

## **TABLES**

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## HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS

### TABLE 2-1

#### KEY RESULTS FROM PREVIOUS INVESTIGATIONS AT HANGAR 1

Date (Reference)	Sample Medium	Analyte(s)	Concentration(s)
1997 (PAI, 2001)	Sediment from settling basin	Aroclor-1268	0.05 to 0.8 mg/kg
1999 to 2000 (NASA, 2003b)	Stormwater samples	Aroclor-1268	non-detect
December 2001 B.E.E.	Hangar 1 building materials, exterior panel, 1 sample	Lead	198,570 mg/kg
October 2002 (PAI, 2001)	Sediment from settling basin influent	Aroclor-1268	2,900 µg/kg
	Stormwater from Manhole 107	Aroclor-1268	1.2µg/L
October 2002 (B.E.E., 2003)	Hangar 1 building materials, exterior corrugated panel siding; 18 samples	Aroclor-1260 Aroclor-1268	Maximum 5,500 mg/kg Maximum 188,000 mg/kg
	Various building materials from exterior roofing and surfacing materials; 40 samples	Asbestos	18 samples with 0.7 to 18% asbestos (as chrysotile)
	Hangar 1 building materials, paint chips from doors	Lead	101,160 mg/kg 198,570 mg/kg
	Hangar 1 building materials, window putty; eight initial samples	Aroclor-1260 Aroclor-1268	1.7 to 77 mg/kg* 4 to 409 mg/kg*
	Hangar 1 building materials, window putty; five confirmation samples	Aroclor-1260 Aroclor-1268	non-detect 0.4 to 2.1 mg/kg
	Hangar 1 building materials, five-ply asphalt roof membrane; six samples; five layers per sample	Aroclor-1260 Aroclor-1268	0.9 mg/kg 0.5 mg/kg
	Hangar 1 building materials, roof sealant; one sample	Aroclor-1260 Aroclor-1268	5.7 mg/kg 4.4 mg/kg
	2002 (NASA, 2003b)	Stormwater samples	Aroclor-1268
October 2002 (NASA, 2003b)	Ambient air sampling from outside and inside of hangar; four screening stations	PCB – inside	0.0888 – 0.1115 µg/m <sup>3</sup>
		Lead – inside	non-detect – 0.0127 µg/m <sup>3</sup>
		PCB – outside	non-detect
November 2002 (Harding ESE, 2002)	Ambient air sampling from outside and inside of hangar	PCB – inside	0.0292 – 0.0407 µg/m <sup>3</sup>
		PCB – outside	non-detect
QE Report 2002 December	Hangar 1 concrete floor wipe sample, 83 samples	PCBs	non-detect - 16 µg/100cm <sup>2</sup>
March 2003 (DMJMH+N, 2003)	Rainwater runoff from Hangar 1 siding	Aroclor-1268	3.09 and 6.7 µg/L
	Rainwater from Hangar 1 downspout	Aroclor-1268	0.37 µg/L and non-detect
March 2003 (NASA, 2003b)	Sediment from stormwater collection trench on east side of Hangar 1	Aroclor-1268	65.5 and 72.4 mg/kg

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#### KEY RESULTS FROM PREVIOUS INVESTIGATIONS AT HANGAR 1

Date (Reference)	Sample Medium	Analyte(s)	Concentration(s)
March 2003 DMJMH+N	Hangar 1 interior, dust samples	PCBs	non-detect to 320 mg/kg
July 2003 (NASA, 2003b)	Sediment from stormwater collection trench around Hangar 1; 17 samples	Aroclor-1268	2.2 to 540 mg/kg
		Lead	330 to 2,200 mg/kg
		Zinc	290 to 4,300 mg/kg
B.E.E., 2003	Hangar 1 building materials, upper (black) walls, 8 samples	Aroclor-1260	2 to 12 mg/kg
		Aroclor-1268	5 to 119 mg/kg
May 2003 DMJMH+N	Hangar 1 concrete floor, 1 sample	Aroclor-1260	non-detect
		Aroclor-1268	0.09 µg/quantity
		Lead	4.4 to 5.0 mg/kg
May 2003 DMJMH+N	Hangar 1 concrete floor wipe sample, 4 samples	Lead (SPLP)	non-detect
		Aroclor-1260	non-detect
		Aroclor-1268	non-detect – 21.2 µg/100cm <sup>2</sup>
February 2005	Hangar 1 rain-gutter sediment sample	Lead	non-detect
		Zinc	non-detect
		Asbestos	2% asbestos (as chrysotile)
		Aroclor-1268	250 mg/kg
ISSi, 2005	Hangar 1 building materials, interior paint on steel, 4 samples	Lead	4,520 mg/kg
		Zinc	3,380 mg/kg
		Aroclor-1260	33 to 120 mg/kg
		Aroclor-1268	32 to 94 mg/kg
		Total PCBs	65 to 214 mg/kg
		Lead	Maximum 200,000 mg/kg

**Notes:**

The results that are presented summarize significant findings of previous investigations and do not represent all of the data previously collected.

\* Samples of window putty are likely contaminated with exterior coating material.

