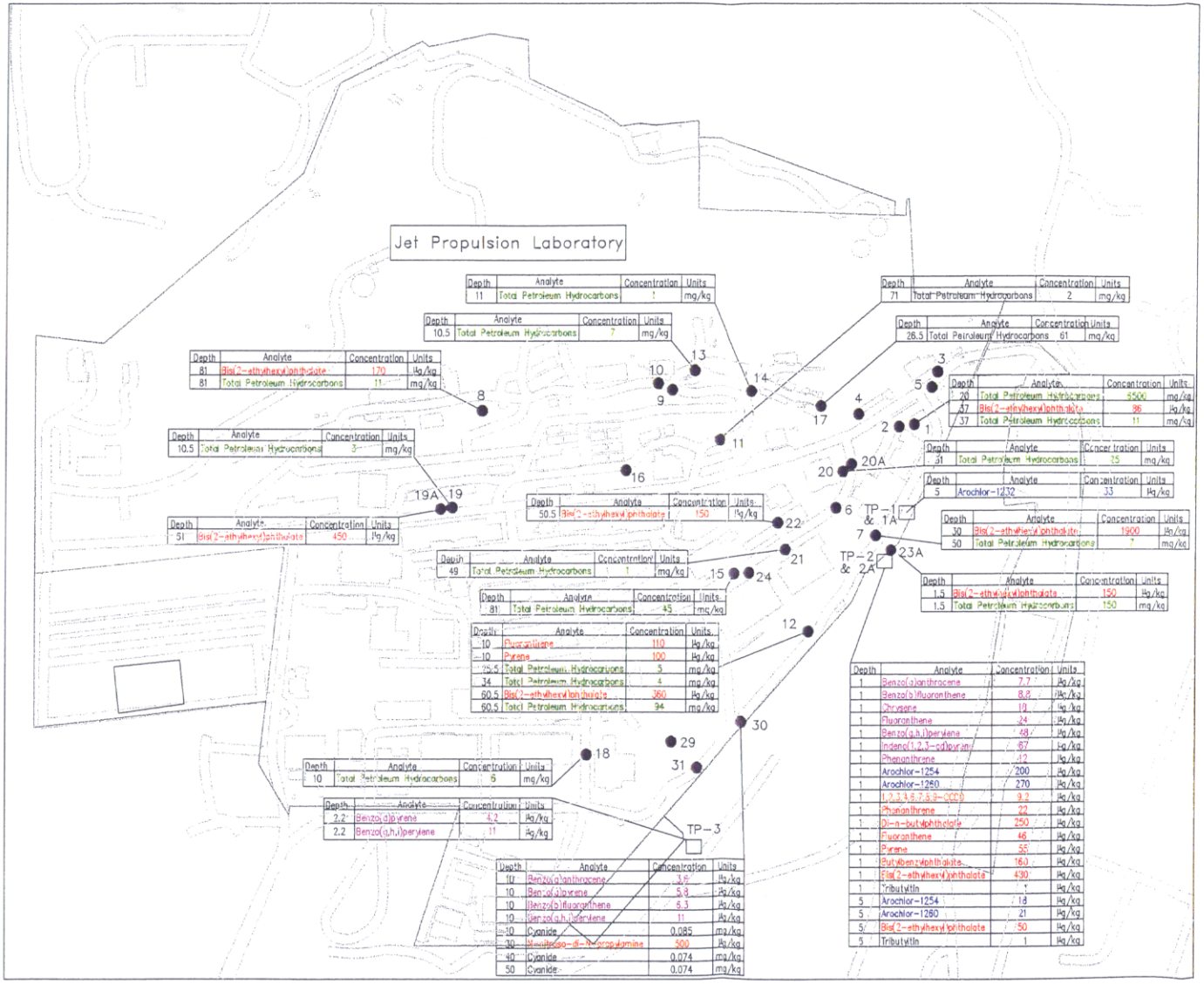

Depth	Analyte	Concentration	Units
11	Total Petroleum Hydrocarbons	1	mg/kg

Depth	Analyte	Concentration	Units
10.5	Total Petroleum Hydrocarbons	7	mg/kg

Depth	Analyte	Concentration	Units
81	Bis(2-ethylhexyl)phthalate	170	µg/kg
81	Total Petroleum Hydrocarbons	11	mg/kg

