would address the outermost layers containing surficial PCBs, but does not address the innermost layers of the siding that contain PCBs closest to the steel core. Upon removal of the outermost layers, the surface would be recoated to control PCBs from being released to the environment.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

Chemical stripper is commercially available. The application would use standard industry methods used for paint stripping. Skilled workers would also be available to support chemical paint-stripping operations. The sludge would be characterized and disposed of at an approved facility. Other wastes and debris from the site would be transported to appropriate disposal facilities. A properly licensed waste-hauling company would provide transportation of the wastes to the selected facilities.

#### 4.5.9.3 Effectiveness (Alternative 9: Remove Contaminants by Chemical Stripping and Coating)

**Overall Protection of Public Health and the Environment**

This alternative would provide adequate protection of public health and the environment. Chemical stripping would remove the asphalt-emulsion and paint layers from the hangar, which would remove the PCBs from the hangar surface. However, this would expose the layers of the siding that contain PCBs that are closest to the steel core. This surface would be recoated to control the PCBs from being released to the environment. During chemical stripping, the work area would be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

A porous surface is defined as any surface that allows PCBs to penetrate or pass into itself including, but not limited to, paint or coating on metal, corroded metal, fibrous glass, or glass wool. For purposes of removing PCBs from surfaces and generating remediation waste, porous surfaces have different requirements than non-porous surfaces. This alternative would not comply with federal and California state ARARs, as identified in Section 3.5 (and summarized in Tables 3-1 through 3-6), because chemical stripping of paint from porous surfaces is not a designated TSCA decontamination procedure for removal of PCBs from porous surfaces as outlined in 40 C.F.R., Part 761.79 (Decontamination Standards and Procedures). Storage or staging requirements would comply with appropriate TSCA ARARs. Several layers in the siding are potentially porous. However, with regards to waste management, any wastes generated in the course of Alternative 9 implementation could be characterized, managed, and disposed of properly in compliance with TSCA, RCRA, and state non-RCRA-hazardous waste ARARs. This alternative would comply with air quality ARARs with the proper air monitoring during the chemical stripping process. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action.

### Historic Mitigation

This alternative would have an adverse effect on Hangar 1 and may affect the Historic District. It is unknown what the effect would be on the original materials or the resulting appearance. This alternative may alter character-defining features of the hangar and may have an adverse visual effect on the Historic District. The following aspects of the hangar's historic integrity would be affected: design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, and preservation of Hangar 1 man-cranes, and matching the colors of the new proposed surface, as closely as possible, to the original colors of the hangar to minimize the visual changes caused by the implementation of this alternative. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

### Short-term Effectiveness

Public health would be protected in the short term under this alternative. Controlled access to the project site and conducting air monitoring and runoff control during implementation would protect the public health. Disposal of project-related wastes at an approved off-site disposal/incineration facility would protect both the public and the environment. Site workers would be protected by using standard respiratory protection and protective clothing worn during the chemical stripping of the siding. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

### Long-term Effectiveness and Permanence

This alternative would be effective over the long term for as long as the integrity of the material coating the PCBs in the layers closest to the steel core is maintained. This would require routine inspection and maintenance of the coating. The RAO would be achieved by encapsulating the source of PCBs.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of the contaminants through treatment. However, on site, the mobility and volume of lead and PCBs would be reduced because surficial PCBs would be permanently removed to an appropriate approved disposal facility where they could be properly managed to control further release to the environment. PCBs in the layers of siding closest to the steel core would remain.

#### 4.5.9.4 Summary (Alternative 9: Remove Contaminants by Chemical Stripping and Coating)

Alternative 9, chemical stripping of Hangar 1, is not a practical alternative since the use of chemical paint stripper to remove PCBs from porous surfaces is not a USEPA-approved self-implementing cleanup method. The alternative is technically and administratively feasible. The required services and material for implementation of this alternative would be readily available, and skilled workers with directly related experience would be available as well. This alternative would provide adequate protection of the public and the environment. The alternative would not be in compliance with ARARs because chemical stripping of paint from porous surfaces is not a designated TSCA decontamination procedure for porous surfaces as outlined in 40 C.F.R., Part 761.70 (Decontamination Standards and Procedures). The alternative is effective in the short term. Long-term effectiveness for containing the PCBs that remain in place is subject to routine maintenance, repair, or replacement of damaged material. The mobility of the PCBs would be reduced, but the volume of PCBs in the layers of siding closest to the steel core would be unaffected.

### 4.5.10 ALTERNATIVE 10: REMOVE SIDING AND COAT EXPOSED SURFACES

This alternative includes removing the siding from the hangar in order to remove the source of the PCB contamination and coating the exposed structural steel surface to encapsulate the PCBs in paint remaining on the structural steel. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.10.1 Description (Alternative 10: Remove Siding and Coat Exposed Surfaces)

This alternative includes the removal of the siding and the roof from Hangar 1. The work would be accomplished in stages and would require coordination to separate waste and debris according to their contents and potential waste classification. This removal action alternative would begin with demolition of the interior buildings and structures (redwood ceiling and catwalk planks) of the hangar. Any asbestos-containing material (ACM) abatement required as part of interior building demolition would also be performed as necessary. The hangar itself would be used as a containment vessel during these activities. Maintaining the doors and windows in a closed position at this stage of demolition would control the potential release of potential contaminants during demolition of the interior structures. Following the demolition of the necessary interior

features, windows, doors, and other exterior features of the building, except the siding, would be removed, characterized, segregated, and properly disposed of at an approved off-site facility. Next, the siding would be detached from the hangar frame by removing the siding panel fasteners. Roofing would be removed similarly to minimize releases of PCBs and other hazardous materials. As the siding panels and roof are removed, they would be packaged for transit and transported to an approved off-site facility.