**Abbreviations and Acronyms:**

µg/c<sup>2</sup> – micrograms per cubic centimeter

µg/kg – micrograms per kilogram

µg/L – micrograms per liter

µg/m<sup>3</sup> – microgram per cubic meter

B.E.E. – Benchmark Environmental Engineering

Harding ESE – Harding Environmental Science and Engineering

ISSi – Integrated Science Solutions, Inc.

mg/kg – milligrams per kilogram

NASA – National Aeronautics and Space Administration

PAI – Professional Analysis Incorporated

PCB – polychlorinated biphenyl

SPLP – Synthetic Precipitation Leaching Procedure

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-1**

**SUMMARY OF POTENTIAL FEDERAL CHEMICAL-SPECIFIC ARARS<sup>a</sup>**

<b>Requirement</b>	<b>Prerequisite</b>	<b>Citation<sup>b</sup></b>	<b>ARAR Determination</b>	<b>Comments</b>
<b>Clean Water Act of 1977, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)</b>				
Water quality standards.	Discharges to waters of the United States.	40 C.F.R. § 131.36(b) and 131.38	Potentially Applicable	These standards are potentially applicable to discharges of surface water, which may be generated through stormwater runoff at the site.
Water quality standards.	Discharges to the San Francisco Bay/Sacramento–San Joaquin Delta Estuary.	40 C.F.R. § 131.37	Potentially Applicable	This establishes water quality criteria for discharges to surface waters. These standards may be potentially relevant and appropriate for site stormwater discharges.
<b>Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])</b>				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste.	Cal. Code Regs., tit. 22, §§ 66261.21, 66261.22(a)(1), 66261.23, and 66261.24(a)(1), and 66261.100	Potentially Applicable	Potentially applicable for determining whether waste is hazardous. RCRA provides specific guidance for determining both characteristic and listed hazardous wastes. Characteristic wastes will be generated during the response action.

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-1**

**SUMMARY OF POTENTIAL FEDERAL CHEMICAL-SPECIFIC ARARS<sup>a</sup>**

<b>Requirement</b>	<b>Prerequisite</b>	<b>Citation<sup>b</sup></b>	<b>ARAR Determination</b>	<b>Comments</b>
Groundwater Protection Standards: requirements to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern in the uppermost aquifer underlying the waste management area of concern at the POC.	A regulated unit that receives or has received hazardous waste before 26 July 1982 or regulated units that ceased receiving hazardous waste prior to 26 July 1982 where constituents in or derived from the waste may pose a threat to human health or the environment.	Cal. Code Regs., tit. 22, § 66264.94(a)(1) and (3)(c), (3)(d), and (3)(e),	Potentially Relevant and Appropriate	The requirement is relevant and appropriate to vadose zone soil because although the site is not a regulated unit, it contains chemicals similar to what may be found in a regulated unit.
LDRs prohibit disposal of hazardous waste unless treatment standards are met.	Hazardous waste land disposal.	Cal. Code Regs, tit. 22., § 66268.1(f)	Potentially Applicable	Potentially applicable for hazardous waste
Treatment standards including technology requirements before hazardous waste can be disposed to land.	Hazardous waste land disposal.	Cal. Code Regs., tit. 22, § 66268.40	Potentially Applicable	Potentially applicable for hazardous waste
BACT shall be applied to any new source or modified source, which results in an emission with the potential to emit 10 pounds or more per highest day of precursor organic compounds, non-precursor organic compounds, nitrogen oxides, sulfur dioxide, PM <sub>10</sub> or carbon monoxide. This regulation is not applicable, because there are no "sources" on site as defined by the regulation. It is not relevant and appropriate, because any limited duration demolition work will not yield 10 pounds of PM <sub>10</sub> .	BAAQMD air regulations.	Regulation 2, Rule 2-301	Not an ARAR	

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-1**

**SUMMARY OF POTENTIAL FEDERAL CHEMICAL-SPECIFIC ARARS<sup>a</sup>**

<b>Requirement</b>	<b>Prerequisite</b>	<b>Citation<sup>b</sup></b>	<b>ARAR Determination</b>	<b>Comments</b>
A person shall not emit from any source for a period or periods aggregating more than 3 minutes in any hour, a visible emission, which is as dark as or darker than No. 1 on the Ringelmann Chart or of such opacity as to obscure an observer's view to an equivalent or greater degree. All alternatives will use dust control methods to minimize visible emissions. BMPs will be implemented to reduce the potential for emissions from the site.	BAAQMD air regulations.	Regulation 6-301	Potentially Applicable	
Emission rate limits for particulate matter based from general operations are based on process weight rate and since the removal action employs no production processes. The regulation is neither applicable nor relevant and appropriate.		Regulation 6-311	Not an ARAR	
This rule states that architectural coatings must meet standards for maximum VOC content, and lists specific VOC content for each type of coating.		Regulation 8, Rule 3	Potentially Applicable	
Air monitoring for lead, a HAP, is required. Lead emission discharges in excess of 1 microgram per cubic meter, as measured at ground level, are prohibited. This regulation is potentially applicable if structural steel is subject to grinding or scarifying.		Regulation 11, Rule 1	Potentially Applicable	
This rule describes the asbestos management requirements during demolition and renovation projects.		Regulation 11, Rule 2	Potentially Applicable	

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**  
**TABLE 3-1**  
**SUMMARY OF POTENTIAL FEDERAL CHEMICAL-SPECIFIC ARARS<sup>a</sup>**

**Notes:**

<sup>a</sup> Many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARARs table.