Depth	Analyte	Concentration	Units
10.5	Total Petroleum Hydrocarbons	3	mg/kg

Depth	Analyte	Concentration	Units
51	Bis(2-ethylhexyl)phthalate	450	µg/kg

Depth	Analyte	Concentration	Units
50.5	Bis(2-ethylhexyl)phthalate	150	µg/kg

Depth	Analyte	Concentration	Units
49	Total Petroleum Hydrocarbons	1	mg/kg

Depth	Analyte	Concentration	Units
81	Total Petroleum Hydrocarbons	45	mg/kg

Depth	Analyte	Concentration	Units
10	Fluoranthene	110	µg/kg
10	Pyrene	100	µg/kg
25.5	Total Petroleum Hydrocarbons	5	mg/kg
34	Total Petroleum Hydrocarbons	4	mg/kg
60.5	Bis(2-ethylhexyl)phthalate	350	µg/kg
60.5	Total Petroleum Hydrocarbons	94	mg/kg

Depth	Analyte	Concentration	Units
10	Total Petroleum Hydrocarbons	5	mg/kg

Depth	Analyte	Concentration	Units
2.2	Benzo(a)pyrene	4.2	µg/kg
2.2	Benzo(g,h,i)perylene	11	µg/kg

Depth	Analyte	Concentration	Units
10	Benzo(a)anthracene	3.6	µg/kg
10	Benzo(a)pyrene	5.8	µg/kg
10	Benzo(b)fluoranthene	6.3	µg/kg
10	Benzo(g,h,i)perylene	11	µg/kg
10	Cyanide	0.085	mg/kg
30	N-nitroso-di-N-propylamine	500	µg/kg
40	Cyanide	0.074	mg/kg
50	Cyanide	0.074	mg/kg

Depth	Analyte	Concentration	Units
71	Total Petroleum Hydrocarbons	2	mg/kg

Depth	Analyte	Concentration	Units
26.5	Total Petroleum Hydrocarbons	61	mg/kg

Depth	Analyte	Concentration	Units
20	Total Petroleum Hydrocarbons	5500	mg/kg
37	Bis(2-ethylhexyl)phthalate	86	µg/kg
37	Total Petroleum Hydrocarbons	11	mg/kg

Depth	Analyte	Concentration	Units
31	Total Petroleum Hydrocarbons	15	mg/kg

Depth	Analyte	Concentration	Units
5	Arochlor-1232	33	µg/kg

Depth	Analyte	Concentration	Units
30	Bis(2-ethylhexyl)phthalate	1900	µg/kg
50	Total Petroleum Hydrocarbons	7	mg/kg

Depth	Analyte	Concentration	Units
1.5	Bis(2-ethylhexyl)phthalate	150	µg/kg
1.5	Total Petroleum Hydrocarbons	150	mg/kg

Depth	Analyte	Concentration	Units
1	Benzo(a)anthracene	7.7	µg/kg
1	Benzo(b)fluoranthene	8.8	µg/kg
1	Chrysene	10	µg/kg
1	Fluoranthene	24	µg/kg
1	Benzo(g,h,i)perylene	48	µg/kg
1	Indeno(1,2,3-cd)pyrene	67	µg/kg
1	Phenanthrene	12	µg/kg
1	Arochlor-1254	200	µg/kg
1	Arochlor-1260	270	µg/kg
1	1,2,3,4,6,7,8,9-OCDD	9.2	µg/kg
1	Phenanthrene	22	µg/kg
1	Di-n-butylphthalate	250	µg/kg
1	Fluoranthene	46	µg/kg
1	Pyrene	55	µg/kg
1	Butylbenzylphthalate	160	µg/kg
1	Bis(2-ethylhexyl)phthalate	430	µg/kg
1	Tributyltin	1	µg/kg
5	Arochlor-1254	18	µg/kg
5	Arochlor-1260	21	µg/kg
5	Bis(2-ethylhexyl)phthalate	50	µg/kg
5	Tributyltin	1	µg/kg