All wastes generated would be transported to appropriate disposal facilities for RCRA and TSCA waste. Assumptions were made regarding waste classification for the purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly. Activities would include pressure washing the structural steel, concrete slab flooring of the hangar, and the perimeter stormwater trench followed by analysis and disposal of the rinsate. The final step would be to coat accessible surfaces of the structural steel infrastructure with a primer and finish coat of weather-resistant epoxy to contain the steel paint. The structural steel coating would be subject to inspections and touch-ups every 5 years and recoating every 10 years.

#### 4.5.10.2 Implementability (Alternative 10: Remove Siding and Coat Exposed Surfaces)

**Technical Feasibility**

This alternative is technically feasible. This alternative uses standard demolition, washing, and construction procedures.

**Administrative Feasibility**

Implementation of this alternative is considered administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

The washing of the hangar's exposed surface and the removal of the siding and roofing could be performed using conventional and readily available equipment and standard transportation and disposal practices. The services for cleaning the hangar interior and removing the siding would be readily available in the area. Skilled workers and materials would also be readily available. Approved off-site disposal facilities would be used for disposal of wastes. A properly licensed waste-hauling company would provide transportation of the wastes to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the waste.

#### 4.5.10.3 Effectiveness (Alternative 10: Remove Siding and Coat Exposed Surfaces)

**Overall Protection of Public Health and the Environment**

Protection of public health and the environment would be ensured by removal of the siding and containment of the PCBs in structural steel paint. Potential environmental impacts during the removal action include air and surface water concerns involving the release of PCBs and other hazardous materials during removal of the siding. During removal of the siding, the work area would be properly secured and controlled to protect the public and the environment. The hangar perimeter trench would be used to collect surface water, if necessary. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California State ARARs as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Air quality ARARs would be the primary focus during implementation of this alternative. Storage and decontamination requirements would comply with appropriate RCRA and TSCA ARARs. BAAQMD regulations would be applicable due to the potential for dust generation during removal of side panels. Visible emissions, emission limit rates for particulate matter, lead emissions, and requirements for asbestos management would all be potentially applicable to this alternative. Implementing engineering controls such as adequately wetting the siding prior to dismantling and carefully lowering the siding panels to the ground would limit emissions during the siding removal. With the implementation of engineering controls and appropriate air monitoring, this alternative would comply with air quality ARARs. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action.

The storage, disposal, and management of Hangar 1 siding and roofing would be regulated under RCRA and TSCA. Large quantities of RCRA and TSCA waste would be generated and would require careful oversight to ensure that RCRA/TSCA waste streams were stored in accordance with regulations. Solids, rinsate, and other wastes would be characterized, managed, and disposed of properly. Compliance with RCRA and state non-RCRA-hazardous waste ARARs would be maintained if this alternative were implemented. Assumptions were made regarding waste classification for the purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly.

**Historic Mitigation**

This alternative would have an adverse effect on Hangar 1 and would affect the Historic District because most of the original structure would be altered. This alternative would affect the character-defining architectural features that make this building distinctive under Criterion C. The following aspects of the hangar's historic integrity and that of the Historic District would be

affected: design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, and preservation of Hangar 1 man-cranes. Two additional mitigation measures considered include coating the steel frame with a protective coating colored to match, as closely as possible, the original hangar siding to minimize the visual changes caused by implementation of this alternative, and replacing Hangar 1 exterior features with materials similar in color and appearance to the former siding. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected primarily through controlling access to the project site. Disposal of project-related wastes at an approved off-site disposal facility would protect both the public and the environment. Site workers would be protected by using standard respiratory protection and protective clothing worn during the siding and roofing removal. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

By removing the siding and roofing, most of the PCB source is removed. The alternative would effectively contain the paint containing PCBs on the structural steel over the long term for as long as the integrity of the coating is preserved. The exposed structural steel would require recoating every 10 years. The RAO would be achieved because the alternative complies with the ARARs and encapsulates the remaining PCB source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of the contaminants through treatment. However, on-site toxicity, mobility, and volume of PCBs would be reduced, because the siding, roof, and ceiling would be permanently removed to an approved facility where they would be properly managed to control further release to the environment. Any collected surface water would also be properly disposed.

#### 4.5.10.4 Summary (Alternative 10: Remove Siding and Coat Exposed Surfaces)

Alternative 10, remove siding and coat exposed surfaces, is a viable alternative. The alternative is technically and administratively feasible. The required services and material for implementation of this alternative would be readily available, and skilled workers with directly related experience would be available as well. The alternative is effective in the short term. Long-term effectiveness for containing the remaining PCBs on the structural steel is subject to inspections and touch-ups every 5 years and recoating the structural steel every 10 years. Although it does not use treatment to reduce toxicity, mobility, or volume at the site, this alternative would reduce the toxicity, mobility, and volume of the PCBs on site by transferring waste material to an approved facility, where it would be properly managed to minimize future impacts to the environment.