<sup>b</sup> Only the substantive provisions of the requirements cited in this table are potential ARARs.

**Abbreviations and Acronyms:**

ARAR – applicable or relevant and appropriate requirement  
BAAQMD – Bay Area Air Quality Management District  
BACT – best available control technology  
BMP – Best Management Practices  
Cal. Code Regs. – California Code of Regulations  
C.F.R. – Code of Federal Regulations  
HAP – hazardous air pollutant  
LDR – land disposal restriction  
PM10 – particulate matter less than 10 microns in diameter  
RCRA – Resource Conservation and Recovery Act  
UTS – universal treatment standard  
VOC – volatile organic compound

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-2**

**SUMMARY OF POTENTIAL STATE CHEMICAL-SPECIFIC ARARs<sup>a</sup>**

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

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-2**

**SUMMARY OF POTENTIAL STATE CHEMICAL-SPECIFIC ARARs<sup>a</sup>**

Requirement	Prerequisite	Citation <sup>b</sup>	ARAR Determination	Comments
		California Water Code § 13307.1(c)	Not an ARAR	California Water Code, Section 13307.1(c) was provided by the Water Board as an ARAR for Hangar 1. However, the scope of this removal is limited to addressing releases of hazardous substances from Hangar 1 into the environment via runoff. The Navy does not intend to address other conditions that may give rise to the need for institutional controls at Site 29.
Incorporated into all regional board basin plans. Designates all groundwater and surface waters of the state as drinking water except where the TDS is greater than 3,000 ppm, the well yield is less than 200 gpd from a single well, the water is a geothermal resource or in a water conveyance facility, or the water cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices.		SWRCB Res. 88-63 (Sources of Drinking Water Policy)	Not an ARAR	SWRCB Resolution No. 88-63 was provided by the Water Board as an ARAR for Hangar 1. The Navy accepts that this resolution may be an ARAR for surface water drinking sources. No discharges to surface water drinking sources will occur, and groundwater remediation is not considered part of this removal action; therefore, this resolution is not applicable to the removal action nor is it relevant and appropriate.

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-2**

**SUMMARY OF POTENTIAL STATE CHEMICAL-SPECIFIC ARARs<sup>a</sup>**

Requirement	Prerequisite	Citation <sup>b</sup>	ARAR Determination	Comments
		Cal. Code Regs., tit. 27, § 20080 et seq. and Cal. Code Regs., tit. 23, § 2510 et seq.	Not an ARAR	27 Cal. Code Regs., 20080 et seq. and 23 Cal. Code Regs., Section 2510 et seq. were provided by the Water Board as ARARs for Hangar 1. Because on-site discharge of waste to land is not part of the proposed removal action, these regulations are not applicable to the removal action nor are they relevant and appropriate.
	Porter-Cologne Water Quality Control Act	27 Cal. Code Regs. 20230	Not an ARAR	27 Cal. Code Regs. 20230 was provided by the Water Board as an ARAR for Hangar 1. This regulation allows inert waste to be discharged at units that are not classified. Because this removal action is conducted under CERCLA, all site waste must be disposed of in accordance with the CERCLA off-site rule; therefore, this regulation is not applicable to the removal action.
Describes the water basins in the San Francisco Bay Region, establishes beneficial uses of groundwater and surface water, establishes WQOs, including narrative and numerical standards, establishes implementation plans to meet WQOs and protect beneficial uses, and incorporates statewide water quality control plans and policies.		Comprehensive Water Quality Control Plan for the San Francisco Bay (Basin Plan) (California Water Code Section 13240)	Potentially Applicable	Substantive requirements pertaining to beneficial uses, WQOs, and certain statewide water quality control plans are potential state ARARs for impacts to surface water during this removal action.

## HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS

### TABLE 3-2

#### SUMMARY OF POTENTIAL STATE CHEMICAL-SPECIFIC ARARs<sup>a</sup>

Requirement	Prerequisite	Citation <sup>b</sup>	ARAR Determination	Comments
<p>Establishes the policy that high-quality waters of the state “shall be maintained to the maximum extent possible” consistent with the “maximum benefit to the people of the State.” It provides that whenever the existing quality of water is better than that required by applicable water quality policies, such existing high-quality water will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies. It also states that any activity that produces or may produce a waste or increased volume or concentration of waste and that discharges or proposes to discharge to existing high-quality waters will be required to meet waste-discharge requirements that will result in the best practicable treatment or control of the discharge.</p>		<p>Statement of Policy with Respect to Maintaining High Quality of Waters in California, SWRCB Res. 68-16</p>	<p>Not an ARAR</p>	<p>SWRCB Resolution 68-16, Statement of Policy With Respect to Maintaining High Quality of Waters in California, was proposed by the Water Board as a potential ARAR, and establishes the policy that high-quality waters of the state “shall be maintained to the maximum extent possible” consistent with “the maximum benefit to the people of the state”.</p> <p>It is the Navy’s position that Res. 68-16 is not an ARAR for existing contamination or further migration of existing contaminant plumes. However, it may be and ARAR if discharges to surface water or groundwater are planned. Because no discharges are planned, Res. 68-16 is not an ARAR.</p>
<p>Describes requirements for RWQCB oversight of investigation and cleanup and abatement activities resulting from discharges of hazardous substances. RWQCB may decide on cleanup and abatement goals and objectives for the protection of water quality and beneficial uses of water within each region. Establishes criteria for “containment zones” where cleanup to established water-quality goals is not economically or technically practicable.</p>		<p>Policies and procedures for investigation and cleanup and abatement of discharges under Cal. Water Code § 13304, SWRCB Res. 92-49</p>	<p>Not an ARAR</p>	<p>Not an ARAR because Cal. Code Regs. tit. 22, § 66264.94(c) is determined to be a federal ARAR and because SWRCB Res. 92-49 is not more stringent.</p>