Explanation

- ● 39 — Soil Boring Completed During RI Investigation
- ☐ TP-1 & 1A — Test Pit Location
- Total Petroleum Hydrocarbons (EPA Method 418.1)
- Semivolatile Organic Compounds (EPA Method 8270)
- Polycyclic Aromatic Hydrocarbons (EPA Method 8310)
- Poly Chlorinated Biphenyls (EPA Method 8081)
- Dioxins (EPA Method 8280)
- Cyanide (EPA Method 335.3)
- Tributyltin (No EPA Method)
- mg/kg — Milligrams per kilogram
- µg/kg — Micrograms per kilogram

NOTE:
The higher concentrations from the test pit pairs are presented.

400 200 0 400
SCALE IN FEET

Source: USGS, 7.5 Minute Topographic Map Pasadena, CA 1966, Revised 1988, 1994.

FIGURE 1-26

CONCENTRATIONS OF ORGANIC COMPOUNDS AND CYANIDE DETECTED IN SOIL DURING THE OU-2 RI

Jet Propulsion Laboratory
Pasadena, California

FOSTER WHEELER ENVIRONMENTAL CORPORATION

I:\1572-JPL\DWG\OU2\FS99\FIG1-26.DWG
PLOT/UPDATE: OCT 23 1999 12:24:05

2.0 IDENTIFICATION OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Identified in this section are the potential applicable or relevant and appropriate requirements (ARARs) for the remedial alternatives described in this FS. The identification of ARARS is a key component of the planning, evaluation, and selection of remedial actions. Also identified in this section are other guidance and criteria "to be considered" (TBCs) in selecting a remedy for JPL.

2.1 DEFINITION OF ARARS AND OTHER CRITERIA OR GUIDELINES TO BE CONSIDERED

Section 121(d) of CERCLA requires remedial actions at CERCLA sites to attain any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate unless any such standard requirement, criterion or limitation is waived. Federal ARARs may include requirements under any federal environmental laws (e.g., the Safe Drinking Water Act (SDWA), the Clean Water Act (CWA), and the Clean Air Act (CAA)). Only promulgated, legally enforceable environmental or facility-siting laws and regulations that are timely identified and are more stringent or broader in scope than federal requirements qualify as State ARARs. Several California laws give local agencies the authority to develop regulations that implement state requirements. As a result, some local regulations are also potential ARARs.

According to the National Contingency Plan (NCP) (40 CFR Part 300), "applicable," "relevant and appropriate," and "TBCs" are defined as follows:

- **Applicable requirements** are those standards, requirements, criteria, or limitations in regulations promulgated by federal or state agencies and in federal or state statutes that specifically address a substance, remedial activity, location, or other circumstances found at a CERCLA site.
- **Relevant and appropriate requirements** are those standards, requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a substance, remedial activity, location, or other circumstances at a CERCLA site, address situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.
- **TBCs** consist of advisories, criteria, or guidance developed by federal agencies, states, or local agencies, which are not set forth in regulations or statutes and which may be useful in developing CERCLA remedies. They are not legally binding and do not have status as potential ARARs.

The hazardous substances present, the remedial actions contemplated, the physical characteristics of the site, and other appropriate factors are considered when determining whether a requirement is "applicable" or "relevant and appropriate."

Pursuant to CERCLA §121 and the NCP, only substantive requirements are ARARs. In addition, under CERCLA §121(e), federal, state, and local permits are not required for those portions of a CERCLA response action that are conducted entirely within the CERCLA site.