### 4.5.11 ALTERNATIVE 11: DEMOLISH AND REMOVE HANGAR

This alternative includes the complete demolition of Hangar 1 and off-site transport and disposal of the waste and debris materials. This alternative would control the migration of PCBs from Hangar 1 through complete elimination of the source. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.11.1 Description (Alternative 11: Demolish and Remove Hangar)

Alternative 11 involves the complete demolition of Hangar 1, including its interior features, and the removal of the resulting debris to appropriate off-site disposal facilities. The demolition would be accomplished in stages and would require coordination to separate waste and debris according to their contents and potential waste classification. The demolition of Hangar 1 would begin with the demolition of all interior buildings and structures (redwood ceiling and catwalk planks) of the hangar. Any ACM abatement required as part of interior building demolition would also be performed. The hangar itself would be used as a containment vessel during these activities. Maintaining the doors and windows in a closed position at this stage of demolition would control the release of contaminants during demolition of the interior structure. Following the demolition of the interior features, windows, doors, and other exterior features of the hangar, except the siding, would be removed, characterized, segregated, and properly disposed. Next, the siding panels would be detached from the frame by removing the siding panel fasteners. Roofing would be removed to control the spread of contamination. As the siding panels and roof are

removed, they would be packaged for transit, then transported to an approved off-site facility. Once the siding panels were removed, the steel framework would be demolished, stockpiled, and then transported to an appropriate disposal facility for RCRA and TSCA waste.

Assumptions were made regarding waste classification for purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly. The perimeter concrete apron would also be demolished and properly disposed. Final cleanout would include pressure washing the concrete slab flooring of the hangar and the perimeter stormwater trench followed by analysis and disposal of the rinsate. At the conclusion of field activities, Hangar 1 exterior and interior features would be removed, and no source of PCBs associated with Hangar 1 would remain at the site.

#### 4.5.11.2 Implementability (Alternative 11: Demolish and Remove Hangar)

**Technical Feasibility**

Demolition and removal of the building debris and waste to appropriate facility are technically feasible methods to achieve the RAO. Conventional construction/demolition methodologies and equipment such as cranes, lifts, swing stages, and trucks could be used to demolish the structure and transport the debris to an appropriate facility for off-site disposal. The site is accessible with available space for segregation of the resulting debris, proper packaging, and temporary storage prior to transportation to the off-site disposal facility. Activities associated with this alternative would be conducted safely and in a manner that is protective of human health and the environment. Standard construction/demolition methodologies would be reliable.

**Administrative Feasibility**

The demolition and removal of Hangar 1 is administratively feasible and does not require additional funding sources to complete. Procedural requirements, such as permits, would not be required, as all actions, except transport and disposal, would be conducted on site.

**Availability of Services and Materials**

The demolition of the hangar could be performed using conventional and readily available equipment and standard transportation and disposal practices. Skilled local workers, equipment, and material would be available. An approved off-site disposal facility would be used for disposal of all RCRA, TSCA, and non-RCRA-state hazardous wastes. A properly licensed waste-hauling company would provide transportation of the contaminated waste to the selected facility. Approved facilities located in both California and Nevada have sufficient capacity to manage the waste.

#### 4.5.11.3 Effectiveness (Alternative 11: Demolish and Remove Hangar)

**Overall Protection of Public Health and the Environment**

This alternative would provide total protection of public health and the environment by complete removal of the source of PCBs. Potential environmental impacts during the removal action include air and surface water concerns involving the release of PCBs and other hazardous materials during removal of the siding. During the demolition activities, the work area would be properly secured and controlled to protect the public and the environment. The hangar perimeter trench would be used to collect surface water, if necessary. Also, on-site workers would be protected by using appropriate safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California state ARARs described in Section 3.5. Storage and PCB decontamination requirements would comply with appropriate TSCA ARARs. Air quality ARARs would be the primary focus during implementation of this alternative. In particular, this alternative would have to comply with several BAAQMD regulations associated with controlling dust generated as a result of demolition. Visible emissions, emission limit rates for particulate matter, lead emissions, and asbestos management requirements would all be potentially applicable to this alternative and must be followed.

The storage, disposal, and management of Hangar 1 siding would be regulated under TSCA. Large quantities of TSCA waste would be generated and would require careful oversight to ensure that TSCA waste streams were stored in accordance with regulations. Construction debris, contaminated sediments, rinsate, and other wastes would be characterized, managed, and disposed of properly. Compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs would be maintained if this alternative were implemented.

**Historic Mitigation**

This alternative would have an adverse effect on Hangar 1 and an effect on the Historic District. The alternative would affect all of the hangar's character-defining historic and architectural features that make this building distinctive under Criterion C. The following aspects of the hangar's historic integrity and that of the Historic District would be affected: design, setting, materials, workmanship, feeling, and association. Consideration of these effects and appropriate potential mitigation measures in coordination with OHP, ACHP, and other stakeholders, and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett

Field Museum collections, and preservation of Hangar 1 man-cranes. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

This alternative would provide short-term protection of public health by controlling the release of PCBs and implementing appropriate mitigating measures during Hangar 1 demolition. Possible short-term environmental effects would be generally limited to air and surface water impacts. The air and surface water impact mitigation measures would include implementing stormwater management, spill control, and minimizing the air dispersal of the COCs. Only authorized and properly trained staff would operate the construction equipment used in demolishing the structure and transporting the wastes to the appropriate disposal facility. Site workers would be protected by using appropriate respiratory protection and PPE. A contamination reduction zone would be used to control migration of potential contaminants from the worksite. Disposal of project-related wastes at an approved off-site disposal facility would protect both the public and the environment.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

The demolition and removal of Hangar 1 would provide long-term effectiveness and permanent removal of the identified source of PCB contamination. Following removal of the hangar structure, no future O&M activities would be required. The RAO would be achieved upon completion of the site activities.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of the contaminants through treatment. However, on site, the toxicity, mobility, and volume of PCBs would be eliminated because the source would be permanently removed to an approved facility where it could be properly managed to control further release to the environment. Recycling or smelting of the structural steel was not considered since decontaminating all the surfaces of the riveted structural members to recycling standards outweigh the cost of disposal. Any collected surface water would also be properly disposed.