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-2**

**SUMMARY OF POTENTIAL STATE CHEMICAL-SPECIFIC ARARs<sup>a</sup>**

<b>Requirement</b>	<b>Prerequisite</b>	<b>Citation<sup>b</sup></b>	<b>ARAR Determination</b>	<b>Comments</b>
Incorporated into all regional board basin plans. Designates all groundwater and surface waters of the state as drinking water except where the TDS is greater than 3,000 ppm, the well yield is less than 200 gpd from a single well, the water is a geothermal resource or in a water conveyance facility, or the water cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices.		SWRCB Res. 88-63 (Sources of Drinking Water Policy)	Not an ARAR	This resolution may be an ARAR for surface water drinking sources. However, no discharges to surface water drinking sources will occur. Additionally, groundwater treatment is not a part of this removal action. In light of these facts, this resolution is not an ARAR for the site.
<b>Cal/EPA Department of Toxic Substances Control</b>				
Definition of “non-RCRA hazardous waste.”	Waste.	Cal. Code Regs., tit. 22, § 66261.3(a)(2)(C) or 66261.3(a)(2)(F), 66261.22(a)(3) and (4), 66261.24(a)(2)-(a)(8), 66261.101	Potentially Applicable	Potentially applicable for determining whether a waste is a non-RCRA hazardous waste.
This regulation oversees LDRs for certain classifications of non-RCRA hazardous waste including asbestos and aqueous wastes containing metals, both of which would be generated as a result of the response action.	Hazardous waste LDRs for non-RCRA, California hazardous waste.	22 Cal. Code Regs. 66268.105	Potentially Applicable	Potentially applicable where non-RCRA wastes are generated.

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**  
**TABLE 3-2**  
**SUMMARY OF POTENTIAL STATE CHEMICAL-SPECIFIC ARARs<sup>a</sup>**

**Notes:**

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

**Abbreviations and Acronyms:**

ARAR – applicable or relevant and appropriate requirement  
 Cal. Code Regs. – California Code of Regulations  
 CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act  
 EE/CA – Engineering Evaluation/Cost Analysis  
 gpd – gallons per day  
 LDR – land disposal restriction  
 Navy – Department of the Navy  
 NPDES – National Pollutant Discharge Elimination System  
 NTCRA – non-time-critical removal action  
 ppm – parts per million  
 RCRA – Resource Conservation and Recovery Act  
 STLCL – Soluble Threshold Limit Concentration  
 SWRCB – State Water Resources Control Board  
 TTLCL – Total Threshold Limit Concentration  
 WQO – Water Quality Objectives

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-3**

**SUMMARY OF POTENTIAL FEDERAL LOCATION-SPECIFIC ARARS**

Location	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination	Comments
<b>National Historic Preservation Act of 1966, as Amended (16 U.S.C. § 470–470x-6)<sup>b</sup></b>					
Historic project owned or controlled by federal agency	Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing on the National Register of Historic Places.	Property included in or eligible for the National Register of Historic Places.	16 U.S.C. § 470-470x-6, 36 C.F.R., Pt. 800 40 C.F.R., § 6.301(b)	Potentially Applicable	Hangar 1 is individually eligible for listing in the National Register and is a contributing element of the U.S. Naval Air Station Sunnyvale Historic District, which is listed on the National Register. Applying the substantive provisions of the statute and regulations, the EE/CA will analyze each project alternative for potential effects to Hangar 1 and the historic district. The analysis will aid in determining whether such effects are adverse, and if so, take into account measures that would avoid, minimize, or mitigate adverse effects. The State Historic Preservation Office and the Advisory Council on Historic Preservation are being given an opportunity to comment on the action, and input from the State Historic Preservation Office is being sought. The CERCLA community involvement program will afford stakeholders and interested members of the public the opportunity to provide their input on proposed mitigation.

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-3**

**SUMMARY OF POTENTIAL FEDERAL LOCATION-SPECIFIC ARARS**

Location	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination	Comments
<b>Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703–712)</b>					
Migratory bird area	Protects almost all species of native migratory birds in the U.S. from unregulated “take,” which can include poisoning at hazardous waste sites.	Presence of migratory birds.	16 U.S.C. §703	Potentially Relevant and Appropriate	Except as permitted by regulations, it is unlawful to pursue, hunt, take, capture, offer to sell, barter, purchase, or deliver any migratory bird, nest, or egg. The remedial design process will identify measures necessary to prevent an unregulated “take” of protected bird species. It is the Navy’s position that this act is not legally applicable to Navy actions. However, substantive portions of the Migratory Bird Treaty Act are considered a potentially relevant and appropriate requirement for this removal action. A biological survey will be conducted prior to starting any intrusive work, and the impacts on nesting/roosting raptors will be minimized.

**Notes:**

<sup>a</sup> Only the substantive provisions of the requirements cited in this table are potential ARARs.