2.2 CLASSIFICATION OF ARARS

ARARs and TBCs can be divided into three categories: chemical-specific, location-specific, and action-specific. Each potential remedial alternative will be evaluated to determine compliance with identified ARARs or TBCs. The three ARAR and TBC categories are summarized below:

- **Chemical-specific** requirements are health- or risk-based concentration limits, or numerical values for various environmental media (i.e., groundwater, surface water, air, and soil) that are established for a specific chemical. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR include state and federal drinking water standards.
- **Location-specific** requirements set restrictions on certain types of activities based on site characteristics and location. Federal and state location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. An example of a location specific ARAR is a prohibition on the disposal of a hazardous waste in a solid waste landfill.
- **Action-specific** requirements are technology- or activity-based requirements that are triggered by the type of remedial activities under consideration. Examples are RCRA regulations for waste treatment, storage, or disposal.

2.3 IDENTIFICATION OF POTENTIAL ARARS

Neither CERCLA nor the NCP provide explicit standards for determining whether a particular remedy will result in an adequate cleanup at a particular site. Rather, CERCLA recognizes that each site has unique characteristics that must be evaluated to determine which federal or state requirements are ARARs.

Federal, state, and local ARARs and TBCs listed herein are based on the current set of remedial alternatives identified for JPL, on available analytical data, and on a review of potential ARARs for sites with similar circumstances.

Since a remedy for JPL has not yet been selected, all ARARs identified in this section are preliminary. A final determination of the ARARs for JPL will be included in the Record of Decision (ROD).

2.3.1 Potential Chemical-Specific ARARs

Chemical-specific ARARs are health- or risk-based concentration limits that are established for a specific chemical that may be present in the environment, or that may be discharged during remedial activities.

With regard to contaminants of interest at JPL, investigations were carried out to characterize both soil and soil vapor. Several constituents were sporadically detected at low concentrations during the soil investigation. Results of the HHRA indicated only two polychlorinated biphenyl congeners (Arochlor-1254 and Arochlor-1260), arsenic, and hexavalent chromium as preliminary COPCs in the soil. However, these constituents were detected with very low frequency (see Section 1.3.7.2) and/or their potential for migration is considered very low (see Section 1.3.8). Calculated risk associated with these constituents was determined to be negligible and within acceptable EPA target risk ranges (see Section 1.3.9.2). Therefore, the soil COPCs are not considered in this FS.

Results of the soil vapor investigation indicated that VOCs, consisting primarily of carbon tetrachloride (CCl_4), trichloroethene (TCE), 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113), and 1,1-dichloroethene (1,1-DCE) were consistently detected in soil-vapor beneath the north-central portion of the site. Results of the HHRA did not identify any of the VOCs in soil vapor as COPCs. However, because the areal extent of these compounds in soil vapor is relatively substantial and VOCs (notably CCl_4 and TCE) have been of concern in groundwater beneath the site, this FS focuses on the soil-vapor, and considers the four primary VOCs detected. The chemical-specific federal and state ARARs that address these contaminants are discussed below. A summary of potential chemical-specific ARARs, including a brief description, regulatory citation, and a determination as to "applicability" or "relevance and appropriateness" to the proposed remedial action is provided in Table 2-1.

2.3.1.1 Safe Drinking Water Act

EPA has established maximum contaminant levels (MCLs) (40 CFR Part 141) under the Safe Drinking Water Act (SDWA) to protect public health from contaminants that may be found in drinking water sources. MCLs are enforceable standards that are applicable at the tap for water that is delivered directly to 25 or more people or which may be supplied to 15 or more service connections.

