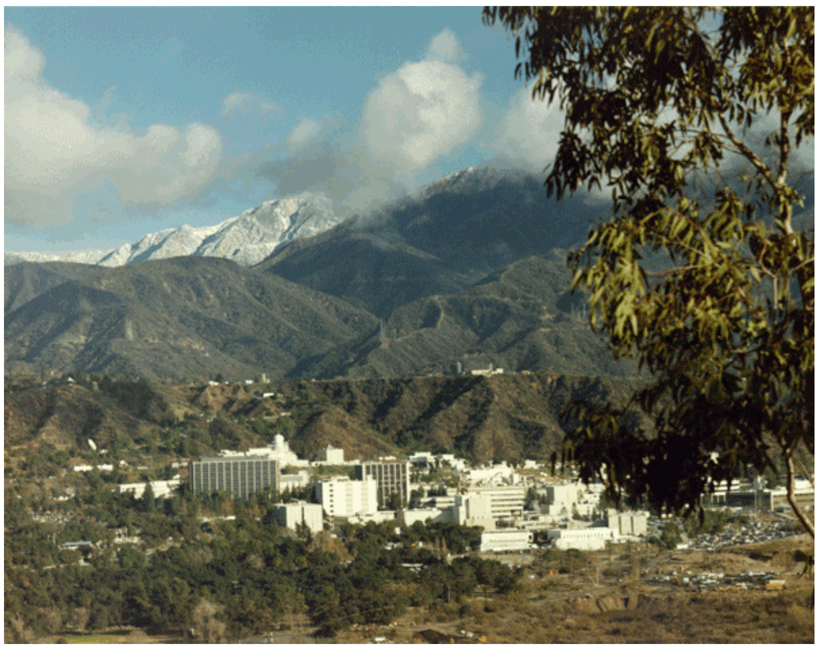
FINAL

RECORD OF DECISION AND REMEDIAL ACTION PLAN FOR OPERABLE UNIT 2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JET PROPULSION LABORATORY
PASADENA, CALIFORNIA

EPA ID# CA9800013030



PREPARED FOR:

National Aeronautics and Space Administration
Management Office, Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91101

September 2002

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4800 Oak Grove Drive
Pasadena, California 91101

PREPARED BY

Battelle
Environmental Restoration Department
505 King Avenue
Columbus, Ohio 43201

September 2002

Part I: DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

SITE NAME:	Jet Propulsion Laboratory (JPL)
EPA ID NUMBER:	CA9800013030; Federal Facility Agreement Docket Number 1998-27
LOCATION:	4800 Oak Grove, Pasadena, California
SITE TYPE:	Federal facility; Government owned, contractor operated
LEAD AGENCY:	National Aeronautics and Space Administration (NASA)
SUPPORTING AGENCIES:	U.S. Environmental Protection Agency (EPA), Region IX; State of California Environmental Protection Agency (Cal-EPA), Department of Toxic Substances Control (DTSC); and California Regional Water Quality Control Board (RWQCB), Los Angeles Region
OPERABLE UNIT:	Operable Unit 2 (OU-2), on-facility vadose zone soil

Statement of Basis and Purpose

This document is published as a Record of Decision (ROD) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 United States Code (USC) § 9601 et seq., and as a Remedial Action Plan (RAP) under the California Health and Safety Code (HSC), § 25356.1. This decision document presents the remedy selected by NASA and the supporting agencies (EPA, DTSC, and RWQCB) for OU-2 at JPL. The remedy was selected in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300.400 et seq. and HSC § 25356.1. The remedy was selected based upon information in the Administrative Record for OU-2.

Assessment of the Site

The remedy selected in this ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

In October 1992, JPL was placed on the National Priorities List (NPL) and, therefore, is subject to the provisions of CERCLA. The JPL site has been divided into 3 OUs. OU-1 is on-facility groundwater at JPL; OU-2 is on-facility vadose zone soil at JPL; and OU-3 is off-facility groundwater adjacent to the JPL property. This decision document addresses OU-2, on-facility vadose zone soil at JPL. The remedy alternatives for OU-1 and OU-3 are being developed separately and will be presented to the public at a later date.

A human health risk assessment (HHRA) and an ecological risk assessment (ERA) were conducted based on the analytical results from soil and soil vapor samples collected during site investigation activities at OU-2. The HHRA and ERA indicated that chemicals present in near-surface soils (<30 below ground surface [bgs]) at JPL do not pose an unacceptable risk to humans or to plant and animal life (FWEC, 1999a). However, volatile organic compounds (VOCs) were detected at elevated concentrations in soil vapor samples collected beneath JPL at depths extending to the water table, and could migrate to groundwater.

The remedial strategy is to use soil vapor extraction (SVE) technology to remove VOCs from the vadose zone. This process will improve the effectiveness and efficiency of the groundwater remedy for OU-1 and OU-3 by reducing chemical mass entering the groundwater.

SVE is a two-step process. In the first step, VOCs in soil vapor are removed from the subsurface by applying a vacuum to an underground well. In the second step, the recovered vapors are filtered out by carbon (or some other treatment process) to prevent their release to the atmosphere. The major components of the selected remedy are as follows:

- Use SVE to remediate VOCs in vadose zone soil.
- Conduct periodic soil vapor sampling to monitor system performance.

The implementation of SVE at OU-2 is protective of human health and the environment and complies with applicable or relevant and appropriate requirements (ARARs). In addition, the EPA has designated SVE as a presumptive remedy for VOCs in soil based on an extensive analysis of technical literature and the results of the remedy selection process at other CERCLA sites (EPA, 1993). The EPA's evaluation concluded that SVE was the preferred remedial approach under most circumstances at sites similar to JPL. NASA's and the supporting agencies' determination to apply SVE to remediate VOCs in soil at OU-2 is supported by the results of a pilot test conducted during the Feasibility Study (FS) (FWEC, 2000).

Remedial Action Plan

The California HSC, Section 25356.1 RAP requirements have been incorporated into the ROD to fulfill state requirements. A copy of the California HSC Section 25356.1 is included as Appendix A.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state ARARs, is cost-effective, and utilizes permanent and alternative treatment technologies to the maximum extent practicable. The remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances through treatment).

NASA intends to remediate VOCs in vadose zone soil at JPL to prevent, to the extent practicable, further migration of VOCs to groundwater. A Five-Year review will be conducted if hazardous substances, pollutants, or chemicals remain at the site above levels that allow for unlimited use and unrestricted exposure. This site and remedy review will be conducted no later than five years after the start of the remedial action (See, 42 USC 9621(c)).

ROD Data Certification Checklist

The following information is included in Part II: Decision Summary of this ROD. Additional information can be found in the Administrative Record.

- Chemicals and their concentrations in vadose zone soil, Section 5.0.
- Baseline risk represented by the chemicals in vadose zone soil, Section 7.0
- Cleanup levels for the chemicals in vadose zone soil, Sections 8.0 and 11.0
- How chemicals in vadose zone soil will be addressed, Section 11.0
- Current and reasonably anticipated future land use assumptions, Section 6.0
- Current and potential future beneficial uses of groundwater, Section 6.0
- Potential land and groundwater use that will be available as a result of SVE, Section 11.0
- Estimated capital, annual operation and maintenance (O&M) and total present worth costs for SVE, Section 11.0
- Number of years that SVE is expected to operate, Sections 9.0 and 11.0
- Key factors that lead to selecting SVE, Sections 9.0, 10.0, 11.0, and 12.0.

FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, JET PROPULSION LABORATORY:

Robert Parker, Director
NASA Management Office
Jet Propulsion Laboratory

9/23/02
Date

FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY:

Deborah Jordan, Chief
Federal Facilities and Site Cleanup Branch
U.S. Environmental Protection Agency, Region IX

9/19/02
Date

FOR THE STATE OF CALIFORNIA:

Sayareh Amir, Chief
Southern California Cleanup Operations, Glendale Office
Department of Toxic Substances Control

6/11/02
Date

Dennis A. Dickerson
Executive Officer
California Regional Water Quality Control Board
Los Angeles Region

July 12, 2002
Date

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ACRONYMS AND ABBREVIATIONS

AR	Administrative Record
ARAR	Applicable or Relevant and Appropriate Requirement(s)
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
Cal-EPA	State of California, Environmental Protection Agency
CalTech	California Institute of Technology
CCl_4	carbon tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DCE	dichloroethene
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
ERA	ecological risk assessment
Freon™113	1,1,2-trichloro-1,2,2-trifluoroethane
FS	feasibility study
FWEC	Foster Wheeler Environmental Corporation
GAC	granular activated carbon
HI	hazard index
HHRA	human health risk assessment
HQ	hazard quotient
HSC	Health and Safety Code
JPL	Jet Propulsion Laboratory
mg/kg	milligram per kilogram
NA	not applicable
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act of 1969
NFA	no further action
NPL	National Priorities List

O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
R&D	research and development
RAO	remedial action objective
RAP	remedial action plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act of 1986
SCAQMD	South Coast Air Quality Management District
SVE	soil vapor extraction
SVOC	semivolatile organic compounds
TCE	trichloroethene
TPH	total petroleum hydrocarbons
USC	United States Code
VOC	volatile organic compound

Part II: DECISION SUMMARY

1.0: SITE NAME, LOCATION, AND DESCRIPTION

SITE NAME:	Jet Propulsion Laboratory (JPL)
EPA ID NUMBER:	CA9800013030; Federal Facility Agreement Docket Number 1998-27
LOCATION:	4800 Oak Grove, Pasadena, California
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OPERABLE UNIT:	Operable Unit 2 (OU-2), on-facility vadose zone soil

JPL is located within the city boundaries of La Cañada Flintridge, California; however, JPL has a Pasadena mailing address. Figure 1-1 shows the location and boundaries of the JPL site, which comprises approximately 176 acres. Federally owned land consists of approximately 156 acres, with the remaining land leased for parking from the City of Pasadena and the Flintridge Riding Club. The surrounding area is primarily residential with some light commercial operations. The site is bordered by the San Gabriel Mountains to the north, an equestrian club and Fire Station to the southwest, residential neighborhoods to the west, and the Arroyo Seco wash to the east and southeast. JPL is located in the Raymond Basin Watershed, which serves as a source of drinking water for several communities in the area. Using data from the United States Census 2000, it is estimated that approximately 44,000 people reside within 3 miles of JPL.

The Army developed and contracted with JPL between 1939 and 1958 as a research and development (R&D) laboratory for ordnance activities. On December 3, 1958, jurisdiction was transferred to NASA at which time R&D efforts at JPL began to focus on aeronautics, space technology, and space transportation. Current R&D activities at JPL also include remote sensing, robotic space exploration, astrophysics, and planetary science. In 2001, the JPL workforce consisted of approximately 5,175 employees and contractors.

NASA is the lead federal agency for selecting, implementing, and funding remedial activities at JPL, while EPA, DTSC, and RWQCB provide oversight and technical assistance.

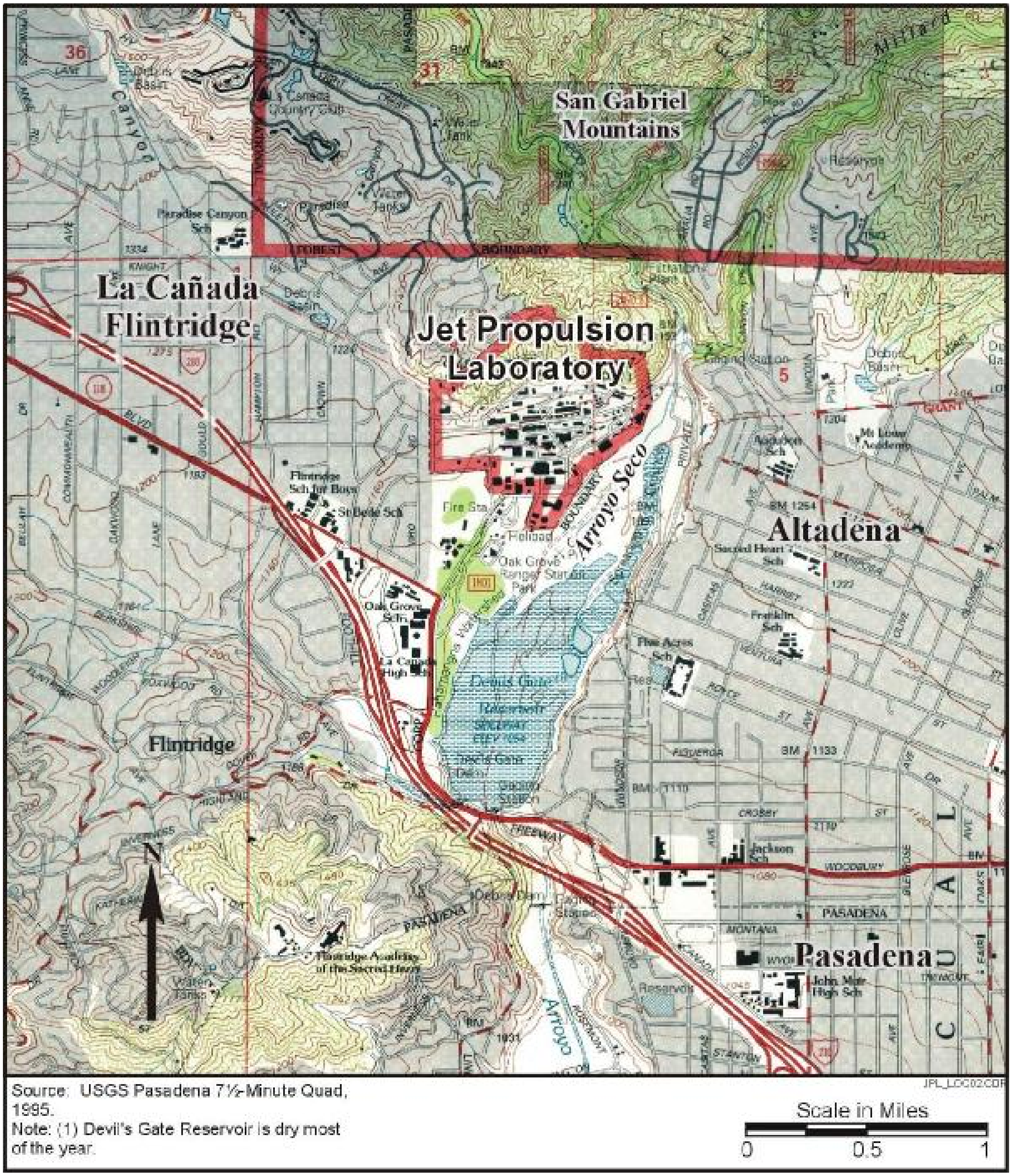


Figure 1-1. Map of JPL and the Surrounding Area

2.0: SITE ASSESSMENT AND CHARACTERIZATION

During historic operations at JPL, various chemicals (including chlorinated solvents, solid rocket fuel propellants, cooling tower chemicals, sulfuric acid, Freon™, and mercury) and other materials were used at the site. During the 1940s and 1950s, many buildings at JPL maintained subsurface seepage pits for disposal of sanitary wastes and laboratory chemical wastes collected from drains and sinks within the buildings. The Remedial Investigation (RI) identified 40 seepage pits, 5 waste pits, and 4 discharge points at the site that were used during historic operations (Foster Wheeler Environmental Corporation [FWEC], 1999a). Some of the seepage pits received volatile organic compounds (VOCs) and other waste materials that are currently found in vadose zone soil and soil vapor beneath JPL. In the late 1950s and early 1960s, a sanitary sewer system was installed at JPL to handle sewage and wastewater, and the use of seepage pits for sanitary and chemical waste disposal was discontinued. Today, laboratory chemical wastes are either recycled or sent off-site for treatment and disposal at regulated, Resource Conservation and Recovery Act (RCRA)-permitted hazardous waste facilities.

In 1980, the analyses of groundwater revealed the presence of VOCs in City of Pasadena water-supply wells located southeast of JPL in the Arroyo Seco. At about the same time, VOCs were detected in two water-supply wells used by the Lincoln Avenue Water Company, located east of the Arroyo Seco (FWEC, 1999a). In 1988, a Preliminary Assessment/Site Inspection was completed at JPL, which indicated that further site characterization was warranted (Ebasco, 1988a and 1988b). Subsequent site investigations were conducted at JPL (Ebasco, 1990a and 1990b) and VOCs were detected in on-facility groundwater at levels above drinking water standards. In 1992, JPL was placed on the National Priorities List (NPL) of sites subject to regulation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (47189-47187 *Federal Register*, 1992, Vol. 57, No. 199).

After being placed on the NPL, potential source areas were investigated at OU-2 during the RI, which lasted from 1994 to 1998 (FWEC, 1999a). Both soil samples and soil vapor samples were collected during the RI. Soil samples were analyzed for metals, semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins, furans, and total petroleum hydrocarbons (TPH). Near-surface soils were also analyzed for VOCs. Soil vapor samples were analyzed for VOCs. Detailed discussions of investigations related to soil and soil vapor at JPL are contained in the RI/Feasibility Study (FS) Work Plan (Ebasco, 1993) and in the RI report (FWEC, 1999a).

The RI was followed by the FS (FEWC, 2000), which involved risk evaluation, data interpretation, and conducting a soil vapor extraction (SVE) pilot test. The SVE pilot test was used to determine the feasibility of SVE for remediating VOCs in soil beneath JPL. The pilot test involved the installation of one SVE well and the use of granular activated carbon for vapor treatment. Twelve vapor monitoring points were used to assess vacuum responses and collect soil vapor samples to determine the effectiveness of the SVE pilot test. Detailed results of the SVE pilot-scale test are presented in the FS (FEWC, 2000). Over 200 pounds (lbs) of VOCs were removed during the pilot test.

3.0: COMMUNITY PARTICIPATION

The communities surrounding JPL have been informed about the progress of environmental programs at JPL. The methods used by NASA to ensure that communities are properly informed and included in the CERCLA process are described in the *Superfund Community Relations Plan* (NASA, 1994).

The RI report (FWEC, 1999a), FS (FWEC, 2000), and other documentation for OU-2 at NASA JPL were made available to the public via the Administrative Record maintained at JPL and the information repositories maintained at the JPL Library, Altadena Public Library, the La Cañada Flintridge Public Library, and the Pasadena Central Library. The index to the Administrative Record for OU-2 is included in Appendix B.

The Proposed Plan (NASA, 2001) was prepared and mailed on May 9, 2001 to 4,759 residences, businesses, and organizations in Altadena, La Cañada Flintridge, and Pasadena. Three public meetings were then held to present the Proposed Plan to the public. Two were held at JPL on May 12 and 14, 2001 and one was held on June 20, 2001 at the Eliot Middle School in Altadena, California. The public comment period was open from May 7 through July 11, 2001.

Public notifications of the May 12 and 14, 2001 meetings were included in the Proposed Plan and newspaper announcements. In addition, on May 1, 2001, notification of the Proposed Plan and public meeting was e-mailed to approximately 5,000 JPL employees. Public notification of the meeting on June 20 was provided through a mailer sent on May 30, KPCC radio announcements on June 18 and 19, and newspaper notices. The newspaper notices appeared in local newspapers, as listed in Table 3-1. The text of these public notices is included in Appendix C.

Table 3-1. Summary of Newspaper Meeting Announcements

Newspaper	May 12 and 14, 2001 Meeting Announcements	June 20, 2001 Meeting Announcements
Foothill Leader	April 28; May 5, 12	NA
Pasadena Star-News	May 7 to 11	June 9 to 15
Glendale News-Press	April 28; May 5, May 7 to 11	June 6, 9, 13, and 16
La Cañada Sun	May 10	June 7 and June 14
Los Angeles Times	May 11	NA

NA = not applicable.

Copies of the public meeting transcripts are included in Appendix D. NASA's responses to the comments received during the public comment period are included in the Responsiveness Summary, Part III of this Record of Decision (ROD). Also, copies of the Responsiveness Summary were mailed to each community member present at the June 20 public meeting, if a mailing address was provided.

4.0: SCOPE AND ROLE OF OPERABLE UNIT 2

This ROD addresses OU-2, which comprises the vadose zone soil located at JPL. The vadose zone is the region located between the ground surface and the water table. Results from the RI showed that chemicals are currently found within the vadose zone beneath JPL, but that the vadose zone soils located adjacent to the JPL property have not been adversely impacted by chemicals from JPL.

NASA's cleanup plan for JPL includes concurrently addressing remediation of soil and groundwater. The potential remedies for the groundwater are still being evaluated at this time and will be addressed in a separate decision document. However, the use of soil vapor extraction at OU-2 may enhance the overall site cleanup strategy by removing VOCs from the vadose zone, thus reducing the source of VOCs that may migrate to the groundwater.

5.0: SITE CHARACTERISTICS (OPERABLE UNIT 2)

5.1 JPL and Operable Unit 2 Area Setting

A description of the area setting of JPL OU-2, including a detailed discussion of the regional demographics, climate, physiography, geology, hydrology, hydrogeology, natural resources, and cultural resources can be found in the National Environmental Policy Act of 1969 (NEPA) Values Assessment, which is provided in Appendix E.

5.2 Sources, Nature, and Extent of Chemicals in Soil at JPL

Various seepage pits and other areas were identified at JPL as possible locations used for chemical waste disposal during historic operations (as shown in Figure 5-1). The nature and extent of VOCs in vadose zone soil was determined through both soil vapor surveys and soil sampling conducted at the site during the RI. More detailed information on the sampling strategy can be found in the RI report (FWEC, 1999a).

5.2.1 Soil Vapor Sampling Results

During the RI and periodic soil vapor monitoring, four VOCs were frequently detected in soil vapor samples at elevated concentrations. These four VOCs are carbon tetrachloride (CCl_4), 1,1,2-trichloro-1,2,2-trifluoroethane (Freon™113), trichloroethene (TCE), and 1,1-dichloroethene (DCE). The estimated horizontal and vertical extent of VOCs in soil vapor is shown in Figures 5-2 and 5-3. More detailed information on the analytical results from soil vapor sampling is included in the RI report (FWEC, 1999a).

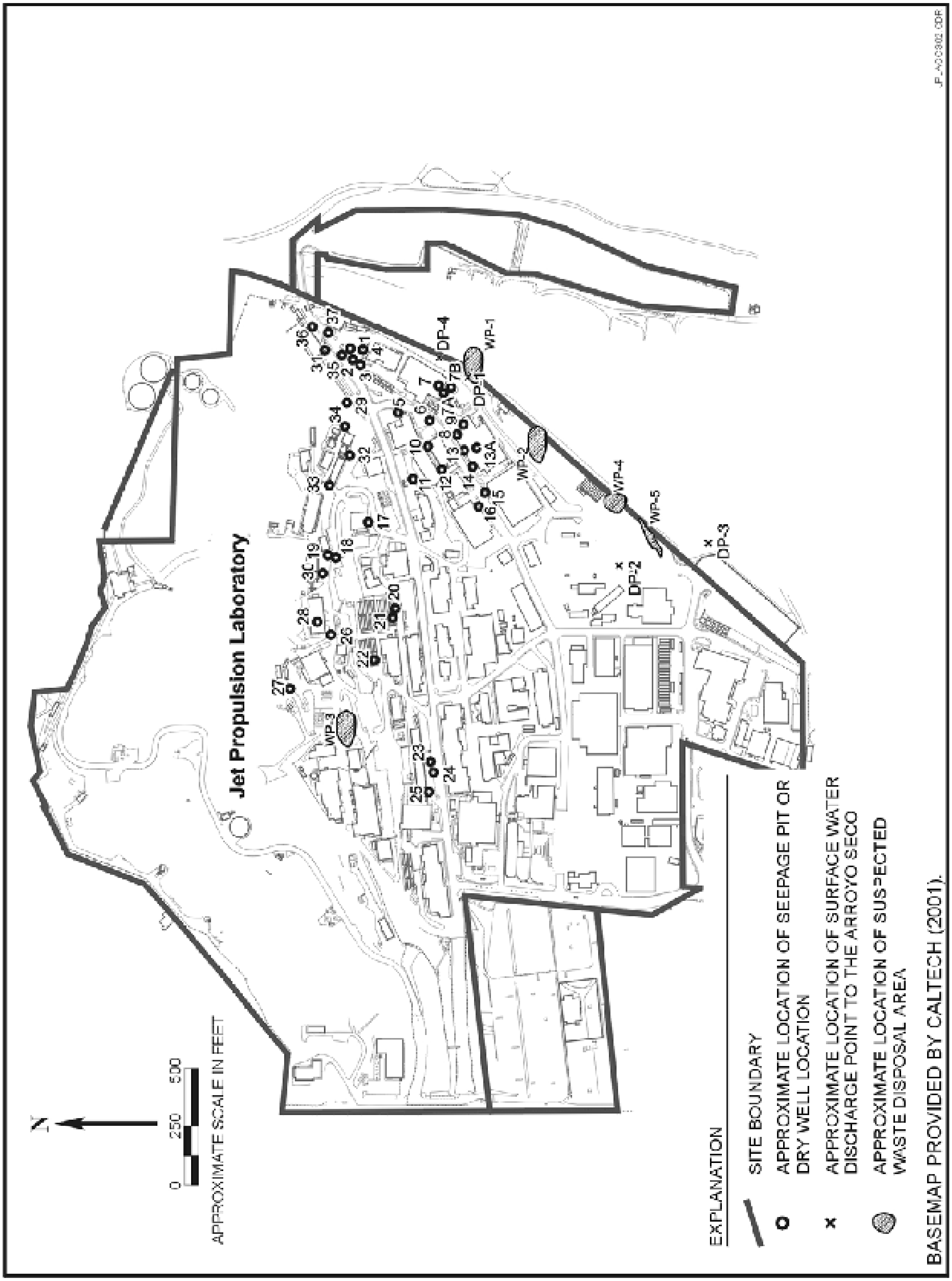


Figure 5-1. Potential Historic Chemical Waste Disposal Locations

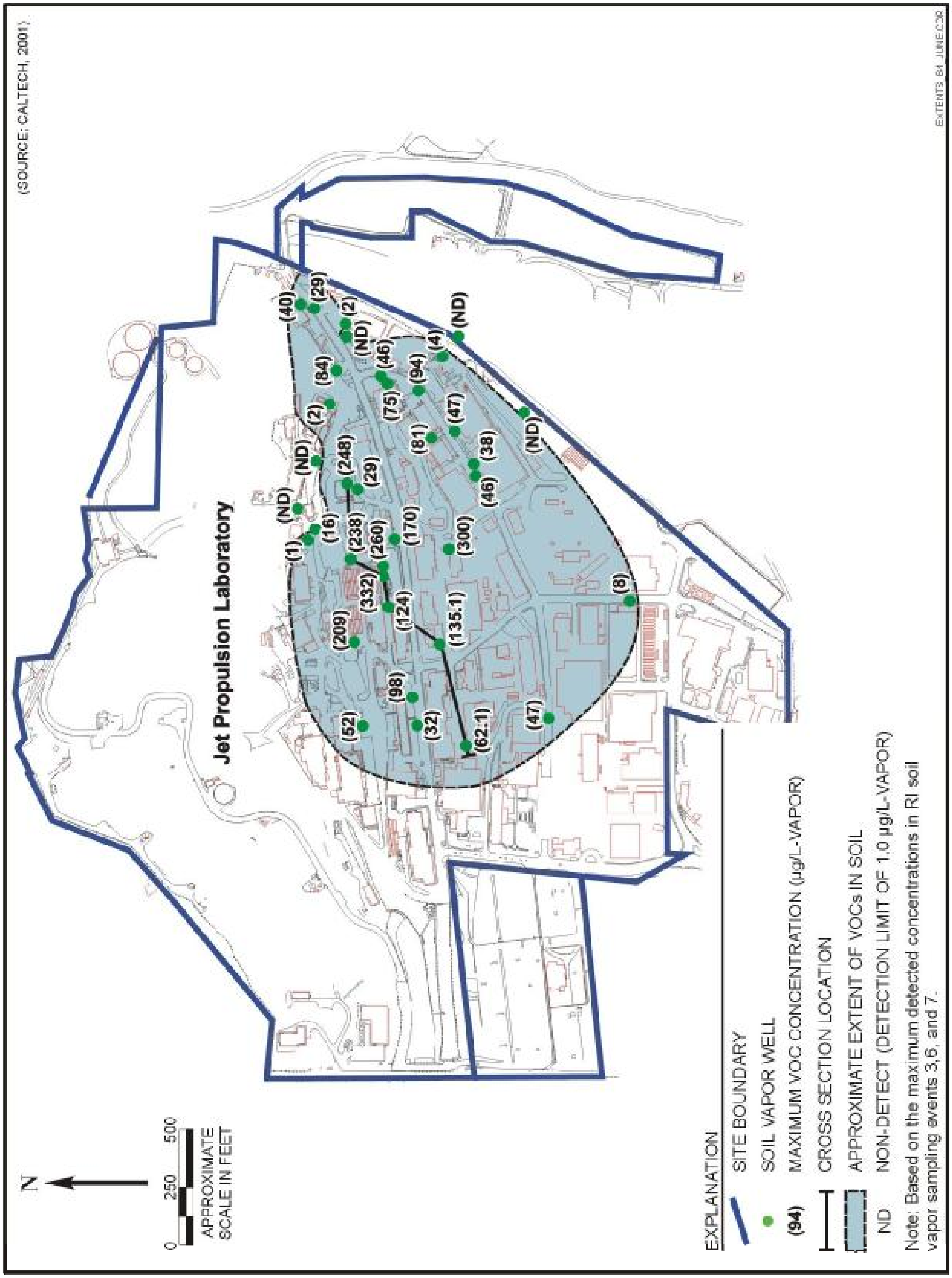


Figure 5-2. Plan View of VOC Soil Vapor Plume (May-June 1998)

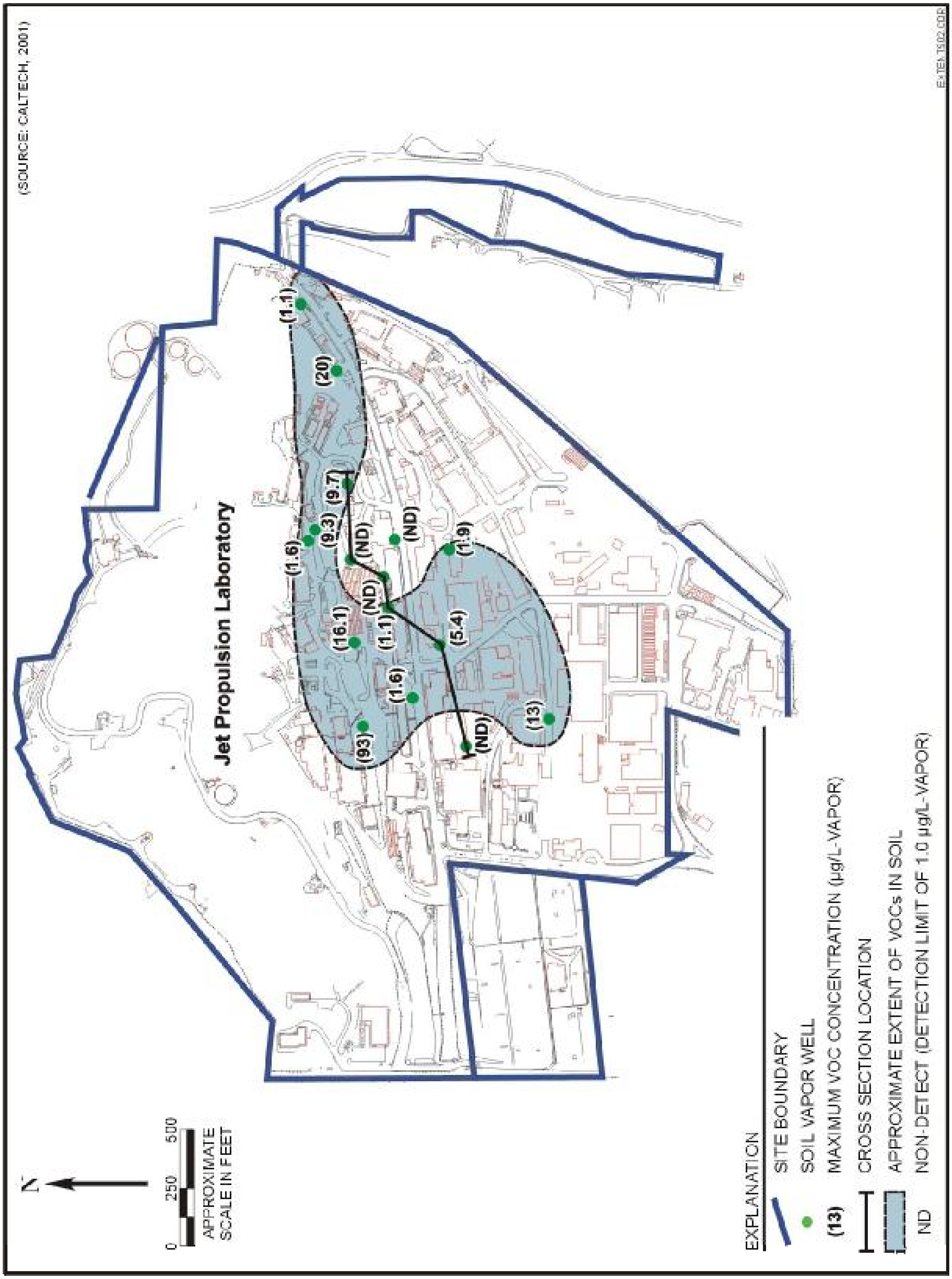


Figure 5-3. Plan View of VOC Soil Vapor Plume (July 2001)

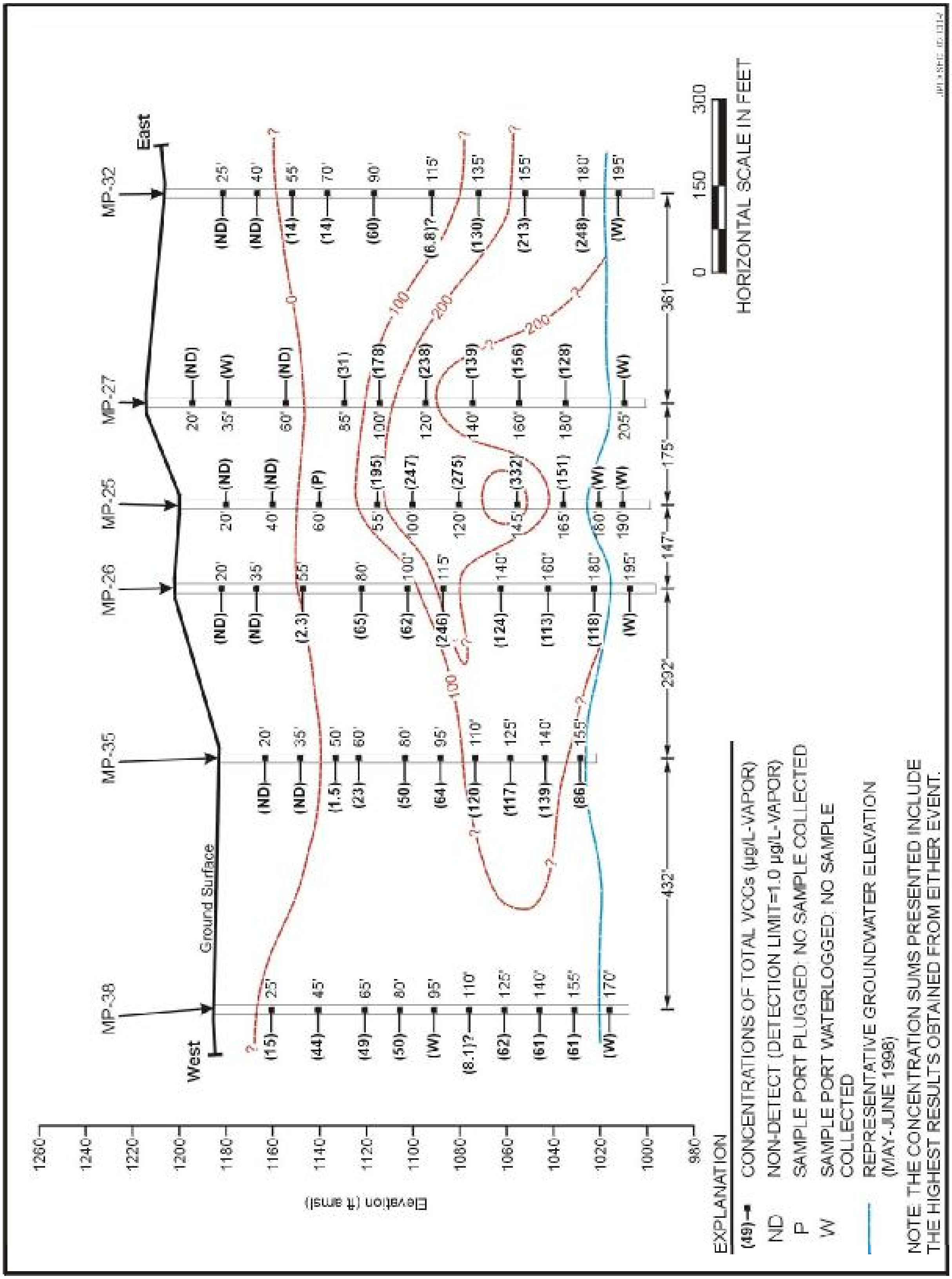


Figure 5-4. Vertical Cross Section of VOC Soil Vapor Plume (May-June 1998)

As part of the FS, the total VOC mass in the vadose zone was estimated to be between 2,250 and 5,040 lbs. These mass estimates were determined using standard equations and simplifying assumptions regarding average VOC concentrations in soil (FWEC, 2000). As part of this ROD, the VOC mass estimates were recalculated using a three-dimensional computer modeling software package, EarthVision™ Volumetrics program, using data from the RI (1996-1998) and more recent data (July 2001). Tables 5-1 and 5-2 summarize the historic (1996-1998) and current (July 2001) range of VOC concentrations in the vadose zone and the revised mass estimates.

Table 5-1. Summary of Historic Soil Vapor Sampling Results (1996-1998)

Chemical	Range of Concentrations (μg/L)	Estimated VOC Mass Remaining in the Vadose Zone[(a)] (lbs)
CCl_4	ND-402	468
DCE	ND-9.8	3
Freon™113	ND-113	113
TCE	ND-47	52
Total VOCs	NA	636

Note: NA= Not Applicable
(a) Mass estimated using EarthVision™ Volumetrics program calculation.

Table 5-2. Summary of Current Soil Vapor Sampling Results (July 2001)

Chemical	Range of Concentrations (μg/L)	Estimated VOC Mass Remaining in the Vadose Zone[(a)] (lbs)
CCl_4	ND-36	9
DCE	ND-3.0	2
Freon™ 113	ND-11	7
TCE	ND-26	27
Total VOCs	NA	45

(a) Mass estimated using EarthVision™ Volumetrics program calculation.

5.2.2 Soil Sampling Results

Soil sampling events, carried out from 1994 to 1998, consisted of collecting samples during drilling and test-pit excavations. Soil samples were analyzed for metals, SVOCs including PAHs, PCBs, dioxins and furans, TPH, tributyltin, cyanide, and nitrate. Only near-surface soil samples from test pits were sampled for VOCs. The use of air percussion drilling techniques, required for the site geology and investigation depths, precluded the sampling of VOCs from soil boring samples. Detailed information regarding the constituents detected in soil is provided in the RI report (FWEC, 1999a). The following subsections summarize soil sampling results.