**Abbreviations and Acronyms:**

ARAR – applicable or relevant and appropriate requirement  
 CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act  
 C.F.R. – Code of Federal Regulations

EE/CA – Engineering Evaluation/Cost Analysis  
 Navy – Department of the Navy  
 U.S.C. – United States Code

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**  
**TABLE 3-4**  
**SUMMARY OF POTENTIAL STATE LOCATION-SPECIFIC ARARS**

Location	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination	Comments
<b>California Endangered Species Act (Cal. Fish &amp; Game Code §§ 2050–2116)</b>					
		Actions impacting birds or mammals.	Cal. Fish and Game Code § 3005(a)	Potentially Relevant and Appropriate	The taking of birds and mammals, including taking by poison (site contaminants), is prohibited. The taking of birds and mammals will be prevented by containing contaminants and severing the pathway of exposure to siding contaminants. It is the Navy’s position that the federal sovereign immunity has not been waived; therefore, the California Fish and Game Code does not legally apply. However, this requirement is deemed to be a potentially relevant and appropriate state ARAR.

**Notes:**

<sup>a</sup> Only the substantive provisions of the requirements cited in this table are potential ARARs.

**Abbreviations and Acronyms:**

ARAR – applicable or relevant and appropriate requirement

Navy – Department of the Navy

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**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-5**

**SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R & A	TBC	
<b>Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])</b>							
Waste Piles	Allows generators to accumulate solid remediation waste in a U.S. EPA-designated pile for storage only, up to 2 years, during remedial operations without triggering LDRs.	Hazardous remediation waste temporarily stored in piles.	40 C.F.R. § 264.554(d)(1)(i–ii) and (d)(2), (e), (f), (h), (i), (j), and (k)	1,2,5,8,9,10,11			Potentially applicable where solid, non-flowing RCRA wastes are stored in stockpiles.
On-site waste generation	Person who generates waste shall determine if that waste is a hazardous waste	Generator of waste.	Cal. Code Regs., tit. 22, § 66262.10(a), 66262.11	1-12, interior			Potentially applicable for any operation where hazardous waste is generated. Several wastestreams including siding, loose paint, decontamination wastewater, and structural steel may be characterized as RCRA hazardous waste pending analysis due to lead concentrations. The determination of whether wastes generated during the removal activity are hazardous will be made at the time the wastes are generated.

## HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS

### TABLE 3-5

#### SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R & A	TBC	
	Requirements for analyzing waste for determining whether waste is hazardous.	Generator of waste.	Cal. Code Regs., tit. 22, § 66264.13(a) and (b)	1-12, interior			Potentially applicable for waste generated during the removal action.
Hazardous waste accumulation	On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers in accordance with § 66262.171–178 or in tanks, on drip pads, inside buildings, and is labeled and dated, etc.	Accumulate hazardous waste.	Cal. Code Regs., tit. 22, § 66262.34	1-12, interior			Potentially applicable for operations where hazardous waste is generated and transported. The determination of whether wastes generated during response action activities are hazardous will be made at the time the wastes are generated.
Placement of waste in land disposal units	Movement of excavated materials to new location and placement in or on land will trigger LDRs for the excavated waste or closure requirements for the unit in which the waste is being placed.	Materials containing RCRA hazardous wastes subject to LDRs are placed in another unit.	Cal. Code Regs., tit. 22, § 66268.40	1-12, interior			Potentially applicable where waste is placed on land.
Container storage	Containers of RCRA hazardous waste must be: <ul style="list-style-type: none"> <li>• maintained in good condition,</li> <li>• compatible with hazardous waste to be stored, and closed during storage except to add or remove waste.</li> </ul> Inspect container storage areas weekly for deterioration.	Storage of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage elsewhere, in a container.	Cal. Code Regs., tit. 22, § 66264.171, 66264.172, and 66264.173	1-12, interior			Potentially applicable for waste stored in containers on site.

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-5**

**SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R & A	TBC	
<b>Toxic Substances Control Act (15 U.S.C. §§ 2601–2692)</b>							
Disposal of PCBs	Provides expanded decontamination procedures and disposal options for PCBs. Ensures consistency with RCRA land disposal restriction.	Remedial actions involving PCBs.	40 C.F.R. § 761.50.	1-12, interior			This ARAR is potentially applicable to disposal of all TSCA waste, as well as the decontamination of tools and equipment that contact PCBs during the removal action.
	PCB bulk product waste shall be disposed of according to performance-based disposal options either in a TSCA-approved incinerator/landfill or by a TSCA-approved alternative disposal method.		40 C.F.R. § 761.62(a)	1-12, interior			This ARAR is potentially applicable to disposal of all TSCA waste, as well as the decontamination of tools and equipment that contact PCBs during the removal action.
Disposal of PCBs	All PCB articles or containers must be removed and disposed within 1 year of storage.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. § 761.65(a)	1-12, interior			This ARAR is potentially applicable to waste regulated under TSCA
	This ARAR provides expanded decontamination procedures. It is potentially applicable to the decontamination of TSCA waste, as well as the decontamination of tools and equipment that contact PCBs during the removal action.		40 C.F.R. § 761.79	1-12, interior			This ARAR is potentially applicable to disposal of all TSCA waste, as well as the decontamination of tools and equipment that contact PCBs during the removal action.