Under the SDWA, EPA has also designated maximum contaminant level goals (MCLGs) (40 CFR Part 141), which are health-based goals that may be more stringent than MCLs. MCLGs are based entirely on health considerations and do not take cost or the feasibility of achieving them into account. MCLGs are set at levels, including an adequate margin of safety, where no known or anticipated adverse health effects would occur. MCLs are required to be set as close as feasible to the respective MCLGs, taking into consideration available treatment technologies, analytical capabilities, and other factors (including cost). Although not legally applicable, MCLGs may be relevant and appropriate in circumstances where multiple contaminants or

multiple pathways of exposure present unacceptable health risks (EPA, Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites, OSWER Directive 9283.1-2, 1988b).

Under the NCP (40 CFR Section 300.430(e)(2)(B)) concerning ARARs, remedial actions for groundwater that is a current or potential source of drinking water must generally attain MCLs and nonzero MCLGs. The groundwater at JPL is a current source of drinking water, and, therefore, MCLs and nonzero MCLGs are applicable. The remedy selected for soil contamination at JPL will consider the soil to groundwater contaminant migration pathway, and would require cleanup levels for soil to be protective of beneficial uses of the groundwater.

2.3.1.2 California Safe Drinking Water Act

California has established standards for sources of public drinking water, under the California Safe Drinking Water Act of 1976 (Health and Safety Code (H&SC) §§ 4010.1 and 4026(c)). Some state MCLs are more stringent than the corresponding federal MCLs. In these instances, the more stringent state MCLs are applicable to JPL. There are also some chemicals that lack federal MCLs. Where state MCLs exist, they are also applicable for these chemicals. The California secondary MCLs contained in Title 22 CCR Section 64449 pertain to minimum aesthetic qualities of drinking water. These enforceable limits are applicable to JPL if treated groundwater is directed for domestic use. Therefore, the remedy selected for soil contamination at JPL will consider the soil to groundwater contaminant migration pathway, and would require cleanup levels for soil to be protective of beneficial uses of the groundwater.

2.3.1.3 State Water Resources Control Board, Resolution 68-16

While there are no specific numerical regulatory standards for soil cleanup, Resolution 68-16 (antidegradation policy) applies to the establishment of cleanup levels for groundwater and for soils which threaten water quality. At a minimum, Resolution 68-16 would be relevant and appropriate to remedial alternatives for the unsaturated zone, and would require cleanup levels for soil to be protective of beneficial uses of the groundwater.

2.3.1.4 State Water Resources Control Board, Resolution 92-49

Resolution 92-49 (Cleanup and Abatement Policy) establishes cleanup and abatement policies and procedures for those cases of pollution wherein it is not reasonable to restore water quality to background levels. Under this policy, case-by-case cleanup levels for the restoration of water quality must, at a minimum:

- Consider all beneficial uses of the waters;
- Cannot result in water quality less than that prescribed by the Basin Plan and policies adopted by the State and Regional boards; and
- Be consistent with maximum benefit to the people of the State.

Resolution 92-49 is relevant and appropriate to NASA's remedial action plan for soil in that it addresses protection of groundwater through the soil to groundwater migration pathway.

2.3.1.5 Los Angeles Regional Water Quality Control Board, Los Angeles River Basin Plan

The LARWQCB Basin Plan identifies beneficial uses, water quality objectives, and incorporates SWRCB Policy (Resolution 68-16) "Statement of Policy With Respect to Maintaining High Water Quality in California." The Basin Plan identifies the beneficial uses of surface and groundwater in the Los Angeles River Basin watershed and water quality objectives necessary to protect these beneficial uses. Waters designated as Municipal and Domestic Supply have California MCLs as water quality objectives. Since the Basin Plan identifies Municipal and Domestic Supply as a potential beneficial use of the Arroyo Creek and the Monk Hill Subbasin, California MCLs are applicable to remedial actions involving potential impact to the Monk Hill Subbasin. Therefore, the remedy selected for soil contamination at JPL will consider the soil to groundwater contaminant migration pathway, and would require cleanup levels for soil to be protective of beneficial uses of the groundwater.