5.2.2.1 Metals. Where detected, metal concentrations reasonably correlated to the range of background levels measured for soils at JPL, and within the range measured for other California soils. Arsenic was detected (at a maximum concentration of 3 mg/kg) in soil samples at concentrations slightly above measured background values, but well within the naturally occurring range measured for other California soils. Hexavalent chromium was detected (at a maximum concentration of 0.84 mg/kg) at only four sampling locations including Test Pit 1A, Test Pit 2A, Test Pit 3A, and Boring 29 (FWEC, 1999a). These detections were all below the U.S. EPA Region 9 health based action level of 30 mg/kg.

5.2.2.2 Semivolatile Organic Compounds. Four SVOCs from the class of polycyclic aromatic hydrocarbons were detected in vadose zone soil. Bis(2-ethylhexyl) phthalate was detected in seven soil borings and two test pit samples at concentrations ranging from 50 to 1,900 μg/kg and at depths ranging from 1 to 81 ft bgs. Butylbenzylphthalate was detected in one shallow test-pit sample (approximately 1 ft bgs) at a concentration of 160 μg/kg. Di-n-butylphthalate was detected in one shallow test pit sample (approximately 1 ft bgs) at a concentration of 250 μg/kg. Finally, N-nitroso-di-N-dipropylamine was detected in one soil boring at a concentration of 500 μg/kg at a depth of 30 ft bgs. The concentrations of all four SVOCs were below the risk-based, screening toxicity values presented in the FS (FWEC, 1999), which were based on EPA Preliminary Remediation Goals (PRGs) (EPA, 1989, 1991, 1998) and State of California Guidance (DTSC, 1994).

5.2.2.3 PCBs, Dioxins, and Furans. Two PCB mixtures, Arochlor-1254 and Arochlor-1260 were detected in two shallow test pit samples (approximately 1-5 ft bgs) at concentrations up to 200 μg/kg and 270 μg/kg, respectively. Another mixture, Arochlor-1232, was detected at a depth of 5 ft in shallow test pit TP-2A at 33 μg/kg. Maximum Arochlor-1254 and Arochlor-1260 concentrations were above the screening toxicity value of 110 μg/kg; however, the site-specific risk assessment demonstrated that the carcinogenic risk was within the target range of $1x10^{-6}$ to $1x10^{-4}$ (FWES, 1999). The dibenzodioxin, 1,2,3,4,6,7,8,9-OCDD, was detected at concentrations of 5.8 to 9.8 μg /kg in two shallow test pit samples at depths of 1 ft bgs. Concentrations of this dibenzodioxin were below the screening toxicity value of 36 μg /kg. Dibenzofurans were not detected in any of the soil samples collected during the OU-2 RI.

5.2.2.4 Volatile Organic Compounds. Four VOCs (acetone, bromodichloromethane, chloroform, and methylene chloride) were detected in soil samples collected from the shallow test pits constructed during the RI phase of the project. All concentrations were equal to or less than their respective reporting limits. VOC analysis of soil collected from deeper soil borings, rather than shallow test pits, is subject to significant error due to volatile losses experienced during both drilling and sample collection. For this reason, soil vapor VOC levels are used as a surrogate for VOC levels in soil at JPL (see Section 5.2.1). The VOC levels in soil vapor can be used to estimate corresponding VOC soil concentrations and vice versa using standard chemical partitioning equations.

5.2.2.5 Other Compounds. Several other constituents were detected in JPL soils. TPH, possibly associated with lubricating or mineral oils, was detected in 13 soil borings. The maximum TPH levels detected in all but one of the soil borings were less than 150 milligrams per kilogram (mg/kg). TPH detected at a concentration of 6,500 mg/kg in soil boring No. 1 was attributed to tiny asphalt granules in the materials used to backfill the seepage pit (FWEC, 1999). Cyanide was detected in three samples collected from one soil boring at concentrations ranging from 0.074 mg/kg to 0.085 mg/kg. These detections were limited to one location and were well below the residential PRG of 11 mg/kg (U.S. EPA, 1998). Nitrate was detected in virtually all soil borings. The widespread occurrence of nitrate is attributed primarily to the use of fertilizers in landscaped areas of JPL and runoff of irrigation waters. Soil sampling for perchlorate will be conducted during the installation of SVE and soil vapor monitoring wells. Following sampling, the impact of the infiltration and migration of perchlorate from the vadose zone to groundwater will be evaluated.

5.3 Fate and Transport of Chemicals in Soil at JPL

Figure 5-5 is a conceptual model for the transport of VOCs from the JPL seepage pits to the vadose zone and the groundwater. A summary of the potential migration pathways and fate and transport processes for chemicals associated with OU-2 is shown in Figure 5-6. A detailed discussion of these processes with regard to specific site conditions is presented in the OU-2 RI report (FWEC, 1999a).

5.3.1 Fate and Transport of VOCs at JPL

The VOCs detected on-facility were generally characterized as being moderately soluble in water and moderately adsorbing to soil organic carbon. Results from the OU-2 RI (FWEC, 1999a) suggest that migration of VOC vapor to the ground surface and subsequent emission to the atmosphere is not likely. Elevated VOC vapor concentrations are generally found at depths of greater than 20 ft below ground surface (bgs), which suggests the bulk of the VOC-impacted soil is also at depth. The infiltration and percolation of rainfall, which causes vertical downward flow of VOCs from the vadose zone to groundwater, appears to be the principal transport mechanism at JPL. However, the OU-1/OU-3 groundwater data (FWEC, 1999b) suggest that their downward migration is decreasing in significance with time.

5.3.2 Fate and Transport of Other Chemicals in Soil at JPL

Although VOCs have migrated to groundwater, significant migration of other organic compounds (e.g., SVOCs, PAHs) through infiltration and percolation to groundwater has not occurred based on the data available from the OU-2 RI (FWEC, 1999a) and the OU-1/OU-3 RI (FWEC, 1999b). The migration of metals such as arsenic and hexavalent chromium through infiltration and percolation has been documented, but their occurrence in soil and groundwater at JPL is very localized.

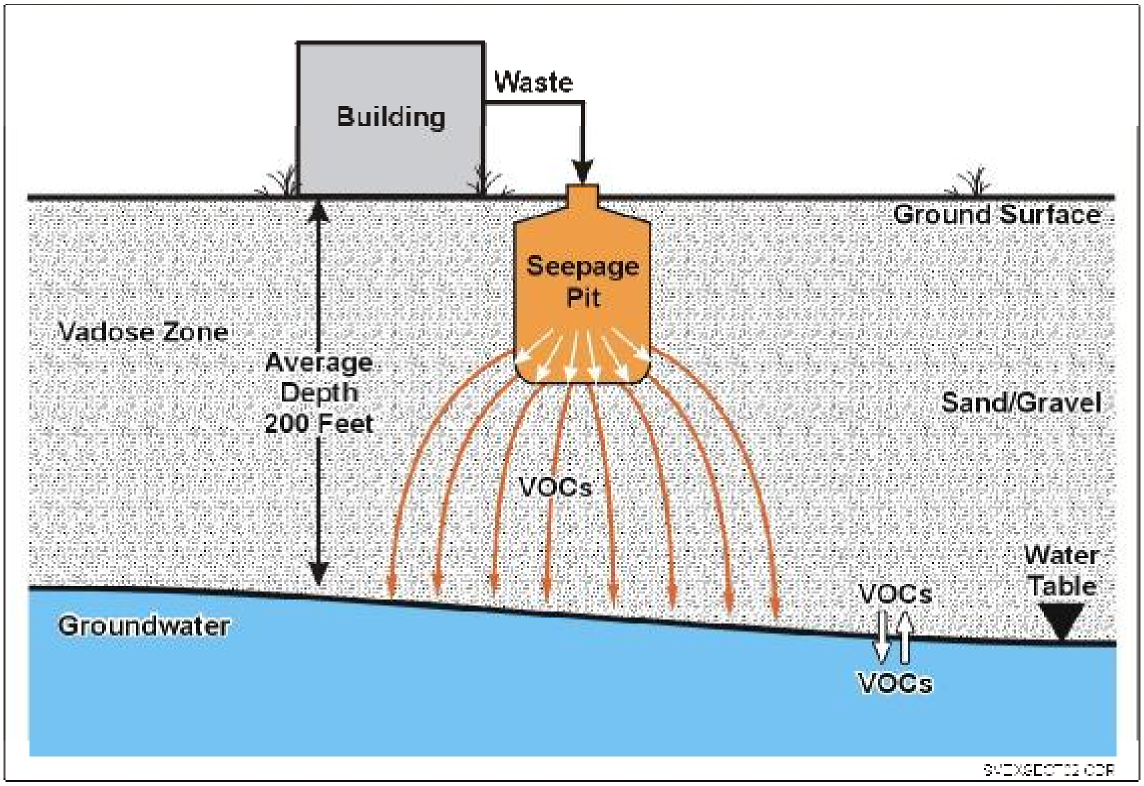


Figure 5-5. Site Conceptual Model for Transport of Chemicals

Stormwater runoff can potentially lead to the migration of chemical constituents in surface soil and sediment to surrounding on- and off-facility receptors, especially during periods of rapid rainfall. However, this migration pathway is insignificant since the majority of JPL is paved and levels of SVOCs, PCBs, metals, and other compounds detected in near-surface soils are below levels of concern (i.e., screening levels or site-specific risk levels).

Erosion and subsequent wind transport of metals, SVOCs, PCBs, and other compounds residing in surface soil and sediment at JPL are considered insignificant because concentrations are generally low, and the affected area is paved.

5.3.2.1 Metals. Arsenic occurs naturally in southern California soils, and arsenic concentrations detected at JPL were within the background range (Kearney, 1996). Arsenic has been detected in groundwater at JPL, but only in a very localized, deep part of the aquifer. During the long-term groundwater monitoring program, levels up to 0.011 mg/L of arsenic were detected at depths of 430 to 908 ft bgs in six monitoring wells at JPL. These arsenic levels are all below the current MCL of 0.05 mg/L and the maximum concentration observed was only slightly above the revised MCL of 0.01 mg/L to be promulgated in 2006. It appears that significant leaching or migration of arsenic from vadose zone soil to groundwater has not occurred and that arsenic levels in soil and groundwater are within acceptable ranges based upon background levels and/or health-based cleanup criteria.

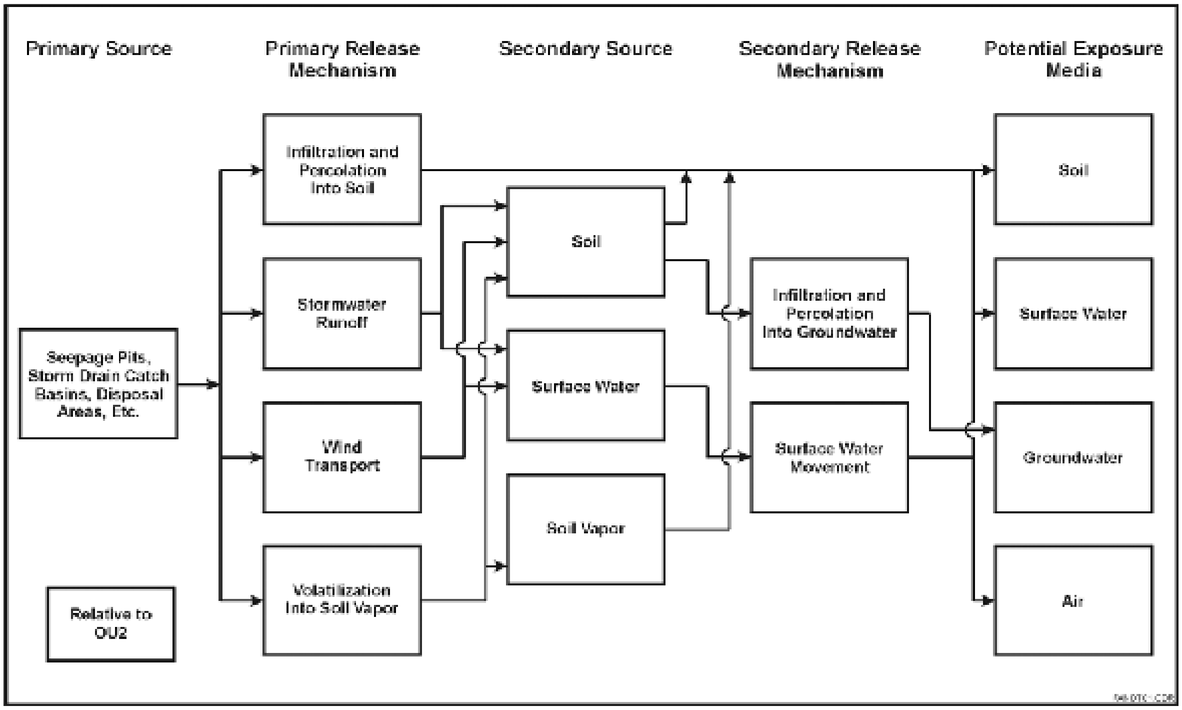


Figure 5-6. Chemical Fate and Transport Conceptual Diagram

Chromium can exist in either a trivalent or hexavalent form. The hexavalent form is more soluble and can be mobilized in soils as water passes through. However, hexavalent chromium was only detected in four soil samples at JPL and the concentrations were all below the health-based action level of 30 mg/kg. During the long-term groundwater monitoring program, hexavalent chromium was detected in six monitoring wells at levels up to 0.047 mg/L and depths of 105 to 476 ft bgs (below the tap water PRG of 0.11 mg/L [EPA, 2001]). The migration or leaching of hexavalent chromium from the vadose zone to groundwater has occurred, however, not above levels of potential concern.

5.3.2.2 Semivolatile Organic Compounds. Volatilization is considered to be of minor concern with regard to PAHs. In addition, because the PAHs detected in soil at JPL have low aqueous solubility and high adsorption potential, they are not expected to leach from soil into groundwater. Results from the OU-2 RI (FWEC, 1999a) and the OU-1/OU-3 RI (FWEC, 1999b) support this assertion because most PAH detections occurred in samples collected from the upper 10 ft of soil and there was no significant evidence of their presence in groundwater. Other SVOCs were detected in soil samples collected near the surface in the vicinity of a suspected waste disposal area. Most have low solubility and low volatilities and are considered relatively immobile in soil-water systems. The infrequency of detections of SVOCs in deeper soil and groundwater at JPL reflects the immobility of these SVOCs.

5.3.2.3 PCBs, Dioxins, and Furans. PCBs are characterized by very low solubility and high affinities for adsorption to soil. Therefore, they are considered to be relatively immobile in soil-water systems. The absence of PCBs and dibenzodioxins in deeper soil and groundwater at JPL reflects their immobility. Potential pathways for PCBs at JPL are most likely limited to wind transport in soil or dust particulates. Potential migration pathways for dibenzodioxins are considered insignificant.

5.3.2.4 Other Compounds. The types of petroleum hydrocarbons present in JPL soils are considered to be relatively insoluble and to adsorb strongly to soil particles. In addition, their tendency to volatilize is weak. Thus, transfer to the atmosphere would be negligible. In addition, petroleum hydrocarbons are subject to biodegradation. Tributyltin compounds are the main active ingredients in bactericides and fungicides used in wood preservatives, marine paints, and industrial water systems. In soil, tributyltin takes one to three months to degrade in aerobic conditions and more than two years to degrade in anaerobic conditions. In soil, cyanide complexes with metals and organic compounds. These complexes vary widely in their chemical properties. Nitrate is readily soluble and mobile in soil, as evidenced by its presence in JPL groundwater. Soil bacteria can reduce nitrate to nitrogen gas under anaerobic conditions, if a suitable carbon source is available.

5.4 Exposure Pathways

For the Human Health Risk Assessment (HHRA), potential exposures to chemicals in vadose zone soil at JPL were quantitatively evaluated for the hypothetical on-facility resident, the commercial worker, and the construction worker. (Note that NASA has no intent to use JPL for residential sites in the foreseeable future. However, NASA based the risk assessments on potential residential use to provide the most conservative and protective results.) Direct exposures through inhalation, dermal contact, and incidental ingestion pathways were evaluated.

For the Ecological Risk Assessment (ERA), chemical exposures were quantitatively evaluated for the deer mouse and the American kestrel. These species were used in the assessment because they generally have the highest exposure because of their diet and bioaccumulation in the food chain.

More information on the results of the HHRA and ERA is included in Section 7.0 of this document and in the RI report (FWEC, 1999a).

6.0: CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

JPL is a NASA-owned facility where the California Institute of Technology (Caltech) performs R&D projects. JPL is the federal government’s lead center for R&D related to robotic exploration of the solar system. In addition to NASA work, tasks for other federal agencies are conducted at JPL in areas such as remote sensing, astrophysics, and planetary science.

6.1 Land Uses

JPL comprises about 176 acres of land. Of these 176 acres, about 156 acres are federally owned. The remaining land is leased for parking from the City of Pasadena and the Flintridge Riding Club. Presently, more than 150 structures and buildings occupy JPL. Total usable building space is approximately 1,330,000 ft^2. The main developed area of JPL is the southern half, which can be divided into two general areas, the northeastern early-developed area and the southwestern later-developed area. Most of the northern half of JPL is not developed because of steeply sloping terrain (see Figure 1-1).

Currently, the northeastern early-developed part of JPL is used for project support, testing, and storage. The southwestern later-developed part is used mostly for administrative, management, laboratory, and project functions. Further development of JPL is constrained because of steeply sloping terrain to the north, the Arroyo Seco to the south and east, and residential development to the west.

Located at the northern boundary of JPL is the Gould Mesa area. This area has widely separated, small buildings and is used primarily for antenna testing. The distance between buildings is a result of the terrain and the need to isolate transmitting and receiving equipment. The relatively steep mountainside between Gould Mesa and the developed area at JPL is unpopulated.

The primary land use in the areas surrounding JPL is residential and light commercial. Industrial areas, such as manufacturing, processing, and packaging, are limited. The closest residential properties are those located along the western fence line of JPL. The nearest off-facility buildings are the Flintridge Riding Club and Fire Camp #2, both located approximately 100 yards from the southern border of JPL. The total number of buildings within 2 miles of JPL is about 2,500, primarily residential and community (e.g., schools, day-care centers, churches). Land use at JPL is not expected to change significantly in the foreseeable future.

6.2 Surface Water and Groundwater Uses

There are no permanent surface water bodies within the boundaries of JPL. The Arroyo Seco Creek intermittently flows through the Arroyo Seco wash to the east of JPL. The entire JPL site drains, via storm drains and surface runoff, into the Arroyo Seco. In addition, stormwater runoff from parts of La Cañada Flintridge mingles with that of JPL prior to discharge to the Arroyo. Within the Arroyo Seco, a series of surface impoundments are used as surface water collection and spreading basins for groundwater recharge.

Groundwater beneath the Arroyo Seco is a current source of drinking water. The Raymond Basin Watershed, Monk Hill Subbasin, where JPL is located, provides an important source of potable water for many communities in the area around JPL. These communities are expected to grow at a modest rate for the foreseeable future and the use of groundwater as drinking water is expected to continue.

7.0: SUMMARY OF SITE RISKS (OPERABLE UNIT 2)

This section of the ROD summarizes the results of the baseline HHRA and the ERA for OU-2. The risk assessment process identifies potential exposure pathways and allows evaluation of the risks to humans and the ecosystem, if no further action were taken at the site.

7.1 Summary of Human Health Risk Assessment

The baseline HHRA in the OU-2 RI (FWEC, 1999a) evaluated the potential risks to the hypothetical on-facility resident, the commercial worker, and the construction worker potentially exposed to chemicals in on-facility soil at JPL. The exposure pathways considered in the HHRA included ingestion, dermal contact, and inhalation. The potential human receptor at greatest risk was the hypothetical on-facility resident. Although NASA has no intent to use JPL for residential purposes in the foreseeable future, the HHRA included a hypothetical residential use scenario (i.e., someone living on the JPL property) to provide the most conservative and protective results.

For carcinogenic compounds, the exposure risk is expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. These risks are expressed in scientific notation (e.g., an excess lifetime cancer risk of 1.0×10^{-6} indicates that an individual experiencing the conservative maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure). According to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 1.0×10^{-6} is defined as the point of departure (i.e., the target level of risk) and the NCP-defined generally acceptable range is 1.0×10^{-6} to 1.0×10^{-4} (EPA, 1989).

For noncarcinogenic compounds, risks are evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose or level that is not expected to cause any harmful effects. The ratio of the chronic daily intake to the reference dose is called a hazard quotient (HQ). The sum of all of the hazard quotients for each chemical compound is referred to as the hazard index (HI). An HI less than 1.0 indicates that toxic, noncarcinogenic effects from all chemical constituents and exposure routes are unlikely (EPA, 1989).

All chemicals detected in soil samples collected in the upper 15 ft of the vadose zone and in soil vapor samples collected in the upper 30 ft of the vadose zone were evaluated in the HHRA. Screening levels were derived based upon a conservative residential-use scenario following the guidelines outlined by the State of California (DTSC, 1994) and the EPA (1989, 1991, 1998). The screening levels were based on an acceptable target risk of 1×10^{-6} for carcinogens and a hazard quotient of 1.0 for noncarcinogens. Based on this evaluation, NASA identified four chemicals that exceeded screening levels, including Arochlor-1254, Arochlor-1260, arsenic, and hexavalent chromium.

The maximum detected values of these four chemicals were used to calculate chemical intakes and to evaluate the site-specific lifetime cancer risks and noncancer risks. Table 7-1 provides a summary of the estimated carcinogenic risks associated with these chemicals for residential receptors at Discharge Point No. 2, Discharge Point No. 3, Discharge Point No. 4, Waste Pit No. 1/Discharge Point No. 1., and Waste Pit No. 4. Table 7-2 provides a summary of the estimated non-carcinogenic risks associated with these chemicals for residential receptors at the same locations. Based on the results of the HHRA as detailed in the OU-2 RI report (FWEC, 1999a), NASA, the EPA, and the state agencies concurred that there is negligible risk to potential receptors, both on-facility and off-facility, due to exposure to on-facility soils at JPL.

Table 7-1. Risk Characterization Summary – Carcinogens

Exposure Point	Chemical	Ingestion	Inhalation	Dermal	Exposure Routes Total
Discharge Point No. 2	Chromium (VI)	1.8×10^{-7}	5.8×10^{-7}	0	7.7×10^{-7}
Discharge Point No. 3	Arsenic	1.1×10^{-5}	2.2×10^{-7}	3.8×10^{-6}	1.5×10^{-5}
Discharge Point No. 4	Arsenic	1.1×10^{-5}	2.3×10^{-7}	4.0×10^{-6}	1.5×10^{-5}
Waste Pit No. 1/ Discharge Point No. 1	Arochlor-1254	6.3×10^{-7}	1.6×10^{-9}	1.1×10^{-6}	1.8×10^{-6}
	Arochlor-1260	8.5×10^{-7}	2.2×10^{-9}	1.5×10^{-6}	2.4×10^{-6}
	Arsenic	7.0×10^{-6}	1.5×10^{-7}	1.3×10^{-5}	2.0×10^{-5}
	Chromium (VI)	1.8×10^{-7}	1.7×10^{-6}	0.0	1.9×10^{-6}
Waste Pit 4	Arsenic	1.3×10^{-5}	2.7×10^{-7}	4.7×10^{-6}	1.8×10^{-5}

Note: Receptor population is a hypothetical on-site resident (i.e., someone living on the JPL property)

Table 7-2. Risk Characterization Summary – Noncarcinogens

Exposure Point	Chemical	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Discharge Point No. 2	Chromium (VI)	None	0.0012	0.0039	0.0	0.0051
Discharge Point No. 3	Arsenic	Skin	0.19	NA	0.058	0.25
Discharge Point No. 4	Arsenic	Skin	0.2	NA	0.06	0.26
Waste Pit No. 1/ Discharge Point No. 1	Arochlor-1254	Eyes	0.13	0.00032	0.19	0.32
	Arochlor-1260	NA	NA	NA	NA	NA
	Arsenic	Skin	0.13	NA	0.19	0.32
	Chromium (VI)	None	0.0036	0.012	0.0	0.0156
Waste Pit 4	Arsenic	Skin	0.24	NA	0.072	0.31

Note: Receptor population is a hypothetical on-site resident (i.e., someone living on the JPL property)

7.2 Summary of Ecological Risk Assessment

The screening-level ERA in the OU-2 RI report (FWEC, 1999a) evaluated the potential risks to ecological receptors exposed to chemicals in on-facility soil at JPL. Chemicals of potential concern for the ERA included chromium, lead, mercury, molybdenum, vanadium, and zinc. The ecological risks associated with exposure to these chemicals were quantitatively evaluated for the deer mouse and the American kestrel through the calculation of HQs (FWEC, 1999a).

The HQ for lead from one soil sample location exceeded 1 for both the deer mouse and the American kestrel. However, uncertainty regarding the form of lead in the sample, as well as the conservative exposure parameters used in the evaluation, likely overestimated the risk from the sample. Animals with large home ranges, such as the American kestrel, are not likely to be at risk because they would potentially obtain only a small fraction of their diet from this location. JPL is a developed, non-wilderness area, so it is not likely to provide high-quality habitat for these species. In addition, lead concentrations found at JPL are within the range of background values for California and western U.S. soils. Thus, potential ecological risks from lead are likely to be lower than indicated by the estimated value. All other constituents had HQs less than 1 for the American kestrel and less than 10 for the deer mouse. Constituents, which yielded an HQ above 1 for the deer mouse, included chromium, molybdenum, and zinc. Since JPL is a developed industrial complex and does not provide quality habitat, these HQs represent an acceptable risk.

7.3 Basis for Action

Although results of the HHRA and the ERA showed that chemicals in on-facility soil at JPL pose no significant direct risks to humans or the ecosystem, the results of analyses performed during the OU-2 RI (FWEC, 1999a) indicated that chemicals in vadose zone soil at JPL have the potential to migrate to groundwater. The remedial strategy is to use SVE technology to remove VOCs from the vadose zone in order to reduce their migration to groundwater and to protect an existing drinking water source.

8.0: REMEDIAL ACTION OBJECTIVES

In order to identify and screen alternatives for the remediation of OU-2, a remedial action objective (RAO) has been established to prevent unacceptable levels of chemicals in the vadose zone from migrating into groundwater. Development of RAOs to protect human health and ecological receptors from exposure to soil are not needed because the HHRA determined that direct exposure to site soils does not pose unacceptable risks to humans, and the ERA concluded that no significant ecological risks from chemicals in soil exist (FWEC, 1999a). However, because groundwater is a resource that must be protected, an RAO to protect groundwater is required.

The development of an RAO includes consideration of applicable or relevant and appropriate requirements (ARARs) in accordance with CERCLA, as amended by SARA and NCP. The RAO for OU-2 is to prevent, to the extent practicable, further migration of VOCs at potential levels of concern from the vadose zone to groundwater to protect an existing drinking water source.

9.0: DESCRIPTION OF ALTERNATIVES

Two remedial alternatives were evaluated for OU-2, on-facility vadose zone soil at JPL to achieve the RAO. Alternative 1 is the “no further action” (NFA) alternative and Alternative 2 is SVE. Both alternatives include a soil vapor monitoring program, currently in place, to track concentrations and the extent of chemicals in soil vapor over time.

9.1 Alternative 1: No Further Action

9.1.1 Description of Remedy Components

The NFA alternative includes no active treatment or containment activities to remediate chemicals in on-facility soil at JPL, and no institutional controls to protect the public or the environment from exposure to chemicals in soil. However, it does include a soil vapor monitoring program, currently in place at JPL. As part of the NFA alternative, the results of the monitoring program are then used to track concentrations and the extent of chemicals in soil vapor beneath JPL over time. The concentrations and extent of chemicals in soil vapor may decrease gradually over time due to chemical or physical transformation, sorption, and/or dilution.

9.1.2 Common Elements and Distinguishing Features

Because soil vapor monitoring is the only active component of the NFA alternative, this alternative is not likely to meet chemical-specific ARARs for OU-2. The NFA alternative is not likely to be effective over the long term or to meet the RAO for OU-2 in a reasonable time frame because chemicals in vadose zone soil are not removed and can continue to migrate into the groundwater. For a discussion of ARARs for OU-2, see Section 13.2 of this report.
Operation and maintenance (O&M) costs for the soil vapor monitoring program at OU-2 are estimated at approximately $1,477,000 (present-worth value), based on 45 sampling events. More details on estimated costs are provided in the OU-2 FS (FWEC, 2000).

9.1.3 Expected Outcomes

The NFA alternative is not a treatment or containment technology and is not expected to reduce the toxicity, mobility, or volume of contaminants at OU-2. Under the NFA alternative, no remediation of OU-2 is planned except that which occurs naturally due to chemical/biological degradation, dispersion, advection, and sorption. The NFA alternative is not expected to prevent further migration of VOCs to groundwater, and thus, is not expected to meet the RAO for OU-2.

9.2 Alternative 2: Soil Vapor Extraction

9.2.1 Description of Remedy Components

Alternative 2 includes the soil vapor monitoring program described for the NFA alternative, plus SVE to remediate vadose zone soil. During SVE, VOCs are removed from the subsurface in vapor form by applying a vacuum to an underground well. The extracted soil vapor is then treated to remove VOCs in order to meet air permit discharge requirements and prevent their release to the atmosphere.

The proposed SVE system for OU-2 consists of a combination of up to five vapor extraction wells and vapor treatment systems. New wells will be installed and constructed in a manner similar to the existing SVE pilot well (VE-01) at JPL. SVE systems will be operated until the criteria for discontinuing their operation have been met. Activities associated with the monitoring program will be discontinued once remedial performance objectives have been achieved.

9.2.2 Common Elements and Distinguishing Features

SVE is a treatment technology that can meet chemical-specific ARARs because chemicals are removed from the vadose zone to reduce their migration to groundwater. In addition, chemical-specific ARARs pertaining to discharge of air are addressed by the vapor treatment system. Location-specific ARARs will also be considered during the remedial design phase. For more detail on ARARs, see Section 13.2 of this report.

SVE is a presumptive remedy commonly used to clean up sites similar to OU-2, where VOCs are present in vadose zone soil (EPA, 1993). Further, SVE was shown to be effective at OU-2 based on the pilot study results, during which it was documented that over 200 lbs of VOCs were removed. Finally, the SVE alternative is effective over the long term, because VOCs in vadose zone soil are permanently removed.

Maximum capital costs for SVE are estimated at approximately $874,000 (assuming five extraction wells and five vapor treatment systems). O&M costs are estimated at approximately $2,861,000 (present-worth value), which includes soil vapor monitoring. The SVE system configuration, sampling frequencies, and duration used are for cost-estimating and comparison purposes only. A summary of estimated costs is presented in Section 11.3 and more detail is provided in the OU-2 FS (FWEC, 2000).

It is estimated that the implementation time frame for design and construction of the full-scale SVE system will be less than 12 months following certification of the ROD. The exact period of performance for the SVE system cannot be accurately determined at this time. Based on past project experience and literature case studies, a typical period of operation for an SVE system is l2 to 18 months.

9.2.3 Expected Outcomes

The SVE alternative is an EPA-designated presumptive remedy (EPA, 1993) that is expected to permanently reduce the volume of VOCs at OU-2, and to reduce VOC migration to groundwater. Thus, the SVE alternative is expected to meet the RAO for OU-2 and to improve the effectiveness and efficiency of the selected remedy for OU-1 and OU-3 by removing VOC mass that could eventually migrate to groundwater. In addition, implementation of SVE is not expected to restrict normal activities or future land use at JPL.

10.0: SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

NASA evaluated the remedial alternatives for OU-2 in accordance with the nine criteria defined in NCP (40 Code of Federal Regulations [CFR] Part 300). The nine evaluation criteria are as follows:

- Protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume of contaminants
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance.

These nine evaluation criteria can be categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. All threshold criteria must be satisfied for a remedial alternative to be eligible for selection. The threshold criteria are protection of human health and the environment and compliance with ARARs. The primary balancing criteria are used to weigh major tradeoffs among alternatives. The primary balancing criteria are long-term effectiveness and permanence, reduction of toxicity, mobility, or volume of contaminants through treatment, short-term effectiveness, implementability, and cost. The modifying criteria, state and community acceptance, are usually addressed after public comment is received on the Proposed Plan. At that time, public comments are reviewed with state regulatory agencies to determine if the preferred alternative remains the most appropriate remedial action.

10.1 Comparison of Remedial Alternatives Using Evaluation Criteria

This section uses the nine evaluation criteria to compare and evaluate the remedial action alternatives for OU-2. Table 10-1 summarizes the screening of the two alternatives for OU-2: Alternative 1, NFA and Alternative 2, SVE.

10.2 Protection of Human Health and the Environment

The HHRA in the OU-2 RI (FWEC, 1999a) determined that direct exposure to soil at JPL does not pose unacceptable risks to humans, and the ERA in the OU-2 RI concluded that no significant ecological risks exist. Thus, both Alternative 1, NFA, and Alternative 2, SVE, are protective of human health in terms of exposure to chemicals through direct contact with near-surface soils. However, if not removed, VOCs in the vadose zone may continue to migrate to groundwater. Because of this possibility, Alternative 1 is not protective of groundwater. Under Alternative 2, the amount of VOCs that will migrate to groundwater is reduced.

Table 10-1. Comparison Summary of Remedial Alternatives for OU-2

Criteria	Alternative 1	Alternative 2
Description	• No Further Action • Soil Vapor Monitoring	• SVE • Off-Gas Treatment • Soil Vapor Monitoring
Overall Protection	• Not protective of environment	• Short- and long-term protection of environment by reducing VOC concentrations and migration to groundwater
Compliance with ARARs	• Does not comply with ARARs since groundwater is not protected	• Complies with ARARs • Treats vadose zone to levels that will minimize VOC migration and be protective of groundwater • Because waste is removed in place through limited construction and no excavation, no impacts to surface water quality are expected. • Emission controls needed to ensure compliance with air quality standards
Long-Term Effectiveness and Permanence	• Not effective in long-term • VOCs remain in vadose zone and could migrate to groundwater	• Well-established technique for removing VOCs from soil • VOCs permanently removed from vadose zone • Requires some treatment or disposal of residuals (e.g., spent carbon stream)
Reduction of Toxicity Mobility, or Volume	• No reduction in mobility or volume of VOCs	• Significantly reduces mobility and volume of VOCs through treatment
Short-Term Effectiveness	• No risk to workers, community, or environment	• Does not present substantive risks to on-facility workers or community in short term • Potential air emissions are easily controlled through GAC or other technologies. • Generally involves relatively short time frame to achieve cleanup levels
Implementability	• Easily implemented	• Technology is readily available from many sources • Effective for treating waste under buildings. Can be performed on active facilities. • Installing and operating extraction wells requires fewer engineering controls than other technologies (i.e., excavation and incineration).
Cost	• Approximate cost: $1,477,000	• Approximate cost: $3,735,000
Conclusion	• Does not meet first two threshold criteria	• Preferred Alternative

10.3 Compliance with Applicable or Relevant and Appropriate Requirements

Appendix F of this document contains an evaluation of ARARs that may apply to OU-2. They include the Safe Drinking Water Act; various resolutions, guidance documents, and plans set forth by the RWQCB; the Federal Facilities Compliance Act; Executive Order 11988 (Protection of Floodplains); the Archaeological Resources Protection Act; the National Historic Preservation Act; the Clean Air Act; various regulations set forth by the South Coast Air Quality Management District; and the Resource Conservation and Recovery Act.

Alternative 1, NFA, does not meet chemical specific ARARs since groundwater at JPL is not protected. Alternative 2, SVE, meets all identified ARARs and reduces the migration of VOCs to the groundwater.

10.4 Long-Term Effectiveness and Permanence

Alternative 1, NFA, is not effective over the long term because, under this alternative, chemicals in the vadose zone can continue to migrate into groundwater.

Alternative 2, SVE, is effective for the long term. The SVE process permanently removes VOCs from vadose zone soil through a vacuum applied to underground wells. The vapors are then treated to remove VOCs and prevent their release to the atmosphere. Because chemicals are permanently removed from the soil, existing and future risks to groundwater are reduced. Thus, long-term effectiveness is achieved.

10.5 Reduction of Toxicity, Mobility, or Volume of Contaminants

Alternative 1, NFA, is not a treatment technology and does nothing to reduce the toxicity, mobility, or volume of chemicals in soil at OU-2. Alternative 2, SVE, permanently removes VOCs from the vadose zone reducing both the volume and mobility of chemicals in soil at JPL. The results of the pilot study, during which more than 200 pounds of VOCs were removed from a single pilot extraction well, show that VOC mass removal can be significant.

10.6 Short-Term Effectiveness

Alternative 1, NFA, entails no remedial action. Because soil vapor sampling does not require construction or installation of equipment on site, potential short-term effects to workers, the public, and the environment are minimal.

Similarly, Alternative 2, SVE, presents minimal risks to workers, the public, and the environment. System construction is localized and procedures would be followed that monitor and prevent exposure to VOCs. SVE systems are designed so that extraction wells and associated piping are under vacuum. The VOCs in the extracted air are removed by an aboveground treatment system in accordance with federal, state, and local ARARs.

10.7 Implementability

Alternative 1, NFA, is easily implemented. The equipment and methods used for soil vapor sampling and analysis are commercially available.

Alternative 2, SVE, is a common remediation process for treatment of VOCs in soil, and equipment is readily available from commercial sources. Further, installation and operation of SVE systems require relatively few engineering controls compared to other remediation technologies.

10.8 Costs

A summary of the present-worth costs associated with the remedial alternatives for OU-2 is presented in Table 10-2. The OU-2 FS (FWEC, 2000) contains a detailed breakdown of these costs. The only costs associated with Alternative 1, NFA, are O&M costs for the soil vapor monitoring program. For cost-estimating purposes, conservative assumptions were made regarding the monitoring program consisting of quarterly sampling for the first five years of the remedial program, followed by annual sampling for 25 more years.

Costs associated with Alternative 2, SVE, include installation and operation of five extraction wells and five off-gas extraction and treatment systems, as well as soil vapor monitoring. The new extraction wells are assumed to be similar in construction to the existing pilot SVE well (VE-01). O&M costs for Alternative 2 include operation and maintenance of the SVE systems and the soil vapor monitoring program. Soil vapor monitoring costs are assumed to be the same as for Alternative 1.

Table 10-2. Comparison of Cost Estimates for Alternatives 1 and 2

Description	Capital Costs[(a)]	O&M Costs[(a,b)]	Total Cost[(a,b,c)]
Alternative 1: NFA			
Soil Vapor Monitoring	-	$1,477,000	$1,477,000
Total Cost	**-**	**$1,477,000**	**$1,477,000**
Alternative 2: SVE			
Soil Vapor Monitoring	-	$1,477,000	$1,477,000
Soil Vapor Extraction	$ 874,000	$1,384,000	$2,258,000
Total Cost	**$874,000**	**$2,861,000**	**$3,735,000**

(a) Costs are estimated to the nearest $1,000.
(b) O&M and total costs are estimated at present-worth value. Estimates are within a –30% to +50% range of accuracy.
(c) Total cost includes capital costs and annual O&M costs incurred over the estimated duration.

10.9 State Acceptance

The state acceptance criterion requires that NASA, as the responsible party, address the state's comments and concerns for each proposed remediation alternative. Comment responses have been accepted by the state. All state agencies have agreed to the proposed remedial Alternatives 1 and 2, and to the selected remedy, Alternative 2. This ROD/Remedial Action Plan (RAP) documents state acceptance of Alternative 2. The DTSC and RWQCB concur with the recommendations of this ROD.