#### 4.5.11.4 Summary (Alternative 11: Demolish and Remove Hangar)

Alternative 11, demolition and off-site disposal of Hangar 1, is technically and administratively feasible. The required services and material for implementation of this alternative would be readily available, and skilled workers with directly related experience would be available as well. The alternative protects public health and the environment, maintains compliance with ARARs,

when applied in combination with proposed historic mitigation measures, and provides both short- and long-term effectiveness. This alternative is also permanent. Although it does not use treatment to reduce toxicity, mobility, or volume at the site, this alternative eliminates the toxicity, mobility, and volume of PCBs on site by transferring waste to an approved facility, where it would be properly managed to minimize future impacts to the environment.

### 4.5.12 ALTERNATIVE 12: COLLECT STORMWATER RUNOFF AND TREAT ON SITE

This alternative includes collecting and treating stormwater runoff from the exterior surface of Hangar 1 to mitigate PCB migration through stormwater. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.12.1 Description (Alternative 12: Collect Stormwater Runoff and Treat On Site)

This alternative provides capture for all stormwater having contact with the hangar surface through the design, installation, and maintenance of a stormwater collection and treatment system. Hangar surfaces include the walls, roof, and the pavement immediately surrounding the hangar, which could contain PCBs that have separated from the hangar surface. An on-site treatment facility would be designed and built to treat the contaminated stormwater. Large storage tanks would be required to contain the captured stormwater prior to treatment.

#### 4.5.12.2 Implementability (Alternative 12: Collect Stormwater Runoff and Treat On Site)

**Technical Feasibility**

Installation of a large-scale stormwater collection system to capture contaminated stormwater generated as a result of contact with the hangar structure is technically feasible. An on-site treatment system for the contaminated stormwater could be constructed. Large tanks would be required to provide storage capacity to manage the stormwater prior to treatment. Based on collecting stormwater for treatment over an area extending 30 feet beyond the footprint of the hangar, during a 10-year storm event of 0.5-inch/hour, approximately 2,000 gallons per minute (2.88 million gallons per day) would be generated.

**Administrative Feasibility**

This alternative is administratively feasible and does not require additional funding sources to complete. Permits for the off-site discharge of treated stormwater would be required.

**Availability of Services and Materials**

This alternative could be implemented using readily available materials and conventional and readily available equipment. Skilled local workers, equipment, and material would be available. An approved off-site disposal facility would be used for disposal of any removal action-

generated wastes. Treatment/disposal facilities in California have sufficient capacity to manage the waste.

#### 4.5.12.3 Effectiveness (Alternative 12: Collect Stormwater Runoff and Treat On-Site)

**Overall Protection of Public Health and the Environment**

This alternative does not protect public health and the environment. Even though on-site stormwater would be treated, this alternative fails to control PCBs (exposed at greater levels over time as the shell of the hangar disintegrates) from becoming airborne and migrating to other stormwater collection points not connected to the treatment system and possible human and ecological receptors. This exposure pathway has the potential to affect public health, particularly as the hangar ages and the existing coating reaches the end of its life span. Additionally, the alternative does not reduce the generation of waste because there is no source control or elimination. Additional waste would actually be generated as a result of implementing this alternative because a large volume of stormwater is collected and treated following its contact with the hangar surface.

Potential environmental impacts during the removal action would be lower than other alternatives because the hangar surface would remain largely undisturbed. During the construction of the system, the work area would be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California state ARARs as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. ARARs involving water protection and quality would be met if this alternative were implemented.

The storage, disposal, and management of hangar wastes generated by the removal action would be regulated under TSCA. Minimal amounts of RCRA/TSCA waste would be generated. TSCA waste streams would be stored in accordance with regulations. Assumptions were made regarding waste classification for purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly. Sediment, rinsate, and other wastes would be characterized, managed, and disposed of properly. Compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs would be maintained if this alternative were implemented.

**Historic Mitigation**

This alternative would have an effect on Hangar 1 and may affect the Historic District. Although the details of the installation and materials of the "large-scale stormwater collection system" and "on-site treatment system" are unknown, these systems might include visual impacts to the Historic District (including the placement of "large storage tanks" required for storage and treatment).

Careful treatment through design and placement could preserve the hangar's and the Historic District's integrity of design, setting, materials, workmanship, feeling, and association. The effects and historic mitigation have been discussed with OHP, ACHP, and other stakeholders. The analysis of effects and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 C.F.R., Part 68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, and preservation of Hangar 1 man-cranes. In addition to these mitigation measures considered, another mitigation measure would be to design the proposed storage and treatment system to be aesthetically compatible with the Historic District. These mitigation options are described in detail in Section 4.4, Historic Mitigation.