2.3.1.6 Title 23 California Code of Regulations, Division 3, Chapter 15, Article 5, Section 2550

This regulation contains monitoring requirements for waste management units, including unauthorized waste discharges to land, and establishes water quality protection standards for corrective action including concentration limits for constituents of concern at background levels unless infeasible to achieve. Cleanup levels greater than background must be the lowest economically and technologically achievable, must consider exposure to other media, and must consider combined toxicologic effects of pollutants. The substantive provisions of this section may be relevant and appropriate for remediation of the unsaturated zone at JPL.

2.3.2 Potential Location-Specific ARARs

Federal and state location-specific ARARs are restraints placed on the activities to be conducted because they are in a specific location. Examples of location-specific ARARs are requirements restricting actions in floodplains, wetlands, historic places, and sensitive ecosystems or habitats. Location-specific ARARs can be considered as a subset of action-specific ARARs. They do not drive the need for a CERCLA action to occur, but, if CERCLA action is otherwise appropriate, they may constrain the range of appropriate action. A summary of potential location-specific ARARs, including a brief description, regulatory citation, and a determination as to "applicability" or "relevance and appropriateness" to the proposed remedial action is provided in Table 2-2. Brief discussions are also provided below.

2.3.2.1 Federal Facilities Compliance Act

The FFCA requires federal facilities, which includes NASA's JPL facility, to comply with all federal, state, and local requirements for solid and hazardous waste management. The FFCA is relevant to remedies that may involve waste management.

2.3.2.2 National Historic Preservation Act

Under this statute, if a federal undertaking affects any district, site, building, structure or object that is listed on or eligible for listing on the National Register of Historic Places, the responsible official shall comply with the procedures for consultation and comment promulgated by the Advisory Council on Historic Preservation. NASA has an obligation to determine if any district, site, building, structure or object listed or eligible to be listed on the National Register of Historic Places would be affected by the proposed remedial activities. It is unlikely that property with historic, architectural, archeological, or cultural value, located within the vicinity of JPL, will be impacted by remedial actions. However, a historic, archeological, architectural and cultural resource review of surrounding and on-site property must be conducted prior to implementation of remedial actions involving structure demolition, construction or intrusive groundwork.

2.3.2.3 Archaeological Resources Protection Act

This statute and implementing regulations establish requirements for the evaluation and preservation of historical and archaeological data that may be destroyed through alteration of terrain as a result of a federal project or a federally approved activity or program. This act is potentially applicable for remedial alternatives that involve construction around archaeological sites. Review of archaeological and historical data of surrounding and on-site property may need to be conducted prior to implementation of remedial actions involving structure demolition or construction or intrusive groundwork.

2.3.2.4 Executive Order 11988 – Protection of Floodplains

In accordance with Executive Order 11988, federal agencies are required to avoid, to the extent possible, adverse effects associated with direct or indirect development in a floodplain. If avoidance is not possible, mitigation of the adverse effect is required. Therefore, this regulation may be applicable to the JPL site depending on the nature of the remedy.

2.3.2.5 Executive Order 11990 – Protection of Wetlands

Executive Order 11990 requires Federal agencies, in carrying out their responsibilities, to take action to minimize the loss, destruction, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. The Arroyo Seco has not been formally identified as a "wetland", and it is unlikely any remediation activities for soil will be conducted in or around Arroyo Seco. Nevertheless, this provision may be applicable to the JPL site depending on the nature of the remedy.

2.3.2.6 Statement of Exclusion

The areal extent of soil contamination and the proposed area for installation and operation of a remediation system for soil, if required, are located on the main JPL campus in previously disturbed and developed areas, which contain no wetlands and provide minimal wildlife habitat. Therefore, certain location-specific ARARs (e.g., the Native American Graves Protection and

Repatriation Act, the Endangered Species Act, Section 404 of the Clean Water Act, and various provisions of the California Fish & Game Code) that might normally be an ARAR of consideration in an FS have been determined to be non-ARARs for this FS.