10.10 Community Acceptance

NASA carefully evaluated all public comments taking into consideration information provided by the public and responded to all questions. Part III of this ROD documents the comments that NASA received from the public about OU-2 and provides NASA's responses to those comments. Although NASA received a number of comments and questions during the public comment period for the Proposed Plan, none of the public stakeholders objected to implementation of the selected remedy.

11.0: THE SELECTED REMEDY

As required by CERCLA and NCP, remedial alternatives were identified in the FS and screened based on effectiveness, implementability, and cost. These alternatives were then subject to detailed analysis using the nine criteria described in Section 10.0 of this ROD. Based on the comparative analysis of the remedial alternatives, the selected remedy for addressing OU-2 is Alternative 2, SVE, which also includes soil vapor monitoring. NASA, EPA, DTSC, and RWQCB agree with the selection of this alternative for remediation at OU-2.

11.1 Rationale for the Selected Remedy

Based on the evaluation of threshold and primary balancing criteria in Section 10.0, Alternative 2, SVE, is the most effective remedial alternative for vadose zone soil at JPL. Because of the potential for continued migration of VOCs to groundwater, Alternative 1, NFA, is not protective, and the RAO for OU-2 cannot be met under this alternative. Alternative 2, SVE, will remove VOCs from the vadose zone, and thus reduce the migration of VOCs to groundwater. The EPA identified SVE as a presumptive remedy for sites with VOCs in soil (EPA, 1993) and NASA has determined that it is appropriate to apply the presumptive remedy at OU-2 based on the results of a pilot test conducted during the FS (FWEC, 2000).

11.2 Description of the Selected Remedy

Under the selected remedy, VOCs in the vadose zone are treated using SVE. The SVE system for OU-2 will consist of up to five vapor extraction wells and vapor treatment systems. New wells will be installed and constructed in a manner similar to the existing SVE pilot well (VE-01), as described in the OU-2 FS (FWEC, 2000). When operation of the SVE system is no longer necessary and/or cost-effective to mitigate VOC migration to groundwater at levels of potential concern, the system will be shut down and dismantled.

The soil vapor extracted from the subsurface will contain VOCs at levels that may require treatment before being discharged to the atmosphere. Several different options for vapor treatment of chlorinated VOCs are available, including granular activated carbon (GAC) adsorption, VOC-adsorbing resins, and catalytic oxidation. Currently, the preferred choice for off-gas treatment is GAC, which is a technology proven to be effective for VOC treatment. Once the GAC becomes saturated with VOCs, it will be removed and replaced with fresh GAC. The spent GAC will then be transported (in compliance with Department of Transportation [DOT] requirements) off-site to a permitted facility to be regenerated or disposed of. The preferred method of VOC vapor treatment may be modified based on the concentrations of VOCs in extracted soil vapor.

The current SCAQMD air permit requires collection of daily SVE system influent and effluent (stack) vapor samples, which are analyzed for VOCs using a hand-held meter. In addition, every two weeks SVE system influent and effluent vapor samples are collected and analyzed by a laboratory for VOCs using EPA Method TO-14.

The selected remedy also includes an ongoing soil vapor monitoring program. This program will be used to evaluate SVE system effectiveness and remedial progress. The soil vapor monitoring program will be terminated upon achieving the RAO.

11.3 Estimated Remedy Costs

Table 11-1 presents the estimated capital costs for the full-scale SVE system at OU-2. The term capital cost refers to the funds required to cover the initial nonrecurring costs associated with purchasing and installing the technology to the point where it is ready for its intended use. The capital cost estimate for the SVE system at JPL OU-2 is based on the installation of a maximum of five extraction wells and five vapor treatment systems. Costs associated with the installation of the SVE wells include drilling expenses, waste disposal, well materials, and other miscellaneous expenses. Costs associated with the installation of the vapor treatment system(s) include the purchase of equipment such as blowers, carbon vessels, and piping. The design and construction management costs are also included as part of the capital cost.

The O&M costs of a technology are the recurring or periodic costs incurred during the operating life of the system. SVE O&M costs include labor, equipment rental, carbon replacement costs, electricity, and other expenses. Table 11-2 presents the annual O&M costs for SVE at OU-2.

In addition to the SVE O&M costs, soil vapor monitoring and Five-Year Reviews costs were considered as part of the remedy operation costs. Soil vapor monitoring costs were estimated to be $51,000 per sampling event and Five-Year Review costs were estimated to be $11,000 per review.

Table 11-1. Estimate of Capital Costs for SVE

Well Installation (5 Wells)	Quantity	Unit	Unit Cost	Total Cost
Driller	1,000	Linear feet	$125	$125,000
Mobilization/Demobilization	2	Each	$4,000	$8,000
Equipment Rental	25	Days	$500	$12,500
Labor	60	Person-days	$1,000	$60,000
Soil Bins/Water Tanks	1	Lump Sum	$10,000	$10,000
Soil Disposal	39	Tons	$100	$3,900
Miscellaneous	5	Each	$5,000	$25,000
Vapor Extraction and Treatment Equipment	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Blower Package	5	Each	$30,000	$150,000
Carbon Vessels	20	Each	$7,000	$140,000
Piping Manifolds	5	Each	$10,000	$50,000
Fence	5	Each	$3,000	$15,000
Miscellaneous	5	Each	$5,000	$25,000
Subtotal Capital Costs				**$624,400**
Design/Construction Management	1	Lump Sum	$93,700	$93,700
Contingency (25%)	1	Lump Sum	$156,100	$156,100
Total Capital Costs for SVE				**$874,200**

Table 11-2. Estimate of Annual Operation and Maintenance Costs for SVE

Field Program	Quantity	Unit	Unit Cost	Total Cost
Labor	60	Person-days	$800	$48,000
Equipment Rental	30	Days	$200	$6,000
Laboratory	120	Samples	$160	$19,000
Carbon	40	Tons	$3,000	$120,000
Electricity	841	MW hour	$100	$84,100
Miscellaneous	12	Month	$1,000	$12,000
Field Program Subtotal				**$289,300**
Reporting	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Data Analysis	300	Hours	$100	$30,000
Reporting	100	Hours	$100	$10,000
Reporting Subtotal				**$40,000**
Total SVE O&M Costs Per Year				**$329,300**

Note (a) Cost estimate assumes that one Five Year Review is completed every year for 30 years.

The total present worth of the SVE remediation project is estimated to be $3,735,300 based on the capital costs, the annual SVE O&M costs, the soil vapor monitoring costs, and the five-year review costs incurred over the life of the project. The term "present worth" represents the amount of money or principal needed today to cover all of the costs over the lifetime of the remediation project given a certain interest rate. This present-worth cost estimate was based on the following simplifying assumptions:

- The implementation time for the selected remedy is 30 years.
- The remediation program is reviewed every five years.
- 45 soil vapor monitoring events.
- SVE continues for five years.

The SVE system configuration, sampling frequencies, and project duration listed in the proceeding sections are conservative, for cost-estimating purposes only, and may vary during remedy implementation. In addition, the number of five-year reviews described above is for cost-estimating purposes only and may vary during project implementation.

11.4 Expected Outcomes of the Selected Remedy

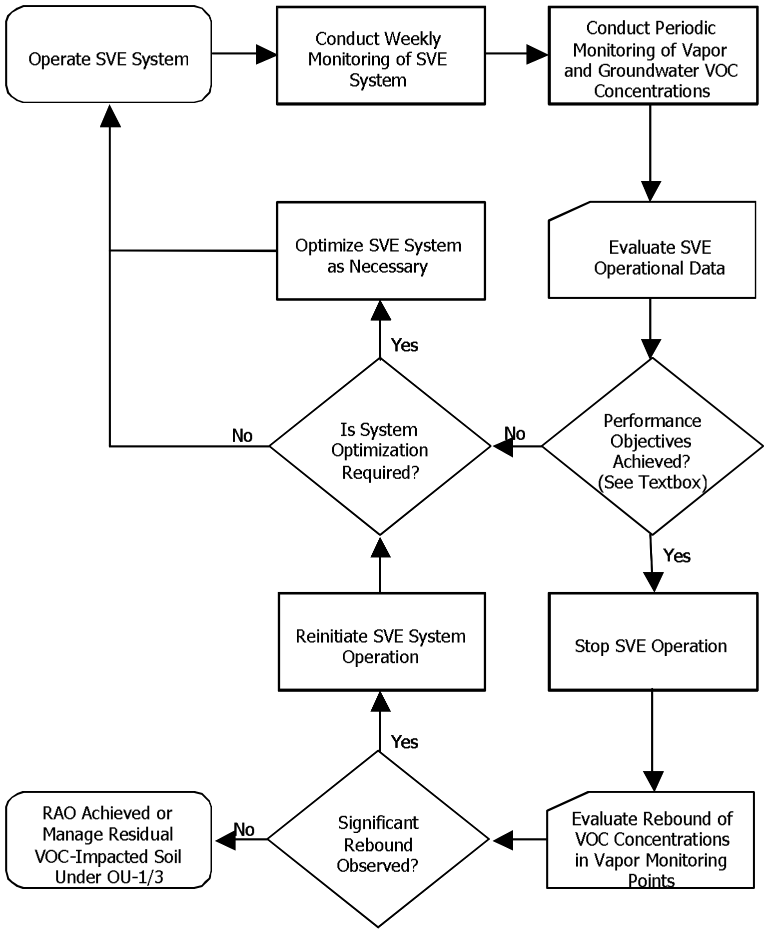
The selected remedy for OU-2 considers the soil-to-groundwater migration pathway and provides for cleanup of the vadose zone to be protective of beneficial uses of groundwater. JPL is located within the Raymond Basin Watershed, which is a current source of drinking water.

It is anticipated that the selected remedy will help to reduce groundwater treatment costs and help to restore aquifer water quality. The remedial approach for the implementation of SVE at OU-2 is summarized in Figure 11-1. The SVE system will be operated and optimized until performance objectives have been achieved. The performance of the SVE system will be evaluated on a continuing basis and the information regarding the amount of VOCs removed will be reported to the regulatory agencies as needed to effectively evaluate system performance objectives. The performance objectives include the following:

- Reduction of overall VOC concentrations at the vapor monitoring points and extraction wells compared to baseline levels. This includes fate and transport modeling to evaluate leaching to groundwater (using RWQCB guidance [RWQCB, 1996] and/or VLEACH™) and groundwater mixing.

- Asymptotic mass removal achieved after temporary shutdown periods and appropriate optimization of the SVE system. Asymptotic conditions will have been reached at a given SVE well when the upper limb of the cumulative mass removal curve is substantially linear and the slope of the curve approaches zero. In addition, rebound of chemical concentrations will be evaluated during the temporary shutdown periods. A general asymptotic decreasing trend in rebound of chemical concentrations in the soil vapor monitoring points will be demonstrated. Time series plots of VOC concentrations at each soil gas monitoring point will be prepared to assist in evaluation of rebound.

- Operate only as long as cost-effective. The SVE system will no longer be cost-effective when operating costs per unit of VOC mass removed from the vadose zone indicate that the additional cost of continuing to operate the SVE system is not warranted and/or when shutdown of the SVE system is not anticipated to significantly increase the cost of the groundwater remedy or significantly prolong the time to achieve groundwater cleanup.



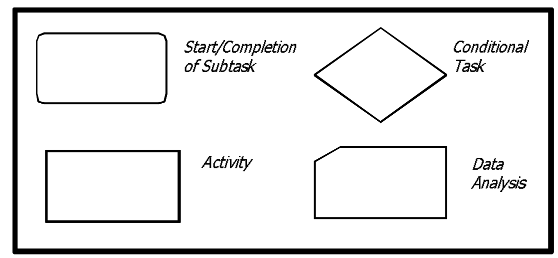
Performance Objectives

1. **VOC Concentration Reduction** – Reduction of overall VOC concentrations at the vapor monitoring points and extraction wells compared to baseline levels and transport modeling to evaluate leaching to groundwater (using RWQCB guidance [RWQCB, 1996] and/or VLEACH™) and groundwater mixing.

2. **Asymptotic Mass Removal** – Asymptotic mass removal achieved after temporary shutdown periods and appropriate optimization of the SVE system. Asymptotic conditions will have been reached at a given SVE well when the upper limb of the cumulative mass removal curve is substantially linear and the slope of the curve approaches zero.

3. **Cost-Effectiveness** – Operate only as long as cost-effective. The SVE system will no longer be cost-effective when operating costs per unit of VOC mass removed from the vadose zone indicate that additional cost of continuing to operate the SVE system is not warranted and/or when shutdown of the SVE system is not anticipated to significantly increase the cost of the groundwater remedy or significantly prolong the time to achieve groundwater cleanup.

Flow Chart Symbols



EXIT STRATEGY FLOW CHART_REV5.PPT

Figure 11-1. Remedial Approach Flowchart

The existing vapor monitoring network will be evaluated during the remedial design phase to determine if sufficient coverage is available to monitor changes in the lateral and vertical distribution of VOCs and the effectiveness of cleanup. Additional soil vapor monitoring points will be installed as necessary to monitor effectiveness of the remedy. In addition, the existing groundwater monitoring network will be used as part of the evaluation of SVE effectiveness. After the performance objectives have been achieved, the SVE system will be idled and soil vapor monitoring will continue to evaluate rebound. If significant rebound occurs, the SVE system will be reinitiated; otherwise the SVE system will be permanently shut down and dismantled. Following shutdown, any residual VOCs remaining in the vadose zone will be managed under OU-1/OU-3. NASA will evaluate chemical fate and transport during the remedial design and periodically during system operation. When performance objectives have been achieved, NASA will request shutdown of the SVE system. The complete modeling results and other data used to evaluate compliance with the performance objectives will be provided to the regulatory agencies for review and approval prior to initiating actions to terminate operation of the SVE system. NASA will shut-down the SVE system once approval has been granted by the EPA, DTSC and RWQCB.

Minimal environmental impacts are expected from SVE implementation. SVE will have no adverse impacts on threatened or endangered species, cultural resources, floodplains, or wetlands. NASA expects no adverse human health impacts from this CERCLA action to occur in any off-facility community, including minority and low-income communities. With SVE implementation, increases in JPL traffic will be minimal and consist of transportation of SVE equipment and supplies to and from the JPL site, resulting in insignificant transportation impacts. There will be no measurable impact on the local economy as a result of SVE implementation, and thus, no socioeconomic impacts are anticipated. Also, there will be no irreversible and irretrievable commitment of resources and the cost of remediation is justified to protect the existing source of drinking water.

Additional information regarding the anticipated socioeconomic, transportation, natural resources, and environmental justice impacts associated with the implementation of SVE are discussed in the NEPA Values Assessment, which is provided in Appendix E.

12.0: REMEDIAL ACTION PLAN REQUIREMENTS

The DTSC RAP requirements are presented in Table 12-1. The DTSC has concurred that the referenced sections of the OU-2 RI report (FWEC, 1999a) and the OU-2 FS (FWEC, 2000) satisfy the RAP requirements. Any revised or additional RAP requirements will be provided and administered by the DTSC. A copy of the California Health and Safety Code (HSC), Section 25356.1, RAP requirements, is included in the ROD as Appendix A.

Table 12-1. DTSC RAP Requirements

RAP Requirement	Reference Location
Health and safety risks posed by the conditions at OU-2. When considering these risks, DTSC or the RWQCB shall consider scientific data and reports that may have a relationship to OU-2.	OU-2 RI report, Section 6.0, Appendices H and I (FWEC, 1999a); OU-1/OU-3 RI report (FWEC, 1999b)
The effect of VOC levels on present, future, and probable beneficial uses of affected resources.	OU-2 RI report, Section 6.0, Appendices H and I (FWEC, 1999a); OU-1/OU-3 RI (FWEC, 1999b)
The effect of alternative remedial action measures on the reasonable availability of groundwater resources for present, future, and probable beneficial uses.	OU-2 FS, Sections 3.0 and 4.0 (FWEC, 2000); NEPA Values Assessment for Operable Unit 2, Sections E.3.0 and E.4.0 (Appendix E)
Specific characteristics of OU-2, including the potential for off-facility migration of VOCs, the surface and subsurface soil, the hydrogeologic conditions, and preexisting background levels of contamination.	OU-2 RI report, Sections 2.0 and 4.0, Appendices A, B, C, D, E, F, and G (FWEC, 1999a); OU-1/OU-3 RI report (FWEC, 1999b)
Cost-effectiveness of alternative remedial action measures.	OU-2 FS, Sections 4.0 and 5.0 (FWEC, 2000)
The potential environmental impacts of alternative remedial action measures, including treatment of VOCs to remove or reduce their volume, toxicity, or mobility prior to disposal.	OU-2 FS, Sections 4.0 and 5.0 (FWEC, 2000); NEPA Values Assessment, Sections E.4.0 and E.5.0 (Appendix E)

13.0: STATUTORY DETERMINATIONS

NASA must undertake remedial actions at this CERCLA site to achieve protection of human health and the environment. In addition, the selected remedy for this site must meet applicable or relevant and appropriate environmental standards as established under federal and state environmental laws, unless a statutory waiver is justified. The selected remedy must also be cost-effective and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the remedy should also employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of chemicals in the vadose zone. This section provides a brief description of how the selected remedy, SVE, satisfies the statutory requirements of CERCLA.

13.1 Protection of Human Health and the Environment

Although results of the HHRA and the ERA showed that chemicals in on-facility soil at JPL pose no significant direct risks to humans or the ecosystem, the results of analyses performed during the OU-2 RI (FWEC, 1999a) showed that chemicals in vadose zone soil at JPL may have the potential to continue to migrate to groundwater. The remedial strategy is to use SVE to remove

VOCs from the vadose zone in order to reduce the migration of these chemicals to groundwater and to protect an existing drinking water source.

Air emissions associated with the implementation of SVE will be limited to possible dust generation during well installation and discharge of treated vapors extracted from the subsurface. The dust generation during well installation will be minimal and occur over a short duration. Therefore, these emissions are expected to have negligible impacts on local air quality. The VOCs in the extracted vapor will be removed by an aboveground treatment system in accordance with state and local regulations. These regulations ensure protection of human health and the environment.

SVE system installation and operation will also result in negligible impacts and minimal waste generation because the system is operated in situ. Solid waste, in the form of spent carbon from the vapor treatment system, will be transported and treated off site. Thus, SVE will have negligible impacts during operation and will be protective of human health and the environment.

Because the SVE process permanently removes VOCs from the vadose zone, the potential for further groundwater impact is reduced. Thus, long-term protection is provided to human health and the environment.

13.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy, SVE, complies with federal and state ARARs. ARARs were identified on a site-specific basis from information about the constituents of interest, the specific actions being considered, and the features of the JPL site. The federal and state chemical-specific, location-specific, and action-specific ARARs for OU-2 are discussed in Appendix F.

13.3 Cost-Effectiveness

Cost-effectiveness is determined by comparing the cost of all alternatives being considered with their overall effectiveness to determine whether costs are proportional to the effectiveness achieved. The overall effectiveness of a remedial alternative is determined by evaluating (1) long-term effectiveness and permanence, (2) reduction in toxicity, mobility, or volume through treatment, and (3) short-term effectiveness. Table 13-1 presents a comparison of costs and effectiveness of Alternative 1, NFA, and Alternative 2, SVE, for OU-2.

Alternative 1, NFA, is not effective over the long term because, under this alternative, VOCs in the vadose zone can continue to migrate into groundwater. Alternative 2, SVE, is effective over the long term because the SVE process permanently removes VOCs from vadose zone soil and existing and future risks to groundwater are reduced. After remediation is complete, residual VOCs are not expected to further impact groundwater.

Table 13-1. Comparison of Costs and Effectiveness of Alternatives for OU-2

Alternative	Present-Worth Cost	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness
Alternative 1, NFA	$1,477,000	• Not effective over the long term • VOCs in vadose zone soil can continue to migrate into groundwater	• Not a treatment technology • Does not reduce toxicity, mobility, or volume of VOCs in vadose zone soil	• No short-term effects on workers, public, or the environment
Alternative 2, SVE	$3,735,000	• Effective over the long term • VOCs permanently removed from vadose zone soil	• Presumptive remedy • Permanently removes VOCs from vadose zone soil	• Insignificant short-term effects on workers, the public, and the environment

Alternative 1, NFA, is not a treatment technology and does not reduce the toxicity, mobility, or volume of VOCs in vadose zone soil at OU-2. Alternative 2, SVE, is an EPA presumptive remedy that permanently and irreversibly removes VOCs from soil (EPA, 1993). Thus, Alternative 2 reduces the volume and mobility of VOCs in vadose zone soil at OU-2. Further, more than 200 lbs of VOCs were removed from a single extraction well during the pilot study at OU-2, which demonstrates the effectiveness of this technology.

Alternative 1, NFA, includes the continuation of the soil vapor monitoring program at OU-2, but no remedial action. Because continuation of the soil vapor sampling at OU-2 does not require construction or installation of equipment on site, potential short-term effects to workers, the public, and the environment are minimal.

Similarly, Alternative 2, SVE, presents minimal risk to workers, the public, and the environment. SVE systems are designed so that extraction wells and associated piping are under vacuum. The VOCs in the extracted air are removed by an aboveground treatment system, in accordance with state and local regulations.

The estimated present-worth cost of Alternative 1, NFA, is $1,477,000. Because Alternative 1 does not reduce the toxicity, mobility, or volume of VOCs at OU-2, it is not effective in the long term, and, therefore, is not a cost-effective alternative.

The estimated present-worth cost of Alternative 2, SVE, is $3,735,000. Because Alternative 2 is a presumptive remedy that permanently reduces the volume of VOCs at OU-2, and thus reduces future risks to groundwater, it is cost-effective in the long term.

NASA and the regulatory authorities agree that the costs associated with SVE are justified because the preferred action reduces and removes VOCs from vadose zone soil at JPL OU-2 and reduces the potential for further groundwater contamination. Thus, groundwater beneath JPL is protected, as required under both NCP (40 CFR Section 300.430(e)(2)(B)) and State of California regulations for the beneficial use of groundwater, including groundwater used as a source of drinking water.

13.4 Use of Permanent Solutions and Alternative Treatment Technologies

Alternative 1, NFA, does not meet chemical-specific ARARs and cannot meet the RAO for OU-2 because, under this alternative, VOCs are left in place at OU-2, and groundwater beneath JPL is not protected. In addition, Alternative 1 is not a treatment technology, does not reduce the toxicity, mobility, or volume of contaminants at OU-2, and is not effective over the long term, because VOCs are left in place with the potential to migrate to groundwater.

Alternative 2, SVE, the selected remedy, is a presumptive remedy that permanently removes VOCs from vadose zone soil, thus reducing the volume of contaminants at OU-2. This alternative is effective over the long term, is protective of human health and the environment, and can meet all ARARs. As an EPA presumptive remedy for sites with VOCs present in soil, SVE represents the maximum extent to which permanence and treatment can be practicably used at OU-2.

13.5 Preference for Treatment as a Principal Element

SVE can permanently remove VOCs from vadose zone soil at OU-2, and thus reduce their volume and mobility. SVE meets the CERCLA preference for treatment as a principal element.

13.6 Five-Year Review Requirements

NASA intends to remediate VOCs in vadose zone soil at JPL to prevent, to the extent practicable, further migration of VOCs to groundwater to protect an existing drinking water source. A Five-Year review will be conducted if hazardous substances, pollutants, or chemicals remain at the site above levels that allow for unlimited use and unrestricted exposure. This site and remedy review will be conducted no later than five years after the start of the remedial action (See, 42 USC 9621(c)).

14.0: DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan identified Alternative 2, SVE, as the Preferred Alternative for remediation of vadose zone soil at JPL (OU-2). NASA reviewed all written and verbal comments submitted during the public comment period. It was determined by NASA, EPA, DTSC, and RWQCB that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

Part III: THE RESPONSIVENESS SUMMARY

The purpose of the Responsiveness Summary is to provide an opportunity for the National Aeronautics and Space Administration (NASA) to review and respond to the public's comments, concerns, and questions about the remedial technology selected to clean up soils at the Jet Propulsion Laboratory (JPL).

NASA held three public meetings: the first on May 12, 2001, the second on May 14, 2001, and the third on June 20, 2001, to formally present the Proposed Plan (NASA, 2001) for cleanup of vadose zone soil to the community, and to answer questions and receive comments. The transcripts of these meetings are included in Appendix D of this Record of Decision (ROD). The Responsiveness Summary is organized as follows:

1.0 Overview
2.0 Background on Community Involvement
3.0 Summary of Comments Received during the Public Comment Period and Responses from NASA

Appendix G contains the Public Comments and NASA Responses.

1.0: OVERVIEW

At the time of the public comment period, NASA presented soil vapor extraction (SVE) as the preferred alternative for Operable Unit 2 (OU-2), on-facility vadose zone soil. NASA proposed utilizing SVE to remove volatile organic compounds (VOCs) from the vadose zone in order to reduce the migration of VOCs to the groundwater and to protect an existing drinking water source. No changes to the SVE alternative have been proposed in the ROD. Additionally, no changes to the preferred alternative and no new alternatives were suggested by the public during the public comment period.

Therefore, the selected remedy for the cleanup of VOCs in the vadose zone soil at JPL is SVE. SVE is a two-step process. In the first step, VOCs in soil vapor are removed from the subsurface by applying a vacuum to an underground well. In the second step, the recovered vapors are filtered out by carbon (or some other treatment process) to prevent their release to the atmosphere.

2.0: BACKGROUND ON COMMUNITY INVOLVEMENT

Initial interviews with community members in 1991 and again in 1993 indicated a relatively low level of awareness in the three surrounding communities regarding the placement of JPL on the National Priorities List (NPL) (NASA, 1994). Despite the apparent lack of awareness, people expressed a relatively high level of concern about environmental issues in general. Residents suggested using community newsletters to convey important information, in addition to the media sources NASA was already using (NASA, 1994). NASA attempted to address these concerns through community newsletters and fact sheets distributed to members of the surrounding communities.

In May and June 2001, three public meetings were held to inform the public of the remediation alternatives chosen as part of the Proposed Plan to clean up on-facility soils at JPL. The public comment period pertaining to these meetings was held May 7 through July 11, 2001. During this time, members of the public had the opportunity to comment on the information presented in the public meetings and the Proposed Plan. Comments submitted during the public comment period were collected, reviewed, and addressed as appropriate.

3.0: SUMMARY OF PUBLIC COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND RESPONSES FROM NASA

This section provides a summary of the comments received from the public during the public comment period and the responses from NASA and the regulatory agencies. Appendix G contains responses to each specific question or comment received during the comment period.

3.1 Remedial Alternative Concerns

The majority of the questions (approximately 40) requested clarification on aspects of the SVE remedial alternative that was proposed to remove VOCs from soils beneath JPL. These included requests for the remedial alternatives that were considered other than the two that were presented; a description of how the granular activated carbon (GAC) used to remove the VOCs is regenerated; clarification of the long-term monitoring plan; and the risks associated with SVE.

NASA Response: SVE, thermal desorption, and incineration are designated by the U.S. Environmental Protection Agency (EPA) as presumptive remedies for sites with VOCs in soils. A presumptive remedy is a technology that EPA believes, based upon its past experience, generally will be the most appropriate remedy for a specified type of site (EPA, 1993). Selection of a presumptive remedy allows NASA to streamline site investigation and speed up selection of cleanup actions. NASA did not select thermal desorption and incineration as alternatives for the JPL site because these options would require excavation of the VOC-impacted soil. Excavation of VOC-impacted soils is not feasible considering the large area, depth of the chemicals under investigation, and the locations of buildings/structures.

The GAC used to remove VOCs from the vapor stream is replaced with fresh GAC when it becomes saturated with VOCs. The GAC is transported off site to a certified hazardous waste facility and regenerated or disposed.

The remedial action objective (RAO) for this site is to prevent, to the extent practicable, further migration of the VOCs at potential levels of concern from the vadose zone to groundwater to protect an existing drinking water source. The monitoring program proposed as part of the SVE alternative consists of the periodic collection and analysis of soil vapor samples from soil vapor monitoring points. The soil vapor sampling frequency will either be adjusted or ended, depending on the performance of the SVE system and analysis of soil vapor concentrations.

SVE is a common, effective remediation process for the treatment of VOCs in soil. Information regarding system effectiveness will be made available throughout the operation. SVE presents minimal risks to workers, the public, or the environment. The South Coast Air Quality Management District (SCAQMD) requires that all discharges to the atmosphere meet certain standards to protect ambient air quality for the public health and welfare. Vapors extracted by the SVE process have been and will be treated as required by the SCAQMD.

3.2 Public Participation Process

Nine complaints were made that not enough notice was given between the announcement of the public meetings and the date of the public meetings held in May 2001. In addition, a comment was made regarding a missing document at one of the information repositories.

NASA Response: In response to these concerns, a third public meeting was held on June 20, 2001 to provide another opportunity for the public to comment on the Proposed Plan. The public comment period subsequently was extended to reflect the addition of the third meeting. The public comment period ran from May 7 through July 11, 2001. NASA apologizes for the short notice and has made plans to send notices of future meetings earlier to allow for better planning.

With regard to the missing document, NASA established information repositories in the public libraries of Altadena, La Cañada Flintridge, and Pasadena. NASA will maintain a copy of the administrative record at each information repository; however, the public is urged to contact one of the officials listed in the Proposed Plan if documents are missing so that replacements may be provided. NASA replaced the missing document on June 28, 2001.

3.3 Cost/Funding Issues

Seven questions were raised regarding who was paying for the cleanup at JPL and how that funding was being provided.

NASA Response: NASA is currently paying for all costs associated with the remedial investigation and work being done at JPL. Cleanup funds are included in the appropriations approved by Congress for NASA.

3.4 Decision Process

Approximately three questions were posed regarding who was being held responsible for the cleanup work at JPL and how that work was going to be carried out.

NASA Response: JPL is a federal facility owned by the federal government. NASA, however, is the executive agency responsible for administrative control of JPL. NASA is the lead federal agency for all cleanup work being done at the site. NASA is working in cooperation with the Federal EPA, the State of California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB), Los Angeles Region. The Naval Facilities Engineering Command (NAVFAC) is also providing technical assistance to NASA on cleanup decisions at JPL. NAVFAC, working with NASA, selects appropriate subcontractors to provide assistance and expertise in performing the investigation and cleanup work at JPL.

3.5 VOCs and Perchlorate in Groundwater

Several questions were asked regarding VOCs and perchlorate in groundwater.

NASA Response: The Proposed Plan, under review during the public comment period extending from May 7 to July 11, 2001, concerned the remedial alternative for the vadose zone soil covered under OU-2. The Proposed Plan for groundwater issues will be presented to the public at a later date. NASA feels that the constituents of concern in the groundwater would be best addressed in detail during the public meetings for OU-1 and OU-3 after more information is available. However, an attempt has been made to address the specific questions asked during the public meetings held for OU-2. These answers may be found in Appendix G.

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APPENDIX A

CALIFORNIA HEALTH AND SAFETY CODE, SECTION 25356.1

CALIFORNIA HEALTH AND SAFETY CODE
SECTION 25356.1

25356.1. (a) For purposes of this section, "regional board" means a California regional water quality control board and "state board" means the State Water Resources Control Board.

(b) Except as provided in subdivision (h), the department, or, if appropriate, the regional board shall prepare or approve remedial action plans for all sites listed pursuant to Section 25356.

(c) A potentially responsible party may request the department or the regional board, when appropriate, to prepare or approve a remedial action plan for any site not listed pursuant to Section 25356, if the department or the regional board determines that a removal or remedial action is required to respond to a release of a hazardous substance. The department or the regional board shall respond to a request to prepare or approve a remedial action plan within 90 days of receipt. This subdivision does not affect the authority of any regional board to issue and enforce a cleanup and abatement order pursuant to Section 13304 of the Water Code or a cease and desist order pursuant to Section 13301 of the Water Code.

(d) All remedial action plans prepared or approved pursuant to this section shall be based upon Section 25350, Subpart E of the National Oil and Hazardous Substances Pollution Contingency Plan (40 C.F.R. 300.400 et seq.), and any amendments thereto, and upon all of the following factors, to the extent that these factors are consistent with these federal regulations and do not require a less stringent level of cleanup than these federal regulations:

(1) Health and safety risks posed by the conditions at the site. When considering these risks, the department or the regional board shall consider scientific data and reports which may have a relationship to the site.

(2) The effect of contamination or pollution levels upon present, future, and probable beneficial uses of contaminated, polluted, or threatened resources.

(3) The effect of alternative remedial action measures on the reasonable availability of groundwater resources for present, future, and probable beneficial uses. The department or the regional board shall consider the extent to which remedial action measures are available that use, as a principal element, treatment that significantly reduces the volume, toxicity, or mobility of the hazardous substances, as opposed to remedial actions that do not use this treatment. The department or the regional board shall not select remedial action measures which use offsite transport and disposal of untreated hazardous substances or contaminated materials if practical and cost-effective treatment technologies are available.

(4) Site-specific characteristics, including the potential for offsite migration of hazardous substances, the surface or subsurface soil, and the hydrogeologic conditions, as well as preexisting background contamination levels.

(5) Cost-effectiveness of alternative remedial action measures. In evaluating the cost-effectiveness of proposed alternative remedial action measures, the department or the regional board shall consider, to the extent possible, the total short-term and long-term costs of these actions and shall use, as a major factor, whether the deferral of a remedial action will result, or is likely to result, in a rapid increase in cost or in the hazard to public health or the

environment posed by the site. Land disposal shall not be deemed the most cost-effective measure merely on the basis of lower short-term cost.

(6) The potential environmental impacts of alternative remedial action measures, including, but not limited to, land disposal of the untreated hazardous substances as opposed to treatment of the hazardous substances to remove or reduce its volume, toxicity, or mobility prior to disposal.

(e) A remedial action plan prepared pursuant to this section shall include the basis for the remedial action selected and shall include an evaluation of each alternative considered and rejected by the department or the regional board for a particular site. The plan shall include an explanation for rejection of alternative remedial actions considered but rejected. The plan shall also include an evaluation of the consistency of the selected remedial action with the requirements of the federal regulations and the factors specified in subdivision (d), if those factors are not otherwise adequately addressed through compliance with the federal regulations. The remedial action plan shall also include a nonbinding preliminary allocation of responsibility among all identifiable potentially responsible parties at a particular site, including those parties which may have been released, or may otherwise be immune, from liability pursuant to this chapter or any other provision of law. Before adopting a final remedial action plan, the department or the regional board shall prepare or approve a draft remedial action plan and shall do all of the following:

(1) Circulate the draft plan for at least 30 days for public comment.

(2) Notify affected local and state agencies of the removal and remedial actions proposed in the remedial action plan and publish a notice in a newspaper of general circulation in the area affected by the draft remedial action plan. The department or the regional board shall also post notices in the location where the proposed removal or remedial action would be located and shall notify, by direct mailing, the owners of property contiguous to the site addressed by the plan, as shown in the latest equalized assessment roll.

(3) Hold one or more meetings with the lead and responsible agencies for the removal and remedial actions, the potentially responsible parties for the removal and remedial actions, and the interested public, to provide the public with the information which is necessary to address the issues which concern the public. The information to be provided shall include an assessment of the degree of contamination, the characteristics of the hazardous substances, an estimate of the time required to carry out the removal and remedial actions, and a description of the proposed removal and remedial actions.

(4) Comply with Section 25358.7.

(f) After complying with subdivision (e), the department or the regional board shall review and consider any public comments, and shall revise the draft plan, if appropriate. The department or the regional board shall then issue the final remedial action plan.

(g) (1) A potentially responsible party named in the final remedial action plan issued by the department or the regional board may seek judicial review of the final remedial action plan by filing a petition for writ of mandate pursuant to Section 1085 of the Code of Civil Procedure within 30 days after the final remedial action plan is issued by the department or the regional board. Any other person who has the right to seek judicial review of the final remedial action plan by filing a petition for writ of mandate pursuant to Section 1085 of the Code of Civil Procedure shall do so within one year after the final remedial action plan is issued. No action may be brought by a potentially responsible party to review the final remedial action plan if the petition for writ of mandate is not filed within 30 days of the date that the final remedial action plan was issued. No action may be brought by any other person to review the final remedial action plan if the petition for writ of mandate is not filed within one year of the date that the final remedial action plan was issued. The filing of a petition for writ of mandate to review the final remedial action plan shall not stay any removal or remedial action specified in the final plan.

(2) For purposes of judicial review, the court shall uphold the final remedial action plan if the plan is based upon substantial evidence available to the department or the regional board, as the case may be.

(3) This subdivision does not prohibit the court from granting any appropriate relief within its jurisdiction, including, but not limited to, enjoining the expenditure of funds pursuant to paragraph (2) of subdivision (b) of Section 25385.6.

(h) (1) This section does not require the department or a regional board to prepare a remedial action plan if conditions present at a site present an imminent or substantial endangerment to the public health and safety or to the environment or, if the department, a regional board, or a responsible party takes a removal action at a site and the estimated cost of the removal action is less than one million dollars ($1,000,000). The department or a regional board shall prepare or approve a removal action workplan for all sites where a nonemergency removal action is proposed and where a remedial action plan is not required. For sites where removal actions are planned and are projected to cost less than one million dollars ($1,000,000), the department or a regional board shall make the local community aware of the hazardous substance release site and shall prepare, or direct the parties responsible for the removal action to prepare, a community profile report to determine the level of public interest in the removal action. Based on the level of expressed interest, the department or regional board shall take appropriate action to keep the community informed of project activity and to provide opportunities for public comment which may include conducting a public meeting on proposed removal actions.

(2) A remedial action plan is not required pursuant to subdivision (b) if the site is listed on the National Priority List by the Environmental Protection Agency pursuant to the federal act, if the department or the regional board concurs with the remedy selected by the Environmental Protection Agency's record of decision. The department or the regional board may sign the record of decision issued by the Environmental Protection Agency if the department or the regional board concurs with the remedy selected.

(3) The department may waive the requirement that a remedial action plan meet the requirements specified in subdivision (d) if all of the following apply:

(A) The responsible party adequately characterizes the hazardous substance conditions at a site listed pursuant to Section 25356.

(B) The responsible party submits to the department, in a form acceptable to the department, all of the following:

(i) A description of the techniques and methods to be employed in excavating, storing, handling, transporting, treating, and disposing of materials from the site.

(ii) A listing of the alternative remedial measures which were considered by the responsible party in selecting the proposed removal action.

(iii) A description of methods that will be employed during the removal action to ensure the health and safety of workers and the public during the removal action.

(iv) A description of prior removal actions with similar hazardous substances and with similar public safety and environmental considerations.

(C) The department determines that the remedial action plan provides protection of human health and safety and for the environment at least equivalent to that which would be provided by a remedial action plan prepared in accordance with subdivision (c).

(D) The total cost of the removal action is less than two million dollars ($2,000,000).

(4) For purposes of this section, the cost of a removal action includes the cleanup of removal of released hazardous substances from the environment or the taking of other actions which are necessary to prevent, minimize, or mitigate damage which may otherwise result from a release or threatened release, as further defined by Section 9601 (23) of Title 42 of the United States Code.

(5) Paragraph (2) of this subdivision does not apply to a removal action paid from the Hazardous Substance Cleanup Fund.

(i) Article 2 (commencing with Section 13320), Article 3 (commencing with Section 13330), Article 5 (commencing with Section 13350), and Article 6 (commencing with Section 13360) of Chapter 5 of Division 7 of the Water Code apply to any action or failure to act by a regional board pursuant to this section.

25356.1.3. (a) In exercising its authority at a hazardous substance release site pursuant to subdivision (a) of Section 25355.5 or 25358.3, the department shall issue orders to the largest manageable number of potentially responsible parties after considering all of the following:

(1) The adequacy of the evidence of each potentially responsible party's liability.