**Short-term Effectiveness**

Public health would be protected during the removal action through general isolation of the project site. Disposal of project-related wastes at approved off-site disposal facilities would protect both the public and the environment. Possible short-term environmental effects would be generally limited to air and surface water impacts associated with the potential release of the COCs. Site workers would be protected by using proper PPE as designated in specific activity hazard analysis. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. Enhanced construction mitigation measures would be implemented for stormwater management, spill control, and for minimizing the air dispersal of the COCs. A contamination reduction zone would be used to control migration of potential contaminants from the worksite.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative is not effective in the long-term removal because the Hangar 1 siding (the source of the PCB contamination) remains in place and airborne contaminant migration is not controlled. The alternative is only effective for capturing on-site stormwater in the long term. Capturing and treating the stormwater would remove this contaminant migration pathway. As the structure ages, it is expected that contaminant concentrations in the stormwater would increase. The alternative is not considered effective over the long term with regards to airborne contaminant migration because of the potential for the siding to crack and/or chip as the hangar ages. Additionally, this alternative requires long-term O&M. On-site personnel would be required to operate the treatment system and to perform needed maintenance on the stormwater collection system. Sampling would be required to ensure that the collection and treatment systems would be working as designed.

The RAO would not be achieved because the source of PCBs would not be controlled or eliminated and PCB contamination would not be decreased. It would only be controlled through on-site treatment. Additionally, this alternative does not address airborne contaminant migration, which is expected to increase as the hangar ages.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of contamination through treatment at the source. This alternative does include capturing and treatment of the stormwater, which would reduce the toxicity, mobility, and volume of PCBs adjacent to Hangar 1.

#### 4.5.12.4 Summary (Alternative 12: Collect Stormwater Runoff and Treat On Site)

Alternative 12, stormwater collection and treatment on site, is technically feasible; however, there would be certain difficulties inherent with treating large quantities of water during the wet season including the construction of large storage tank(s) to hold stormwater prior to treatment. The alternative is administratively feasible; however, on-site treatment would require sampling prior to discharge of treated stormwater off site. The services and materials would be readily available. The alternative would not provide protection of the public and the environment because it does not control airborne migration of PCBs. The alternative, when applied in combination with proposed historic mitigation measures, is compliant with ARARs and is effective in the short term. However, the alternative is not effective in the long term because the siding would remain in place and airborne contaminant migration would not be controlled. The alternative would not reduce the toxicity, mobility, or volume of contaminants through treatment.

### 4.5.13 ALTERNATIVE 13: COLLECT STORMWATER RUNOFF AND TREAT/DISPOSE OFF SITE

This alternative includes collecting and appropriate treatment prior to disposal of stormwater runoff from the exterior surfaces of Hangar 1 off site to mitigate PCB migration through

stormwater. This alternative is described below and evaluated for implementability and effectiveness.

#### 4.5.13.1 Description (Alternative 13: Collect Stormwater Runoff and Treat/Dispose Off Site)

This alternative provides capture for all stormwater having contact with the hangar surface through the design, installation, and maintenance of a stormwater collection system. Hangar surfaces include the walls, roof, and pavement immediately surrounding the hangar, which could contain PCBs that have separated from the hangar surface. Large storage tanks would be required to contain the captured stormwater prior to shipment off site for appropriate treatment prior to disposal.

#### 4.5.13.2 Implementability (Alternative 13: Collect Stormwater Runoff and Treat/Dispose Off Site)

**Technical Feasibility**

Installation of a large-scale stormwater collection system to capture contaminated stormwater generated as a result of contacting the hangar structure is technically feasible. Large storage tanks would be required to provide capacity to manage the stormwater prior to transport off site for appropriate treatment and disposal. Based on collecting stormwater for treatment over an area extending 30 feet beyond the footprint of the hangar, during a 10-year storm event of 0.5-inch/hour, approximately 2,000 gallons per minute (2.88 million gallons per day) would be generated.

**Administrative Feasibility**

This alternative is administratively feasible and does not require additional funding sources to complete.

**Availability of Services and Materials**

This alternative could be implemented using readily available materials and conventional and readily available equipment. Skilled local workers, equipment, and material would be available. An approved off-site disposal facility would be used for disposal of any removal action-generated wastes. Such facilities in California have sufficient capacity to manage the waste.

#### 4.5.13.3 Effectiveness (Alternative 13: Collect Stormwater Runoff and Treat/Dispose Off Site)

**Overall Protection of Public Health and the Environment**

This alternative does not protect public health and the environment. Even though on-site stormwater would be treated, this alternative fails to control PCBs (exposed at greater levels over

time as the shell of the hangar disintegrates) from becoming airborne and migrating to other stormwater systems and possible ecological receptors. This exposure pathway has the potential to affect public health, particularly as the hangar ages and the existing coating reaches the end of its life span. Additionally, the alternative does not reduce the generation of waste because there is no source control or elimination. Additional waste would actually be generated as a result of implementing this alternative because stormwater is collected, transported, appropriately treated, and disposed of following its contact with the hangar surface. Potential environmental impacts during the removal action would be lower than other alternatives because the hangar surface would remain largely undisturbed. During the construction of the system, the work area would be properly secured and controlled to protect the public and the environment. Also, on-site workers would be protected by using appropriate worker safety measures and PPE.