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-5**

**SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R & A	TBC	
Marking of PCBs	The following must be marked as designated in 40 C.F.R. § 761.45: PCB containers containing greater than 50 ppm PCBs, PCB articles (see 40 C.F.R. § 761.45), PCB article containers, storage areas used to store PCBs, and PCB items for disposal. All marks must be on the exterior of PCB container and must be clearly visible.	PCB article described in 40 C.F.R. § 761.45.	40 C.F.R. § 761.40	1-12, interior			This ARAR is potentially applicable to waste regulated under TSCA
PCB storage on-site prior to disposal	Storage facilities must be constructed with adequate roof and walls; with a floor and curb of impervious materials; without drain valves, floor drains, expansion joints, sewer lines, or other openings; and above the 100-year floodwater level.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. § 761.65(b)	1-12, interior			Storage facilities for PCBs must have adequate roof and walls; with a floor and curb of impervious materials; without drain valves, floor drains, expansion joints, sewer lines, or other openings; and above the 100-year floodwater level. This regulation is potentially applicable if a long-term (1 year) storage area is determined to be necessary to manage TSCA wastes. Wastes that are both RCRA and TSCA will be managed under both regulations, following the more stringent of the two when overlap exists.

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-5**

**SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R & A	TBC	
PCB storage on-site prior to disposal	<p>TSCA wastes in temporary storage (30 days or less) need not comply with the storage regulations in 40 C.F.R. § 761.65(b) for the following items: PCB articles and equipment that are non-leaking; leaking articles and equipment placed in non-leaking containers; PCB containers containing non-liquid PCBs, such as soil, rags, and debris; or liquid PCBs between 50-500 ppm if covered by the Spill Prevention, Control, and Countermeasures Plan.</p> <p>All storage areas must be properly marked.</p> <p>No item of movable equipment used to handle PCBs that comes in contact with PCBs shall be moved from the storage area unless it has been decontaminated as specified in 40 C.F.R. § 761.79.</p> <p>All stored articles must be checked for leaks every 30 days.</p> <p>Containers must be dated when they are placed in storage.</p>	Temporary storage of PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 C.F.R. § 61.65(c)(3), (c)(4), (c)(7), and (c)(8).	1-12, interior			

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-5**

**SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R & A	TBC	
<b>Federal Hazardous Materials Transportation Law (49 U.S.C. §§ 5101–5127)</b>							
Hazardous materials marking, labeling, and placarding	Each person who offers hazardous material for transportation or each carrier that transports it shall mark each package, container, and vehicle in the manner required.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 C.F.R. § 172.300		1-12, interior		Potentially relevant and appropriate for transport of DOT hazardous materials while on site. Shipping requirements must be met prior to off-site transport.
	Each person offering nonbulk hazardous materials for transportation shall mark the proper shipping name and identification number (technical name) and consignee’s name and address.		49 C.F.R. § 172.301				
	Hazardous materials for transportation in bulk packages must be labeled with proper ID number, specified in 49 C.F.R. § 172.101 table, with required size of print. Packages must remain marked until cleaned or refilled with material requiring other marking.		49 C.F.R. § 172.302				
	No package marked with a proper shipping name or ID number may be offered for transport or transported unless the package contains the identified hazardous material or its residue.		49 C.F.R. § 172.303				

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-5**

**SUMMARY OF POTENTIAL FEDERAL ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R & A	TBC	
	The markings must be durable, in English, in contrasting colors, unobscured, and away from other markings.contains the identified hazardous material or its residue.		49 C.F.R. § 172.304		1-12, interior		
	Labeling of hazardous material packages shall be as specified in the list.		49 C.F.R. § 172.400		1-12, interior		Potentially relevant and appropriate for transport of DOT hazardous materials while on site. Shipping requirements must be met prior to off-site transport.
Hazardous materials marking, labeling, and placarding	Each bulk packaging or transport vehicle containing any quantity of hazardous material must be placarded on each side and each end with the type of placards listed in Tables 1 and 2 of 49 C.F.R. § 172.504.	Each person who offers for transport or transports any hazardous materials shall comply with these placarding requirements.	49 C.F.R. § 172.504		1-12, interior		Potentially relevant and appropriate for transport of DOT hazardous materials while on site. Shipping requirements must be met prior to off-site transport.

**Notes:**

<sup>a</sup> Only the substantive provisions of the requirements cited in this table are potential ARARs.

**Abbreviations and Acronyms:**

A – Applicable  
 ARAR –applicable or relevant and appropriate requirement  
 C.F.R. – Code of Federal Regulations  
 DOT – Department of Transportation  
 LDR – land disposal restriction

PCB – polychlorinated biphenyl  
 ppm – parts per million  
 R&A – Relevant and Appropriate  
 RCRA – Resource Conservation and Recovery Act  
 TBC – to be considered  
 TSCA – Toxic Substances Control Act

TSD – treatment, storage, and disposal

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**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-6**