(2) The financial viability of each potentially responsible party.

(3) The relationship or contribution of each potentially responsible party to the release, or threat of release, of hazardous substances at the site.

(4) The resources available to the department.

(b) The department shall schedule a meeting pursuant to Section 25269.5 and notify all identified potentially responsible parties of the date, time, and location of the meeting.

(c) A person issued an order pursuant to Section 25355.5 or 25358.3 may identify additional potentially responsible parties for the site to which the order is applicable and may request the department to issue an order to those parties. The request shall include, with appropriate documentation, the factual and legal basis for identifying those parties as potentially responsible parties for the site. The department shall review the request and accompanying information and, within a reasonable period of time, determine if there is a factual and legal basis for identifying other persons as potentially responsible parties, and notify the person that made the request of the action the department will take in response to the request.

(d) Any determination made by the department regarding the largest manageable number of potentially responsible parties or the identification of other persons as potentially responsible parties pursuant to this section is not subject to judicial review. This subdivision does not affect the rights of any potentially responsible party or the department under any other provision of this chapter.

25356.1.5. (a) Any response action taken or approved pursuant to this chapter shall be based upon, and be no less stringent than, all of the following requirements:

(1) The requirements established under federal regulation pursuant to Subpart E of the National Oil and Hazardous Substances Pollution Contingency Plan (40 C.F.R. 300.400 et seq.), as amended.

(2) The regulations established pursuant to Division 7 (commencing with Section 13000) of the Water Code, all applicable water quality control plans adopted pursuant to Section 13170 of the Water Code and Article 3 (commencing with Section 13240) of Chapter 4 of Division 7 of the Water Code, and all applicable state policies for water quality control adopted pursuant to Article 3 (commencing with Section 13140) of Chapter 3 of Division 7 of the Water Code, to the extent that the department or the regional board determines that those regulations, plans, and policies do not require a less stringent level of remediation than the federal regulations specified in paragraph (1) and to the degree that those regulations, plans, and policies do not authorize decisionmaking procedures that may result in less stringent response action requirements than those required by the federal regulations specified in paragraph (1).

(3) Any applicable provisions of this chapter, to the extent those provisions are consistent with the federal regulations specified in paragraph (1) and do not require a less stringent level of remediation than, or decisionmaking procedures that are at variance with, the federal regulations set forth in paragraph (1).

(b) Any health or ecological risk assessment prepared in conjunction with a response action taken or approved pursuant to this chapter shall be based upon Subpart E of the National Oil and Hazardous Substances Pollution Contingency Plan (40 C.F.R. 300.400 et seq.), the policies, guidelines, and practices of the United States Environmental Protection Agency developed pursuant to the federal act, and the most current sound scientific methods, knowledge, and practices of public health and environmental professionals who are experienced practitioners in the fields of epidemiology, risk assessment, environmental contamination, ecological risk, fate and transport analysis, and toxicology. Risk assessment practices shall include the most current sound scientific methods for data evaluation, exposure assessment, toxicity assessment, and risk characterization, documentation of all assumptions, methods, models, and calculations used in the assessment, and any health risk assessment shall include all of the following:

(1) Evaluation of risks posed by acutely toxic hazardous substances based on levels at which no known or anticipated adverse effects on health will occur, with an adequate margin of safety.

(2) Evaluation of risks posed by carcinogens or other hazardous substances that may cause chronic disease based on a level that does not pose any significant risk to health.

(3) Consideration of possible synergistic effects resulting from exposure to, or interaction with, two or more hazardous substances.

(4) Consideration of the effect of hazardous substances upon subgroups that comprise a meaningful portion of the general population, including, but not limited to, infants, children, pregnant women, the elderly, individuals with a history of serious illness, or other subpopulations, that are identifiable as being at greater risk of adverse health effects due to exposure to hazardous substances than the general population.

(5) Consideration of exposure and body burden level that alter physiological function or structure in a manner that may significantly increase the risk of illness and of exposure to hazardous substances in all media, including, but not limited to, exposures in drinking water, food, ambient and indoor air, and soil.

(c) If currently available scientific data are insufficient to determine the level of a hazardous substance at which no known or anticipated adverse effects on health will occur, with an adequate margin of safety, or the level that poses no significant risk to public health, the risk assessment prepared in conjunction with a response action taken or approved pursuant to this chapter shall be based on the level that is protective of public health, with an adequate margin of safety. This level shall be based exclusively on public health considerations, shall, to the extent scientific data are available, take into account the factors set forth in paragraphs (1) to (5), inclusive, of subdivision (b), and shall be based on the most current principles, practices, and methods used by public health professionals who are experienced practitioners in the fields of epidemiology, risk assessment, fate and transport analysis, and toxicology.

(d) The exposure assessment of any risk assessment prepared in conjunction with a response action taken or approved pursuant to this chapter shall include the development of reasonable maximum estimates of exposure for both current land use conditions and reasonably foreseeable future land use conditions at the site.

APPENDIX B

ADMINISTRATIVE RECORD FILE FOR JPL OU-2

DRAFT ADMINISTRATIVE RECORD FILE INDEX - UPDATE (SORTED BY RECORD DATE / RECORD NUMBER)

OPERABLE UNIT 2

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
NAS7 / 000842 NONE RPT 68-01-7251 0432	02-10-2001 **04-17-1990** NONE	CH2M HILL USEPA	PUBLIC REVIEW DRAFT - BASINWIDE TECHNICAL PLAN REPORT, SAN GABRIEL BASIN (VOLUMES I AND II)	ADMIN RECORD	GW RI	OU 1ED OU 2BCFHK OU 2LM OU 3BDEGF OU 4IJ OU 5CDGFIJ OU 5TUV OU 5W OU 6AB OU 6E OU 7AB	SOUTHWEST DIVISION SW01032214 SW01032214 IMAGED NAS7_002
NAS7 / 000036 NONE MM NONE 0013	12-06-2000 **01-14-1993** NONE		SCOPING MEETING MINUTES - JANUARY 14-15, 1993	ADMIN RECORD INFO REPOSITORY	MW PA QA QC RA RI SI	BLDG. 143 BLDG. 187 BLDG. 67 BLDG. 87 BLDG. 88 BLDG. 98 OU 1 OU 2	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 000936 SOUTHWEST NONE MISC NONE 0029	02-11-2001 **01-14-1993** NONE	JPL	SCOPING MEETING HANDOUT - JANUARY 14, 1993 THROUGH JANUARY 15, 1993		ADMIN RECORD MW RI VOC	FS	OU 2 DIVISION SW01040502 IMAGED NAS7_003

B-1

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UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
NAS7 / 000713 JPL 93-032.CLB:11 LTR NONE 0007	02-05-2001 **02-08-1993** NONE	JPL C. BURIL VARIOUS	TRANSMITTAL OF PROPOSED PROJECT SCHEDULE	ADMIN RECORD INFO REPOSITORY	FFA FS RI WORK PLAN	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000474 NONE LTR NONE 0003	12-13-2000 **02-22-1993** NONE	USEPA M. SCHUTZ JPL C. BURIL	AS MADE REQUISITE BY THE FEDERAL FACILITIES AGREEMENT (FFA) COMMENTS TO NASA'S PROPOSED PROJECT SCHEDULE DATED FEBRUARY 8, 1993	ADMIN RECORD	CRP FFA FS OU QAPP RI ROD SAP	OU 2 OU 3	SOUTHWEST DIVISION SW01032207 SW01032207 IMAGED NAS7_001
NAS7 / 000579 JPL 93-059.CLB:11 LTR NONE 0005	01-23-2001 **03-04-1993** NONE	JPL C. BURIL USEPA M. SCHUTZ	AGENCY COMMENTS ON DRAFT PROJECT SCHEDULE/PROPOSED FINAL SCHEDULE	ADMIN RECORD	COMMENTS FFA FS RI	OU 1 OU 2	SOUTHWEST DIVISION SW01032209 IMAGED NAS7_001
NAS7 / 000703 SOUTHWEST JPL 93-062.CLB:11 LTR NONE 0007	02-05-2001 **03-17-1993** NONE	JPL C. BURIL VARIOUS	TRANSMITTAL OF PROPOSED FINAL PROJECT SCHEDULE			ADMIN RECORD OU 2 OU 3	OU 1 DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000704 SOUTHWEST JPL 93-070.CLB:11 LTR NONE 0006	02-05-2001 **03-31-1993** NONE	JPL C. BURIL VARIOUS	TRANSMITTAL OF FINAL PROJECT SCHEDULE			ADMIN RECORD OU 2 OU 3	OU 1 DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000705 NONE LTR NONE 0002	02-05-2001 **04-27-1993** NONE	DTSC H. SAEBFAR JPL C. BURIL	DTSC AND RWQCB CONCURRENCE WITH FINAL PROJECT SCHEDULE FOR OU 1, OU 2, AND OU 3	ADMIN RECORD		OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 SW01032211 IMAGED NAS7_002

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NAS7 / 000038 NONE MM NONE 0026	12-06-2000 **05-04-1993** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES - MAY 4, 1993	ADMIN RECORD INFO REPOSITORY	FS MW PA QAPP RI SI	BLDG. 183 BLDG. 302 BLDG. 67 OU 1 OU 2	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 000015 JPL 93-097.CLB:11 MM NONE 0015	12-05-2000 **05-20-1993** NONE	JPL C. BURIL VARIOUS	SCOPING MEETING MINUTES (REMEDIAL PROJECT MANAGERS' [RPM] MEETING) - MAY 4, 1993	ADMIN RECORD	EIS FS MTG MINS MW PA RI SI UST	BLDG. 183 BLDG. 302 OU 1 OU 2	SOUTHWEST DIVISION SW01032201 SW01032201 IMAGED NAS7_001
NAS7 / 000706 NONE MISC NONE 0061	02-05-2001 **06-01-1993** NONE	JPL	RESPONSE TO EPA COMMENTS ON DRAFT WORK PLAN	ADMIN RECORD	COMMENTS FFA MW RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000968 NONE PLAN NONE 0385	02-16-2001 **06-01-1993** NONE	EBASCO JPL	DRAFT WORK PLAN FOR PERFORMING A REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)	ADMIN RECORD	FS GW MW RA RI VOC	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040503 SW01040503 IMAGED NAS7_003
NAS7 / 000584 NONE MISC NONE 0018	01-24-2001 **07-01-1993** NONE	JPL	RESPONSE TO USEPA, DTSC, AND RWQCB COMMENTS ON FIELD SAMPLING AND ANALYSIS (FSAP) PLAN FOR OU 2	ADMIN RECORD	FS MONITORING QA QC RI SAP VOC WELLS	OU 2	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED NAS7_001

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
NAS7 / 000585 NONE LTR NONE 0005	01-24-2001 **07-01-1993** NONE	JPL D. HUFF VARIOUS	TRANSMITTAL FOR REVIEW AND COMMENT OF DRAFT FIELD SAMPLING AND ANALYSIS PLAN FOR OU 2	ADMIN RECORD	SAP	OU 2	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED NAS7_001
NAS7 / 000969 SOUTHWEST NONE PLAN NONE 0155	02-16-2001 **07-01-1993** NONE	EBASCO JPL	DRAFT FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2		ADMIN RECORD RI SAP TCE	MW	OU 2 DIVISION SW01040503 SW01040503 IMAGED NAS7_003
NAS7 / 000692 NONE LTR NONE 0009	02-05-2001 **08-03-1993** NONE	RWQCB H. YACOUB EPA/DTSC P. NAKASHIMA	COMMENTS AND REQUEST FOR ADDENDUM ON QUALITY ASSURANCE PROGRAM PLAN (QAPP); HEALTH AND SAFETY PLAN; COMMUNITY RELATIONS PLAN; WORK PLAN FOR PERFORMING AN RI/FS; FIELD SAMPLING AND ANALYSIS PLAN, OU 1; FIELD SAMPLING AND ANALYSIS PLAN, OU 2	ADMIN RECORD	COMMENTS FS GW MONITORING MW QA QC RI VOC	BLDG. 187 BLDG. 197 OU 1 OU 2	SOUTHWEST DIVISION SW01032211 SW01032211 IMAGED NAS7_001
NAS7 / 000587 SOUTHWEST NONE LTR NONE 0019	01-24-2001 **08-04-1993** NONE	USEPA M. SCHUTZ JPL C. BURIL	COMMENTS ON DRAFT QUALITY ASSURANCE PROJECT PLAN (QAPP) AND FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR OU 1		ADMIN RECORD FS GW MW QA QAPP QC RI SAP VOC	COMMENTS OU 2	OU 1 DIVISION SW01032209 SW01032209 IMAGED NAS7_001
NAS7 / 000581 NONE MISC NONE 0014	01-24-2001 **08-06-1993** NONE	JPL	RESPONSE TO USEPA COMMENTS DATED AUGUST 4, 1993 AND DTSC COMMENTS DATED AUGUST 6, 1993 ON DRAFT QUALITY ASSURANCE PROJECT PLAN (QAPP)	ADMIN RECORD	COMMENTS QA QAPP QC SAP	OU 1 OU 2	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED NAS7_001

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NAS7 / 000021 NONE MM NONE 0010	12-06-2000 **08-19-1993** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES - AUGUST 19, 1993	ADMIN RECORD INFO REPOSITORY	COMMENTS FS GW MTG MINS MW OU QA QAPP QC RI ROD	BLDG. 119 BLDG. 144 BLDG. 302 BLDG. 306 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 000589 NONE LTR NONE 0008	01-24-2001 **09-07-1993** NONE	USEPA M. SCHUTZ JPL C. BURIL	COMMENTS ON FIELD SAMPLING AND ANALYSIS PLAN FOR OU 2	ADMIN RECORD	COMMENTS	OU 2	SOUTHWEST DIVISION SW01032209 IMAGED NAS7_001
NAS7 / 000590 SOUTHWEST NONE LTR NONE 0003	01-24-2001 **09-07-1993** NONE	DTSC H. SAEBFAR JPL C. BURIL	COMMENTS TO DRAFT FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR OU 2		ADMIN RECORD SAP	COMMENTS	OU 2 DIVISION SW01032209 IMAGED NAS7_001
NAS7 / 000032 NONE MISC NONE 0001	12-06-2000 **11-10-1993** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING AGENDA - NOVEMBER 10, 1993	ADMIN RECORD		OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 000598 SOUTHWEST NONE LTR NONE 0006	01-24-2001 **11-19-1993** NONE	USEPA M. SCHUTZ JPL D. HUFF	COMMENTS ON DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR OU 2 AND DRAFT FINAL WORK PLAN		ADMIN RECORD	COMMENTS	OU 2 DIVISION SW01032209 SW01032209 IMAGED NAS7_001

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NAS7 / 000693 NONE LTR NONE 0002	02-05-2001 **11-19-1993** NONE	DTSC H. SAEBFAR JPL C. BURIL	REQUEST FOR CLARIFICATION ON DRAFT FINAL FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR OU 2	ADMIN RECORD	COMMENTS SAP	OU 2	SOUTHWEST DIVISION SW01032211 SW01032211 IMAGED NAS7_001
NAS7 / 000033 JPL 93-042.SF:11 MM NONE 0020	12-06-2000 **11-23-1993** NONE	JPL C. BURIL VARIOUS	TRANSMITTAL OF REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES - NOVEMBER 10, 1993	ADMIN RECORD INFO REPOSITORY	GW WELLS	BLDG. 302 BLDG. 306 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 SW01032201 IMAGED NAS7_001
NAS7 / 000817 NONE PLAN NONE 0156	02-09-2001 **12-01-1993** NONE	EBASCO	FINAL FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2	ADMIN RECORD INFO REPOSITORY	FSAP RI	OU 2	SOUTHWEST DIVISION SW01032213 SW01032213 IMAGED NAS7_002
NAS7 / 000820 NONE PLAN NONE 0355	02-09-2001 **12-01-1993** NONE	EBASCO	FINAL WORK PLAN FOR PERFORMING A REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)	ADMIN RECORD INFO REPOSITORY	ARAR FS MW RI WORK PLAN	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040509 SW01040509 IMAGED NAS7_002
NAS7 / 000599 NONE LTR NONE 0027	01-24-2001 **12-06-1993** NONE	USEPA M. SCHUTZ JPL D. HUFF	COMMENTS ON REMEDIAL PROJECT MANAGER (RPM) MEETING MINUTES DATED AUGUST 19, 1993 AND NOVEMBER 10, 1993	ADMIN RECORD	ARAR COMMENTS GW QA QC	BLDG. 302 BLDG. 306 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED NAS7_001
NAS7 / 000604 JPL 94-006.SF:11 LTR NONE 0006	01-29-2001 **01-10-1994** NONE	JPL C. BURIL VARIOUS	TRANSMITTAL OF REPLACEMENT PAGE FOR FINAL FIELD SAMPLING AND ANALYSIS PLAN FOR OU 2	ADMIN RECORD	SAP	OU 2	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED NAS7_001

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NAS7 / 000041 NONE MISC NONE 0002	12-06-2000 **01-19-1994** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING AGENDA - JANUARY 19, 1994	ADMIN RECORD	CRP FS H&SP OU RA RI SAP	OU 1 OU 2	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 001131 NONE DATA NONE 0100	02-21-2001 **01-19-1994** NONE	TRANSGLOBAL ENVIRON GEOCHEM B. HARTMAN EBASCO B. RANDOLPH	SOIL VAPOR SURVEY, LAB ID 940114CM (VOLATILE AROMATIC HYDROCARBONS, VOLATILE HALOGENATED HYDROCARBONS), EVENT NO. 1 (INCLUDES CHAINS OF CUSTODY) - ANALYSIS DATES JANUARY 14, 1994 THROUGH JANUARY 18, 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000040 NONE MM NONE 0016	12-06-2000 **01-20-1994** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES - JANUARY 20, 1994	ADMIN RECORD INFO REPOSITORY	GW MW QAPP RA WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 000804 JPL 94-028.SF:11 LTR NONE 0245	02-09-2001 **02-23-1994** NONE	JPL C. BURIL JPL D. HUFF	TRANSMITTAL OF SOIL GAS DATA	ADMIN RECORD	FFA	OU 2	SOUTHWEST DIVISION SW01032212 IMAGED NAS7_002
NAS7 / 000049 NONE MM NONE 0013	12-06-2000 **03-03-1994** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES - MARCH 3, 1994	ADMIN RECORD INFO REPOSITORY	GW MW OU RA WELLS	OU 1 OU 2	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 001314 NONE DATA DATA NONE 0020	02-21-2001 **04-02-1994** NONE	MONTGOMERY LABORATORIES ENSERCH ENVIRONMENTAL, INC. M. CUTLER	SOIL RESULTS FOR VOC'S, METALS, AND EXTRACTABLES - REPORT #12727, SAMPLES TAKEN 04/02/94 (SC-03) - LEVEL 3	ADMIN RECORD	EXTRACTABLES METALS SOIL VOC	OU 2	SOUTHWEST DIVISION

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NAS7 / 001315 NONE DATA DATA NONE 0039	02-21-2001 **04-06-1994** NONE	MONTGOMERY LABORATORIES ENSERCH ENVIRONMENTAL, INC. M. CUTLER	SOIL RESULTS FOR VOLATILE ORGANICS, METALS, AND EXTRACTABLES - REPORT #12798, SAMPLES TAKEN 04/06/94 (SS-1, SS-2) - LEVEL 3	ADMIN RECORD	EXTRACTABLES METALS SOIL VOLATILES	OU 2	SOUTHWEST DIVISION
NAS7 / 000610 NONE LTR NONE 0003	01-30-2001 **04-19-1994** NONE	DTSC H. SAEBFAR JPL C. BURIL	CONFIRMATION ON PLACEMENT OF SOIL VAPOR MONITORING WELLS FOR OU 2	ADMIN RECORD	SAP	BLDG. 78 OU 2	SOUTHWEST DIVISION SW01032209 IMAGED NAS7_001
NAS7 / 000695 JPL 94-063.SF:11 LTR NONE 0005	02-05-2001 **05-23-1994** NONE	JPL D. HUFF USEPA B. SWARTHOUT	SUMMARY OF SCHEDULE IMPACTS DUE TO DTSC COMMENTS ON FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR OU 1, OU 2, AND OU 3	ADMIN RECORD	FS QAPP RI SAP	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 SW01032211 IMAGED NAS7_001
NAS7 / 000054 NONE MM NONE 0013	12-06-2000 **06-21-1994** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES - JUNE 21, 1994	ADMIN RECORD INFO REPOSITORY	ARAR FACT SHEET FS RI ROD WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001
NAS7 / 000711 SOUTHWEST JPL 94-080.SF MISC NONE 0002	02-05-2001 **07-15-1994** NONE	JPL	FINAL REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) SCHEDULE		ADMIN RECORD GW RI	FS OU 2 OU 3	OU 1 DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000058 NONE MM NONE 0013	12-06-2000 **08-23-1994** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES - AUGUST 23, 1994	ADMIN RECORD INFO REPOSITORY	ARAR FS MW OU RI ROD WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 IMAGED NAS7_001

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NAS7 / 000756 NONE LTR NONE 0001	02-05-2001 **08-29-1994** NONE	USEPA B. SWARTHOUT JPL P. ROBLES, JR.	APPROVAL OF SCHEDULE CHANGES FOR DRAFT REMEDIAL INVESTIGATION (RI) FOR OU 1, OU 2, AND OU 3	ADMIN RECORD	RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 SW01032211 IMAGED NAS7_002
NAS7 / 000065 JPL 94-113.SF:11 MM NONE 0027	12-06-2000 **11-16-1994** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING MINUTES AND MEETING ATTENDANCE RECORD - NOVEMBER 2, 1994	ADMIN RECORD INFO REPOSITORY	ARAR CEQA FACT SHEET MONITORING MW ROD WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 SW01032201 IMAGED NAS7_001
NAS7 / 001133 NONE DATA NONE 0035	02-21-2001 **12-22-1994** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 941220CM, EVENT NO. 2 - ANALYSIS DATES DECEMBER 20, 1994 AND DECEMBER 22, 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001132 NONE DATA NONE 0050	02-21-2001 **12-29-1994** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 941219CM, EVENT NO. 2 - ANALYSIS DATES DECEMBER 21, 1994, DECEMBER 23, 1994, DECEMBER 29, 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000066 JPL 95-005.SF:11 LTR NONE 0005	12-06-2000 **01-20-1995** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING NOTICE AND AGENDA - FEBRUARY 1, 1995	ADMIN RECORD	OU	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032201 SW01032201 IMAGED

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NAS7 / 001134 NONE DATA NONE 0250	02-21-2001 **03-13-1995** NONE	TRANSGLOBAL ENVIRON GEOCHEM B. HARTMAN FOSTER WHEELER B. RANDOLPH	SOIL VAPOR SURVEY, LAB ID 950306CM (VOLATILE AROMATIC HYDROCARBONS, VOLATILE HALOGENATED HYDROCARBONS), EVENT NO. 3 - ANALYSIS DATES MARCH 7, 1995 THROUGH MARCH 10, 1995	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001706 NONE DATA NONE 0025	04-24-2001 **04-17-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485A1 - WATER, VOLATILES - SDG NO. JPL01, COLLECTION DATE: 29 AUGUST 1994 THROUGH 02 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001707 NONE DATA NONE 0025	04-24-2001 **04-17-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485B1 - WATER, VOLATILES - SDG NO. JPL02, COLLECTION DATE: 03 SEPTEMBER 1994 THROUGH 05 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001708 NONE DATA NONE 0025	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485C1 - WATER, VOLATILES - SDG NO. JPL03, COLLECTION DATE: 08 SEPTEMBER 1994 THROUGH 12 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001709 NONE DATA NONE	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485D1 - WATER, VOLATILES - SDG NO. JPL04, COLLECTION DATE: 17 SEPTEMBER 1994 THROUGH 19 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001710 NONE DATA NONE 0025	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485E1 - WATER, VOLATILES - SDG NO. JPL05, COLLECTION DATE: 20 SEPTEMBER 1994 THROUGH 24 SEPEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001711 NONE DATA NONE 0025	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485F1 - WATER, VOLATILES - SDG NO. JPL06, COLLECTION DATE: 28 SEPTEMBER 1994 THROUGH 30 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001712 NONE DATA NONE 0025	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485G1 - WATER, VOLATILES - SDG NO. JPL07, COLLECTION DATE: 01 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001713 NONE DATA NONE 0025	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485H1 - WATER, VOLATILES - SDG NO. JPL08, COLLECTION DATE: 01 OCTOBER 1994 THROUGH 04 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001714 NONE DATA NONE 0025	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485I1 - WATER, VOLATILES - SDG NO. JPL09, COLLECTION DATE: 08 OCTOBER 1994 THROUGH 11 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001716 NONE DATA	04-24-2001 **04-18-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485K1 - WATER, VOLATILES - SDG NO. JPL11, COLLECTION DATE: 22 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

NONE 0025		NASA					
NAS7 / 001718 NONE DATA	04-24-2001 **04-19-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485B2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL02, COLLECTION DATE: 03 SEPTEMBER 1994 THROUGH 05 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NONE 0025		NASA					

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NAS7 / 001723 NONE DATA NONE 0025	04-24-2001 **04-19-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485G2 - WATER, SEMIVOLATILES - SDG NO. JPL07, COLLECTION DATE: 01 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001724 NONE DATA NONE 0025	04-24-2001 **04-19-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485H2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL08, COLLECTION DATE: 01 OCTOBER 1994 THROUGH 04 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001720 NONE DATA NONE 0025	04-24-2001 **04-20-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485D2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL04, COLLECTION DATE: 17 SEPTEMBER 1994 THROUGH 19 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001722 NONE DATA NONE 0025	04-24-2001 **04-20-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485F2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL06, COLLECTION DATE: 28 SEPTEMBER 1994 THROUGH 30 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001726 NONE DATA	04-24-2001 **04-20-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485J2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL10, COLLECTION DATE: 13 OCTOBER 1994 THROUGH 18 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

NONE 0025		NASA					
NAS7 / 001727 NONE DATA	04-24-2001 **04-20-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485K2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL11, COLLECTION DATE: 22 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NONE 0025		NASA					

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NAS7 / 001721 NONE DATA NONE 0025	04-24-2001 **04-21-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485E2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL05, COLLECTION DATE: 20 SEPTEMBER 1994 THROUGH 24 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001717 NONE DATA NONE 0025	04-24-2001 **05-10-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485A2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL01, COLLECTION DATE: 29 AUGUST 1994 THROUGH 02 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001738 NONE DATA NONE 0025	04-24-2001 **05-10-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485A6 - SOIL, GENERAL MINERALS - SDG NO. JPL01, COLLECTION DATE: 29 AUGUST 1994 THROUGH 02 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001739 NONE DATA NONE 0025	04-24-2001 **05-10-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485B6 - SOIL, GENERAL MINERALS - SDG NO. JPL02, COLLECTION DATE: 03 SEPTEMBER 1994 THROUGH 05 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001740 NONE DATA	04-24-2001 **05-10-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485C6 - SOIL, GENERAL MINERALS - SDG NO. JPL03, COLLECTION DATE: 08 SEPTEMBER 1994 THROUGH 12 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001742 NONE DATA	04-24-2001 **05-10-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485E6 - SOIL, GENERAL MINERALS - SDG NO. JPL05, COLLECTION DATE: 20 SEPTEMBER 1994 THROUGH 24 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NONE 0025		NASA					

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NAS7 / 000076 NONE MM NONE 0148 0148	12-07-2000 **05-11-1995** NONE	L. R. LINN & ASSOCIATES VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - MAY 11, 1995	ADMIN RECORD INFO REPOSITORY	FS GW MW RA RI ROD WELLS	BLDG. 158 BLDG. 170 BLDG. 183 BLDG. 301 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001 NAS7_001
NAS7 / 001741 NONE DATA NONE 0025	04-24-2001 **05-11-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485D6 - SOIL, GENERAL MINERALS - SDG NO. JPL04, COLLECTION DATE: 17 SEPTEMBER 1994 THROUGH 19 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001743 NONE DATA NONE 0025	04-24-2001 **05-11-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485F6 - SOIL, GENERAL MINERALS - SDG NO. JPL06, COLLECTION DATE: 28 SEPTEMBER 1994 THROUGH 30 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001744 NONE DATA NONE 0025	04-24-2001 **05-11-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485G6 - SOIL, GENERAL MINERALS - SDG NO. JPL07, COLLECTION DATE: 01 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001745 NONE DATA NONE 0025	04-24-2001 **05-11-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485H6 - SOIL/WATER, GENERAL MINERALS - SDG NO. JPL08, COLLECTION DATE: 01 OCTOBER 1994 THROUGH 04 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

NAS7 / 001746 NONE DATA NONE 0025	04-24-2001 **05-11-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485I6 - SOIL/WATER, GENERAL MINERALS - SDG NO. JPL09, COLLECTION DATE: 08 OCTOBER 1994 THROUGH 11 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001747 NONE DATA NONE 0025	04-24-2001 **05-11-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485J6 - SOIL/WATER, GENERAL MINERALS - SDG NO. JPL10, COLLECTION DATE: 13 OCTOBER 1994 THROUGH 18 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001748 NONE DATA NONE 0025	04-24-2001 **05-11-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485K6 - SOIL/WATER, GENERAL MINERALS - SDG NO. JPL11, COLLECTION DATE: 22 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001728 NONE DATA NONE 0025	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485A4 - SOIL, TRACE METALS - SDG NO. JPL01, COLLECTION DATE: 29 AUGUST 1994 THROUGH 02 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001729 NONE DATA NONE 0025	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485B4 - SOIL, TRACE METALS - SDG NO. JPL02, COLLECTION DATE: 03 SEPTEMBER 1994 THROUGH 05 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001730 NONE DATA	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485C4 - SOIL, TRACE METALS - SDG NO. JPL03, COLLECTION DATE: 08 SEPTEMBER 1994 THROUGH 12 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

NONE 0025		NASA					
NAS7 / 001731 NONE DATA	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485D4 - SOIL, TRACE METALS - SDG NO. JPL04, COLLECTION DATE: 17 SEPTEMBER 1994 THROUGH 19 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NONE 0025		NASA					

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NAS7 / 001732 NONE DATA NONE 0025	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485F4 - SOIL, TRACE METALS - SDG NO. JPL06, COLLECTION DATE: 28 SEPTEMBER 1994 THROUGH 30 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001733 NONE DATA NONE 0025	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485G4 - SOIL, TRACE METALS - SDG NO. JPL07, COLLECTION DATE: 01 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001734 NONE DATA NONE 0025	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485H4 - SOIL/WATER, TRACE METALS - SDG NO. JPL08, COLLECTION DATE: 01 OCTOBER 1994 THROUGH 04 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001735 NONE DATA NONE 0025	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485I4 - SOIL/WATER, TRACE METALS - SDG NO. JPL09, COLLECTION DATE: 08 OCTOBER 1994 THROUGH 11 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001736 NONE DATA	04-24-2001 **05-15-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485J4 - SOIL/WATER, TRACE METALS - SDG NO. JPL10, COLLECTION DATE: 13 OCTOBER 1994 THROUGH 18 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

NONE 0025		NASA					
NAS7 / 001737 NONE DATA	04-24-2001 **05-16-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC)	DATA VALIDATION REPORT NO. 1485K4 - SOIL/WATER, TRACE METALS - SDG NO. JPL11, COLLECTION DATE: 22 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NONE 0025		NASA					

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NAS7 / 001715 NONE DATA NONE 0025	04-24-2001 **05-17-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485J1 - WATER, VOLATILES - SDG NO. JPL10, COLLECTION DATE: 13 OCTOBER 1994 THROUGH 18 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001719 NONE DATA NONE 0025	04-24-2001 **05-17-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485C2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL03, COLLECTION DATE: 08 SEPTEMBER 1994 THROUGH 12 SEPTEMBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001725 NONE DATA NONE 0025	04-24-2001 **05-17-1995** NONE	LABORATORY DATA CONSULT. (LDC) (LDC) NASA	DATA VALIDATION REPORT NO. 1485I2 - SOIL/WATER, SEMIVOLATILES - SDG NO. JPL09, COLLECTION DATE: 08 OCTOBER 1994 THROUGH 11 OCTOBER 1994	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000516 NONE MISC NONE 0020	01-16-2001 **05-31-1995** NONE	JPL C. BURIL	PRESENTATION ON JPL SITE CONDITIONS - MAY 31, 1995 (INCLUDES ENVIRONMENTAL CLEANUP REVIEW FACT SHEET NUMBER 4 DATED JULY 1994)	ADMIN RECORD	MW	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032208 SW01032208 IMAGED NAS7_001
NAS7 / 000578 JPL 95-027.SF:11 LTR NONE 0025	01-31-2001 **06-30-1995** NONE	JPL P. ROBLES, JR. USEPA B. SWARTHOUT	PROPOSAL TO INSTALL THREE ADDITIONAL GROUNDWATER MONITORING WELLS; PROPOSAL LETTER TO COLLECT AND ANALYZE SOIL SAMPLES; AND PROPOSAL FOR LONG TERM GROUNDWATER MONITORING	ADMIN RECORD	FS GW MW QAPP RI	OU 1 OU 2	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED NAS7_001
NAS7 / 000518 JPL 95-031.SF:11 AND JPL AND JPL	01-17-2001 **07-25-1995** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF PROPOSAL TO INSTALL THREE ADDITIONAL GROUNDWATER MONITORING WELLS; PROPOSAL TO COLLECT AND ANALYZE SOIL SAMPLES; AND	ADMIN RECORD	GW MONITORING MW	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032208 SW01032208

95-027.SF:11 LTR NONE 0019	PROPOSAL FOR LONG TERM GROUNDWATER MONITORING	RI VOC	IMAGED NAS7_001

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NAS7 / 000342 NONE MISC NONE 0012	12-12-2000 **08-03-1995** NONE	JPL	SUMMARIES OF SAMPLING AND ANALYSES REQUIREMENTS FOR GROUNDWATER, SOIL CUTTINGS, DRILLING FLUIDS, AND SOIL BORINGS SAMPLES	ADMIN RECORD	FSAP GW RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032205 SW01032205 IMAGED NAS7_001
NAS7 / 000078 JPL 95-038.SF:11 LTR NONE 0006	12-07-2000 **08-15-1995** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING NOTICE - AUGUST 25, 1995	ADMIN RECORD		OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001
NAS7 / 000712 NONE MISC NONE 0012	02-05-2001 **08-15-1995** NONE	JPL	PROJECT SCHEDULE	ADMIN RECORD		OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000519 SOUTHWEST NONE MISC NONE 0134	01-17-2001 **08-21-1995** NONE	JPL	SUPERFUND PROJECT UPDATE - AUGUST 21, 1995		ADMIN RECORD GW MW	DATA OU 2	OU 1 DIVISION SW01032208 IMAGED NAS7_001
NAS7 / 000080 NONE MISC NONE 0001	12-07-2000 **08-25-1995** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING AGENDA - AUGUST 25, 1995	ADMIN RECORD	RA	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001

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NAS7 / 000081 NONE MM NONE 0158 0158	12-07-2000 **08-25-1995** NONE	L. R. LINN & ASSOCIATES VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - AUGUST 25, 1995	ADMIN RECORD INFO REPOSITORY	FFA GW MW PCE RA RI TCA TCE VOC WELLS	BLDG. 107 BLDG. 150 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001 NAS7_001
NAS7 / 000083 JPL 95-043.SF:11 MISC NONE 0127	12-07-2000 **09-13-1995** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING PRESENTATION MATERIALS - AUGUST 25, 1995	ADMIN RECORD	GW MW	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 SW01032202 IMAGED NAS7_001
NAS7 / 000521 JPL 96-001.SF:11 LTR NONE 0041	01-17-2001 **01-11-1996** NONE	JPL P. ROBLES, JR. VARIOUS	RESPONSE TO DTSC AND RWQCB LETTER DATED NOVEMBER 14, 1995 REGARDING PROPOSAL TO INSTALL THREE ADDITIONAL GROUNDWATER MONITORING WELLS; PROPOSAL TO COLLECT AND ANALYZE SOIL SAMPLES; AND PROPOSAL FOR LONG TERM GROUNDWATER MONITORING	ADMIN RECORD	GW MW VOC	OU 1 OU 2	SOUTHWEST DIVISION SW01032208 SW01032208 IMAGED NAS7_001
NAS7 / 000085 JPL 96-003.SF:11 LTR NONE 0004	12-07-2000 **01-12-1996** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING NOTICE - JANUARY 18, 1996	ADMIN RECORD	GW MONITORING SB WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001

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NAS7 / 000088 NONE MM NONE 0185 0185	12-07-2000 **01-18-1996** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - JANUARY 18, 1996	ADMIN RECORD INFO REPOSITORY	MONITORING MW PCE QA QC RA RI TCE WELLS	BLDG. 103 BLDG. 302 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001 NAS7_001
NAS7 / 000717 SOUTHWEST JPL 96-009.SF:11 LTR NONE 0022	02-05-2001 **02-08-1996** NONE	JPL P. ROBLES, JR. VARIOUS	REQUEST FOR SCHEDULE EXTENSION FOR OU 1, OU 2, AND OU 3		ADMIN RECORD RI	FS OU 2 OU 3	OU 1 DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000718 NONE MISC NONE 0006	02-05-2001 **02-14-1996** NONE	JPL	OVERALL COMBINED SCHEDULE FOR OU 1, OU 2, AND OU 3	ADMIN RECORD		OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000089 NONE MM NONE 0227	12-07-2000 **04-10-1996** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - APRIL 10, 1996	ADMIN RECORD INFO REPOSITORY	GW MW OU WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001
NAS7 / 000098 NONE MM NONE 0093 0093	12-07-2000 **04-11-1996** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - APRIL 11, 1996	ADMIN RECORD INFO REPOSITORY	ARAR FS RA RI ROD	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001 NAS7_001
NAS7 / 000824 SOUTHWEST NONE PLAN PLAN NONE 0020	02-09-2001 **05-01-1996** NONE	FOSTER WHEELER JPL	DRAFT ADDENDUM TO FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2		ADMIN RECORD SAP	RI	OU 2 DIVISION SW01032213 SW01032213 IMAGED NAS7_002

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NAS7 / 000720 JPL 96-020.SF:11 LTR NONE 0039	02-05-2001 **05-02-1996** NONE	JPL P. ROBLES, JR. VARIOUS	REVISED PROJECT SCHEDULE	ADMIN RECORD		OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000100 JPL 96-022.SF:11 LTR NONE 0028	12-07-2000 **05-30-1996** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF 4 DRAFT ADDENDUMS: 1) FIELD SAMPLING ANALYSIS PLAN FOR OU 1; 2) FIELD SAMPLING ANALYSIS PLAN FOR OU 2; 3) WORK PLAN FOR PERFORMING A RI/FS; AND 4) QUALITY ASSURANCE PROGRAM FOR PERFORMING A REMEDIAL INVESTIGATION	ADMIN RECORD	FS GW OU RI RISK WORK PLAN	OU 1 OU 2	SOUTHWEST DIVISION SW01032202 SW01032202 IMAGED NAS7_001
NAS7 / 000101 NONE LTR NONE 0004	12-07-2000 **06-11-1996** NONE	USEPA D. LOWE JPL P. ROBLES, JR.	JOINT DTSC, RWQCB, AND EPA JOINT COMMENTS TO JPL SUPERFUND PROJECT SCHEDULE	ADMIN RECORD	FS GW RA RI ROD	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 SW01032202 IMAGED NAS7_001
NAS7 / 000616 NONE LTR NONE 0005	01-30-2001 **06-21-1996** NONE	USEPA D. LOWE JPL P. ROBLES, JR.	COMMENTS TO DRAFT ADDENDA TO REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN	ADMIN RECORD	COMMENTS FS MW RI SAP WORK PLAN	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000386 NONE TEL NONE 0004	12-12-2000 **06-27-1996** NONE	FOSTER WHEELER M. JONES FOSTER WHEELER D. MELCHIOR	CONFERENCE CALL NOTES REGARDING JPL HEALTH RISK ASSESSMENT - MAY 15, 1996	ADMIN RECORD	GW PRG RISK	OU 1 OU 2	SOUTHWEST DIVISION SW01032206 IMAGED NAS7_001
NAS7 / 000827 SOUTHWEST NONE PLAN PLAN NONE 0020	02-09-2001 **07-01-1996** NONE	FOSTER WHEELER	DRAFT FINAL ADDENDUM TO FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2		ADMIN RECORD SAP	RI	OU 2 DIVISION SW01032213 SW01032213 IMAGED NAS7_002