**Compliance with ARARs**

This alternative would comply with federal and California ARARs as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. ARARs involving surface water requirements would be met through the implementation of stormwater BMPs during the removal action. ARARs involving water protection and quality would be met if this alternative were implemented.

The storage, treatment, disposal, and management of hangar wastes generated by the removal action would be regulated under TSCA. Minimal amounts of RCRA/TSCA waste would be generated. TSCA waste streams would be stored in accordance with regulations. Assumptions were made regarding waste classification for purpose of this EE/CA based on previously collected data; however, all waste would be fully characterized prior to off-site disposal and would be managed accordingly. Sediment, rinsate, and other wastes would be characterized, managed, and disposed of properly. Compliance with RCRA, state non-RCRA-hazardous waste, and TSCA ARARs would be maintained if this alternative were implemented.

**Historic Mitigation**

Similar to Alternative 12, this alternative would have an effect on Hangar 1 and may affect the Historic District. Although the details of the installation and materials of the “large-scale stormwater collection system” would be unknown, this system may include visual impacts to the Historic District (including the placement of “large storage tanks”).

Careful treatment through design and placement could preserve the hangar’s integrity of design, setting, materials, workmanship, feeling, and association. The effects and historic mitigation have been discussed with OHP, ACHP, and other stakeholders. The analysis of effects and implementation of historic mitigation would constitute compliance with the substantive requirements of the applicable portions of the NHPA and 36 C.F.R., Part 800.

Mitigation measures would be performed to substantively comply with the NHPA and the Secretary of the Interior’s Standards for the Treatment of Historic Properties (36 C.F.R., Part

68). Mitigation measures considered include preparation of Level 1 HAER documentation, oral histories, preparation and distribution of a virtual Hangar 1 interactive CD, inventory of Moffett Field Museum collections, and preservation of Hangar 1 man-cranes. In addition to these mitigation measures to be considered, another mitigation measure would be to design the proposed storage and treatment system to be aesthetically compatible with the Historic District.

**Short-term Effectiveness**

Public health would be protected during the removal action through general isolation of the project site. Disposal of project-related wastes at approved off-site disposal facilities would protect both the public and the environment. Possible short-term environmental effects would be generally limited to air and surface water impacts associated with the potential release of the COCs. Potential impacts would be mitigated by minimizing disturbance of the surface of the hangar. Site workers would be protected by using proper PPE in accordance with specific activity hazards. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel. Enhanced construction mitigation measures would be implemented for stormwater management, spill control, and for minimizing the air dispersal of the COCs. A contamination reduction zone would be used to control migration of potential contaminants from the worksite.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

**Long-term Effectiveness and Permanence**

This alternative is not effective in the long term because the hangar siding (the source of the PCB contamination) would remain in place and airborne contaminant migration would not be controlled. The alternative would only be effective for capturing stormwater on site in the long term. Capturing and disposing of the stormwater off site would remove this contaminant migration pathway. As the structure ages, it is expected that contaminant concentrations in the stormwater would increase. The alternative is not considered effective over the long term with regards to airborne contaminant migration because of the potential for the siding to crack and/or chip as the hangar ages. Additionally, this alternative requires long-term O&M. On-site personnel would be required to perform needed maintenance on the stormwater collection system.

The RAO would not be achieved because the source of PCBs would not be controlled or eliminated and PCB contamination would not be decreased. It would only be controlled through off-site treatment and disposal. Additionally, this alternative does not address airborne contaminant migration, which is expected to increase as the hangar ages.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

This alternative does not reduce the toxicity, mobility, or volume of contamination through treatment at the source. This alternative does include capturing and treatment of the stormwater; it would reduce the toxicity, mobility, and volume of PCBs adjacent to Hangar 1.

#### 4.5.13.4 Summary (Alternative 13: Collect Stormwater Runoff and Treat/Dispose Off Site)

Alternative 13, stormwater collection and its treatment off site, is technically feasible; however, there would be certain difficulties inherent with capturing and storing large quantities of water, including the construction of large storage tank(s) to hold stormwater prior to treating off site. The alternative is administratively feasible. There would be no barriers to the availability of services and materials. The alternative would not provide protection of the public and the environment because it does not control airborne contamination migration. The alternative is compliant with ARARs and is effective in the short term. However, the alternative is not effective in the long term because the siding remains in place and airborne migration of PCBs is not controlled. The alternative would not reduce the toxicity, mobility, or volume of contaminants through treatment.

## 4.6 SUMMARY OF IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Thirteen potential removal action alternatives were identified and evaluated with respect to implementability and effectiveness. Table 4-1 summarizes the evaluation results. Each element of implementability and effectiveness is listed in the table for each of the 13 alternatives. If the element was satisfied by an alternative, a “Yes” designation was given to the element. If the element was not satisfied by an alternative, the element was given a “No” designation. A designation for community acceptance has not been included in the table; it will be addressed after this document has been made available to the public. The table assists in an analysis to determine which alternatives should remain for further consideration through comparative analysis, including costs, in Section 5.0.

There are five criteria that can lead to the elimination of an alternative at this stage of evaluation if the element has a single “No” designation in Table 4-1. These elements are technical feasibility, administrative feasibility, availability of services, compliance with ARARs, and overall protection of human health and the environment.