**SUMMARY OF POTENTIAL STATE ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R	TBC	
	<p>The Navy will comply with the substantive provisions of the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (SWRCB Order No. 99-08) identified by the state of California as “TBC” guidance for compliance with the federal CWA and state of California water quality requirements identified as potential water quality ARARs in this EE/CA. Associated reporting and recordkeeping are considered procedural and are, therefore, not substantive.</p> <p>The Navy will also comply with the substantive requirements for development and implementation of BMPs, substantive requirements for the content of an SWPPP, and substantive technical monitoring and analytical requirements (location and frequency of sample collection, parameters to be tested, and analytical methodologies).</p>	NPDES Stormwater Pollution Prevention.	SWRCB Order No. 99-08			1-12, interior	
Disposal of waste	Requires that nonhazardous solid waste as defined at § 20220(a) be discharged to a classified waste management unit.	Discharge of nonhazardous solid waste after 18 July 1997 to land for treatment, storage, or disposal.	Cal. Code Regs., tit. 27, § 20220(b), (c), and (d)	1-12, interior			Potentially applicable for waste that meets the definition of nonhazardous waste. Wastes will be characterized prior to disposal to determine applicability

**HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS**

**TABLE 3-6**

**SUMMARY OF POTENTIAL STATE ACTION-SPECIFIC ARARS**

Action	Requirement	Prerequisite	Citation <sup>a</sup>	ARAR Determination			Comments
				A	R	TBC	
Disposal of non-RCRA waste	Land disposal restrictions for non-RCRA, California-regulated hazardous waste.	Non-RCRA, California-regulated hazardous waste disposal.	Cal. Code Regs., tit. 22, § 66268.105	1-12, interior			Potentially applicable where more stringent than federal ARARs.
Disposal of waste	Requires that designated waste as defined at Cal. Water Code § 13173 be discharged to Class I or Class II waste management units.	Discharges of designated waste after 18 July 1997 (nonhazardous waste that could cause degradation of surface or ground waters) to land for treatment, storage, or disposal.	Cal. Code Regs., tit. 27, § 20210	1-12, interior			Potentially applicable to waste that meets the definition of “designated waste”. All wastes will be characterized prior to disposal.
Waste disposal	Wastes that contain total lead in excess of 350 ppm, copper in excess of 2,500 ppm, or nickel in excess of 200 ppm must be disposed in a Class I landfill.	Waste containing total lead, copper, or nickel in excess of specified levels.	Cal. Health & Safety Code § 25157.8	1-12, interior			Potentially applicable for disposal of wastes. All wastes will be characterized prior to disposal.

**Notes:**

<sup>a</sup> Only the substantive provisions of the requirements cited in this table are potential ARARs.

**Abbreviations and Acronyms:**

ARAR – applicable or relevant and appropriate requirement

BDAT – best demonstrated available technology

BMP – Best Management Practice

Cal. Code Regs. – California Code of Regulations

CERCLA – Comprehensive Environmental

Response, Compensation, and Liability Act

CWA – Clean Water Act

EE/CA – Engineering Evaluation/Cost Analysis

EPA – U.S. Environmental Protection Agency

LDR – land disposal restriction

Navy – Department of the Navy

NPDES – National Pollutant Discharge Elimination System

ppm – parts per million

RCRA – Resource Conservation and Recovery Act

SWPPP – Stormwater Pollution Prevention Plan

SWRCB – State Water Resources Control Board

TBC – to be considered

## HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS

TABLE 4-1

EVALUATION OF REMOVAL ACTION ALTERNATIVES  
HANGAR 1

REMOVAL ACTION ALTERNATIVES	IMPLEMENTABILITY				EFFECTIVENESS				
	Technical Feasibility	Administrative Feasibility	Availability of Services and Materials	Community Acceptance	Overall Protection of Public Health and the Environment	Compliance with ARARs	Short-term Effectiveness	Long-term Effectiveness	Reduction of Toxicity, Mobility, or Volume through Treatment
1. Enclose entire hangar inside another structure	NO	YES	YES	–	YES	YES	YES	YES	NO
2. Cover with rubberized material	YES	YES	YES	–	YES	YES	YES	YES	NO
3. Coat with asphalt-emulsion	NO	YES	YES	–	NO	YES	YES	NO	NO
4. Coat with acrylic coating	YES	YES	YES	–	YES	YES	YES	YES	NO
5. Coat with plasma-sprayed oxide	NO	YES	YES	–	YES	YES	YES	YES	NO
6. Cover with new visually similar siding	YES	YES	YES	–	YES	YES	YES	YES	NO
7. Media blast contaminated surfaces	NO	YES	YES	–	YES	YES	YES	YES	NO
8. Neutralize PCBs using emulsified bimetallic extraction	NO	YES	NO	–	YES	YES	YES	YES	YES
9. Remove contaminants by chemical stripping and coating	YES	YES	YES	–	YES	NO	YES	YES	NO
10. Remove siding and coat exposed surfaces	YES	YES	YES	–	YES	YES	YES	YES	NO
11. Demolish and remove hangar	YES	YES	YES	–	YES	YES	YES	YES	NO
12. Collect stormwater runoff and treat on site	YES	YES	YES	–	NO	YES	YES	NO	NO
13. Collect stormwater runoff and treat/dispose off site	YES	YES	YES	–	NO	YES	YES	NO	NO

**Notes:**

Community acceptance will be determined once the document is made available to the public and after a meeting to receive, record, and respond to public comment. Shading indicates alternatives to be retained for further analysis.