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NAS7 / 000617 NONE MISC NONE 0002	01-30-2001 **07-02-1996** NONE	DTSC JPL	COMMENTS TO DRAFT ADDENDA TO REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN	ADMIN RECORD	COMMENTS FS GW MW RI WORK PLAN	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000721 JPL 96-026.SF:KLP LTR NONE 0042	02-05-2001 **07-08-1996** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF REVISED PROJECT SCHEDULE	ADMIN RECORD	FS RI WORK PLAN	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032211 IMAGED NAS7_002
NAS7 / 000105 NONE TEL TEL NONE 0038	12-08-2000 **07-10-1996** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) TELECON MEETING TRANSCRIPT - JULY 10, 1996	ADMIN RECORD INFO REPOSITORY	MW RA WELLS	OU 2	SOUTHWEST DIVISION SW01032202 SW01032202 IMAGED NAS7_001
NAS7 / 000106 NONE MM NONE 0168 0168	12-08-2000 **07-19-1996** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - JULY 19, 1996	ADMIN RECORD INFO REPOSITORY	ARAR GW MONITORING MW PCE RI RISK TCE VOC WELLS	OU 1 OU 2	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001 NAS7_001
NAS7 / 000829 NONE PLAN PLAN NONE 0027	02-09-2001 **08-01-1996** NONE	FOSTER WHEELER	DRAFT FINAL ADDENDUM TO WORK PLAN FOR PERFORMING A REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)	ADMIN RECORD	FS RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032213 SW01032213 IMAGED NAS7_002

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NAS7 / 000618 NONE LTR NONE 0010	01-30-2001 **08-20-1996** NONE	CAL EPA S. AMIR JPL P. ROBLES, JR.	COMMENTS ON DRAFT ADDENDA TO THE REMEDIAL INVESTIGATION /FEASIBILITY STUDY (RI/FS) WORK PLAN	ADMIN RECORD	COMMENTS FS MW RI WORK PLAN	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000831 NONE PLAN PLAN NONE 0017	02-10-2001 **09-01-1996** NONE	FOSTER WHEELER JPL	DRAFT FINAL PART A ADDENDUM TO THE FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2	ADMIN RECORD	RI SAP	OU 2	SOUTHWEST DIVISION SW01032213 SW01032213 IMAGED NAS7_002
NAS7 / 000832 NONE PLAN PLAN NONE 0029	02-10-2001 **09-01-1996** NONE	FOSTER WHEELER JPL	DRAFT FINAL PART A ADDENDUM TO THE WORK PLAN FOR PERFORMING A REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)	ADMIN RECORD	GW MW WORK PLAN	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040509 SW01040509 IMAGED NAS7_002
NAS7 / 000833 NONE PLAN PLAN NONE 0018	02-10-2001 **09-01-1996** NONE	FOSTER WHEELER JPL	DRAFT FINAL PART B ADDENDUM TO FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2	ADMIN RECORD	RI SAP	OU 2	SOUTHWEST DIVISION SW01032213 SW01032213 IMAGED NAS7_002
NAS7 / 000619 JPL 96-046.SF LTR NONE 0026	01-30-2001 **09-19-1996** NONE	JPL P. ROBLES, JR. VARIOUS	DRAFT FINAL ADDENDUMS TO WORK PLAN, QUALITY ASSURANCE PROJECT PLAN (QAPP), FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR OU 1; AND FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR OU 2; AND SUMMARY OF HOW EACH COMMENT WAS ADDRESSED	ADMIN RECORD	COMMENTS QAPP SAP	OU 1 OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000620 SOUTHWEST NONE LTR NONE 0003	01-30-2001 **10-22-1996** NONE	USEPA D. LOWE JPL P. ROBLES, JR.	COMMENTS ON DRAFT FINAL ADDENDUM TO REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN		ADMIN RECORD FS RI	COMMENTS OU 2 OU 3	OU 1 DIVISION SW01032210 SW01032210 IMAGED NAS7_001

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NAS7 / 000621 NONE LTR NONE 0011	01-30-2001 **10-22-1996** NONE	CAL EPA S. AMIR JPL P. ROBLES, JR.	COMMENTS ON ADDENDA TO REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN AND THE RESPONSES TO COMMENTS	ADMIN RECORD	COMMENTS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000622 JPL 96-054.SF LTR NONE 0016	01-30-2001 **11-13-1996** NONE	JPL P. ROBLES, JR. VARIOUS	RESPONSE TO COMMENTS ON DRAFT FINAL ADDENDA TO REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) PROJECT DOCUMENTS	ADMIN RECORD	COMMENTS FS RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000127 NONE MISC NONE 0036	12-08-2000 **11-15-1996** NONE		JPL SUPERFUND PROJECT NEW SCOPE SCHEDULES	ADMIN RECORD	WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001
NAS7 / 000122 NONE MISC NONE 0111 0111	12-08-2000 **11-22-1996** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - NOVEMBER 22, 1996	CONFIDENTIAL	DCA GW MONITORING MW QA QC RI ROD VOC WELLTCE	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032202 IMAGED NAS7_001 NAS7_001
NAS7 / 000135 NONE MM NONE 0070 0070	12-08-2000 **01-16-1997** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - JANUARY 16, 1997	ADMIN RECORD INFO REPOSITORY	FS GW MONITORING MW RI ROD TCE VOC WELLS	OU 1 OU 2	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001 NAS7_001

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NAS7 / 000136 NONE MISC NONE 0004	12-08-2000 **01-16-1997** NONE		JPL SUPERFUND PROJECT NEW SCOPE SCHEDULES	ADMIN RECORD	MONITORING RA RI SB WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001
NAS7 / 001135 NONE MISC NONE 0004	02-21-2001 **02-20-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM B. HARTMAN FOSTER WHEELER B. RANDOLPH	RESPONSE LETTER TO LA TIMES ARTICLE REGARDING TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY'S PERFORMANCE AND INTERACTIONS WITH LOS ANGELES WATER QUALITY CONTROL BOARD ON SOIL VAPOR SURVEYS	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000767 SOUTHWEST JPL 97-021.SF:11 LTR NONE 0004	02-08-2001 **03-03-1997** NONE	JPL C. BURIL VARIOUS	NOTIFICATION THAT FIELD WORK WILL BEGIN MARCH 11, 1997 FOR OU 2			ADMIN RECORD	OU 2 DIVISION SW01032212 IMAGED NAS7_002
NAS7 / 001136 NONE MISC NONE 0003	02-21-2001 **03-03-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM B. HARTMAN FOSTER WHEELER B. RANDOLPH	NOTIFICATION THAT RWQCB DECIDED THAT ACTIONS AGAINST TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY ARE UNWARRANTED	ADMIN RECORD		OU 2	SOUTHWEST DIVISION
NAS7 / 000149 NONE MISC NONE 0003	12-08-2000 **04-16-1997** NONE		SCHEDULE OF DELIVERABLES	ADMIN RECORD	FS GW MONITORING RA RI ROD	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001
NAS7 / 000150 NONE MISC NONE 0001	12-08-2000 **04-16-1997** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING AGENDA - APRIL 16, 1997	ADMIN RECORD	GW MONITORING	OU 2	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001

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NAS7 / 000151 NONE MM NONE 0100 0100	12-08-2000 **04-16-1997** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - APRIL 16, 1997	ADMIN RECORD INFO REPOSITORY	FFA FS GW MW RA RI RISK ROD TCE WELLS	BLDG. 306 BLDG. 79 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001 NAS7_001
NAS7 / 001137 NONE LTR NONE 0003	02-21-2001 **05-20-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM	TRANSMITTAL OF LETTERS FROM DHS ENVIRONMENTAL LAB ACCREDITATION PROGRAM (ELAP) AND RWQCB STATING THAT TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY (TEG) STATE CERTIFICATIONS ARE IN GOOD STANDING AND THAT TEG IS WELCOME TO SUBMIT DATA TO THE RWQCB	ADMIN RECORD		OU 2	SOUTHWEST DIVISION
NAS7 / 000157 JPL 97049SF.DOC LTR NONE 0009	12-08-2000 **06-03-1997** NONE	JPL P. ROBLES, JR. VARIOUS	REMEDIAL PROJECT MANAGERS' (RPM) MEETING NOTICE - JUNE 12, 1997	ADMIN RECORD	FS RI ROD	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001
NAS7 / 000158 NONE MISC NONE 0003	12-08-2000 **06-19-1997** NONE		SCHEDULE OF FINISH DATES - JUNE 19, 1997	ADMIN RECORD	FS RA RI ROD	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001
NAS7 / 000161 SOUTHWEST NONE MISC NONE 0001	12-08-2000 **06-20-1997** NONE	JPL P. ROBLES, JR.	ACCEPTANCE OF SCHEDULE FOR APPENDIX A OF FEDERAL FACILITY AGREEMENT (FFA) FOR OU 1, OU 2, AND OU 3		ADMIN RECORD	FFA OU 2 OU 3	OU 1 DIVISION SW01032203 SW01032203 IMAGED NAS7_001

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NAS7 / 000162 NONE MISC NONE 0001	12-08-2000 **06-20-1997** NONE		REMEDIAL PROJECT MANAGERS' (RPM) MEETING AGENDA - JUNE 20, 1997	ADMIN RECORD	ARAR MONITORING RA ROD	OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001
NAS7 / 000163 NONE MM NONE 0132 0132	12-08-2000 **06-20-1997** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - JUNE 20, 1997	ADMIN RECORD INFO REPOSITORY	FFA FS MONITORING PCE QA QC RA RI RISK ROD VOC WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001 NAS7_001
NAS7 / 001138 NONE DATA NONE 0025	02-21-2001 **06-23-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970623W1, EVENT NO. 4 - ANALYSIS DATE JUNE 23, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001139 NONE DATA NONE 0025	02-21-2001 **06-24-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970624W1, EVENT NO. 4 - ANALYSIS DATE JUNE 24, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001140 NONE DATA NONE 0025	02-21-2001 **06-25-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970625W1, EVENT NO. 4 - ANALYSIS DATE JUNE 25, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001141 NONE DATA NONE 0025	02-21-2001 **07-01-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM J. SHEPLER FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970626W1 (VOLATILE HALOGENATED HYDROCARBONS AND VOLATILE AROMATIC HYDROCARBONS), EVENT NO. 4 - ANALYSIS DATE JUNE 26, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001143 NONE DATA NONE 0030	02-21-2001 **07-22-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM B. RANDOLPH FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970722W1, EVENT NO. 5 - ANALYSIS DATE JULY 22, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001144 NONE DATA NONE 0025	02-21-2001 **07-23-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970723W1, EVENT NO. 5 - ANALYSIS DATE JULY 23, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001145 NONE DATA NONE 0025	02-21-2001 **07-24-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970724W1, EVENT NO. 5 - ANALYSIS DATE JULY 24, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001142 NONE DATA NONE 0025	02-21-2001 **07-30-1997** NONE	TRANSGLOBAL ENVIRON GEOCHEM J. SHEPLER FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 970721W1 (VOLATILE HALOGENATED HYDROCARBONS AND VOLATILE AROMATIC HYDROCARBONS), EVENT NO. 5 - ANALYSIS DATE JULY 21, 1997	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000552 NONE LTR NONE 0003	01-23-2001 **11-07-1997** NONE	B. RANDOLPH EASTERN RESEARCH GROUP C. DEVONSHIRE JPL C. BURIL	LIST OF QUESTIONS WITH REGARD TO AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR) PUBLIC HEALTH ASSESSMENT	ADMIN RECORD	FS RI ROD	OU 2 OU 3	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED IMAGED NAS7_001 NAS7_001
NAS7 / 000855 SOUTHWEST NONE MISC NONE 0001	02-11-2001 **12-01-1997** NONE		SCHEDULE FOR ADDITIONAL FIELD WORK FOR OU 2 AND SOIL VAPOR EXTRACTION (SVE) PILOT TEST			ADMIN RECORD	OU 2 DIVISION SW01040501 SW01040501 IMAGED NAS7_003
NAS7 / 000177 NONE MM NONE 0099 0099	12-08-2000 **12-03-1997** NONE	L. R. LINN & ASSOCIATES	REMEDIAL PROJECT MANAGERS' (RPM) MEETING TRANSCRIPT - DECEMBER 3, 1997	ADMIN RECORD INFO REPOSITORY	MW ROD TCE VOC WELLS	BLDG. 264 BLDG. 296 BLDG. 313 OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001 NAS7_001
NAS7 / 000858 NONE MISC NONE 0001	02-11-2001 **12-03-1997** NONE	JPL	REMEDIAL PROJECT MANAGER (RPM) TELECON MEETING AGENDA - DECEMBER 3, 1997	ADMIN RECORD		OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 SW01040501 IMAGED NAS7_003
NAS7 / 000974 SOUTHWEST NONE PLAN PLAN NONE 0024	02-18-2001 **01-01-1998** NONE	FOSTER WHEELER JPL	DRAFT ADDENDUM NUMBER 2 TO THE WORK PLAN FOR PERFORMING A REMEDIAL INVESTIGATOIN/FEASIBILITY (RI/FS) STUDY		ADMIN RECORD RI VOC WORK PLAN	FS	OU 2 DIVISION SW01040503 SW01040503 IMAGED NAS7_004

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NAS7 / 000975 SOUTHWEST NONE PLAN PLAN NONE 0021 0021	02-18-2001 **01-01-1998** NONE	FOSTER WHEELER JPL	DRAFT ADDENDUM NUMBER 2 TO THE FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2		ADMIN RECORD RI SAP VOC WELLS	MONITORING	OU 2 DIVISION SW01040503 SW01040503 IMAGED NAS7_004 NAS7_004
NAS7 / 000861 JPL 98002SF.DOC LTR NONE 0009	02-11-2001 **01-06-1998** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGER (RPM) MEETING NOTICE AND AGENDA - JANUARY 8, 1998; DRAFT SOIL VAPOR EXTRACTION PILOT TEST (REVISED) IS ALSO ATTACHED	ADMIN RECORD	WELLS	OU 2	SOUTHWEST DIVISION SW01040501 SW01040501 IMAGED NAS7_003
NAS7 / 000977 NONE PLAN PLAN NONE 0133 0133	02-18-2001 **02-01-1998** NONE	FOSTER WHEELER JPL	DRAFT WORK PLAN FOR SOIL VAPOR EXTRACTION (SVE) PILOT TEST IN OPERABLE UNIT 2	ADMIN RECORD	MONITORING RI VOC WELLS WORK PLAN	OU 2	SOUTHWEST DIVISION SW01040503 SW01040503 IMAGED NAS7_004 NAS7_004
NAS7 / 000864 NONE MISC NONE 0102	02-11-2001 **02-18-1998** NONE	L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - FEBRUARY 18, 1998	ADMIN RECORD	GW MW PCE QA QC ROD VOC WELLS	OU 2 OU 3	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 000554 NONE LTR NONE 0002	01-23-2001 **02-19-1998** NONE	EASTERN RESEARCH GROUP C. DEVONSHIRE JPL C. BURIL	MISCELLANEOUS QUESTIONS FOR PUBLIC HEALTH ASSESSMENT	ADMIN RECORD	WELLS	OU 2	SOUTHWEST DIVISION SW01032209 IMAGED IMAGED NAS7_001 NAS7_001
NAS7 / 000865 JPL 98002SF.DOC LTR NONE 0004	02-11-2001 **03-03-1998** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGER (RPM) MEETING NOTICE AND AGENDA - MARCH 5, 1998	ADMIN RECORD	FS RI	OU 2	SOUTHWEST DIVISION SW01040501 SW01040501 IMAGED NAS7_003

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NAS7 / 000628 SOUTHWEST NONE LTR NONE 0001	01-30-2001 **03-06-1998** NONE	CAL EPA/RWQCB E. NUPEN JPL C. BURIL	COMMENTS ON DRAFT WORK PLAN FOR SOIL VAPOR EXTRACTION (SVE) PILOT TEST IN OU 2		ADMIN RECORD VOC WELLS WORK PLAN	COMMENTS	OU 2 DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000629 NONE LTR NONE 0003	01-30-2001 **03-06-1998** NONE	CAL EPA/DTSC S. AMIR JPL C. BURIL	APPROVAL WITH INCORPORATION OF COMMENTS FOR DRAFT WORK PLAN FOR SOIL VAPOR EXTRACTION (SVE) PILOT TEST IN OU 2; DRAFT ADDENDUM #2 TO WORK PLAN FOR PERFORMING A RI/FS; DRAFT ADDENDUM #2 TO FIELD SAMPLING AND ANALYSIS PLAN AT OU 2	ADMIN RECORD	FS RI WORK PLAN	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000630 NONE LTR NONE 0012	01-30-2001 **03-09-1998** NONE	CAL EPA/RWQCB E. NUPEN JPL P. ROBLES, JR.	APPROVAL WITH INCORPORATION OF COMMENTS ON DRAFT ADDENDUM #2 TO WORK PLAN FOR PERFORMING A RI/FS; AND DRAFT ADDENDUM #2 TO FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A RI/FS AT OU 2	ADMIN RECORD	COMMENTS FS RI SAP WORK PLAN	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000768 SOUTHWEST JPL 98014SF.DOC LTR NONE 0004	02-08-2001 **03-11-1998** NONE	JPL C. BURIL VARIOUS	NOTIFICATION THAT FIELD WORK WILL BEGIN MARCH 23, 1998 FOR OU 2			ADMIN RECORD	OU 2 DIVISION SW01032212 IMAGED NAS7_002
NAS7 / 000980 SOUTHWEST NONE PLAN PLAN NONE 0154 0154	02-18-2001 **05-01-1998** NONE	FOSTER WHEELER JPL	DRAFT FINAL ADDENDUM NUMBER 2 TO THE FIELD SAMPLING AND ANALYSIS PLAN (FSAP) FOR PERFORMING A REMEDIAL INVESTIGATION (RI) AT OU 2		ADMIN RECORD RI SAP WELLS WORK PLAN	MONITORING	OU 2 DIVISION SW01040504 SW01040504 IMAGED NAS7_004 NAS7_004
NAS7 / 000982 NONE PLAN NONE 0133	02-18-2001 **05-01-1998** NONE	FOSTER WHEELER JPL	DRAFT FINAL WORK PLAN FOR SOIL VAPOR EXTRACTION (SVE) PILOT TEST IN OU 2	ADMIN RECORD	MONITORING VOC WORK PLAN	OU 2	SOUTHWEST DIVISION SW01040504 IMAGED NAS7_004

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NAS7 / 000868 NONE MISC NONE 0123	02-11-2001 **05-13-1998** NONE	L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - MAY 13, 1998	ADMIN RECORD INFO REPOSITORY	GW MW RI WELLS	BLDG. 107 OU 2	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 000869 NONE MISC NONE 0001	02-11-2001 **05-13-1998** NONE	JPL	SUPERFUND SCHEDULE REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) DELIVERABLES	ADMIN RECORD	RA RISK	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 SW01040501 IMAGED NAS7_003
NAS7 / 001146 NONE DATA NONE 0050	02-21-2001 **05-18-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980518W1 (VOLATILE HALOGENATED HYDROCARBONS AND VOLATILE AROMATIC HYDROCARBONS), EVENT NO. 6 - ANALYSIS DATE MAY 18, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000557 NONE LTR NONE 0001	01-23-2001 **05-19-1998** NONE	CAL/EPA A. CARLOS JPL C. BURIL	COMMENTS TO DRAFT PUBLIC HEALTH ASSESSMENT	ADMIN RECORD	COMMENTS RI	OU 2	SOUTHWEST DIVISION SW01032209 IMAGED NAS7_001
NAS7 / 001147 NONE DATA NONE 0025	02-21-2001 **05-19-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980519W1, EVENT NO. 6 - ANALYSIS DATE MAY 19, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001148 NONE DATA NONE 0025	02-21-2001 **05-20-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980520W1, EVENT NO. 6 - ANALYSIS DATE MAY 20, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001149 NONE DATA NONE 0025	02-21-2001 **05-21-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980521W1, EVENT NO. 6 - ANALYSIS DATE MAY 21, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001150 NONE DATA NONE 0025	02-21-2001 **05-22-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980522W1, EVENT NO. 6 - ANALYSIS DATE MAY 22, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001151 NONE DATA NONE 0025	02-21-2001 **05-26-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980526W1, EVENT NO. 6 - ANALYSIS DATE MAY 26, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001152 NONE DATA NONE 0025	02-21-2001 **05-27-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980527W1, EVENT NO. 6 - ANALYSIS DATE MAY 27, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001153 NONE DATA NONE 0025	02-21-2001 **05-28-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980528W1, EVENT NO. 6 - ANALYSIS DATE MAY 28, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 000558 JPL 98034SF.DOC LTR NONE 0025	01-23-2001 **06-03-1998** NONE	JPL C. BURIL ATSDR M. WEBER	COMMENTS ON INITIAL REVIEW DRAFT OF PUBLIC HEALTH ASSESSMENT	ADMIN RECORD	FS GW RI VOC	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032209 IMAGED NAS7_001
NAS7 / 001155 NONE DATA NONE 0025	02-21-2001 **06-16-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980616W1, EVENT NO. 7 - ANALYSIS DATE JUNE 16, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001156 NONE DATA NONE 0025	02-21-2001 **06-17-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980617W1, EVENT NO. 7 - ANALYSIS DATE JUNE 17, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001157 NONE DATA NONE 0025	02-21-2001 **06-18-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980618W1, EVENT NO. 7 - ANALYSIS DATE JUNE 18, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001158 NONE DATA NONE 0025	02-21-2001 **06-19-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980619W1, EVENT NO. 7 - ANALYSIS DATE JUNE 19, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 000634 JPL 98038SF.DOC LTR NONE 0003	01-30-2001 **07-02-1998** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF DRAFT FINAL ADDENDUM #2 TO FIELD SAMPLING AND ANALYSIS PLAN (FSAP); DRAFT FINAL ADDENDUM #2 ON WORKPLAN; DRAFT FINAL WORK PLAN FOR SOIL VAPOR EXTRACTION (SVE) PILOT TEST IN OU 2; DRAFT ADDENDUM #3 TO QUALITY ASSURANCE PROGRAM	ADMIN RECORD	FS QAPP RI SAP WORK PLAN	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 001154 NONE DATA NONE 0050	02-21-2001 **07-07-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM B. HARTMAN FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 980615W1 (VOLATILE HALOGENATED HYDROCARBONS AND VOLATILE AROMATIC HYDROCARBONS), EVENT NO. 7 - ANALYSIS DATE JUNE 15, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000561 NONE RPT NONE 0090	01-23-2001 **08-04-1998** NONE	B. RANDOLPH DEPT HEALTH AND HUMAN SERVICES	PUBLIC COMMENT RELEASE OF PUBLIC HEALTH ASSESSMENT	ADMIN RECORD	GW TCE VOC	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032209 IMAGED IMAGED NAS7_001 NAS7_001
NAS7 / 001159 NONE DATA NONE 0025	02-21-2001 **10-07-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981007W1, FIRST LONG-TERM EVENT - ANALYSIS DATE JUNE 16, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000885 NONE MISC NONE 0140	02-11-2001 **10-15-1998** NONE	L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - OCTOBER 15, 1998	ADMIN RECORD INFO REPOSITORY	ARAR FS GW MW RA RI RISK ROD	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003

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NAS7 / 000890 NONE MISC NONE 0001	02-11-2001 **10-15-1998** NONE		SUPERFUND PROJEJCT SCHEDULE OF DELIVERABLES - OCTOBER 15, 1998	ADMIN RECORD	RA RI RISK	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 001160 NONE DATA NONE 0075	02-21-2001 **10-19-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981019W1 (VOLATILE HALOGENATED HYDROCARBONS AND VOLATILE AROMATIC HYDROCARBONS), FIRST LONG-TERM - ANALYSIS DATE OCTOBER 19, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001161 NONE DATA NONE 0025	02-21-2001 **10-20-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981020W1, FIRST LONG-TERM EVENT - ANALYSIS DATE OCTOBER 20, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001162 NONE DATA NONE 0025	02-21-2001 **10-21-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981021W1, FIRST LONG-TERM EVENT - ANALYSIS DATE OCTOBER 21, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001163 NONE DATA NONE 0025	02-21-2001 **10-22-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981022W1, FIRST LONG-TERM EVENT - ANALYSIS DATE OCTOBER 22, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001164 NONE DATA NONE 0025	02-21-2001 **10-23-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981022W1, FIRST LONG-TERM EVENT - ANALYSIS DATE OCTOBER 23, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001165 NONE DATA NONE 0025	02-21-2001 **10-26-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981026W1, FIRST LONG-TERM EVENT - ANALYSIS DATE OCTOBER 26, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001166 NONE DATA NONE 0025	02-21-2001 **10-27-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981027W1, FIRST LONG-TERM EVENT - ANALYSIS DATE OCTOBER 27, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001167 NONE DATA NONE 0025	02-21-2001 **10-28-1998** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 981028W1, FIRST LONG-TERM EVENT - ANALYSIS DATE OCTOBER 28, 1998	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000983 NONE RPT RPT NONE 0106 0106	02-18-2001 **12-01-1998** NONE	FOSTER WHEELER JPL	SECOND ANNUAL REPORT ON LONG-TERM QUARTERLY GROUNDWATER MONITORING PROGRAM SEPTEMBER 1997 TO AUGUST 1998	ADMIN RECORD INFO REPOSITORY	GW MONITORING MW QA QC	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040504 SW01040504 IMAGED NAS7_004 NAS7_004

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NAS7 / 000894 NONE MISC NONE 0248	02-11-2001 **01-07-1999** NONE	L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - JANUARY 7, 1999	ADMIN RECORD	GW MW PCE QA QC RA RI RISK TCE	OU 2	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 001007 SOUTHWEST NONE RPT RPT NONE 0869 0869	02-18-2001 **02-01-1999** NONE	FOSTER WHEELER JPL	DRAFT REMEDIAL INVESTIGATION (RI) FOR OU 2 (VOLUMES I AND II) (VOLUME II APPENDIX D CONTAINS CD OF EXCEL SOIL DATA)		ADMIN RECORD QC RA REMOVAL RI RISK WELLS	QA	OU 2 DIVISION SW01040508 SW01040508 IMAGED NAS7_007 NAS7_007
NAS7 / 000643 JPL 99004LL.DOC LTR NONE 0004	01-30-2001 **02-16-1999** NONE	JPL P. ROBLES, JR. RWQCB A. CARLOS	TRANSMITTAL OF DRAFT REMEDIAL INVESTIGATION REPORT FOR OU 2	ADMIN RECORD	RI	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 001168 NONE DATA NONE 0025	02-21-2001 **03-08-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990308W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 8, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001169 NONE DATA NONE 0025	02-21-2001 **03-09-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990309W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 9, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001170 NONE DATA NONE 0025	02-21-2001 **03-10-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990311W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 10, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001171 NONE DATA NONE 0025	02-21-2001 **03-12-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990312W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 12, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001172 NONE DATA NONE 0025	02-21-2001 **03-15-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990315W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 15, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001173 NONE DATA NONE 0025	02-21-2001 **03-16-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990316W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 16, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001174 NONE DATA NONE 0025	02-21-2001 **03-17-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990317W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 17, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001175 NONE DATA NONE 0025	02-21-2001 **03-18-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 990318W1, SECOND LONG-TERM EVENT - ANALYSIS DATE MARCH 18, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000897 NONE MISC NONE 0112	02-11-2001 **03-25-1999** NONE	L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - MARCH 25, 1999	ADMIN RECORD INFO REPOSITORY	ARAR FS RI	OU 2	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 000899 NONE MISC NONE 0001	02-11-2001 **03-25-1999** NONE		SUPERFUND PROJECT SCHEDULE OF DELIVERABLES - MARCH 25, 1999	ADMIN RECORD	FS RA RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 000648 NONE LTR NONE 0001	02-01-2001 **04-12-1999** NONE	RWQCB A. HEATH JPL P. ROBLES, JR.	REQUEST FOR TIME EXTENSION FOR COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	COMMENTS	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000649 NONE LTR NONE 0002	02-01-2001 **04-21-1999** NONE	DTSC S. AMIR JPL C. BURIL	REQUEST FOR TIME EXTENSION FOR COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	COMMENTS	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000907 JPL 99021SF.DOC LTR NONE 0004	02-11-2001 **04-28-1999** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGER (RPM) MEETING NOTICE AND AGENDA - MAY 4, 199	ADMIN RECORD	ARAR GW RA RI RISK	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003

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NAS7 / 000650 SOUTHWEST NONE MISC NONE 0021	02-01-2001 **04-30-1999** NONE	JPL	RESPONSE TO USEPA COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2		ADMIN RECORD GW RI RISK VOC	COMMENTS	OU 2 DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000651 NONE MISC NONE 0012	02-01-2001 **04-30-1999** NONE	USEPA M. RIPPERDA JPL C. BURIL	COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	ARAR COMMENTS RI VOC	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 000652 NONE LTR NONE 0006	02-01-2001 **05-03-1999** NONE	RWQCB A. HEATH JPL P. ROBLES, JR.	COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	COMMENTS QA QC RI VOC	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 000769 SOUTHWEST NONE MISC NONE 0008	02-08-2001 **05-03-1999** NONE	JPL	RESPONSE TO RWQCB COMMENTS ON DRAFT REMEDIAL INVESTIGATION REPORT FOR OU 2		ADMIN RECORD RI VOC	COMMENTS	OU 2 DIVISION SW01032212 IMAGED NAS7_002
NAS7 / 000908 NONE MISC NONE 0185	02-11-2001 **05-04-1999** NONE	L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - MAY 4, 1999	ADMIN RECORD INFO REPOSITORY	ARAR GW RA RI RISK	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 000653 NONE LTR NONE 0007	02-01-2001 **05-07-1999** NONE	DTSC S. AMIR JPL C. BURIL	COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	COMMENTS GW RI RISK WELLS	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001

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NAS7 / 000654 NONE MISC NONE 0006	02-02-2001 **05-07-1999** NONE	JPL	RESPONSE TO DTSC COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	COMMENTS RI VOC WORK PLAN	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000914 NONE MISC NONE 0037	02-11-2001 **05-26-1999** NONE	L. MIZOTA	INFORMATIONAL MEETING TRANSCRIPT DISCUSSING DHS POLICY 97-005 - MAY 26, 1999	ADMIN RECORD	FS GW MW PCE	OU 2	SOUTHWEST DIVISION SW01040501 SW01040501 IMAGED NAS7_003
NAS7 / 000568 JPL 99034SF.DOC LTR NONE 0028	01-23-2001 **07-09-1999** NONE	JPL J. NOVELLY ATSDR M. WEBER	TRANSMITTAL OF DRAFT FINAL REMEDIAL INVESTIGATION REPORT (OU 1 AND OU 3); OU 2 SVOCS; SUMMARY OF VOC AND PERCHLORATE DETECTED IN GROUNDWATER FEBRUARY-MARCH 1999 & MAY-JUNE 1999; & METALS ANALYSIS OF GROUNDWATER SAMPLES FEBRUARY-MARCH 19999 & MAY-JUNE 1999	ADMIN RECORD	DATA GW RI SVOC VOC	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01032209 SW01032209 IMAGED NAS7_001
NAS7 / 000659 NONE MISC NONE 0001	02-02-2001 **07-14-1999** NONE	USEPA M. RIPPERDA JPL K. PERDUE	ACCEPTANCE OF REQUEST FOR 30-DAY EXTENSION ON EVALUATION OF RISK ASSESSMENT FOR REMEDIAL INVESTIGATION (RI) FOR OU 2	ADMIN RECORD	RI	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000916 NONE MISC NONE 0001	02-11-2001 **07-20-1999** NONE		INFORMATIONAL MEETING AGENDA TO DISCUSS DHS POLICY 97-005 - JULY 20, 1999	ADMIN RECORD	RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040501 IMAGED NAS7_003
NAS7 / 000918 NONE MISC NONE 0115	02-11-2001 **07-20-1999** NONE		INFORMATIONAL MEETING TRANSCRIPT TO DISCUSS DHS POLICY 97-005 - JULY 20, 1999	ADMIN RECORD	RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040502 IMAGED NAS7_003

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NAS7 / 000661 JPL 99044SF.DOC LTR NONE 0001	02-02-2001 **08-03-1999** NONE	JPL P. ROBLES, JR. RWQCB A. CARLOS	REQUEST FOR SCHEDULE EXTENSION FOR DELIVERY OF REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	RI	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000662 NONE LTR NONE 0001	02-02-2001 **08-03-1999** NONE	USEPA M. RIPPERDA JPL P. ROBLES, JR.	APPROVAL OF REQUEST FOR SCHEDULE EXTENSION FOR DELIVERY OF DRAFT FINAL REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	RI	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000663 NONE LTR NONE 0001	02-02-2001 **08-05-1999** NONE	RWQCB A. HEATH JPL P. ROBLES, JR.	APPROVAL OF REQUEST FOR SCHEDULE EXTENSION FOR DELIVERY OF DRAFT FINAL REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD		OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 001010 NONE RPT NONE 0365	02-18-2001 **09-01-1999** NONE	FOSTER WHEELER JPL	DRAFT FINAL REMEDIAL INVESTIGATION (RI) FOR OU 2 (VOLUME II APPENDICES ONLY)	ADMIN RECORD	RI SVOC VOC	OU 2	SOUTHWEST DIVISION SW01041901 IMAGED NAS7_007
NAS7 / 001176 NONE DATA NONE 0025	02-21-2001 **10-04-1999** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991004W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 4, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001177 NONE DATA NONE 0025	02-21-2001 **10-05-1999** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991005W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 5, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001178 NONE DATA NONE 0025	02-21-2001 **10-06-1999** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991006W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 6, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001179 NONE DATA NONE 0025	02-21-2001 **10-07-1999** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991007W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 7, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000666 NONE LTR NONE 0002	02-02-2001 **10-08-1999** NONE	USEPA M. RIPPERDA JPL C. BURIL	COMMENTS ON DRAFT FINAL REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	COMMENTS RI	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 000667 NONE LTR NONE 0001	02-02-2001 **10-08-1999** NONE	RWQCB A. HEATH JPL P. ROBLES, JR.	REQUEST FOR SCHEDULE EXTENSION ON REVIEW OF DRAFT FINAL REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2	ADMIN RECORD	RI	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 001180 NONE DATA NONE 0025	02-21-2001 **10-08-1999** NONE	TRANSGLOBAL ENVIRON GEOCHEM FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991008W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 8, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001181 NONE DATA NONE 0025	02-21-2001 **10-09-1999** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991009W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 9, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001182 NONE DATA NONE 0025	02-21-2001 **10-10-1999** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991010W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 10, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001183 NONE DATA NONE 0025	02-21-2001 **10-11-1999** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 991011W1, THIRD LONG-TERM EVENT - ANALYSIS DATE OCTOBER 11, 1999	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000668 NONE LTR NONE 0004	02-02-2001 **10-18-1999** NONE	RWQCB A. HEATH JPL P. ROBLES, JR.	APPROVAL TO FINALIZE DRAFT FINAL REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2; COMMENTS ARE ALSO PROVIDED PERTAINING TO FUTURE SOIL GAS MONITORING	ADMIN RECORD	RI	OU 2	SOUTHWEST DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000991 SOUTHWEST NONE RPT RPT NONE 0907 0907	02-18-2001 **11-01-1999** NONE	FOSTER WHEELER JPL	FINAL REMEDIAL INVESTIGATION REPORT FOR OU 2 (VOLUMES I AND II) (CD OF REPORT INCLUDED IN VOLUME II)	INFO REPOSITORY	ADMIN RECORD GW QA QC RA RI RISK SVOC VOC	FS	OU 2 DIVISION SW01040504 SW01040504 IMAGED NAS7_004 NAS7_004
NAS7 / 000919 NONE MISC NONE 0099	02-11-2001 **11-04-1999** NONE	 L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - NOVEMBER 4, 1999	ADMIN RECORD INFO REPOSITORY	FS PCE RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040502 IMAGED NAS7_003
NAS7 / 000920 NONE LTR NONE 0004	02-11-2001 **11-04-1999** NONE	JPL C. BURIL VARIOUS	REMEDIAL PROJECT MANAGER (RPM) MEETING NOTICE AND AGENDA - NOVEMBER 4, 1999	ADMIN RECORD	FS PCE RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040502 SW01040502 IMAGED NAS7_003

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NAS7 / 000669 SOUTHWEST JPL 99058F.DOC LTR NONE 0002	02-02-2001 **11-12-1999** NONE	JPL P. ROBLES, JR. RWQCB A. HEATH	RESPONSE TO RWQCB COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2		ADMIN RECORD	COMMENTS	OU 2 DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000672 SOUTHWEST JPL 99061SF.DOC LTR NONE 0024	02-04-2001 **11-17-1999** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF REPLACEMENT PAGES FOR FINAL REMEDIAL INVESTIGATION (RI) REPORT FOR OU 2		ADMIN RECORD	RI	OU 2 DIVISION SW01032210 SW01032210 IMAGED NAS7_001
NAS7 / 000992 NONE RPT NONE 0258 0258	02-18-2001 **12-01-1999** NONE	FOSTER WHEELER JPL	DRAFT FEASIBILITY STUDY FOR OU 2	ADMIN RECORD	FS MONITORING RA REMOVAL RISK SVOC VOC	OU 2	SOUTHWEST DIVISION SW01040505 IMAGED NAS7_004 NAS7_004
NAS7 / 000675 SOUTHWEST JPL 99066SF.DOC LTR NONE 0001	02-04-2001 **12-28-1999** NONE	JPL P. ROBLES, JR. USEPA M. RIPPERDA	TRANSMITTAL OF DRAFT FEASIBILITY STUDY (FS) FOR OU 2		ADMIN RECORD	FS	OU 2 DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 001184 NONE DATA NONE 0025	02-21-2001 **01-17-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0117W1, FOURTH LONG-TERM EVENT - ANALYSIS DATE JANUARY 17, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001185 NONE DATA NONE 0025	02-21-2001 **01-18-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0118W1, FOURTH LONG-TERM EVENT - ANALYSIS DATE JANUARY 18, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001186 NONE DATA NONE 0025	02-21-2001 **01-19-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0119W1, FOURTH LONG-TERM EVENT - ANALYSIS DATE JANUARY 19, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001187 NONE DATA NONE 0025	02-21-2001 **01-20-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0120W1, FOURTH LONG-TERM EVENT - ANALYSIS DATE JANUARY 20, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001188 NONE DATA NONE 0025	02-21-2001 **01-21-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0121W1, FOURTH LONG-TERM EVENT - ANALYSIS DATE JANUARY 21, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001189 NONE DATA NONE 0025	02-21-2001 **01-22-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0122W1, FOURTH LONG-TERM EVENT - ANALYSIS DATE JANUARY 22, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001190 NONE DATA NONE 0025	02-21-2001 **01-23-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0123W1, FOURTH LONG-TERM EVENT - ANALYSIS DATE JANUARY 23, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000923 NONE MISC NONE 0068	02-11-2001 **01-27-2000** NONE	L. MIZOTA	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - JANUARY 27, 2000	ADMIN RECORD	FS GW MW QA QC RI	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040502 IMAGED NAS7_003