2.3.3 Potential Action-Specific ARARs

Action-specific ARARs are usually technology- or activity-based requirements for remedial activities. Action-specific ARARs described in this section are intended to address those actions resulting from implementation of remedial alternatives. Remedial alternatives for JPL could include the construction and operation of vapor extraction and treatment facilities and pipelines and other conveyance facilities needed to recover soil vapors from wells in various locations. A summary of potential action-specific ARARs, including a brief description, regulatory citation, and a determination as to "applicability" or "relevance and appropriateness" to the proposed remedial action is provided in Table 2-3. Brief descriptions of potential action-specific ARARs are also presented in the following subsections.

2.3.3.1 Clean Air Act - Local Air Quality Management

The primary treatment technology to be evaluated for addressing VOCs in soil vapor is carbon adsorption. Air emissions from vapor treatment units are regulated by the California Air Resources Board, which implements the federal Clean Air Act (CAA), as well as the air pollution control requirements of the California Health and Safety Code, which includes the state's counterpart to the Clean Air Act, through local air quality management districts. Local districts may impose additional regulations to address local air emission concerns. The local air district for JPL is the South Coast Air Quality Management District (SCAQMD). The SCAQMD has adopted several rules that may be ARARs for air emissions.

SCAQMD Regulation XIII, comprising Rules 1301 through 1313, establishes new source review requirements. Rule 1303 requires that all new sources of air pollution in the district use best available control technology (BACT) and meet appropriate offset requirements. Emissions offsets are required for all new sources that emit in excess of one pound per day.

SCAQMD Rule 1401 requires that best available control technology for toxics (T-BACT) be employed for new stationary operating equipment, so that the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of 10 in 1 million (1×10^{-5}). Contaminants such as carbon tetrachloride and trichloroethene found in the JPL soil vapor are air toxics subject to Rule 1401.

SCAQMD Rules 401, 402, and 403 may also be ARARs for NASA depending on the remedy selected. Rule 401 limits visible emissions from a point source. Rule 402 prohibits discharge of material that is odorous or causes injury, nuisance, or annoyance to the public. Rule 403 limits downwind particulate concentrations.

These regulations may be applicable if the selected remedy involves air emissions from a soil vapor treatment system. It is noted that an SCAQMD permit was applied for and received for the soil-vapor extraction pilot system currently in operation at JPL.

2.3.3.2 Resource Conservation and Recovery Act and the California Hazardous Waste Management Program

The federal Resource Conservation and Recovery Act (RCRA) establishes requirements for the management and disposal of hazardous wastes. In lieu of the Federal RCRA program, the State of California is authorized to enforce its Hazardous Waste Control Act, and implementing regulations (California Code of Regulations (CCR) Title 22, Division 4.5), subject to the authority retained by EPA in accordance with the Hazardous and Solid Waste Amendments of 1984 (HSWA). California is responsible for permitting hazardous waste treatment, storage, and disposal facilities within its borders and carrying out other aspects of the RCRA program. Some of the Title 22 regulations may be ARARs if the selected remedy for JPL results in the generation, storage, treatment, or disposal of hazardous wastes.

2.4 IDENTIFICATION OF GUIDANCE AND CRITERIA TO BE CONSIDERED

Other standards, criteria, or guidance to be considered are federal, state, or local advisories or guidance that do not have the status of potential ARARs. If there are no specific federal or state ARARs for a particular chemical or remedial action, or if the existing ARARs are not considered sufficiently protective, then guidance or advisory criteria may be identified and used to ensure the protection of public health and the environment. TBCs may provide health effects information, technical information on performing or evaluating site investigations or remedial actions, and useful policies for dealing with hazardous substances.

2.4.1 Federal Guidance Documents

Many of the procedures and standards to be used in a CERCLA action are set forth in guidance documents issued by EPA. A list of the types of guidance that are TBC is included in the preamble to the NCP, 55 Federal Register 8765 (March 8, 1990). That guidance, along with current updates of and additions to that guidance, will be considered in this FS and in selecting and implementing the remedy at JPL.