**Abbreviations and Acronyms:**

ARAR - applicable or relevant and appropriate requirement

PCB - polychlorinated biphenyl

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## HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS

### TABLE 4-2

#### EVALUATION OF INTERIOR COATING ALTERNATIVES HANGAR 1

REMOVAL ACTION ALTERNATIVES	IMPLEMENTABILITY				EFFECTIVENESS				
	Technical Feasibility	Administrative Feasibility	Availability of Services and Materials	Community Acceptance	Overall Protection of Public Health and the Environment	Compliance with ARARs	Short-term Effectiveness	Long-term Effectiveness	Reduction of Toxicity, Mobility, or Volume through Treatment
1. Acrylic Coating	YES	YES	YES	-	YES	YES	YES	YES	NO
2. Epoxy Coating	YES	YES	YES	-	YES	YES	YES	YES	NO
3. Asphalt-emulsion Coating	YES	YES	YES	-	YES	YES	YES	YES	NO
4. Polyurethane Foam Coating	NO	YES	YES	-	NO	YES	YES	YES	NO

**Notes:**

Community acceptance will be determined once the document is made available to the public and after a meeting to receive, record, and respond to public comment.  
Shading indicates alternatives to be retained for further analysis.

**Abbreviations and Acronyms:**

ARAR - applicable or relevant and appropriate requirement  
PCB - polychlorinated biphenyl

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## HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS

### TABLE 5-1

#### REMOVAL ACTION ALTERNATIVES COST SUMMARY

Task	Alternative 2 Cover with Rubberized Material	Alternative 4 Coat with Acrylic Coating	Alternative 6 Cover with New Visually Similar Siding	Alternative 10 Remove Siding and Coat Exposed Surfaces	Alternative 11 Demolish and Remove Hangar
Construction					
Direct	\$ 41,151,777	\$ 36,342,877	\$ 42,054,877	\$ 15,781,450	\$ 18,375,150
Indirect	\$ 8,184,700	\$ 5,097,700	\$ 7,155,700	\$ 6,916,700	\$ 7,956,700
<b>Total Construction</b>	<b>\$ 49,336,477</b>	<b>\$ 41,440,577</b>	<b>\$ 49,210,577</b>	<b>\$ 22,698,150</b>	<b>\$ 26,331,850</b>
<b>Total O&amp;M (30 Years)</b>	<b>\$ 167,704</b>	<b>\$ 7,125,642</b>	<b>\$ 96,100</b>	<b>\$ 3,114,647</b>	<b>\$ -</b>
<b>Total Estimated Costs</b>	<b>\$ 49,500,000 <sup>1</sup></b>	<b>\$ 48,570,000 <sup>1</sup></b>	<b>\$ 49,310,000</b>	<b>\$ 25,810,000 <sup>1</sup></b>	<b>\$ 26,330,000</b>

*Notes:*

Cost detail provided in Appendix C; Summary costs are rounded to the nearest \$10,000.00.

Costs accurate within the EPA Guidance range of -30 percent to +50 percent for study estimates.

<sup>1</sup> These costs do not represent the totals within Appendix C due to rounding

*Abbreviations and Acronyms:*

O&M - operation and maintenance

USEPA - U.S. Environmental Protection Agency

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## HANGAR 1 ENGINEERING EVALUATION/COST ANALYSIS

### TABLE 5-2

#### REMOVAL ACTION ALTERNATIVES AND HISTORIC MITIGATION MEASURES COST SUMMARY<sup>1</sup>

Alternative	Removal <sup>5</sup> Action Costs	Historic <sup>2</sup> Mitigation	Removal Action and Historic Mitigation <sup>2</sup> Cost	Other Historic Mitigation	Removal Action, Historic Mitigation, and Other Historic Mitigation Cost
<b>Alternative 2 – Cover with Rubberized Material</b>	<b>\$49,500,000</b>	\$350,000	\$49,850,000	\$3,370,000 <sup>3</sup>	\$53,220,000
<b>Alternative 4 – Coat with Acrylic Coating</b>	<b>\$48,570,000</b>	\$350,000	\$48,920,000	\$0	\$48,920,000
<b>Alternative 6 – Cover with New Visually Similar Siding</b>	<b>\$49,310,000</b>	\$350,000	\$49,660,000	\$3,370,000 <sup>3</sup>	\$53,030,000
<b>Alternative 10 – Remove Siding and Coat Exposed Surfaces</b>	<b>\$25,810,000<sup>6</sup></b>	\$350,000	\$26,160,000	\$14,910,000 <sup>4</sup>	\$41,070,000
<b>Alternative 11 – Demolish and Remove Hangar</b>	<b>\$26,330,000</b>	\$350,000	\$26,680,000	\$0	\$26,680,000

*Notes:*

- <sup>1</sup> Cost detail is provided in Appendix C. Summary costs are within the Environmental Protection Agency Guidance Range of –30 percent to +50 percent for study estimates.
- <sup>2</sup> Level I HAER documentation, oral histories of individuals who worked in the hangar during different eras, virtual Hangar 1 interactive CD, and inventory-catalogue of Hangar 1 collections contained in Moffett Historical Museum.
- <sup>3</sup> Includes costs for applying and maintaining an exterior coat that matches the hangar's original colors.
- <sup>4</sup> Includes costs for covering the hangar structural frame and roof with a siding similar in appearance to the original hangar siding and replacement of windows and access doors.
- <sup>5</sup> Includes costs for preservation of man-cranes.
- <sup>6</sup> Protective coating will be similar in color to the original siding.

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