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UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
NAS7 / 001016 NONE RPT RPT NONE 0136	02-19-2001 **02-01-2000** NONE	FOSTER WHEELER JPL	FIRST LONG-TERM SOIL VAPOR SAMPLING RESULTS, OCTOBER 1998 INCLUDES TRANSMITTAL LETTER TO P. ROBLES DATED 11/02/00 (REFER TO: GEN20001102)	ADMIN RECORD INFO REPOSITORY	OU SOIL VOC	OU 2	SOUTHWEST DIVISION SW01041902 SW01041902 IMAGED NAS7_008
NAS7 / 001017 SOUTHWEST NONE RPT RPT NONE 0143	02-19-2001 **02-01-2000** NONE	FOSTER WHEELER JPL	SECOND LONG-TERM SOIL VAPOR SAMPLING RESULTS, MARCH 1999 INCLUDES TRANSMITTAL LETTER TO P. ROBLES DATED 11/02/00 (REFER TO: GEN20001102)	INFO REPOSITORY	ADMIN RECORD SOIL VOC	OU	OU 2 DIVISION SW01041902 SW01041902 IMAGED NAS7_008
NAS7 / 000677 SOUTHWEST NONE MISC NONE 0003	02-04-2001 **02-11-2000** NONE	JPL	RESPONSE TO RWQCB COMMENTS ON DRAFT FEASIBILITY STUDY FOR OU 2		ADMIN RECORD FS RA VOC	COMMENTS	OU 2 DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 000679 NONE LTR NONE 0015	02-04-2001 **02-25-2000** NONE	USEPA M. RIPPERDA JPL P. ROBLES, JR.	COMMENTS ON DRAFT FEASIBILITY STUDY (FS) REPORT FOR OU 2	ADMIN RECORD	ARAR COMMENTS FS VOC	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 000680 NONE LTR NONE 0003	02-04-2001 **02-25-2000** NONE	DTSC S. AMIR JPL P. ROBLES, JR.	COMMENTS ON DRAFT FEASIBILITY STUDY (FS) REPORT FOR OU 2	ADMIN RECORD	COMMENTS FS	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 000681 NONE MISC NONE 0002	02-04-2001 **02-25-2000** NONE	JPL	RESPONSE TO DTSC COMMENTS ON DRAFT FEASIBILITY STUDY (FS) REPORT FOR OU 2	ADMIN RECORD	COMMENTS FS	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001

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NAS7 / 000682 NONE MISC NONE 0027	02-04-2001 **02-25-2000** NONE	JPL	RESPONSE TO EPA COMMENTS ON DRAFT FEASIBILITY STUDY (FS) REPORT FOR OU 2	ADMIN RECORD	COMMENTS FS MW RESPONSE RI VOC	OU 2	SOUTHWEST DIVISION SW01032210 IMAGED NAS7_001
NAS7 / 001018 NONE RPT RPT NONE 0137	02-19-2001 **03-01-2000** NONE	FOSTER WHEELER JPL	THIRD LONG-TERM SOIL VAPOR SAMPLING RESULTS, OCTOBER 1999 INCLUDES TRANSMITTAL LETTER TO P. ROBLES DATED 11/02/00 (REFER TO: GEN20001102)	ADMIN RECORD INFO REPOSITORY	OU SOIL VOC	OU 2	SOUTHWEST DIVISION SW01041902 SW01041902 IMAGED NAS7_008
NAS7 / 001019 SOUTHWEST NONE RPT RPT NONE 0151	02-19-2001 **04-01-2000** NONE	FOSTER WHEELER JPL	FOURTH LONG-TERM SOIL VAPOR SAMPLING RESULTS, JANUARY 2000 INCLUDES TRANSMITTAL LETTER TO P. ROBLES DATED 11/02/00 (REFER TO: GEN20001102)	INFO REPOSITORY	ADMIN RECORD SOIL VOC	OU	OU 2 DIVISION SW01041902 SW01041902 IMAGED NAS7_008
NAS7 / 000926 NONE MISC NONE 0027	02-11-2001 **05-18-2000** NONE	L. LINN	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - MAY 18, 2000	ADMIN RECORD	FS MW ROD WELLS	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01040502 IMAGED NAS7_003
NAS7 / 001191 NONE DATA NONE 0025	02-21-2001 **06-20-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0620W1, FIFTH LONG-TERM EVENT - ANALYSIS DATE JUNE 20, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001192 NONE DATA NONE 0025	02-21-2001 **06-21-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0621W1, FIFTH LONG-TERM EVENT - ANALYSIS DATE JUNE 21, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION

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NAS7 / 001193 NONE DATA NONE 0025	02-21-2001 **06-22-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0622W1, FIFTH LONG-TERM EVENT - ANALYSIS DATE JUNE 22, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001194 NONE DATA NONE 0025	02-21-2001 **06-23-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0623W1, FIFTH LONG-TERM EVENT - ANALYSIS DATE JUNE 23, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001195 NONE DATA NONE 0025	02-21-2001 **06-24-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0624W1, FIFTH LONG-TERM EVENT - ANALYSIS DATE JUNE 24, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001196 NONE DATA NONE 0025	02-21-2001 **06-25-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0625W1, FIFTH LONG-TERM EVENT - ANALYSIS DATE JUNE 25, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 001197 NONE DATA NONE 0025	02-21-2001 **06-26-2000** NONE	HP LABS FOSTER WHEELER	SOIL VAPOR SURVEY, LAB ID 2K0626W1, FIFTH LONG-TERM EVENT - ANALYSIS DATE JUNE 26, 2000	ADMIN RECORD	DATA	OU 2	SOUTHWEST DIVISION
NAS7 / 000929 NONE MISC NONE 0001	02-11-2001 **06-28-2000** NONE	JPL L. WOODARD VARIOUS	REMEDIAL PROJECT MANAGER (RPM) MEETING AGENDA - JUNE 29, 2000	ADMIN RECORD		OU 2	SOUTHWEST DIVISION SW01040502 IMAGED NAS7_003

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NAS7 / 000931 NONE MISC NONE 0086	02-11-2001 **06-29-2000** NONE	L. LINN	REMEDIAL PROJECT MANAGER (RPM) MEETING TRANSCRIPT - JUNE 29, 2000	ADMIN RECORD		OU 2	SOUTHWEST DIVISION SW01040502 IMAGED NAS7_003
NAS7 / 000996 NONE RPT NONE 0301 0301	02-18-2001 **07-01-2000** NONE	FOSTER WHEELER JPL	DRAFT FINAL FEASIBILITY STUDY (FS) FOR OU 2	ADMIN RECORD	ARAR FS MONITORING RA RI RISK	OU 2	SOUTHWEST DIVISION SW01040505 IMAGED NAS7_004 NAS7_004
NAS7 / 002109 SOUTHWEST NONE MISC NONE 0075	05-01-2001 **07-01-2000** NONE	FOSTER WHEELER M. LOSI JPL	REPLACEMENT PAGES FOR FINAL FEASIBILITY STUDY FOR OU 2	INFO REPOSITORY		ADMIN RECORD	OU 2 DIVISION
NAS7 / 001126 NONE LTR NONE 0002	02-21-2001 **08-29-2000** NONE	USEPA M. RIPPERDA JPL P. ROBLES, JR.	COMMENTS ON DRAFT FINAL FEASIBILITY STUDY (FS) FOR OU 2	ADMIN RECORD	COMMENTS FS RISK VOC	OU 2	SOUTHWEST DIVISION SW01042501 IMAGED NAS7_008
NAS7 / 001020 NONE DIVISION RPT RPT NONE 0148	02-19-2001 **09-01-2000** NONE	FOSTER WHEELER JPL	FIFTH LONG-TERM SOIL VAPOR SAMPLING RESULTS, JUNE 2000 INCLUDES TRANSMITTAL LETTER TO P. ROBLES DATED 11/02/00 (REFER TO: GEN20001102)	ADMIN RECORD	OU INFO REPOSITORY VOC	OU 2	SOUTHWEST SOIL SW01041902 SW01041902 IMAGED NAS7_008

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NAS7 / 001015 SOUTHWEST JPL GEN20001102-1 MISC NONE 0090	02-19-2001 **11-02-2000** NONE	JPL C. BURIL JPL P. ROBLES	REPLACEMENT PAGES FOR THE DRAFT FINAL OU 2 FEASIBILITY STUDY REPORT DATED JULY 2000 INCLUDES TRANSMITTAL LETTERS TO VARIOUS AGENCIES (THESE REPLACEMENT PAGES MAKE THE DRAFT FINAL REPORT A FINAL)		ADMIN RECORD FS OU PAH PCB RCRA RI RI/FS ROD SVOC TPH VOC	ARAR	OU 2 DIVISION SW01041902 SW01041902 IMAGED NAS7_008
NAS7 / 001128 JPL GENS0001102 LTR NONE 0001	02-21-2001 **11-02-2000** NONE	JPL C. BURIL JPL P. ROBLES, JR.	TRANSMITTAL OF LONG-TERM QUARTERY SOIL VAPOR MONITORING REPORTS, EVENTS 1 THROUGH 5	ADMIN RECORD	MONITORING	OU 2	SOUTHWEST DIVISION SW01042501 SW01042501 IMAGED NAS7_008
NAS7 / 001125 NONE MM NONE 0108	02-21-2001 **12-07-2000** NONE	CSR L. MIZOTA JPL	REMEDIAL PROJECT MANAGER MEETING (RPM) TRANSCRIPT - DECEMBER 7, 2000	ADMIN RECORD INFO REPOSITORY	GW MONITORING ROD	OU 1 OU 2 OU 3	SOUTHWEST DIVISION SW01042501 IMAGED NAS7_008
NAS7 / 000178 NONE MISC NONE 0001	12-08-2000 **12-08-2000** NONE		DRAFT TABLE OF CONTENTS FOR OU2 FSAP ADDENDUM NUMBER 2	ADMIN RECORD	MONITORING WELLS	OU 2	SOUTHWEST DIVISION SW01032203 IMAGED NAS7_001
NAS7 / 002088 NONE LTR NONE 0003	05-01-2001 **01-08-2001** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF DRAFT PROPOSED PLAN FOR OU 2	ADMIN RECORD		OU 2	SOUTHWEST DIVISION

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NAS7 / 000733 NONE MISC MISC NONE 0003	02-05-2001 **02-05-2001** NONE	FOSTER WHEELER	MW-22, MW-23, AND MW-24 INSTALLATION SCHEDULE BREAKDOWN; SOIL VAPOR WELLS, SOIL BORINGS, AND ARROYO TEST PITS FOR OU 2; AND PERIODS OF PERFORMANCE FOR PREVIOUS DEEP GROUNDWATER WELL INSTALLATIONS	ADMIN RECORD	MW	OU 2	SOUTHWEST DIVISION SW01032211 SW01032211 IMAGED NAS7_002
NAS7 / 000860 SOUTHWEST NONE MISC NONE 0050	02-11-2001 **02-11-2001** NONE		CROSS REFERENCE FOR POTENTI8AL SOURCE LOCATIONS AND EXPLORATORY METHODS; SOIL-VAPOR PROBE LOCATIONS; AND MISCELLANEOUS DATA		ADMIN RECORD	DATA	OU 2 DIVISION SW01040501 SW01040501 IMAGED NAS7_003
NAS7 / 002087 SOUTHWEST NONE RPT NONE 0150 0150	05-01-2001 **03-01-2001** NONE	FOSTER WHEELER JPL	FINAL SOIL VAPOR EXTRACTION PILOT TEST FOR OU 2	INFO REPOSITORY	ADMIN RECORD MW REMOVAL SOIL VOC	MONITORING	OU 2 DIVISION
NAS7 / 002104 NONE LTR NONE 0009	05-01-2001 **03-13-2001** NONE	JPL P. ROBLES, JR. VARIOUS	RESPONSE TO COMMENTS ON DRAFT PROPOSED PLAN FOR OU 2	ADMIN RECORD		OU 2	SOUTHWEST DIVISION
NAS7 / 002092 SOUTHWEST NONE DIVISION LTR NONE 0100	05-01-2001 **03-29-2001** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF DRAFT REMEDIAL PROJECT MANAGER (RPM) MEETING MINUTES - MARCH 7, 2001			ADMIN RECORD INFO REPOSITORY OU 3	OU 1 OU 2
NAS7 / 002093 NONE LTR NONE 0003	05-01-2001 **04-02-2001** NONE	JPL P. ROBLES, JR. VARIOUS	TRANSMITTAL OF FINAL QUARTERLY GROUNDWATER MONITORING RESULTS (9/00 THRU 10/00); FINAL FOURTH ANNUAL REPORT ON QUARTERLY GROUNDWATER MONITORING (3/01); & FINAL SOIL VAPOR EXTRACTION PILOT TEST FOR OU 2 (3/01)	ADMIN RECORD		OU 2	SOUTHWEST DIVISION

UIC No. / Rec. No. Doc. Control No. Record Type Contr./Guid. No. Approx. # Pages	Prc. Date Record Date CTO No. EPA Cat. #	Author Affil. Author Recipient Affil. Recipient	Subject	Classification	Keywords	Sites	Location Box No.
NAS7 / 002091 NONE LTR NONE 0001	05-01-2001 **04-04-2001** NONE	JPL P. ROBLES, JR. RAYMOND BASIN MANAGEMENT BOARD R. PALMER	TRANSMITTAL OF DRAFT FINAL PROPOSED PLAN FOR OU 2	ADMIN RECORD		OU 2	SOUTHWEST DIVISION
NAS7 / 002105 NONE MISC NONE 0009	05-01-2001 **04-25-2001** NONE	JPL	PROPOSED PLAN TO SELECT A REMEDY TO CLEAN UP SOIL	ADMIN RECORD INFO REPOSITORY	ARAR RA RI RISK VOC	OU 2	SOUTHWEST DIVISION

UIC=NAS7
No Keywords
Sites=OU 2;OU 2BCFHK;OU 2LM

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APPENDIX C

PUBLIC NOTICES

Proof of Publication
(2015.5 C.C.P)

STATE OF CALIFORNIA,
COUNTY OF LOS ANGELES

I am a citizen of the United States, and a resident of the county aforesaid; I am over the age of eighteen years; and I am not a party to or interested in the notice published. I am the chief legal advertising clerk of the publisher of the

LA CANADA VALLEY SUN

a newspaper of general circulation, printed and

published WEEKLY

in the City of LA CANADA FLINTRIDGE
County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California,

under the date of AUGUST 08 19 77

Case Number 200411
that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

MAY 10

all in the year 20 01
I certify (or declare) under penalty of perjury that the foregoing is true and correct

Dated at LA CANADA FLINTRIDGE

California, this 10 day of MAY 2001

Ruth Douglass
Signature

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Rev. 12/99. Daily Journal Corporation, 915 East First Street, Los Angeles, CA 90012

This Space is for the County Clerk's Filing Stamp

Proof of Publication of

PUBLIC NOTICE
PROPOSED PLAN FOR CLEANUP OF SOIL AT THE NATIONAL AERONAUTIC SPACE ADMINISTRATION JET PROPULSION LABORATORY

Paste Clipping
Of Notice
SECURELY
In This Space

See back

PUBLIC NOTICE

Public Comment Period
Proposed Plan for Cleanup of Soil at the National Aeronautic Space Administration
Jet Propulsion Laboratory

The National Aeronautics and Space Administration (NASA) will hold two public meetings to discuss the proposed cleanup of soils at its Jet Propulsion Laboratory (JPL) in Pasadena, California. The public meetings will be held at the following location and on the following dates:

Von Karman Auditorium,
NASA Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91101

May 12, 2001
Information forum will be open from **1:00–4:00 p.m.**
A summary presentation will begin at **2:30 p.m.** and will be followed by a **formal comment** session.

May 14, 2001
Information forum will be open from **6:00–9:00 p.m.**
A summary presentation will begin at **7:30 p.m.** and will be followed by a **formal comment** session.

During the "information forums," the public will have the opportunity to speak with NASA and federal and local regulatory agency representatives on a one-on-one basis about the proposed cleanup actions. Following the summary presentations, attendees can formally address questions to these representatives that will be included in a transcript which will become part of the final decision made for the proposed action.

JPL is a federal facility owned by the NASA and is located between the city of LaCanada-Flintridge and the unincorporated city of Altadena, near Pasadena, California. JPL covers about 176 acres of land and includes more than 150 buildings and other structures. The JPL site was added to the National Priorities List (NPL) in 1992 after an initial inspection revealed the presence of chlorinated solvents and other chemicals in the subsurface soil and groundwater. The purpose of this notice is to invite the public to provide comments and ask questions on the Proposed Plan for cleanup of subsurface or "vadose zone" soils at the site (which has been designated as Operable Unit 2 or OU-2).

The cleanup or "remedial action" objective for OU-2 is to prevent, to the extent practicable, the migration of volatile organic compounds (VOCs) from soil to groundwater. The Proposed Plan provides information about the alternatives considered to meet the remedial action objective and the rationale for selecting the proposed technology or "remedy." The Proposed Plan also serves to seek public input prior to making a final decision. NASA is proposing the following remedy as the preferred alternative:

NASA is proposing soil vapor extraction (SVE) as the preferred remedy for recovering VOCs from the soils at OU-2. SVE systems are designed to remove chemicals that have a tendency to evaporate or "volatilize" easily by applying a vacuum through a system of underground wells. The VOCs are then pulled from the subsurface in vapor form and treated before discharge to the atmosphere. SVE was shown to be effective based on pilot tests NASA conducted at OU-2.

Under this proposed remedy, up to five vapor extraction wells and vapor treatment systems would be installed. The extraction wells and vapor treatment systems would be operated until VOCs in soil vapor have been reduced to an agreed-upon level. To some extent, natural processes will also assist in the overall remediation of the soils. As part of the cleanup process, a soil-vapor monitoring program, currently in place, would be used to track concentrations and evaluate the extent of VOCs in soil vapor over time.

Final decisions on the cleanup plans will be made after public comments have been received and considered. The public comment period is May 7 through June 11, 2001. If requested, NASA may consider extending the public comment period. Written comments and requests for extension of the comment period should be mailed or e-mailed to Mr. Peter Robles, Jr. at the address provided in this notice, or brought to the public meeting.

An administrative record file has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act of 1986. CERCLA governs the cleanup of facilities where there has been a release of hazardous substances into the environment. The administrative record includes the site Remedial Investigation, Feasibility Study, and Proposed Plan. The administrative record is located at JPL and several local "information repositories." Local residents and other interested parties are encouraged to review the Proposed Plan at the following information repositories:

Altadena Public Library
600 E. Mariposa Ave.
Altadena, CA 91001
(626) 798-0833

LaCanada-Flintridge Public Library
4545 Oakwood Ave.
LaCanada-Flintridge, CA 91011
(818) 790-3330

Pasadena Central Library
285 E. Walnut St.
Pasadena, CA 91101
(626) 744-4052

Questions regarding the Proposed Plan, Feasibility Study, Remedial Investigation, administrative record, and/or other issues should be directed to the contact below:

Mr. Peter Robles, Jr.
NASA Management Office, Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91101
Phone: (818) 393-2920
Fax: (818) 393-2607
E-mail: probles@nmo.jpl.nasa.gov

(Published in the La Cañada Valley Sun May 10, 2001.)

PROOF OF PUBLICATION

(2015.5 C.C.P.)

STATE OF CALIFORNIA,
County of Los Angeles,

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Foothill Leader, a newspaper of general circulation, printed and published bi-weekly in the cities of La Canada Flintridge, La Crescenta, Sunland and Tujunga, County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California, under the date of March 1, 1934, Case Number 369086; that the notice, of which the annexed is a printed copy (set in type no smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

April 28, 2001
May 5, ~~X~~ 12 2001

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Glendale, California,

this 9th day of May, 2001

Signature

Proof of Publication of

Public Comment Period
Proposed Plan for Cleanup of Soil at the National Aeronautic Space Administration
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NASA Management Office, Jet Propulsion Laboratory
4800 Oak Grove Drive
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Phone: (818) 393-2920
Fax: (818) 393-2607
E-mail: probles@nmo.jpl.nasa.gov

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Proposed Plan for Cleanup of Soil at the National Aeronautic Space Administration
Jet Propulsion Laboratory

The National Aeronautics and Space Administration (NASA) will hold two public meetings to discuss the proposed cleanup of soils at its Jet Propulsion Laboratory (JPL) in Pasadena, California. The public meetings will be held at the following location and on the following dates:

Von Karman Auditorium,
NASA Jet Propulsion
Laboratory
4800 Oak Grove Drive
Pasadena, CA 91101

May 12, 2001
Information forum will be open from **1:00–4:00 p.m.**
A summary presentation will begin at 2:30 p.m. and will be followed by a **formal comment** session.

May 14, 2001
Information forum will be open from **6:00–9:00 p.m.**
A summary presentation will begin at 7:30 p.m. and will be followed by a **formal comment** session.

During the "information forums," the public will have the opportunity to speak with NASA and federal and local regulatory agency representatives on a one-on-one basis about the proposed cleanup actions. Following the summary presentations, attendees can formally address questions to these representatives that will be included in a transcript which will become part of the final decision made for the proposed action.

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The cleanup or "remedial action" objective for OU-2 is to prevent, to the extent practicable, the migration of volatile organic compounds (VOCs) from soil to groundwater. The Proposed Plan provides information about the alternatives considered to meet the remedial action objective and the rationale for selecting the proposed technology or "remedy." The Proposed Plan also serves to seek public input prior to making a final decision. NASA is

Continued to next column

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Under this proposed remedy, up to five vapor extraction wells and vapor treatment systems would be installed. The extraction wells and vapor treatment systems would be operated until VOCs in soil vapor have been reduced to an agreed-upon level. To some extent, natural processes will also assist in the overall remediation of the soils. As part of the cleanup process, a soil-vapor monitoring program, currently in place, would be used to track concentrations and evaluate the extent of VOCs in soil vapor over time.

Final decisions on the cleanup plans will be made after public comments have been received and considered. The public comment period is May 7 through June 11, 2001. If requested, NASA may consider extending the public comment period. Written comments and requests for extension of the comment period should be mailed or e-mailed to Mr. Peter Robles, Jr. at the address provided in this notice, or brought to the public meeting.

An administrative record file has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act of 1986. CERCLA governs the cleanup of facilities where there has been a release of hazardous substances into the environment. The administrative record includes the site Remedial Investigation, Feasibility Study, and Proposed Plan. The administrative record is located at JPL and several local "information repositories." Local residents and other interested parties are encouraged to review the Proposed Plan at the following information repositories:

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NASA Management Office, Jet Propulsion Laboratory
4800 Oak Grove Drive

Continued to next column

Pasadena, CA 91101
Phone: (818) 393-2920
Fax: (818) 393-2607
E-mail:
probles@nmo.jpl.nasa.gov

Publish: April 28, May 5, 7, 8, 9, 10, 11, 2001

BATTELLE

505 KING AVENUE

COLUMBUS, OH 43201

State of California, } ss.
County of Los Angeles

HOWARD MORRISON *of said*

County and State, being duly sworn, says:

That he is and at all times herein mentioned was a citizen of the United States, over 21 years of age, and not a party to nor interested in the above entitled matter; that he is a principal clerk of the printers and publishers of the LOS ANGELES TIMES *a newspaper printed and published daily in the said Los Angeles County; that the*

LEGAL NOTICE

in the above entitled matter of which the annexed is a printed copy, was published in said newspaper

LOS ANGELES TIMES

202 WEST FIRST ST.
LOS ANGELES, CA 90012

on the following days, to-wit:

FRIDAY MAY 11, 2001

Howard Morrison

Subscribed and sworn to before me, this MAY 2 1 2001 *day of*

Alicia D. Burruel

Notary Public in and for the County of Los Angeles, State of California

ALICIA D. BURRUEL
Comm. # 1196929
NOTARY PUBLIC - CALIFORNIA
Los Angeles County
My Comm. Expires Sept. 28, 2002

M-696

Affidavit of Publication

-of-

CLASSIFIED ADVERTISING

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Publish: May 7, 8, 9, 10, 11, 2001
Pasadena Star-News Ad No. 109989

Los Angeles Times

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PROOF OF PUBLICATION

(2015.5 C.C.P.)

STATE OF CALIFORNIA,
County of Los Angeles,

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Glendale News-Press, a newspaper of general circulation, printed and published daily in the City of Glendale, County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California, under the date of March 1, 1934, Case Number 369086; that the notice, of which the annexed is a printed copy (set in type no smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

June 6, 9, 13, 16, 2001

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Glendale, California,

this 16th day of June, 2001

Signature

GNP 6-29

Public Comment Period
Public Meeting Announcement
Proposed Plan for Cleanup of Soil at the National Aeronautic Space Administration
Jet Propulsion Laboratory

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2184 North Lake Avenue
Altadena, CA 91001
June 20, 2001

Summary presentation: 7:00 p.m.
Information forum: 6:00 - 9:00 p.m.
Formal comment session: 7:30 p.m.

During the "information forum," the public will have the opportunity to speak with NASA and federal and local regulatory agency representatives on a one-on-one basis about the proposed cleanup actions. Following the summary presentations, attendees can formally address questions to these representatives; these questions (and agency responses) will be included in a transcript and become part of the final decision made for the proposed action.

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NASA is proposing soil vapor extraction (SVE) as the preferred remedy for recovering VOCs from the soils. SVE systems are designed to remove chemicals that have a tendency to evaporate or "volatilize" easily by applying a vacuum through a system of underground wells. The VOCs are then pulled from the subsurface in vapor form where they are treated and clean air is vented from the system. SVE was shown to be effective based on a pilot test of the system at JPL.

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Publish: June 6, 9, 13, 16, 2001

Proof of Publication
(2015.5 C.C.P)

STATE OF CALIFORNIA,
COUNTY OF LOS ANGELES

I am a citizen of the United States, and a resident of the county aforesaid; I am over the age of eighteen years; and I am not a party to or interested in the notice published. I am the chief legal advertising clerk of the publisher of the

LA CANADA VALLEY SUN

a newspaper of general circulation, printed and

published WEEKLY

in the City of LA CANADA FLINTRIDGE
County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California,

under the date of AUGUST 08 19 77.

Case Number 200411
that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

JUNE 7,14

all in the year 20 01
I certify (or declare) under penalty of perjury that the foregoing is true and correct

Dated at LA CANADA FLINTRIDGE

California, this 14 day of JUNE 20 01

Ruth Douglass
Signature

This Space is for the County Clerk's Filing Stamp

Proof of Publication of

PUBLIC MEETING ANNOUNCEMENT PROPOSED PLAN FOR CLEANUP OF SOIL AT THE NATIONAL AERONAUTIC SPACE ADMINISTRATION - JPL

Paste Clipping
Of Notice
SECURELY
In This Space

See back

PUBLIC NOTICE

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(Published in the La Canada Valley Sun June 7, 14, 2001.)

(Space below for use of County Clerk only)

PASADENA STAR-NEWS

affiliated with
SGV Newspaper Group
911 E. Colorado Blvd.
Pasadena, CA 91109

PROOF OF PUBLICATION

(2015.5 C.C.P.)

STATE OF CALIFORNIA

County of Los Angeles

I am a citizen of the United States, and a resident of the county aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of PASADENA STAR-NEWS, a newspaper of general circulation which has been adjudicated as a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California, on the date of June 22, 1927, Case Number 225647. The notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

6/9, 6/10, 6/11, 6/12, 6/13,
6/14, 6/15/01

I declare under penalty of perjury that the foregoing is true and correct.

Executed at West Covina, LA Co. California this 15TH day of JUNE, 2001.

signature

Public Comment Period and Public Meeting Announcement
Proposed Plan for Cleanup of Soil
at the National Aeronautic Space Administration
Jet Propulsion Laboratory

For those who were unable to attend the public meetings held on May 12 and 14, 2001, the National Aeronautics and Space Administration (NASA) will hold an additional public meeting to discuss the proposed cleanup of soils at its Jet Propulsion Laboratory (JPL) in Pasadena, California. The public meeting will be held at the following location and date:

Eliot Middle School Auditorium
2184 North Lake Avenue
Altadena, CA 91001

June 20, 2001

Summary presentation:	7:00 p.m.
Information forum:	6:00 p.m.–9:00 p.m.
Formal comment session:	7:30 p.m.

During the "information forum," the public will have the opportunity to speak with NASA and federal and local regulatory agency representatives on a one-on-one basis about the proposed cleanup actions. Following the summary presentations, attendees can formally address questions to these representatives; these questions (and agency responses) will be included in a transcript and become part of the final decision made for the proposed action.

JPL is a federal facility owned by NASA and is located between the city of LaCanada-Flintridge and the unincorporated city of Altadena, near Pasadena, California. JPL covers about 176 acres of land and includes more than 150 buildings and other structures. The JPL site was added to the National Priorities List (NPL) and became a "Superfund" site in 1992 after an initial inspection revealed the presence of volatile organic compounds (VOCs) and other chemicals in the subsurface soil and groundwater. The purpose of this notice is to invite the public to provide comments and ask questions on the Proposed Plan for cleanup of subsurface or "vadose zone" soils at the site. The Proposed Plan was previously mailed to the public during the second week of May 2001. If you did not receive a copy of the Proposed Plan or would like an additional copy, please contact Mr. Peter Robles, Jr. at the number provided in this notice.

NASA is proposing soil vapor extraction (SVE) as the preferred remedy for recovering VOCs from the soils. SVE systems are designed to remove chemicals that have a tendency to evaporate or "volatilize" easily by applying a vacuum through a system of underground wells. The VOCs are then pulled from the subsurface in vapor form where they are treated and clean air is vented from the system. SVE was shown to be effective based on a pilot test of the system at JPL.

This proposed remedy would involve installation of up to five vapor extraction wells and vapor treatment systems on the JPL site. The extraction wells and vapor treatment systems would be operated until VOCs in soil vapor have been reduced to an agreed-upon level. As part of the cleanup process, a soil-vapor monitoring program, currently in place, would be used to track concentrations and evaluate the extent of VOCs in soil vapor over time.

Final decisions on the cleanup plans will be made after public comments have been received and considered. The public comment period has been extended 30 days and now ends July 11, 2001 to allow for greater public participation in this decision process. Written comments should be mailed or e-mailed to Mr. Peter Robles, Jr. at the address provided in this notice, or brought to the public meeting.

An administrative record file has been prepared in accordance with federal regulations governing the cleanup of facilities where there has been a release of hazardous substances into the environment. The administrative record includes site document-ation, including the Remedial Investigation, Feasibility Study, and Proposed Plan. Local residents and other interested parties are encouraged to review available Superfund information at the following information repositories:

Altadena Public Library
600 E. Mariposa Ave.
Altadena, CA 91001
(626) 798-0833

LaCanada-Flintridge Public Library
4545 Oakwood Ave.
LaCanada-Flintridge, CA 91011
(818) 790-3330

Pasadena Central Library
285 E. Walnut St.
Pasadena, CA 91101
(626) 744-4052

Questions regarding the Proposed Plan, Feasibility Study, Remedial Investigation, administrative record, and/or other issues should be directed to the contact below:

Mr. Peter Robles, Jr.
NASA Management Office
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91101
Phone: (818) 393-2920
Fax: (818) 393-2607
E-mail: probles@nmo.jpl.nasa.gov

Pasadena Star-News
Publish: June 9, 10, 11, 12, 13, 14, 15, 2001

APPENDIX D

PUBLIC MEETING TRANSCRIPTS

Public Meeting Transcripts

This appendix contains the official transcripts from the public meetings held on May 12, May 14, and June 20, 2001 for the purpose of commenting on the Proposed Plan for OU-2. The transcripts were reviewed and several corrections were noted to the official transcripts. The corrections pertaining to each public meeting are as follows:

Court Reporter #1, Vickie Blair: Public Meeting held May 12, 2001

NUMBER	PAGE	LOCATION	CORRECTION
1	5	Line 1,5,and 6	“NAFAC” should be “NAVFAC”
2	7	Line 18	“vado zone” should be “vadose zone”
3	9	Line 24	“remediate” should be “remedial”
4	10	Line 8	“vado zone” should be “vadose zone”
5	25	Line 13	“gasses” should be “gases”

Court Reporter #2, Leslie MacNeil: Public Meeting held May 12, 2001

NUMBER	PAGE	LOCATION	CORRECTION
1	5	Line 11,14,and 15	“NAVFEC” should be “NAVFAC”
2	10	Line 9	“arroyo” should be “Arroyo”
3	18	Line 11	“you” should be “up”
4	27	Line 3	“been” should be “then”
5	36	Line 10	“THE FLOOR” should be “MS. TUTT”

Court Reporter #1, Vickie Blair: Public Meeting held May 14, 2001

NUMBER	PAGE	LOCATION	CORRECTION
1	5	Line 2,5,and 7	"NAFAC" should be "NAVFAC"
2	8	Line 13	"NASA/JPL" should be "NASA-JPL"
3	9	Line 7	"sound" should be "found"
4	9	Line 13	"remedial investigation feasibility study" should be "remedial investigation/feasibility study"
5	10	Line 17	"faculties" should be "facilities"
6	13	Line 5	"Faculties" should be "Facilities"
7	19	Line 1	"our on" should be "on our"

Court Reporter #2, Leslie MacNeil: Public Meeting held May 14, 2001

NUMBER	PAGE	LOCATION	CORRECTION
1	5	Line 9,12,and 13	"NAVFEC" should be "NAVFAC"
2	7	Line 15	Replace "standard" with "state"
3	8	Line 23	"won't" should be "want to"
4	9	Line 18	"arroyo" should be "Arroyo"
5	13	Line 6	"random" should be "ran the"

Court Reporter, Vickie Blair: Public Meeting held June 20, 2001

NUMBER	PAGE	LOCATION	CORRECTION
1	5	Line 14, 17, and 19	“NAFAC” should be “NAVFAC”
2	8	Line 9	“congress” should be capitalized
3	10	Line 16	“depositories” should be “repositories”
4	11	Line 25	“1,1, -cichloroethene” should be “1,1,-dichloroethene”
5	19	Line 16	“private road” should be capitalized
6	19	Line 17	“south gate” should be capitalized
7	21	Line 7	“taking” should be “talking”
8	21	Line 13	“immediately” should be “immediately”
9	26	Line 3	“depositories” should be “repositories”
10	28	Line 21	“Cynthis”, I believe her name was Cynthia.
11	30	Line 3	“RPN” should be “RPM”
12	30	Line 3	“RPN” should be “RPM”
13	30	Line 20	Insert to read: “vapor samples”
14	32	Line 24	“rain basin” may be “Raymond Basin”
15	33	Line 4	“rain basin” may be “Raymond Basin”
16	34	Line 24-25	“responses in the summary” should be “responsiveness summary”
17	37	Line 10	“air circulating” should be “soil vapor
18	37	Line 22	“Britta” should be “Brita”
19	38	Line 11	“Force Wheeler” should be “Foster
20	38	Line 21	“Geofund” should be “Geofon”
21	39	Line 8	“Geofund” should be “Geofon”
22	39	Line 23	“Geofund” should be “Geofon”

NUMBER	PAGE	LOCATION	CORRECTION
23	40	Line 2,3, 10, 16	“Patel” should be “Battelle”
24	40	Line 5	[unintelligible] should be “Proposed”
25	40	Line 13, 19	“Geofund” should be “Geofon”
26	57	Line 11	“response [unintelligible]” should read “responsiveness summary”
27	57	Line 22-23	“response to summary” should be “responsiveness summary”
28	58	Line 2	“Mr. Compton” should be “Ms. Compton”
29	58	Line 8	“Response in the summary” should be “responsiveness summary”
30	64	Line 8	“hearing” should be “meeting”
31	64	Line 15	“response summary” should be “responsiveness summary”
32	65	Line 1	“information depositories” should be “information respositories”
33	67	Line 6, 8	“information depositories” should be “information respositorie

PUBLIC MEETING AND PUBLIC COMMENT PERIOD

JET PROPULSION LABORATORY

PASADENA, CALIFORNIA

SATURDAY, MAY 12, 2001

1:00 P.M. to 4:00 P.M.

Reported by:
Vickie Blair
C.S.R. No. 8940, RPR-CRR

PASADENA, CALIFORNIA; SATURDAY, MAY 12, 2001
1:00 P.M.
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MR. SAUNDERS: Good afternoon. Welcome to the Jet Propulsion Laboratory. Thank you for taking the time to attend this meeting on a Saturday afternoon.

My name is Lee Saunders. I'm an environmental public affairs officer for the U.S. Navy and your facilitator for today's meeting about the proposed plan to select a remedy to clean up soils at the National Aeronautics and Space Administration, Jet Propulsion Laboratory, located here in Pasadena.

Prior to this meeting, you had the opportunity to speak to NASA, federal, and other local leading regulatory agency representatives on a one-to-one basis about the proposed cleanup actions. During this portion of the meeting, you, the community, can provide questions and comments to these representatives and their agencies on the proposed plan. These comments and questions will be included in a meeting transcript and become part of the final decision made for soil cleanup at JPL.

Representing the agencies responsible for the cleanup and talking to you about the proposed plan and

its remedial alternatives are agency representatives who will each introduce themselves starting from my left here.

MR. ROBLES: Peter Robles from NASA.

MR. ZUROMSKI: Richard Zuromski from the Naval Facilities Engineering Command.

MR. GEBERT: Richard Gebert from the State of California Department of Toxic Substances Control.

MR. RIPPERDA: I'm Mark Ripperda from the U.S. EPA.

MR. YOUNG: I'm David Young from the Los Angeles Regional Quality Control Board.

MR. SAUNDERS: All these representatives are what we call remedial project managers that are responsible in one way or form in the cleanup of this particular site.

Ground rules. I want to talk about ground rules for today's meeting, which are as follows: This afternoon's format will consist of presentations by representatives about the proposed plan and remedial alternatives, followed by a formal comment session where you, the community, can provide us with your comments and questions.

I'm going to ask you to please hold your questions until the presentations have been completed. Once we've heard from all the presenters, we will open the floor for questions and comments. You may want to use the sheets of paper that were distributed, the comment sheets,

to write down your questions during the presentations in case you have some questions that you develop and you just feel you can't wait until the time comes. But that will help you keep track of what those questions are.

To ensure that everyone that wishes to make a comment or ask a question has a fair and equal opportunity to do so, we ask that you limit your comments or questions to two minutes. At the end of this time, please take your seat. If you have not finished your remarks, you may continue for another three-minute period after we've heard from all the other speakers.

We have a court reporter -- actually, we have two court reporters here today, so we ask you to please state your first and last name and spell your last name before you begin your comments or questions.

If you do not wish to provide verbal comments or questions, you may also submit your comments and questions in writing. There are comment sheets that I just mentioned a moment ago available on the tables in the back for those of you in the audience who would prefer not to give your input or comments verbally at this meeting.