An alternative that is not technically feasible or not proven is not considered as a viable alternative. Therefore, any alternative that does not meet this requirement is eliminated from further consideration. Five alternatives fall into this category: Alternative 1, enclose entire hangar inside another structure; Alternative 3, coat with asphalt-emulsion; Alternative 5, coat

with plasma-sprayed oxide; Alternative 7, media blast contaminated surfaces; and Alternative 8, neutralize PCBs using emulsified bimetallic extraction.

An alternative cannot be considered if it is not in compliance with ARARs. One alternative falls into this category: Alternative 9, remove contaminants by chemical stripping and coating.

An alternative that is not protective of human health and the environment cannot be considered. Therefore, any alternative that does not meet this requirement is eliminated from further analysis. Two alternatives fall into this category: Alternative 12, collect stormwater runoff and treat on site, and Alternative 13, collect stormwater runoff and treat/dispose off site.

The elimination of the eight alternatives above leaves five alternatives to compare in detail to determine the appropriate removal action. These include Alternatives 2, 4, and 6, which involve covering or coating the existing siding; Alternative 10, which involves the removal of the Robertson Protected Metal siding and containment of PCBs in the remaining structural steel paint; and Alternative 11, which involves permanent removal of Hangar 1. These alternatives will be further evaluated in Section 5.0.

## 4.7 INTERIOR COATING ALTERNATIVES

To completely address the RAO, methods of mitigating PCBs in the interior components of the hangar (corrugated Robertson Protected Metal siding, redwood ceiling, structural steel, and catwalks) were also evaluated based on two of the three EE/CA criteria, implementability and effectiveness, taking into consideration site-specific conditions. The third EE/CA criteria, cost, is retained for comparative analysis in Section 5.0. The following interior coating alternatives were evaluated:

- Acrylic coating
- Epoxy coating
- Asphalt-emulsion coating
- Polyurethane foam coating

Interior coating alternative selection mirrored the approach established for evaluation of the removal action alternatives. For Alternative 10, the coatings were evaluated for their weather resistant performance because they would be exposed to the weather once the siding was removed. For Alternatives 2, 4, and 6, these Interior coatings were not evaluated based on weather-resistance performance because the siding would stay in place and therefore the coatings would not be exposed to weathering.

In preparation for applying any of the coatings described in this section, accessible surfaces inside the hangar interior would be pressure washed and areas with rusted steel would be mechanically prepared or chemically stripped. In addition, perimeter buildings along the west

and east side of the hangar would be abated, demolished, and properly disposed of as ACM to gain access to the interior siding and lower sections of the structural steel. The buildings along the north end of the hangar, not causing an obstruction, would not be demolished during interior coating activities.

### 4.7.1 Description

**Acrylic Coating**

Two variations of acrylic coatings were evaluated: the first is a Belzona 5131 EG-Cladding, which is a modified acrylic emulsion; and the second is a Sherwin Williams system that utilizes an epoxy primer with an acrylic top coat. The Belzona system consists of one coat of 3921 GSC conditioner and two coats of 5131 EG-Cladding. This is a very flexible system that is impermeable to water and will control the release of PCBs into the environment. It is ideally suited for joints, seams, flashings, and complex roof and dome designs. The Belzona system would require inspections/touch-ups every 5 years and a recoat every 15 years. The Sherwin Williams system consists of a 2-part Macropoxy 920 pre-prime and a Fast Clad® 128 HB acrylic top coat. The Sherwin Williams system was selected for coating the interior siding at a similar hangar in Akron, Ohio, because it had 1) compatible chemical and mechanical characteristics with the Robertson Protected Metal siding, 2) good adhesion, 3) high elongation, and 4) the capability of penetrating and stabilizing the Robertson Protected Metal siding. The Sherwin Williams system would require inspections/touch-ups every 5 years and a recoat every 10 years. Both acrylic coating systems are compatible with the interior surfaces and would be sprayed on.

**Epoxy Coating**

The interior of the hangar would be covered with Neopoxy 5300 series epoxy coating. The epoxy has a 50-year design life, much longer than the 30-year O&M requirement for other potential interior coatings, and requires inspections/touch-ups every 5 years. The epoxy is applied using state-of-the-art epoxy spray equipment capable of reaching and applying epoxy up to 220 feet vertically. Once applied, the material forms a “jointless” solid protective coating.

**Asphalt-Emulsion Coating**

The proposed asphalt-emulsion option for the interior siding and ceiling is the same that was applied to the hangar exterior as an interim removal action during the TCRA in 2003. The proposed asphalt-emulsion system consists of a Henry #229 Aluminum Emulsion to be applied on the interior siding and redwood ceiling, and ICI Dulux Paint 4308-9020 Solvent Borne on the structural steel. The asphalt-emulsion option would require frequent inspections/touch-ups and a recoat every 12 years. The coatings would be sprayed onto all interior surfaces.

**Polyurethane Foam Coating**

This alternative proposes covering the Hangar 1 interior with polyurethane foam. Rigid polyurethane foam is an expanded plastic material that forms an impervious barrier over irregular surfaces. Polyurethane foam's closed cell structure allows it to insulate and waterproof at the same time. Following surface preparation, a primer is first applied on the surface then the foam is sprayed on. Polyurethane foam coatings, as an encapsulant of contaminants, have been tested successfully at a similar hangar in Akron, Ohio.