2.4.2 Chemical-Specific TBCs

The following chemical-specific TBCs shall be considered in the evaluation of the potential remedial alternatives.

2.4.2.1 Preliminary Remediation Goals

EPA Region IX has created a set of preliminary remediation goals (PRGs) for a number of organic and inorganic constituents for both industrial and residential site-use scenarios. The PRGs consider a number of exposure pathways. The PRG values are often proposed as

cleanup goals by federal, state and local agencies for responsible parties as an alternative to performing a risk-assessment. PRGs for the JPL soil contaminants have been developed. PRGs may be considered in determining soil cleanup goals for JPL.

2.4.2.2 U.S. EPA Soil Screening Levels

EPA's soil screening guidance document (EPA, 1996) proposes soil screening levels (SSLs) that are to be evaluated in consideration of potential migration of contaminants to underlying potable aquifers. The SSL values are often proposed as cleanup goals by federal, state and local agencies for responsible parties as an alternative to performing a risk-assessment. Generic SSLs for the protection of groundwater are derived using default values in standardized equations presented in the guidance document (EPA, 1996).

According to EPA (1996) guidance, the SSLs were developed using a default dilution-attenuation factor (DAF) of 20 to account for natural processes that reduce contaminant concentrations in the subsurface. Generic SSLs assume no dilution or attenuation between the source and the receptor well (i.e., a DAF of 1). These values can be used at sites where little or no dilution or attenuation of soil leachate concentrations is expected at a site (e.g., sites with shallow water tables, fractured media, karst topography, or source size greater than 30 acres). SSLs for the JPL soil contaminants have been developed and may be considered in determining soil cleanup goals for JPL. However, in general, if an SSL is not exceeded for the migration to groundwater pathway, this pathway may be eliminated from further investigation.

2.4.2.3 RWQCB Interim Site Assessment and Cleanup Guidebook

The California Regional Water Quality Control Board, Los Angeles Region (RWQCB) published their *Interim Site Assessment and Cleanup Guidebook* in May of 1996. The purpose of the guidebook was to present a new approach to the cleanup process: one that reduced time, cut costs, and established a defined endpoint for investigations and cleanup actions. Chapter 5.0 of the guidebook presents soil-screening levels for VOCs in the vadose zone, which are calculated from attenuation factors derived from equations based on chemical and physical parameters. This approach can be used to generate soil-screening levels (SSLs), and is a potential means of evaluating adequate cleanup of soils at JPL. However, at JPL, it has been generally agreed that soil vapor concentrations would be used for determining the nature and extent of contamination. Hence, in order to compare with SSLs, the soil vapor concentrations would have to be converted to a soil concentration. This will be further evaluated prior to finalizing the design for full-scale implementation.

2.4.3 Action-Specific TBCs

The following action-specific TBCs shall be considered in the evaluation of the potential remedial alternatives.

2.4.3.1 RWQCB Interim Site Assessment and Cleanup Guidebook

The RWQCB published their *Interim Site Assessment and Cleanup Guidebook* in May of 1996. Chapter 5.0 presents performance standards for vapor extraction systems. The performance standards from the *Interim Site Assessment and Cleanup Guidebook* for soil vapor extraction systems shall be considered if the remedial alternative at JPL involves soil vapor extraction.

2.4.3.2 RWQCB Interim Guidance for Active Soil Gas Investigation

In February 1997, the RWQCB published their latest *Interim Guidance for Active Soil Gas Investigations*, which updates a previous RWQCB (1992) soil gas guidance. The latest guidance document presents the RWQCB preferred procedures and techniques for soil gas investigation survey design, sample collection, analysis, and reporting. The guidance shall be considered if soil gas sampling and analysis is planned for JPL as part of the remedial alternative.