For those of you wondering why the U.S. Navy is involved with the environmental cleanup of a NASA facility, the explanation is fairly simple. In 1999, NASA and the Naval Facilities Engineering Command, who I work

for, who are commonly known by the acronym NAFAC, reached a memorandum of agreement establishing roles and responsibilities that state that NASA may procure environmental engineering and consultancy services from NAFAC and its subordinate commands.

In late 1999, NAFAC remained heavily involved in providing environmental services to NASA JPL. Peter Robles, our regional project manager from NASA, is our first presenter.

Peter.

MR. ROBLES: Good afternoon.

The first thing we want to talk about is our presentation. What we are going to present this afternoon is a site description, regulatory framework, site assessment and investigative activities, and our remedial activity and proposed remediation alternatives.

In other words, we're going to go and follow along what the booths in the back are in sequence so that you can get a feel for the total history of this site.

There it is. Site description. The site has been active since the late '30s to early '40s. It was part of a project out of Cal Tech. The Army Ordnance took over the site in the '40s and became the owner of the site, and work was done here for the Army Ordnance service, particularly during the World War II era.

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At that time during the '40s and '50s, the proper and acceptable way of disposing of chemicals was done through what we call seepage pits. Seepage pits are no more than bricks without the binding between them so that things can seep out into the ground through them. At that time, it was accepted. Most of that was working on propulsion systems to support jet aircraft -- we call JATO, jet assist to take-off rockets. Also reverse engineering of V-II rockets from World War II and further on.

During the late '50s, early '60s, the Army Ordnance was working in negotiating with NASA, and NASA took over the site in 1959, 1960, at which time what we did was we replaced the seepage pits with a sewer system so, therefore, we could stop that type of activity.

Up until that time, there was not a problem with the ground or soils in the area. But in '92 was when the concern came about, and we were placed on the national priorities list by EPA. And at that time that made us a SuperFund site, which is the process that we have been talking about these last couple of hours with you. That process started in October of '92. We signed a federal facility agreement, and the process started for us to investigate the site.

Current activities right now is that all of our operations meet federal and state and local

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regulations. And, by the way, I was told by our people to say this, that almost all, very small percentile, is ever sent through disposal. We recycle and destroy as much as we can here. And the fact is, this facility is the best in NASA for recycling materials and chemicals that are used here. And we do a lot of research here. But we meet all federal, state, and local requirements, so current operations is not a concern. We're talking about past acceptable practices that we are trying to remediate.

Here is a site description of what we're talking about, and here's the gist of the problem. Because of the seepage pits and the stuff that was put in there, they slowly -- and it takes years to migrate through the soils and to reach the water table.

Our biggest concern is between 50 feet below the surface all the way down to 200 feet. And the main purpose of our discussion today is to talk about remediating what we call Operable Unit 2 vado zone. "Vado zone" is an engineering term for just the soils between the surface to the water table. We want to remove this source so that it stops migrating and impacting the environment. And that's what our focus is today, about minimizing that, removing that, and we have certain technologies that we have tried.

NASA will address the groundwater issue in

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the future. We plan another meeting like this next year to talk about remediating groundwater Operable Unit 1 and 3; but for today, we want to focus on the soils.

And now I would like to turn this over to our regulatory framework speaker, which is --

MR. RIPPERDA: Thanks, Peter.

I'm Mark Ripperda from EPA, and I'm kind of speaking for all the regulators, for Richard and David who are here from the State of California.

But first I'd just like to ask that all of you from the public go home and tell your friends, tell 10 friends each, how much fun this is, how much you learned, and tell them that they have to come back on Monday night.

So what does it mean to be a SuperFund site, and for that matter what is SuperFund? Congress, about 20 years ago, passed a law that put a tax on the chemical industry, and that money from the chemical industry all went into a trust fund that's called the SuperFund that EPA is authorized to use to spend to clean up abandoned hazardous waste sites. That same law also gave EPA the authority to go after existing facilities such as NASA JPL that have had releases that need to be cleaned up.

But before you become a SuperFund site, you have to go through a rank process. EPA evaluates how bad the site is, how bad the potential risk might be. And if

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you score high enough, you're put on the national priorities list, which means you're a SuperFund site. And right now there's about 2000 or so SuperFund sites.

So after the discovery of the release, and for NASA JPL, that meant that the City of Pasadena found chemicals in their drinking water wells -- I'm not sure which way is east and west here -- over this way. Right across the Arroyo, City of Pasadena had some drinking water wells, and they found levels of chemicals in there that were high enough that they needed to put a treatment system on them. At that time, all that information is turned in to EPA; we rank it and say, "Okay, this needs to be a SuperFund site."

But the first thing that happened is that as soon as the City of Pasadena found those chemicals, they put treatment systems in. NASA had to reimburse the City for that, and then NASA needs to start looking at their site and determine where those chemicals came from, how much there might be, and how best to clean it up so the groundwater in the future is not getting either more contaminated; and, in fact, we can start to clean up the groundwater itself.

So to do that we do what is called a remediate investigation and feasibility study. That means we look through all the records, what kind of chemicals are

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used on-site. NASA drilled bore holes all over the site. They drilled monitoring wells to take samples of groundwater both on-site and off-site. They sampled drinking water wells from all over the area to try to determine the extent of the problem and to design a way to best clean it up.

And that brings us to about where we are now for the vado zone soils. So NASA JPL have completed the investigation of the soil zone, and they're making a proposed plan to you, to the public, saying that, you know, "We think we understand the problem. We think we know the best way to clean it up, and what do you think?" You know, both "What do you think of what we've done, and what do you think of what we," NASA, not me, EPA, "is saying on how to clean it up?"

So if you do have any, not just questions, but if you have any comments on what they're proposing, please make those either today or after the meeting in writing. Let NASA know what you think.

At that point, NASA needs to respond to all those comments. They'll do a written response that gets sent out to the public; it gets sent to the regulators. State of California people, and we at EPA review NASA's response and say either, "Yeah, you did a good job responding or not."

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And if everybody agrees that this is the best way to go, then they'll do an actual legal document called a "Record of Decision" where they say, "This is what we're selecting to do."

And then from there, they actually design the system. Right now they have a rough idea -- you know, if you've been talking to us back there, you know they're planning to put in about five bore holes. That's not set in stone; that's an estimation of what we think would be best. But actual -- after public comments are received and the decision of record is signed, then the contractors will do a more detailed study. And it will probably be five bore holes plus or minus a little bit, but they'll do the actual details of the design.

And after the soils are cleaned up, there will still be long-term monitoring to make sure that the remedy actually worked. And all of this is separate from the groundwater system, which, as Peter said, will be addressed in kind of six months to a year. There will be another meeting with another proposed plan on how NASA plans to clean up the groundwater.

And kind of like I already said, the whole point of this is just to get the public involved. So please tell your friends to come, tell people you live near what's going on, and, you know, give us any comments or

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concerns you might have.

MR. ROBLES: Tell them about the cookies.

MR. RIPPERDA: And eat that table full of cookies. Richard.

MR. ZUROMSKI: Thank you, Mark.

Hi. I think I've talked to some of you. My name is Richard Zuromski. I'm with the Naval Facilities Engineering Command, and I'm here today to talk to you about the site assessment and investigation activities that have been done here at JPL, and also what we're proposing as a remedy for JPL OU-2.

First I'll start out with the remedial investigation. From 1994 through 1998, JPL conducted the remedial investigation in over nine sampling events, different sampling events. They looked at 45 soil vapor wells, 35 soil borings, and three test pits. Now, they've also, at the end of that remedial investigation, established 37 permanent monitoring points for soil vapor that we monitor on a quarterly basis. So we are continuing to monitor the extent of VOCs in the soil to date on a quarterly basis.

The samples that we took during the remedial investigation identified the extent to which the chemicals were found in the soils. The results showed that there were elevated levels of four different chemicals in the

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soil vapor. These four chemicals were carbon tetrachloride, trichloroethene, Freon 113, and 1,1-dichloroethene. These chemicals are chemicals that are used as cleaning solvents. When we used to test the old rocket motors here back, as Peter was saying, back in the '30s, '40s, and '50s they used to clean out the rocket motors with these solvents, and that's how they came into the ground here at OU-2.

Secondly, I want to talk to you today about the OU-2 risk assessment. The human health risk assessment found that there were no risks above regulatory thresholds from exposure to humans to soils or soil vapor. Now, as Peter mentioned earlier, the main reason is that these chemicals are more than 50 feet below the ground surface where we are today, so it's really very, very unlikely that any of you will come in contact with those chemicals.

However, also, as Peter and Mark mentioned, there is a risk that these chemicals will continue to migrate. They've already migrated 50 to 200 feet down, and they will continue to migrate to the groundwater, and that is the purpose of the remedy that we're proposing here.

Now, we are currently studying how we're going to remove the VOCs from the groundwater. And, as mentioned earlier, that's going to be the subject of another public meeting almost exactly like this in the near

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future.

However, in the meantime, again, to reiterate what Peter said, there isn't a risk from the chemicals in the groundwater because your water purveyors or the individuals who have to deliver the water to you have to meet very strict regulatory requirements. But the focus of today's meeting is looking at how we can remove what we're calling source removal. It is how can we remove the chemicals that are in the soil that may potentially continue to migrate into the groundwater. And that's what we're looking at today.

Now, this graphic shows the extent to which VOCs at any level, whether that was a very, very small level or a high level were found at JPL during the remedial investigation. Now, to date -- I don't know how many of you had a chance to look back at our table back here, but the size of this area is smaller to date; and so if you are interested, please take a look. But this was during the 1994 through the 1998 remedial investigation. The highest levels -- like I said, this is the extent of all levels that we found during our remedial investigation; however, the highest levels that we found were here in the north central part of the site. And that's where most of the lab activities were taking place at the time.

Now, based on the results of what we did in

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the soil investigation and the remedial investigation and also our continued quarterly monitoring program for soil vapor, we have found that, as I said, the VOC vapor plume has not migrated in soil vapor off the site. This is about the limit. It's about 45 acres here on the site in soil vapor, so it hasn't gotten any bigger than this.

And, again, I encourage you to take a look after the formal presentation at some of the other documents we have in the back that would show you some of the more current conditions.

Now, like I said, based on the analysis of the remedial -- during the remedial investigation, the remedial objective for OU-2 is to prevent VOCs from migrating to the groundwater. That's our objective here.

To meet this objective, we looked at several alternatives, and these were investigated in what Mark called earlier the feasibility study. Of these alternatives, two were selected for a very detailed evaluation, as mentioned in the proposed plan that was sent out. Others were looked at and, for example, just weren't found to be feasible. For example, it would be very unfeasible to try to dig out soils underneath all the buildings here at JPL where the soils are more than 50 feet below the buildings here on-site. So we wanted to look at two alternatives in detail that we wanted to make sure were

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viable alternatives for cleaning up the site.

The first is no further action. This is a default that is used to compare all other technologies to. It would involve maintaining our quarterly soil vapor monitoring program and any possible natural degradation of the chemicals in the soil and the soil vapors.

The second is soil vapor extraction with granular activated carbon treatment. Now, this technology would involve placing up to five soil vapor extraction wells and five extraction systems or treatment systems, and also continuing the ongoing quarterly soil vapor monitoring program here at JPL.

To help us evaluate the technologies and the alternatives, we conducted a pilot study of the soil vapor extraction technology at JPL starting in 1998. Again, some of the results from our pilot study are available at the tables in the back, but what it showed in over 14 months of operation, we removed over 200 pounds of these chemicals from the soils. Now, it was so effective during our pilot study that we do continue to operate the pilot study to date, and it does continue to remove the chemicals from the soil vapor to date.

Now, this is a conceptual drawing of how soil vapor extraction works. Now, let me point out some of the details of this diagram. It's fairly simplified, but

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it does give you a good picture of how soil vapor extraction works.

First, here, this is the past seepage pits that were used back, as Peter said, back in the '30s and '40s that released VOCs into the soil and soil vapor. These VOCs are basically -- it's like a vacuum. The soil vapor extraction is like a vacuum that sucks these soil vapors, the chemicals, into this extraction well, right here, and extracts the vapors in a gaseous phase to the surface through this little pump. The pump then sends the chemicals into the vapor treatment system. Now, the vapor treatment system consists of granular activated carbon. What it does is -- actually, it's like charcoal. What it does is when the vapors with the chemicals go through the carbon, they bind to the carbon and they stay permanently in the carbon and clean air is released from the system. So, basically, all of the chemicals that are sucked from the ground through the system remain in the vapor treatment system and are permanently removed from the soil vapor.

So based on our analysis, based on the remediation investigation, based on our soil vapor extraction pilot study, alternative one was not chosen because it just doesn't prevent the migration of VOCs to the groundwater. Therefore, the proposed alternative for OU-2 is soil vapor extraction. Soil vapor extraction would

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be used to reduce the source of the chemicals in the soil vapor so that they do not migrate to groundwater. It would permanently remove them from the soil vapor to the system.

Soil vapor extraction works very well for several reasons.

First, number one, it permanently removes the VOCs from the soil vapor.

Number two, it works very well in the types of geology and soil that we have here at JPL, and that was shown during our pilot study.

Third, it protects the groundwater from further migration of these chemicals through the soils.

Fourth, the treatment period is relatively short, probably from one to five years, operating these types of systems.

And, finally, because of these advantages, and because soil vapor extraction has been so successful, not only here in our pilot study, but at sites all over the country, it's given the name "a presumptive remedy" by the United States EPA. What a presumptive remedy is, it's the most effective technology for conditions similar to JPL as was seen at sites tested throughout the country. And that's another main reason why we're proposing soil vapor extraction for OU-2.

Based on the pilot study data, based on the

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results of the remedial investigation and ongoing quarterly monitoring, we are proposing soil vapor extraction as the proposed alternative for JPL OU-2.

Lee.

MR. SAUNDERS: Thank you, Richard.

We're now going to go into the comment phase, comment and question phase, of this meeting. As a quick reminder: To ensure that all participants' comments or questions receive equal treatment, please limit your comments and questions to two minutes. We also ask you to please state your first and last name and spell your last name for the court reporters.

Thank you.

Do we have any speakers that would like to comment or ask any questions? Please step up to the mike. Don't be shy. Any questions or comments that you want to submit to the court reporters in writing?

Yes, ma'am. Would you step up to the mike, please.

MS. TUTT: My name is Elaine Susan Tutt, and my last name is T- as in Thomas -u-t-t as in Tom. And I'm a resident of Altadena, and I also work here at JPL.

Yeah. What I would like to ask is for the alternatives. There's alternative one and alternative two, and it seems like alternative one is not really an

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alternative, but it's just continuing not to do something. If I'm wrong about that, I'd like to be corrected.

And so alternative two is to pursue the soil vapor extraction. And it's interesting. I appreciate the description that was given today. I wonder if some folks from either the Navy or maybe someone -- the fellow from the EPA could tell us more about some other alternatives that were considered for this.

Also, my other comment is that I just received the notice, an invitation to this meeting, today, May 12th. And the meeting -- I just received it in the mail today, May 12th, from the post office in my mailbox here in Altadena, and today the meeting is also May 12th. So I'd like to comment that this is not soon enough before the meeting to be able to get people over here and tell people about what an interesting meeting this is. I think that if we would have known about it a little more in advance, it would have helped --

MR. SAUNDERS: Thirty seconds.

MS. TUTT: Thank you.

-- it would have helped to get more interested community members out to the meeting. So I just wanted to just pass that along. I would think that at least 10 days would be the minimum that you would let us know in advance of the meeting.

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Thank you.

MR. RIPPERDA: I'll say something from the EPA's perspective on your question on alternatives, and I also agree with you about the short notice. That's inexcusable on our part, on NASA's part. You know, I'm not sure why it happened that way. It wasn't supposed to. These things were supposed to be mailed out about 10 days ago. So we screwed up, and I have to take responsibility for that, too, because I'm supposed to be overseeing what NASA's doing to make sure they do it right.

But back to the alternatives.

It does look like, you know, NASA is not giving anybody very much choice. They're giving you alternative one and alternative two, and alternative one is essentially do nothing. But in a -- we talked about this, actually, before the meeting, saying, "Wow, you know, we're not giving people much choice here." But it's what Richard said about a presumptive remedy.

In a case like this, soil vapor extraction has been used at thousands of sites around the country. It's been the one and only technology that's proven to work consistently at sites like this.

You know, there are other things you can do. You can dig up the whole site, but EPA doesn't require a facility to investigate, you know, obviously ridiculous

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choices such as digging up the entire site.

But there's other things you can do like injecting steam to make it be cleaned up faster. That would be called an innovative technology. But we don't really require that a facility look at things like that that would cost so much more when an off-the-shelf technology works so well and relatively quickly.

So even though it looks like there's really not much choice here, it's because NASA is following the process that's kind of set in law by Congress that they're supposed to look at alternatives, but we've been doing this long enough that the alternatives that it boils down to in some cases are very few, or, in this case, only one real alternative.

Congress makes us look at "no further action" just as a baseline to make sure we're not out there spending money willy-nilly. And other than that, the way the law was written by Congress, you know, we're supposed to look at viable alternatives. And, in this case, we have enough experience to know that soil vapor extraction is actually the only viable alternative. But we're still supposed to do it in this way where we go to the public with our various alternatives that NASA is proposing. We haven't changed the process even though we've learned enough to know that there actually is only one real

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alternative here.

So I don't know if NASA wants to say anything.

MR. ROBLES: Just because it's SVE now doesn't mean that if, in the future, new technology comes in that we find better that we won't revisit this. This is not like cast in stone right now. So I want to assure the public that as technologies develop, we are required through the process to periodically review what we're doing, and if we see something better, and if an issue comes up that we want to augment the SVE with another technology that has appeared to be better, that's what we do.

So as the technology improves, one of the things -- I've been in this business 30 years. One of the things that amazes me is that the regulations are always set forth before the technology catches up. But as technology improves, we in the environmental community can say, "Okay, look, this new technology might be better than be SVE, so let's replace it or let's augment."

So don't think that this is it. We're only going to do SVE, and that's it; we've lost the opportunity. We are required through the process, and Mark is always on my case about this, is to make sure that the technology matches what we need to do. And so we're going to revisit this. It's not cast in stone.

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We have meetings quarterly, and we will discuss this, and we will have information meetings in the future because we still need your inputs. So as we go on, hopefully we'll find some technology with the silver bullet that will clean everything up, we hope, some day. But until now we have to use what we've got.

MR. ZUROMSKI: I just want to make two quick comments just to clarify what Peter said, as well.

It's true that every five years we do what is called a five-year review once we sign the legal document that Mark talked about called the ROD, the record of decision. So every five years, we do review what we've done and, again, see if we're doing the right thing.

And, secondly, as I think was mentioned today, this is the proposed alternative, as well. The opportunity here is that we are presenting, though limited, but what we think is the best alternative. We do encourage your comments as to what you think, if this is the best alternative. And that's why this part of the process involves public comment.

So thank you.

MR. SAUNDERS: Any other comments?

MR. ROBLES: Just a couple of comments I wanted to make was we did mail these out on Tuesday, May 8th. Obviously, it wasn't enough time, so we'll definitely make

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sure that we mail these farther in advance to get them out to you in plenty of time to plan to attend the meeting.

And one other comment, as Richard was basically saying, is the purpose of this meeting is that you can come here and provide some alternatives that you feel might be useful to add into the record that we could consider in the future.

Are there any other comments or questions from the public?

MS. BLAIR: I have one, yes.

My name is Susan Blair, B-l-a-i-r. I'm also an Altadena resident. Mine's a curiosity question. Once the gasses come up through the pipe into the chamber where the carbon is and it absorbs the chemical, what happens to those carbons?

MR. ZUROMSKI: What happens is once the carbon becomes full of all the different chemicals that we are pulling from the soil vapors, we have to, as Peter stated earlier, in accordance with all the state and local and federal regulatory requirements, take that carbon canister, remove it, and then it's either recycled or incinerated or somehow disposed of in a very legal manner off-site. And then we then replace the carbon with brand-new carbon and it continues the process again.

MS. BLAIR: Thank you.

MR. SAUNDERS: Do we have any other questions from the public?

Go ahead, ma'am.

MS. COMPTON: Cynthia Compton, C-o-m-p-t-o-n. I'm an employee of JPL and interested community member. I have a few questions, so I'll just plow through them in my two minutes.

You said that in the '50s to the early '60s, a sewer system replaced the seepage pits. Does that mean the chemicals are now going into the sewer system, and where do they go from there?

Other questions I have are: Is there a record of what other alternatives were considered other than these one and two, and where can we read or find out about that?

And it says the pilot system has removed 200 pounds of VOCs. Out of how many is predicted or known to be at the site?

It says that -- I think what I'm hearing is that the VOCs are in the vapor or the pockets of the soil, so what about the soil itself, involving the VOCs in the soil particles, and once you remove it from the vapor, does it now migrate from the soil particles back into the vapors afterwards?

And I also agree with the short notice to

the public, and that's why there are -- in my opinion, are not adequate representation from the community here. I got the E-mail notice on Wednesday, and didn't really see it until Friday, about six P.M. on Friday. And I would like to know: Is there some kind of record of when notices are sent out to the public and where they're at?

And the other thing is, I think I was talking to Richard about who these notices are sent to in a half-a-mile radius from the site. What about -- I understand sending it another half a mile to get more public is maybe too many -- you know, too costly, but what about sending the notice to the customers of the water companies that are involved?

MR. SAUNDERS: Time. Thank you.

Your questions are involved, and we'll address them one at a time.

MR. ROBLES: Good questions.

On the first one is we do not send chemicals down the sewer system. What happens is we try to recycle them. They're usually used up in the processes. If we can't recycle them, we try to destroy them in some form or fashion. The regulations try to minimize sending stuff down the sanitary sewer. Very particular about that.

I don't know if you've seen around the lab these circles with the ducks on them because they're

saying, "This is a storm water drain. This is sanitary sewer." We don't want chemicals going down there. That's part of our regulation. We have a whole office on-site to manage that. So that's not going down there. That's one of the reasons.

The second -- well, I'll answer your last item on the notices. There are repositories in the local area, the libraries, that you can get these documents, and there is on the record when we sent the notice. We do apologize. We had a little snafu. We had sent 4,732 mailers. Now, I have received some phone calls that people did receive them by Monday and Tuesday of this week, but there was a slight mix-up where you might have been the ones that didn't get it until later. We did send the E-mail out -- I don't know what happened. Well, we want to send it earlier, so that's a good comment. We're going to have to notice -- I think we're going to really have to send them more than 10 days earlier to make sure that the mail -- because there were some problems with some of the post offices in sending this stuff out, so we want to make sure it does.

We also put it in the paper. We put it in the four local papers and "L.A. Times." But I also notice that some people didn't see that, so we have to agument in the future -- so we have to be creative about which way --

do you guys listen to radio? Might that be a better way? I'm just asking because we're trying to get more items out, and that's why we have two meetings. So if you could tell the public, you know, I apologize, come out Monday. I would love to see a hundred people here or more. But we have sent 4,732 of these mailers plus the 6,000 JPLers who were contacted.

MR. ZUROMSKI: I think I'm going to address the other two of them. I think Peter covered a lot of yours.

The first, if you do want to see the other types of technologies that were evaluated, that is in the feasibility study and that is available at all of the document repositories. And that shows you the detailed analysis, like I talked to you about earlier, that we go through to evaluate technologies. It will show when certain things were dropped out and when certain things were retained. And it's very detailed. It's about three, four inches thick, but it's very easy to look at. So feel free; it's at all the document repositories.

The second question I think that I'm going to answer is the amount of chemicals that are in the soil vapor and how they move around.

There are different ways to technically estimate how much is in the soil vapor. I can't get into every little detail of how that is done. Again, that is in the feasibility study, as well. But there is an estimate of somewhere between three to five thousand pounds, 5,000 being the maximum that we believe could be in the soil vapors, and that also includes what would be in the soils.

When we say "soil vapors," since they are volatile organic compounds, they tend to be in a vapor state, and so that is why we are removing soil vapors, versus soils themselves.

MR. RIPPERDA: I'll add a little bit to that. That's actually a great question about soil vapor versus soil, and what Richard said is right, but I'm just going to add a little bit.

So we estimate, or NASA estimates, that there's up to about 5,000 pounds total of these things, and that's total in the soils, absorbed in the soils and in the soil vapor. When it's located like it is, 50 to 200 feet below the surface, you actually have to drill a well, a bore hole, to get down to it. And the act of drilling that bore and taking your sample, you can't -- it drives the VOCs out of that piece of soil. So you can't just take a sample of the soil and analyze how much in the soil. It's just not very effective.

So what we do instead is we measure what's in the soil vapor, and that's very easy. You drill your same bore hole, and that sucks some air in, and that

volatilizes it off the soil. So we're being somewhat legalistic when we're always saying the VOCs in the soil vapor because that's where we actually measured it, and that represents how much is actually in the soil. And there are various equations that you can use based on soil chemistry with partitioning co-efficients and so forth to calculate from what you have in the soil vapor back to what you have in the soil.

So just because we always say "soil vapor," that doesn't mean we're only looking at the vapor. What we really care about is what is in the soil and about any rainwater that might migrate through that soil, deabsorb it, and carry it down to groundwater.

MR. SAUNDERS: Any other feedback from any other representatives?

MR. ROBLES: Did we answer all your questions, ma'am?

MS. TUTT: What about when you remove the VOCs from the vapors, as more chemicals evaporate out of the soil into the --

MR. ROBLES: Right. That's why you constantly do that. The question is -- one question that she had asked, once you remove the particles through the vapor, are there any particles left on the soil?

This is a continuous process because you

want it to volatilize that material because it's a volatile organic. So you want to draw it out. So you constantly are pulling pressure and putting a vacuum on it to suck it up. Eventually there should be no particles left there.

I'd say no because any system cannot be 100 percent clean. You can't get the last molecule out. What you're trying to do is get as low as possible until the technology doesn't work anymore, and then you wait for another technology. You say, "Hey, we're kind of finished, and there is no more threat to the groundwater." And that's what you do on that. It's not an exact science. We try our best, and that's what we do.

And that, like I said -- the document, as Richard said, is thick. It has everything in there that you want to know, and if it's not in there, we'll have informative meetings and we can give you the boring lecture. Because this is long and to read these documents right now at -- once we finish this process, sometime in the future, we're going to have so many documents that you will not believe. I mean, we generate so much information. This process requires of the government to do this to make sure that we make the right decision, and we have to publish these documents so you the public can read them and say, "How did you guys make that choice?" That's what we call the administrative record, and that's why we have that

in the repositories for you.

MR. SAUNDERS: I don't know if it was mentioned, the proposed plan information repositories are located on, if you want that information, on page six of this, the different information respositories. The item of record, I believe, is kept here at JPL.

MR. ROBLES: There's three.

MR. SAUNDERS: Okay. And, again, what you're telling us tonight is very useful this evening because we need this feedback. I believe this is the first time that you've held a public meeting here, so this is a learning process for NASA, for all of us. And we appreciate this feedback that you're giving to us. It will help us make the meetings better in the future, to communicate information to the public better.

Yes, ma'am.

MS. TUTT: The only question that wasn't answered is: Have you considered sending these public notices to the customers and the water companies that are impacted?

MR. ROBLES: Thank you. We have a representative here. I'm not going to put him on the spot.

We meet with the Raymond Basin Management Board. We have dialogue. We are meeting with the City of Pasadena on Monday. The water purveyors know about these meetings, and we have told them in their board meetings and the word has gotten out that way. We have gone to local community meetings like, I think, Northeast Trees and a few others. We've told them about this.

We are looking to expand our mailing list, so if you can recommend some groups or people that you want to put on the mailing list, please let us know because we have no fear of sending as many as it takes so that the public -- normally, believe it or not, I've been in this business 30 years, and I've only been at one public meeting where it was standing room only and that was because the government needed to expand a bombing range. You know how controversial that was. But most of the time people get their information through the newsletter or they call up or they go to the repositories. But if you have any suggestions of people that you want on the mailing list or groups, please let us know. But this information has gotten out to the purveyors of water.

MR. SAUNDERS: I believe what you're referring to is like when --

MR. ROBLES: Oh, the customers? You mean the water customers?

MS. TUTT: You and me that are drinking water and paying the purveyor to send water to our houses.

MR. ROBLES: So you're asking should we send this to all the people who get the water?

MS. TUTT: All the customers who live within a half-mile radius.

MR. ROBLES: That's a good point.

MR. SAUNDERS: I think the point you may also be making, and I may be wrong about this, but when utilities, they have public hearings and such, they usually include a public notice in their mail-out in the billing. Of course, that is their mailing; it's not ours. So we would have to approach a utility to do that. Whether they would do it for free or charge us, I don't know, but that's something we would have to discuss with the utility.

UNIDENTIFIED SPEAKER: That's a community right to know.

MR. ROBLES: Right. That's a community right to know.

That's a very good suggestion that when we're going to talk about groundwater, a good thing to do might be to go and talk to the purveyors and see if we should send those notice -- that's a good point. Thank you.

MRS. BLAIR: The Lincoln Avenue Water Company, every member of the Lincoln Avenue Water Company is a shareholder, so they have the right to know that.

MR. ROBLES: That's right. That's a good point. Thank you. I didn't think about that. That's good.

Particularly when we're talking about groundwater. Good suggestion.

MR. SAUNDERS: Did we answer all your questions? Was there anything else that we skipped over?

MS. TUTT: Record of public notices, is that in the repositories or only here at JPL?

MR. SAUNDERS: That type of information is put in the information respository. Public notice for the meeting would be put in there.

Any other questions or comments from the public? We welcome this opportunity to hear from you. Anyone else?

Well, there is another opportunity if you think of further questions that you'd like to ask. We are having another public meeting on Monday night, and that information is also in that proposed plan fact sheet and the times. And the public comment period is continuing on.

Again, I want to thank you for attending. I encourage you to review and comment on the proposed plan. Final decisions regarding cleanup will be made after your public comments have been received and considered.

The public comment period started on May 7th and runs through June 11th, 2001. If requested, NASA may consider extending the public comment period. Written

comments, and request for extension of the comment period should be mailed or E-mailed to Peter Robles, and his address is in the fact sheet, and it's also up here on the slide here.

If there's nothing else, no other comments, any last statements from our representatives up here, I thank you for attending this afternoon and have a good evening.

Oh, yes. And there will continue to be the representatives here who will be available after the meeting if you want to do follow-ups or ask any further questions. And, again, if you think of a question after we've officially closed this meeting, feel free to write it out on the comment sheet and submit it to our court reporters and such so they can include it in the public record.

Thank you.

(Whereupon, at 4:00 P.M., the HEARING was adjourned.)

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STATE OF CALIFORNIA)
) ss
COUNTY OF LOS ANGELES)

I, Vickie Blair, Certified Shorthand Reporter, number 8940, RPR-CRR, for the State of California, do hereby certify;

That the foregoing transcript is a true record of the proceedings.

I hereby certify that I am not interested in the event of the action.

IN WITNESS WHEREOF, I have subscribed my name this 4th day of June, 2001.

Certified Shorthand Reporter for
the State of California

PUBLIC MEETING AND PUBLIC COMMENT PERIOD

SATURDAY, MAY 12, 2001

1:00 P.M.

VON KARMAN AUDITORIUM

NASA JET PROPULSION LABORATORY

4800 OAK GROVE DRIVE

PASADENA, CALIFORNIA

PASADENA, CALIFORNIA
SATURDAY, MAY 12, 2001; 1:00 P.M.

MR. SAUNDERS: Good afternoon. Welcome to the Jet Propulsion Laboratory. Thank you for taking the time to attend this meeting on a Saturday afternoon.

My name is Lee Saunders. I'm an environmental public affairs officer for the U.S. Navy and your facilitator for today's meeting about the proposed plan to select a remedy to clean up soils at the National Aeronautics and Space Administration Jet Propulsion Laboratory, located here in Pasadena.

Prior to this meeting you had the opportunity speak to NASA, federal and other local regulatory agency representatives on a one-on-one basis about the proposed cleanup actions. During this portion of the meeting you, the community, can provide questions and comments to these representatives and their agencies on the proposed plan. These comments and questions will be included in a meeting transcript and become part of the final decision made for soil cleanup at JPL.

Representing the agencies responsible

for the cleanup and talking to you about the proposed plan and its remedial alternatives are agency representatives, who will each introduce themselves, starting from my left here.

MR. ROBLES: Peter Robles from NASA.

MR. ZUROMSKI: Richard Zuromski from the Naval Facilities Engineering Command.

MR. GEBERT: Richard Gebert from the state of California Department of Toxic Substance Control.

MR. RIPPERDA: Mark Ripperda from the U.S. EPA.

MR. YOUNG: David Young from the Los Angeles Regional Water Quality Control Board.

MR. SAUNDERS: And all these representatives are what we call remedial project managers that are responsible in one way or form in the cleanup of this particular site.

Ground rules, I want to talk about ground rules for today's meeting, are as follows: This afternoon's format will consist of presentations by our representatives about the proposed plan and remedial alternatives, followed by a formal comment session where you, the community, can provide us with your comments and questions.

I'm going to ask you to please hold your questions until the presentations have been completed. Once we've heard from all the presenters we will open the floor for questions and comments. You may want to use the sheets of paper that were distributed, comments sheets, to write down your questions during the presentation, in case you have some questions that you develop and you just feel you can't wait until the time comes, but that will help you keep track of what those questions are.

To ensure that everyone that wishes to make a comment or ask a question has a fair and equal opportunity do so, we ask that you limit your comments or questions to two minutes. At the end of that time please take your seat. If you have not finished your remarks, you may continue for another three-minute period after we've heard from all the other speakers.

We have a court reporter -- actually, we have two court reporters here today, so we ask you to please state your first and last name and spell your last name before you begin your comments or questions.

If you do not wish to provide verbal comments or questions, you may also submit your

comments and questions in writing. There are comments sheets, as I just mentioned a moment ago, available on the tables in the back for those of you in the audience that would prefer not to give your input or comments verbally at this meeting.

For those of you wondering why the U.S. Navy is involved with the environmental cleanup of a NASA facility, the explanation is fairly simple. In 1999 NASA and the Naval Facilities Engineering Command, who I work for, more commonly known by the acronym NAVFEC, reached a memorandum of agreement establishing roles and responsibilities that state that NASA may procure environmental engineering and consultancy services from NAVFEC and its subordinate commands. In late 1999 NAVFEC became heavily involved in providing environmental services to NASA JPL.

Peter Robles, remedial project manager from NASA, is our first presenter.

Peter?

MR. ROBLES: Good afternoon. First thing we want to talk about is our presentation. What we have -- going to present this afternoon is a site description, regulatory framework, site assessment and investigative activities and our

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remedial activity and proposed remediation alternatives. In other words, we're going to go and follow along what the booths in the back are, in sequence, so that you can get a feel for the total history of this site.

Site description. The site has been active since the late '30s to early '40s. It was part of a project out of Cal Tech. The Army ordinance took over the site in the '40s and became the owner of the site and work was done here for the Army ordinance service, particularly during the World War II era.

At that time during the '40s and '50s, the proper and acceptable way of disposing of chemicals was done through what we call seepage pits. Seepage pits are no more than bricks without the binding between them, so that things can seep out into the ground through them. At that time it was accepted. Most of that was working on propulsion systems to support jet aircraft, we call JATO, genesis to take-off rockets, also reverse engineering of V-II rockets for World War II and further on.

During the late '50s, early '60s the Army ordinance was working and negotiating with NASA

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and NASA took over the site in 1959, 1960, at which time what we did was we replaced the seepage pits with a sewer system so, therefore, we could stop that type of activity. Up until that time there was not a problem with the ground or soils in the area, but in '92 was when the concern came about and we were placed on the national priorities list by EPA.

And at that time that made us a Superfund site, which is what the process that we have been talking about these last couple of hours with you. That process started in October of '92, we signed a federal facility agreement and the process started for us to investigate the site.

Current activities right now is that all of our operations meet federal and state and local regulations. And by the way, I was told by our people to say this, that almost all, very small percentile is ever sent through disposal. We recycle and destroy as much as we can. The effect is, this facility is the best in NASA for recycling materials and chemicals that are used here. And we do a lot of research here but we meet all federal, state and local requirements so current operations is not a concern. We're talking about past acceptable practices that we are trying to

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remediate.

Here is the site description of what we're talking about and here is the gist of the problem. Because of the seepage pits and the stuff that was put in there, they slowly, and it takes years to migrate through the soils and to reach the water table.

Our biggest concern is between 50 feet below the surface all the way down to 200 feet, and the main purpose of our discussion today is to talk about remediating what we call Operable Unit 2 vadose zone. Vadose zone is an engineering term for just the soils between the surface to the water table.

We want to remove this source, so that it stops migrating and impacting the environment. And that's what our focus is today about, minimizing that, removing that and we have certain technologies that we have tried.

NASA will address the groundwater issue. In the future we plan another meeting like this next year, to talk about remediating groundwater Operable Unit 1 and 3, but today we want to focus on the soils.

And now I would like to turn this over

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to our regulatory framework speaker, which is ...

MR. RIPPERDA: Thanks, Peter.

I'm Mark Ripperda from EPA and I'm kind of speaking for all the regulators, for Richard and David who are here from the state of California.

But first I would just like to ask that all of you from the public go home, tell your friends -- tell 10 friends each how fun this is, how much you learned and tell them that they have to come back on Monday night.

So what does it mean to be a Superfund site and, for that matter, what's Superfund. Congress, about 20 years ago, passed a law that put a tax on the chemical industry, and that money from the chemical industry all went into a trust fund that's called the Superfund, that EPA is authorized to use to spend to clean up abandoned hazardous waste sites. That same law also gave EPA the authority to go after existing facilities, such as NASA JPL, that have had releases that need to be cleaned up.

But before you become a Superfund site you have to go through a ranking process. EPA evaluates how bad the site is, how bad the potential risk might be and, if you score high enough, you're put on the national priorities list, which that means you're a Superfund site. And right now there's about 2000 or so Superfund sites.

So after the discovery of the release, and for NASA JPL that meant that the city of Pasadena found chemicals in their drinking water wells -- I'm not sure which way is east or west here -- over this way, right across the arroyo, the city of Pasadena has some drinking water wells, and they found levels of chemicals in there that were high enough that they needed to be -- to put a treatment system on them. At that time all that information -- started at EPA, we rank it and we say okay, this needs to be a Superfund site.

But the first thing that happened is, that as soon as the city of Pasadena found those chemicals they put treatment systems in, NASA had to reimburse the city for that, and then NASA needs to start looking at their site and say -- and determine where those chemicals came from, how much there might be and how best to clean it up so that the groundwater in the future is not getting either more contaminated -- and in fact we can start to clean up the groundwater itself.

So to do that, we do what's called a remedial investigation and feasibility study. That means we look through all the records, what kind of chemicals are used on-site, drill -- NASA drilled bore holes all over the site, they drilled monitoring wells that gets down to the groundwater both on site and off site, they sampled drinking water wells from all over the area to try to determine the extent of the problem and to design a way to best clean it up. And that brings us to about where we are now, for the vadose zone soil.

So NASA JPL completed the investigation of the soil zone and they're making a proposed plan to you, to the public, saying that, you know, we think we understand the problem, we think we know the best way to clean it up and what do you think? Both what do you think of what we've done and what do you think of what we, NASA, not the EPA, is saying on how to clean it up.

You know, so if you do have any -- not just questions, but if you have any comments on what they're proposing, you know, please make those either today or, after the meeting, in writing. You know, let NASA know what you think.

At that point NASA needs to respond to

all those comments. They'll do a written response that gets sent out to the public, it gets sent to the regulators, state of California people and, you know, we at EPA review NASA's response and say either yeah, you did a good job responding or not.