### 4.7.2 Implementability

**Technical Feasibility**

The acrylic, epoxy, and asphalt emulsion coatings are technically feasible and proven to adhere well on surfaces similar to the interior of the hangar. The polyurethane foam, even though it is proven to be a viable coating for the hangar, is not technically feasible because it creates a fire hazard due to its flammable properties. The fire hazard can be eliminated by isolating the foam with a fireproofing cover, but this would make it prohibitively expensive, and complete isolation of the foam cannot be achieved over all the surfaces of the hangar interior components.

**Administrative Feasibility**

Interior coatings are considered administratively feasible and do not require additional funding sources to complete.

**Availability of Services and Materials**

The materials, services for application, and ongoing O&M would be available for all interior coating alternatives. An approved off-site disposal facility would be used for disposal of contaminated wastes and debris from the site. A properly licensed waste-hauling company would provide transportation of wastes to the selected facilities. Approved facilities located in both California and Nevada have sufficient capacity to manage the waste.

### 4.7.3 Effectiveness

**Overall Protection of Public Health and the Environment**

The interior coating alternatives provide adequate protection of public health and the environment with the proper application and O&M. The interior coatings evaluated are capable of controlling the release of PCBs by providing encapsulation of the interior portions of the hangar and eliminating direct exposure to the atmosphere. The coatings would require long-term O&M activities to preserve their integrity. During application, the work area must be properly secured and controlled to protect the public and the environment. On-site workers would be

protected by using appropriate worker safety measures and PPE. The polyurethane foam presents a fire hazard that poses a safety risk to the public.

### Compliance with ARARs

All interior coating alternatives would comply with federal and California State ARARs as identified in Section 3.5 and summarized in Tables 3-1 through 3-6. Implementation of these alternatives would comply with air quality ARARs. VOC emissions from coatings are quite limited and all evaluated coatings comply with those ARARs. Wastes generated in the course of the coating operations would be characterized, managed, and disposed of properly in compliance with RCRA and state non-RCRA-hazardous waste ARARs.

### Historic Mitigation

Applying coating layers to the interior of the hangar would not have a visual effect on the hangar and hence would neither contribute to, nor detract from, the Historic District.

### Short-term Effectiveness

Public health would be protected primarily through controlled access to the project site, conducting air monitoring, and containment of water and particulates during implementation. Disposal of project-related wastes at approved off-site disposal facilities would protect both the public and the environment. Site workers would be protected by using standard PPE during application of the coating. The required construction equipment and procedures would conform to OSHA specifications. The hangar and other work areas would be properly delineated to limit access by unauthorized personnel only. A contamination reduction zone would be used to control migration of potential contaminants from the worksite and to ensure that unprotected personnel would not be exposed by maintaining a safe distance from the work zone.

Short-term effectiveness would be achieved because this alternative would control the migration of contaminants from the hangar and protect public and worker health during implementation.

### Long-term Effectiveness and Permanence

The interior coatings would be effective over the long term for as long as the integrity of the coatings is preserved. Both acrylic coatings would require inspections and touch-ups every 5 years and recoating 15 years after application (Belzona) and every 10 years (Sherwin Williams). The epoxy coating has a life expectancy of 50 years, but should be inspected every 5 years to ensure that no recoating is required. The asphalt-emulsion would be subject to inspections and touch ups every 2 years and recoating every 3 to 5 years. Polyurethane foam would require inspections and touch-ups every 5 years and no recoating.

The RAO would be achieved because coating the interior complies with the ARARs and encapsulates the PCB source.

**Reduction of Toxicity, Mobility, or Volume through Treatment**

The interior coatings do not reduce the toxicity, mobility, or volume of the contaminants through treatment. Reduction of mobility on the site is addressed by isolating the paint containing PCBs from the atmosphere and controlling it from potentially releasing contaminants to the environment.

### 4.7.4 Summary

The acrylic, epoxy, and asphalt-emulsion coatings are technically feasible, with the exception of the polyurethane foam. The coatings are administratively feasible. The required services and material for applying the coatings are readily available, and skilled workers with directly related experience are available as well. The interior coatings, except for the polyurethane foam, which poses a fire hazard, would provide adequate protection of the public and the environment, as long as the integrity of the coatings is preserved. The coating alternatives comply with federal and state ARARs. The coating alternatives are effective in the short term, but the long-term effectiveness is subject to routine inspection, repair, and periodic recoating except for the epoxy and polyurethane coatings. The mobility of the contaminants would be reduced, but the volume and toxicity would be unaffected.

## 4.8 SUMMARY OF IDENTIFICATION AND ANALYSIS OF INTERIOR COATING ALTERNATIVES

Four potential interior coating alternatives were identified and evaluated with the same criteria applied to the removal action alternatives and described in Section 4.7. Table 4-2 summarizes the evaluation results.

An interior coating alternative that is not technically feasible or not proven is not considered as a viable alternative. Therefore, any alternative that does not meet this requirement is eliminated from further consideration. The polyurethane foam coating alternative falls into this category because it imposes a potential fire hazard to the hangar.

All interior coating alternatives were found to be administratively feasible, had available services and materials, are overall protective of the environment, are compliant with ARARs, and would be effective in the short term. Long-term effectiveness of the interior coatings can be achieved for as long as the integrity of the coatings is preserved.

The elimination of the polyurethane foam coating leaves three coating alternatives for comparative analysis. Because the acrylic, epoxy, and asphalt-emulsion interior coatings are all equally viable alternatives, the most cost-effective alternative will be chosen as the common interior coating cost. The comparative analysis is discussed in Section 5.0.