And if everybody agrees that, you know, this is the best way to go, then they'll do an actual legal document, called a record of decision, where they say this is what we're selecting to do and then, from there, they actually design the system. Right now they have a rough idea, you know -- if you've been talking to us back there, you know that they're planning to put in about five bore holes. And that's not set in stone, that's, you know, an estimation of what we think will be best.

Actual -- after public comments are received and the record of decision is signed, then there are contractors who will do a more detailed study, and it will probably be about five bore holes, plus or minus a little bit, but they'll do the actual details of the design. And after the soils are cleaned up, there will still be long-term monitoring to make sure that the remedy actually worked.

And all of this is separate than the

groundwater system which, as Peter said, will be addressed in -- in six months to a year there will be another meeting, with another proposed plan on how NASA plans to clean up the groundwater.

And -- kind of like I already said, the whole point of this is just to get the public involved. So please tell your friends to come, tell people you live near what's going on and, you know, give us any comments or concerns you might have.

MR. ZUROMSKI: Tell them about the cookies.

MR. RIPPERDA: And eat the tablefull of cookies.

MR. ZUROMSKI: Thank you, Mark.

I think I talked to some of you. My name is Richard Zuromski, with the Naval Facilities Engineering Command, and I'm here today to talk to you about the site assessment and investigation activities that have been done here at JPL and, also, what we're proposing as a remedy for JPL OU-2.

First I'll start out with the remedial investigation. From 1994 through 1998 JPL conducted a remedial investigation in over nine sampling events, different sampling events. They looked at

45 soil vapor wells, 35 soil borings and three test pits. Now, they also, at the end of that remedial investigation, established 37 permanent monitoring points for soil vapor, that we monitor on a quarterly basis. So we are continuing to monitor the extent of VOCs in the soil to date, on a quarterly basis.

The samples that we took during the remedial investigation identify the extent to which the chemicals were found in the soils. The results showed that there were elevated levels of four different chemicals in the soil vapor. These four chemicals were carbon tetrachloride, trichloroethene, Freon 113 and 1,2-dichloroethylene. These chemicals are chemicals that are used as cleaning solvents when they used to test the old rocket motors here, back -- as Peter was saying, back in the '30s, '40s and '50s they used to clean out the rocket motors with these solvents, and that's how they came into the ground here OU-2.

Secondly, I want to talk to you today about the OU-2 risk assessment. The human health risk assessment found that there were no risks above regulatory thresholds from exposure to humans to

soils or soil vapor. Now as Peter mentioned earlier, the main reason is that these chemicals are more than 50 feet below the ground surface, where we are today. So it's really very, very unlikely that any of you will come in contact with those chemicals.

However, also as Peter and Mark mentioned, there is a risk that these chemicals will continue to migrate, they've already migrated 50 to 200 feet down and will continue to migrate to the groundwater, and that is the purpose of the remedy that we're proposing here.

Now, we are currently studying how we're going to remove the VOCs from the groundwater and, as mentioned earlier, that is going to be the subject of another public meeting, almost exactly like this, in the near future. However, in the meantime, again to reiterate what Peter said, there isn't a risk from the chemicals in the groundwater because your water purveyors, or the individuals who have to deliver the water to you, have to meet very strict regulatory requirements.

But today's -- the focus of today's meeting is looking at how we're going to remove what we're calling -- we're calling source removal, is

how can we remove the chemicals that are in the soil that may potentially continue to migrate into the groundwater, and that's what we're looking at today.

Now, this graphic shows the extent to which VOCs at any level, whether that was a very, very small level or a high level, were found at JPL during the remedial investigation. Now, to date, I don't know how many of you had a chance to look back at our table back here, but the size of this area is smaller to date. And so if you are interested, please, take a look. But this was during the 1994 through the 1998 remedial investigation.

The highest levels -- like I said, this is the extent of all levels that we have -- we found during our remedial investigation. However, the highest levels that we found were here, in the north central part of the site. That's where most of the lab activities were taking place at the time.

Now, based on the results of what we did in the soil investigation and the remedial investigation, and also our continued quarterly monitoring program for soil vapor, we have found that, as I said, the VOC vapor plume has not

migrated in soil vapor off the site. This is about the limit, it's about 45 acres here on the site in soil vapor. So it hasn't gotten any bigger than this.

And, again, I encourage you to take a look, after the formal presentation, at some of the other documents that we have in the back, which will show you some of the more current conditions.

Now, like I said, based on the analysis of the remedial -- during the remedial investigation, the remedial objective for OU-2 is to prevent VOCs from migrating to the groundwater. That's our objective here. To meet this objective, we looked at several alternatives and these were investigated, what is called -- what Mark called earlier the feasibility study. Of these alternatives, two were selected for a very detailed evaluation, as mentioned in the proposed plan that was sent out. Others were looked at and, for example -- but just weren't found to be feasible. For example, it would be very infeasible to try to dig out soils underneath all the buildings here at JPL that are more than -- that the soils are more than 50 feet below the buildings here on site. So we wanted to look at two alternatives that were --

in detail, that we wanted to make sure were viable alternatives for cleaning up the site.

The first is no further action. This is a default that is used to compare all other technologies to. It would involve maintaining our quarterly soil vapor monitoring program and any possible natural degradation of the chemicals in the soil -- in the soil vapors.

The second is soil vapor extraction with granular activated carbon treatment. Now, this technology would involve installing you to five soil vapor extraction wells and five extraction systems or treatment systems, and also continuing the ongoing quarterly soil vapor monitoring program here at JPL.

To help us evaluate the technologies and the alternatives, we conducted a pilot study of the soil vapor extraction technology at JPL, starting in 1998. Again, some of the results from our pilot study are available at the tables in the back. But what it showed, in over 14 months of operation, we removed over 200 pounds of these chemicals from the soil.

Now, it was so effective during our pilot study, that we have -- we do continue to

operate the pilot study to date, and it does continue to remove the chemicals from the soil vapor to date.

Now, this is a conceptual drawing of how soil vapor extraction works. Now, let me point out some of the details of this diagram. It is fairly simplified but it does give you a good picture of how soil vapor extraction works.

First, here, this is from -- these are the past seepage pits that were used back -- as Peter said, back in the '30s and '40s that released VOCs into the soil and soil vapor. These VOCs are basically -- it's like a vacuum. The soil vapor extraction system is like a vacuum that sucks these soil vapor, the chemicals, into this extraction well, right here, and extracts the vapors, in a gaseous phase, to the surface through this little pump. The pump then sends the chemicals into the vapor treatment system.

Now, the vapor treatment system consists of granulated activated carbon. What it does, it's -- actually, it is like charcoal. What it does is, when the vapors, with the chemicals, go through the carbon, they bind to the carbon and they stay permanently in the carbon and clean air is

released from the system. So, basically, all of the chemicals that are sucked from the ground through the system remain in the vapor treatment system and are permanently removed from the soil vapor.

So, based on our analysis, based on the remedial investigation, based on our soil vapor extraction pilot study, Alternative 1 was not chosen because it just doesn't prevent the migration of VOCs to the groundwater. Therefore, the proposed alternative for OU-2 is soil vapor extraction.

Soil vapor extraction will be used to reduce the source of the chemicals in the soil vapor, so that they do not migrate to groundwater. It would permanently remove them from the soil vapor, through the system.

VOC -- excuse me. Soil vapor extraction works very well for several reasons. First, number one, it permanently removes the VOCs from the soil vapor.

Number two, it works very well in the types of geology and soil that we have here at JPL, and that was shown during our pilot study.

Third, it protects the groundwater from further migration of these chemicals through the soils.

Fourth, the treatment period is relatively short, probably from one to five years, operating these types of systems.

And, finally, because of these advantages and because soil vapor extraction has been so successful not only here in our pilot study but at sites all over the country, it's given the name "a presumptive remedy" by the United States Environmental Protection Agency. What a presumptive remedy is, it's the most effective technology for conditions similar to JPL as was seen at sites tested throughout the country. And that's another main reason why we're proposing soil vapor extraction for OU-2.

Based on the pilot study data, based on the results of the remedial investigation and ongoing quarterly monitoring, we are proposing soil vapor extraction as the proposed alternative for JPL OU-2.

Lee?

MR. SAUNDERS: Thank you, Richard.

We're now going to go into the comment phase, comment and question phase of this meeting. As a quick reminder, to ensure that all participants' comments or questions are received --

receive equal treatment, please limit your comments and questions to two minutes. We also ask you to please state your first and last name and spell your last name for the court reporters.

Thank you.

Do we have any speakers that would like to comment or ask any questions? Please step up to the mike.

Don't be shy.

Any questions or comments that you want to submit to the court reporters in writing?

Yes, ma'am. Would you step up to the mike, please.

MS. TUTT: My name is Elaine Suzanne Tutt and my last name is T- as in Thomas -u-t-t as in Tom, and I'm a resident of Altadena, and I also work here at JPL.

Yeah. What I would like to ask is for the alternatives, there's alternative one and alternative two, and it seems like alternative one is not really an alternative but it's just continuing not to do something. If I'm wrong about that I'd like to be corrected. And so alternative two is to pursue the soil vapor extraction.

And it -- it's interesting. I

appreciate the description that was given today. I wonder if some folks from either the Navy or maybe someone -- the fellow from the EPA could tell us more about some other alternatives that were considered for this.

Also, my other comment is, that I just received the notice, an invitation to this meeting, today, May 12, and the meeting -- I just received it in the mail today, May 12, from the post office in mail box here in Altadena, and today -- the meeting is also May 12. So I'd like to comment that this is not soon enough before the meeting to be able to get people over here and tell people about what an interesting meeting this is.

I think that if we would have known about it a little more in advance, it would have helped.

MR. SAUNDERS: 30 seconds.

THE FLOOR: Thank you.

It would have helped to get more interested community members out to the meeting. So I just wanted to just pass that along. I would think that at least 10 days would be the minimum that you would let us know in advance of the meeting.

Thank you.

MR. RIPPERDA: I'll say something from EPA's perspective on your question on alternatives. And I also -- I agree with you about the short notice. That's inexcusable on our part, on NASA's part. I'm not sure why it happened that way, it wasn't supposed to. These things were supposed to be mailed out more than 10 days ago. So we screwed up, and I have to take responsibility for that, too, because I'm supposed to be overseeing what NASA's doing to make sure they do it right.

But back to the alternatives.

It does look like, you know, NASA is not giving anybody very much choice. They're giving you alternative one and alternative two, and alternative one is essentially do nothing. But in a -- we talked about this, actually, before the meeting, saying, "Wow, you know, we're not giving people much choice here." But it's what Richard said about a presumptive remedy.

In a case like this, soil vapor extraction has been used at thousands of sites around the country. It's been the one and only technology that's proven to work consistently at sites like this.

You know, there's other things you can do. You can dig up the whole site, but EPA doesn't require a facility to investigate obviously ridiculous choices, such as digging up the entire site.

But there's other things that you can do, like injecting steam to make it be cleaned up faster. That would be called innovative technology. But we don't really require that a facility look at things like that, that would cost so much more, when an off-the-shelf technology works so well and relatively quickly.

So even though it looks like there's not really much choice here, it's because NASA is following the process that's set in law by Congress that they're supposed to look at alternatives, but we've been doing this long enough that the alternatives boil down to, in some cases, some very few or, in this case, only one real alternative.

Congress makes us look at no further action just as a baseline, to make sure we're not out there spending money willy-nilly. And other than that, the way the law is written by Congress, we're supposed to look at viable alternatives.

And in this case, we have enough

experience to know that soil vapor extraction is actually the only viable alternative. But we're still supposed to do it in this way when we go to public with our various alternatives that NASA is proposing.

We haven't changed the process, even though we've learned enough to know that there actually is only one real alternative here.

So I don't know if NASA wants to say anything.

MR. ROBLES: Just because it's SVE now doesn't mean that if, in the future, new technology comes in that we find better that we won't revisit this. This is not like cast in stone right now.

So I want to assure the public that as technologies develop, we are required through the process to periodically review what we're doing and, if we see some thing better, and if an issue comes up that we want to augment the SVE with another technology that has appeared to be better, that's what we do.

So as the technology improves, one of the things -- I've been in this business for 30 years. One of the things that amazes me is the regulations are always set forth before the

technology catches up. But as technology improves, we in the environment community can say, "Okay, look, this new technology might be better been SVE, so let's replace or let's augment."

So don't think that this is it. We're only going to do SVE and that's it, we've lost the opportunity. We're required through the process, and Mark is always on my case about this, is to make sure that the technology matches what we need to do. And so we're going to revisit this. This is not cast in stone.

We have meetings quarterly and we will discuss this, and we will have information meetings in the future because we still need your inputs. So as we go on, hopefully we'll find some technology with the silver bullet that will clean everything up. We hope. Some day. But until now we have to use what we've got.

MR. ZUROMSKI: I just want to make two quick comments just to clarify what Peter said, as well.

It's true that every five years we do what is called a five-year review once we sign the legal document that Mark talked about called the ROD, the record of decision. So every five years we

do review what we've done and, again, see if we're doing the right thing.

And, secondly, as I think was mentioned today, this is the proposed alternative, as well. The opportunity here is that we are presenting, though limited, but what we think is the best tentative, we do encourage your comments as to what you think if this is the best alternative. And that's why this part of the process involves public comment.

So thank you.

MR. SAUNDERS: Any other comments?

And just a couple of comments I wanted to make was, we did mail these out on Tuesday, May 8. Obviously, it wasn't enough time, so we'll definitely make sure that we mail these farther in advance, to get out to you in plenty of time to plan to attend the meeting.

And one other comment, as Richard is basically saying, is the purpose of this meeting is you can come here and provide some alternatives that you feel might be useful to add into the record, that we can consider in the future.

Are there any other comments or questions from the public?

Yes.

MS. BLAIR: My name is Susan Blair, B-l-a-i-r. I'm also an Altadena resident. Mine's a curiosity question. Once the gases come up through the pipe into the chamber where the carbon is and it absorbs the chemical, what happens to those carbons?

MR. ZUROMSKI: What happens is, once the carbon becomes full of all the different chemicals that we are pulling from the soil vapors, we have to, as Peter stated earlier, in accordance with all the state, local and federal regulatory requirements, take that carbon canister, remove it, and then it's either recycled or incinerated or somehow disposed of in a very legal manner off-site. And then we then replace the carbon with brand new carbon and it continues the process again.

MS. BLAIR: Thank you.

MR. SAUNDERS: Do we have any other comments or questions from the public?

Yes, ma'am.

MS. COMPTON: Cynthia Compton, C-o-m-p-t-o-n. I'm an employee of JPL and interested community member. I have a few questions, so I'll just plow through them in my two minutes.

You said that in the '50s to the early '60s a sewer system replaced the seepage pits. Does that mean the chemicals are now going into the sewer system, and where do they go from there?

Other questions I have are: Is there a record of what other alternatives were considered other than these one and two, and where can we read or find out about that?

And it says the pilot system has removed 200 pounds of VOCs. Out of how many is predicted or known to be at the site?

It says the -- I think the -- what I'm hearing is that the VOCs are in the vapor or the pockets of the soil. So what about the soil itself, and all the VOCs in the soil particles, and, you know, once you remove it from the vapors does it now migrate from the soil particles back into the vapors afterwards?

And I also agree with the short notice to the public, and that's why there, in my opinion, are not adequate representation from the community here. I got the e-mail notice on Wednesday and

didn't really see it until Friday, about 6 p.m. on Friday. And I would like to know: Is there some kind of record of when notices are sent out to the public and where they're at.

And the other thing is, I think I was talking to Richard about who these notices are sent to in a half a mile radius from the site. What about -- I understand sending it another half a mile to get more public is maybe too many -- you know, too costly, but what about sending the notice to the customers --

MR. SAUNDERS: Time.

MS. COMPTON: -- of the water companies that are involved?

MR. SAUNDERS: Thank you.

Quite a few questions, and we'll try to address those one at a time.

MR. ROBLES: Good questions.

On the first one is, we do not send chemicals down the sewer system. What happens is we try to recycle them. They're usually used up in the processes. If we can't recycle them, we try to destroy them in some form of fashion. The regulations try to minimize sending stuff down the sanitary sewer. We're very particular about that.

I don't know if you've seen around the lab these circles with the ducks on it because they're saying this is a storm water drain, this is sanitary sewer. We don't want chemicals going down there. That's part of our regulation. We have a whole office on-site to manage that. So that's not going down there. That's one of the reasons.

The second -- well, I'll answer your last item on the notices. There is repositories in the local area, the libraries, that you can get these documents, and there is on the record of when we sent the notice. And we apologize. We had a little SNAFU. But we had sent 4,732 mailers.

Now, I have received some phone calls that people did receive them by Monday and Tuesday of this week, but there was a slight mix-up where you might have been the ones that didn't get it until later. We did send the e-mail out -- I don't know what happened. Well, we want to send it earlier, so that's a good comment. We're going to have to notice -- I think we're going to have to send them more than 10 days earlier, to make sure that the mail -- because there was some problems with some of the post offices in sending this stuff out, so we want to make sure it does.

We also put it in the paper. We put it in the four local papers and L.A. Times. But I also notice that some people didn't see that, so we might have to augment in the future. So we have to be creative about which way -- do you guys listen to radio? Or -- might that be a better way? I'm just asking. Because we're trying to get more items out, and that's why we have two meetings.

So if you could tell the public. You know, I apologize. Come out Monday. I would love to see 100 people here, or more. But we have sent 4,732 of mailers, plus the 6,000 JPLers who were contacted.

Okay?

MR. ZUROMSKI: I think I'm going to address the other two of them. I think Peter covered lot of yours.

The first is, if you do want to see the other types of technologies that were evaluated, that is in the feasibility study and that is available at all of the document repositories. And that shows you the detailed analysis, like I talked to you about earlier, that we go through to evaluate the technologies. And it will show when certain things were dropped out and when certain things were retained. And it is very detailed, it is about three -- three inches, four inches thick, but it is very easy to look at. So feel free, it's at all the document repositories.

The second question I think I'm going to answer is, the amount of chemicals that are in the soil vapor and how they move around.

There are different ways to -- technically, to estimate how much is in the soil vapor. I can't get into every little detail of how that is done. Again, that is in the feasibility study as well. But there is an estimate of somewhere between three to five thousand pounds, 5,000 being the maximum that we believe could be in the soil vapors, and that also includes what would be in the soils.

When we say "soil vapors," since they are volatile organic compounds they tend to be in a vapor state, and so that is why we are removing soil vapors by soils themselves.

Anybody?

MR. RIPPERDA: I'll add a little bit to that. That's actually a great question about soil vapor versus soil, and what Richard said is right, but I'm just going to add a little bit.

We estimate, or NASA estimates, that there's up to about 5,000 pounds total of these things, and that's total in the soils, absorbed in the soils and in the soil vapor.

When it's located like it is, 50 to 200 feet below the surface, you actually have to drill a well, a bore hole, to get down to it. And the act of drilling that bore hole and taking your sample, you can't -- it drives the VOCs out of that piece of soil. So you can't just take a sample of the soil and analyze how much is in the soil. It's just not very effective. So what we do instead is, we measure what's in the soil vapor. It's very easy. You drill your same bore hole, suck some air in, and that volatilizes it off the soil.

So we're being somewhat legalistic when we're always saying the VOCs in the soil vapor, because that's where we actually measured it, and that represents how much is actually in the soil. And there's various equations that you can use, based on the soil chemistry with partitioning coefficients and things like that, to calculate from what you have in the soil vapor back to what's in the soil.

So just because we always say "soil

vapor," that doesn't mean we're only looking at the vapor. What we really care about is what's in the soil and about any rainwater that might migrate through that soil, deabsorb it, and carry it down to groundwater.

MR. SAUNDERS: Any other feedback from our representatives?

MR. ROBLES: Did we answer all your questions, ma'am.

THE FLOOR: What about when you remove the VOCs from the vapors, as more chemicals evaporate out of the soil into the --

MR. ROBLES: Right. That's why you constantly do that. The question is -- there was one question that she had asked, once you remove the particles through the vapor, are there any particles left on the soil.

This is a continuous process because you want it to volatilize that material because it's a volatile organic. So you want to draw it out. So you constantly are pulling pressure and putting a vacuum on it to suck it up. Eventually there should be no particles left there.

I'd say no, because any system cannot 100 percent clean. You can't get the last molecule

out. What you're trying to do is get as low as possible until the technology doesn't work anymore. And then you wait for another technology, where you say, "Hey, we're kind of finished, and there is no more threat to the groundwater." And that's what you do on it. It's not an exact science, we try our best, and that's what we do.

And that, like I said, the document, as Richard said, is thick. It has everything in there that you want to know. And if it's not in there, we'll have informative meetings and we can give you the boring lecture. Because this is -- it's long. And to read these documents right now, at -- once we finish this process, sometime in the future, we're going to have so much documents that you will not believe. I mean, we generate so much information. This process requires of the government to do this, to make sure that we make the right decision. And we have to publish these documents so you, the public, can read them and say, "How did you guys make that choice?" That's what we call the administrative record, and that's why we have that in the repositories for you.

MR. SAUNDERS: I don't know if it was mentioned, in the proposed plan, the information repositories are located on, if you want that information, on page 6 of the proposed plan. That's the different information repositories.

The item of record, I believe, is kept here? At JPL?

MR. ROBLES: There's three.

MR. SAUNDERS: Okay.

And, again, what you're telling us tonight is very useful, this evening, because we need this feedback. I believe this is the first time that you've held a public meeting here, so this is a learning process for NASA, for all of us, and we appreciate this feedback that you're giving to us. It will help us make meetings better in the future, to communicate information to the public better.

Yes, ma'am.

MS. COMPTON: The only question that wasn't answered is have you considered sending these public notices to the customers of the water companies that are impacted.

MR. ROBLES: Thank you.

We have a representative here. I'm not going to put him on the spot.

We meet with the Raymond Basin

Management Board. We have dialogue. We are meeting with the city of Pasadena on Monday. The water purveyors know about these meetings, and we have told them in their board meetings and the word has gotten out that way. We have gone to local communities like, I think, Northeast Trees and a few others. We've told them about this.

We are looking to expand our mailing list. So if you can recommend some groups or people that you want to put on the mailing list, please let us know. Because we have no fear of sending as many as it takes, so that the public -- normally , believe it or not -- I've been in this business 30 years, and I've only been at one public meeting where it was standing room only, and that was because there was -- the government needed to expand a bombing range. You know how controversial that was. But most of the time people get their information through the newsletter, or they call up, or they go to the repositories. But if you have any suggestions of people that you want on the mailing list or groups, please let us know. But this information has gotten out to the purveyors of water.

MR. SAUNDERS: I believe what you're

referring to is like when --

MR. ROBLES: Oh, the customers? You mean the water customers?

MS. COMPTON: You and me that are drinking the water and paying the purveyor to send water to our houses.

MR. ROBLES: Oh, so you're asking should we send these to all the people that get the water.

MS. COMPTON: All the customers who live within a half mile radius.

MR. ROBLES: That's a good point.

MR. SAUNDERS: I think, also, the point you may be making, and I may be wrong about this, but when utilities have public hearings and such, they usually include a public notice in their mail-out, in the billing. And, of course, that is their mailing, it's not ours. So we would have to approach a utility to do that. Whether they would do it for free or charge us, I don't know, but that's something we would have to discuss with the appropriate utility.

MR. ROBLES: Right. That's a community right to know.

That's a very good suggestion, that

when we're going to talk about groundwater it might be a good thing is to go and talk to the purveyors and see if we should send those notice -- that's a good point. Thank you.

MS. BLAIR: The Lincoln Avenue Water Company, every member of the Lincoln Avenue Water Company is shareholder, so they have the right to know that.

MR. ROBLES: That's right. That's a good point. Thank you. I didn't think about that. That's good. Particularly when we're talking about groundwater. Good suggestion.

MR. SAUNDERS: Right.

Did we answer all your questions? Was there anything else that we skipped over?

You had around six questions.

MS. COMPTON: Record of public notices. Is that in the repositories or only here at JPL?

MR. SAUNDERS: That type of information is put in the information repository. The public notice for the meeting would be put in there.

Okay. Any other questions or comments from the public? We welcome this opportunity to hear from you. Anyone else?

Well, there is another opportunity, if you think of further questions that you would like to ask. We are having another public meeting on Monday night, and that information is also in that proposed plan fact sheet, with times. And the public comment period is continuing on.

Again, I want to thank you for attending. We encourage you to review and comment on the proposed plan. Final decision regarding cleanup will be made after your public comments have been received and considered.

The public comment period started on May 7 and runs through June 11, 2001. If requested, NASA may consider extending the public comment period. Written comments and requests for extensions of the comment period should be mailed or e-mailed to Peter Robles, and his address is in the fact sheet and it's also up here on the slide here.

If there's nothing else, no other comments, anything -- any last statements from our representatives up here, I thank you for attending this afternoon and have a good evening.

Oh, yes. And there will continue to be -- the representatives here will be available

after the meeting, if you want to do follow-ups or ask any further questions. And, again, if you think of a question after we've officially closed this meeting, feel free to write it out on a comment sheet and submit it to our court reporters and such so they can include it in the public record.

Thank you.

CERTIFICATE

I, LESLIE A. MAC NEIL, RPR, CSR No. 7187, in and for the State of California, do hereby certify:

That the foregoing ___-page proceedings were taken down by me in shorthand at the time and place stated herein, and represent a true and correct transcript of the proceedings.

I further certify that I am not interested in the event of the action.

WITNESS my hand this _____ day of __________, 2001.

____

Certified shorthand
reporter in and for the
State of California

PUBLIC MEETING AND PUBLIC COMMENT PERIOD

JET PROPULSION LABORATORY

PASADENA, CALIFORNIA

MONDAY, MAY 14, 2001

6:00 P.M. to 9:00 P.M.

Reported by:
Vickie Blair
C.S.R. No. 8940, RPR-CRR

PASADENA, CALIFORNIA; MONDAY, MAY 14, 2001
6:00 P.M.
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MR. SAUNDERS: Good evening.

We're going to start a couple minutes early. Welcome to the Jet Propulsion Laboratory. Thank you for taking the time tonight to attend this meeting.

My name is Lee Saunders. I'm an Environmental Public Affairs Officer for the U.S. Navy and a facilitator for tonight's meeting about the proposed plan to select a remedy to clean up soils at the National Aeronautic Space Administration, Jet Propulsion Laboratory located here in Pasadena.

During this portion of the meeting, you, the community, can provide questions and comments to these representatives and their agencies on the proposed plan.

Excuse me. Let me backtrack just a moment.

Prior to the meeting, you had the opportunity to speak with NASA, federal, and local lead and regulatory agency representatives on a one-to-one basis about the proposed cleanup actions.

During this portion of meeting, you, the community, can provide questions and comments to those representatives and their agencies on the proposed plan.

These comments and questions will be included in a meeting transcript and become part of the final decision for soil cleanup at JPL. Representing the agencies responsible for cleanup and talking to you the proposed plan and its remedial alternatives are agency representatives who will each introduce themselves.

To my left -- do you want to --

MR. ROBLES: Oh, Peter Robles of NASA representing the SuperFund cleanup here.

MR. ZUROMSKI: Hi. I'm Richard Zuromski with the Naval Faculties Engineering Command.

MR. GEBERT: I'm Richard Gebert with the State of California Department of Toxic Substances Control.

MR. RIPPERDA: I'm Mark Ripperda with the United States Environmental Protection Agency.

MR. YOUNG: I'm David Young with the Los Angeles Water Regional Quality Control Board.

MR. SAUNDERS: Ground rules for today's meeting are as follows: This evening's format will consist of presentations by our representatives about the proposed plan and remedial alternatives, followed by a formal comment session where you, the community, can provide us with your comments and questions.

I'm going to ask you to please hold your questions until the presentations have been completed.

Once we've heard from all the presenters, we will open the floor for questions and comments. You may want to use the comment sheets that are in the back to write your questions down during the formal comment session while we're waiting for opportunity.

To assure that everyone that wishes to make a comment or ask a question has a fair and equal opportunity to do so, we ask that you limit your questions or comments to two minutes. At the end of that time, please take your seat. If you have not finished your remarks, you may continue for another three-minute period after we have heard from all the other speaks.

We have court reporters -- two of them -- here tonight, so we ask you to please state your first and last name and spell your last name before you begin your comments.

If you do not wish to provide verbal comments or questions, you may also submit your comments and questions in writing. There are comment sheets available on the tables in the back for those of you in the audience who would prefer to submit your input by this method.

For those of you wondering why the U.S. Navy is involved with the environmental cleanup of a NASA facility, the explanation is fairly simple. In 1999, NASA

and the Naval Facilities Engineering Command, most commonly known by the acronym NAFAC reached a memorandum of agreement establishing roles and responsibilities that state NASA may procure environmental engineering and the consultantcy services from NAFAC and its subordinate commands.

In late 1999, NAFAC became heavily involved in providing environmental services to NASA and JPL. Peter Robles, remedial property manager for NASA, is our first presenter.

Peter.

MR. ROBLES: Good evening. What we're going to present today is a site description to give a little history of why this site is on the SuperFund list. Then we're going to have Mark Ripperda talk about regulatory framework, coming up with Richard Zuromski talking about site assessment and investigation activities and the remedial activities and the proposed remedial alternatives for OU-2 soils.

We will, at a later date, talk about groundwater. We'll have another public meeting in the near future. But right now what we're focusing on are the soils underneath JPL and how to remediate the contaminants in the soil to minimize any migration into the groundwater. And that's what we're going to do right now.

The site that we call JPL has been active since the late '30s, early '40s. It was owned by the Army ordnance, and then it was owned by NASA in '59 to '60 when we took it over.

During the 40s and '50s, seepage pits were the main method to dispose of waste. At that time, it was the most accepted practice. It was within the regulations, no problem at all. We found out later that that was a mistake, and we had to correct that. In the late '50s early '60s, we, NASA, started programing to replace these seepage pits with sewer lines.

Now, the indication and a question that came in on Saturday was "So contaminants are going down the sewer line." No, they're not. That's a good question. Very little gets put into landfills. We usually destroy or recycle the chemicals that we use today, or they are used up in the operational processes. We do not do that. The regulatory requirements require us to make sure of that, so from the standpoint today, we are all within regulations. But at the time, the main reason why the contaminants got into the ground soil is because of these seepage pits.

In 1992, the site became a SuperFund site. It was put on the national priorities list, and the EPA will talk a little bit more about that.

We are talking about trying to remediate

Operable Unit 2, which is -- as I said, before currently all operations meet federal, state, and local requirements. We have a host of regulations that we have to follow, and so, therefore, we are assured that we're doing what's right. What we're dealing with is past practices that we have to take care of.

Here is a conceptal model of what we're talking about. What you have here is a VOC plume, volatile organic carbons, that have gone through the soils because of past practices from JPL. The area that we are most concerned with is 50 feet below the surface to about 200 feet, which is the groundwater zone that we're talking about.

In the soils, we're talking about chlorinated solvents, and when we say "vadose zone," we mean in a vapor state in the soil. NASA wants to address this issue tonight, and we will be addressing groundwater in the future.

Now we'll have the EPA talk about regulatory framework.

MR. ZUROMSKI: I just want to ask the court reporters really quick, can you hear me okay without having to use the microphone? Okay. Mark and I are going to try to do ours without the microphone then.

MR. RIPPERDA: That way I can stand out of the

light.

So what's it mean to be a SuperFund site, and for that matter, what's -- oh, I got a toy.

What's it mean to be a SuperFund site? For that matter, what's SuperFund? About 20 years ago, Congress passed a law, it's called CERCLA, and I'll talk about what the acronym means, that authorize a tax on the chemical industry. And that tax all went into a trust fund, which is called the SuperFund, which EPA can spend to clean up abandoned hazardous waste sites.

That same law passed by Congress also gave EPA the authority to go to existing, ongoing sites such as NASA/JPL that have contamination that might pose a serious threat to public health, and we have the authority to force them to clean it up.

In order for us to use that authority, we have to rank how bad the potential hazard might be, and if it scores high enough, the site is put on a national priorities list also called an NPL. And like Peter said, that happened with NASA/JPL in 1992.

So what was it that first got NASA/JPL on the national priorities list? In the late, very late '80s, the City of Pasadena found some chemicals in their drinking water wells right here across the Arroyo just through their standard compliance testing that they have to do for the

State of California. And that's what got us -- all of us regulators, the State of California, Richard, and David and myself -- well, actually our predecessors. But that got us involved looking over their shoulders making sure that they're doing the cleanup appropriately.

Right when the contamination was first sound, City of Pasadena put treatment systems onto their wells immediately, which means that anybody who is drinking the water was protected right from the beginning.

But to cleanup the actual release, to cleanup all the aquifer and the source here on the site is a long, lengthy process. And the majority of that process is called the remedial investigation feasibility study. Which means they have to go out drill bore holes all over the site, take soil samples, soil vapor samples. They have to put in monitoring wells, take groundwater samples both on the site, they also went out into the neighborhoods put monitoring wells out there, and sampled them. They also worked with the water purveyors to look at their water analyses. And with all of that, they figured out where the contamination is now, where it came from originally, and they go through the process of deciding how best to clean it up.

Usually you clean up groundwater contamination by looking at the source where the contamination is coming from and at the aquifer itself in two separate stages because you're using a different physical mechanisms to cleanup the two. So what they're working on now, and what this whole meeting is about, is the actual cleanup of the source here on the site. So As Peter said to keep it from going into the water, which means that ultimately the water can be cleaned up faster.

So in the feasibility study, they look at various alternatives on how best to clean something up. And in some cases, such as here at JPL, there's only one real option. I don't know if you've read the proposed plan, but it looks like you were given two choices, do nothing or do what NASA wants to do. And that may look like you don't really have a choice, but Congress says that we also have to look at the do-nothing alternative because they don't want EPA out there spending money willy-nilly making faculties and industries spending money if doing nothing might work. I don't know why they don't trust us to be good stewards of public money, but they don't.

So in this case they had to look at the do-nothing alternative. And the other alternative that they show to you in the proposed plan which is called vapor extraction system is something that EPA has found over the 20 years we've been doing SuperFund cleanups to be the one system that really works in a case like this where you got

all the organic compounds in the soil deep beneath the site. You can't really dig up a site. You know, one alternative might be dig up the whole site, take the soil away. But, obviously, you can't do that here because you'd be digging up all of JPL.

There are some other technologies such as heating the soil with large electrical current, actually what is called vitrify it. So you turn it into one solid lump. You melt the soil. And you can't do that here.

So technologies like that which exist but they don't really make sense for a site, we, the government, don't make NASA do a detailed evaluation of. So we essentially cut right to the chase is that what we're proposing the one and only system that really works best now. There might be something else that comes along in the future, but for now, this is what makes sense.

So once they select a remedy, they have to do a legal document, which is called a record of decision. Before you get to that point -- I forgot the most important part, the yellow box, where we are now. We have to go out to the public and say, "This is what we're proposing. What do you think?"

So you can comment both on, you know, their selection of a remedy, but you can also make whatever comments you want on, you know, how they ran the process,

how well they've involved the public. If you think they've been hiding things from you or whatever, which they haven't, but anything you might think, you can make comment on that. It doesn't just have to be on their remedy.

They then have to respond to your comments. They have to check with the regulators, make sure that the State of California and EPA is happy with how they've responded to the public. And, at that point, if we're all happy with each other, they do the record of decision, and then they go on to the remedy implementation. And eventually, if a site gets completely cleaned up, they're no longer a SuperFund site. They get delisted from the national priorities list.

But even if that happens, there's still always going to be long-term monitoring and review of what the situation is here at JPL.

This is just kind of what we've already said. This is a chance for you to ask us questions, and also make comments on what you think about both the remedy and the process, you know, everything that's going on right now.

You can always call Peter. Peter's name and number is in the documentation you got. I don't think my phone number is there, but -- it is? Good. And you can also feel free to call me, and I'll even say feel free to

call the State of California guys if you feel like you're not getting appropriate responses from NASA.

MR. ZUROMSKI: Thank you, Mark.

Hi. My name is Richard Zuromski. I'm with the Naval Faculties Engineering Command, and, as Lee described earlier, I'm here to assist NASA in their cleanup efforts here at JPL.

From 1994 through 1998, JPL conducted what's called the remedial investigation, as Mark described earlier. During the remediation investigation, in over nine different sampling events, JPL took 45 soil vapor wells, 35 soil borings, and three test pits throughout the site to investigate where the chemicals may be found in what we're calling Operable Unit 2. Further, over 37 -- or 37 of those points were turned into permanent monitoring, soil vapor monitoring points that is we must now monitor on a regular basis to see how the contaminants are moving, or not moving, in this case, within the subsurface.

Now, during the remedial investigation, the samples identified the extent to which the chemicals were in the soil, and the results showed that there were elevated levels of four different volatile organic compounds. They were carbon tetrachloride, trichloethene, Freon 113, and 1,1-dichloroethene.

Now, these chemicals were used back, as

Peter described earlier, in the '30s, '40s, and '50s to clean out the inside of rocket motors that they were testing back in those days, which they don't use here anymore. And that's where the chemicals came from that are now in OU-2.

The OU-2 risk assessment, the human health assessment, determined that there were no risks above regulatory thresholds from exposure to soils or soil vapor.

Now, the primary reason that this risk was so low was the fact that, as Peter described earlier, these chemicals are now more than 50 feet below the ground surface. So exposure to humans is very much unlikely.

However, there is a risk that these chemicals will continue to migrate through the soils and eventually reach the groundwater, and that's the purpose of the remedy that we're talking about here today, is to make sure that those chemicals do not enter the groundwater and pose a further problem in the groundwater.

Now, we are currently studying how to remove these chemicals from groundwater. And that is going to be the subject of a meeting very similar to this probably within a year from now. However, the groundwater and the risk from chemicals in the groundwater, there's no risk because the water purveyors, or those people who deliver

the water to the public, have to meet very, very strict regulatory requirements. So today's meeting is focused on removing this source of contaminants, what we call source reduction, from the soils before they reach the groundwater. And that's the purpose of our meeting here today.

Now, this graphic shows the extent to which any level of a volatile organic compound was detected here at the site during the remedial investigation. Now, the hottest or most -- the highest levels of these chemicals were found in the north central part of the site, right up here where most of the laboratory activities took place. And that's where we focused a lot of our efforts to date doing some pilot studies which I'll talk about in just a moment.

Now, based on the results of the remedial investigation and our ongoing monitoring program of the soil vapor, we have found that the soil vapor and the chemicals in the soil vapor have not migrated off the JPL site boundary; but it does encompass roughly 45 acres on the site.

So based on the analysis in the remedial investigation and also the continuing monitoring we do here at the site, the remedial objective for Operable Unit 2 is to remove the chemicals, the VOCs from the soils before

they migrate to the groundwater.

To meet this objective, kind of as Mark talked about earlier, JPL evaluated several alternatives to remove the chemicals. And of those alternatives, two were selected for very detailed evaluation. And if you look in your proposed plan, I think it's on the third or fourth page, there's a list of nine criteria that we have to go through when evaluating each technology in detail.

The first is called no further action. As Mark talked about earlier, this is a baseline that all other technologies are compared to. Now, at this site, no further action would entail continuing a regular soil vapor monitoring program to see how the contaminants are behaving in the subsurface.

The second, and the proposed alternative, for OU-2 is soil vapor extraction with granular activated carbon treatment and also the continuation of our regular monitoring program. To help evaluate these two alternatives, JPL conducted a pilot test of the soil vapor extraction technology. And this started back in 1998. In over 14 months of operation of this pilot test, we removed roughly 200 pounds of VOCs, of these chemicals, out of roughly up to a maximum of 5,000 pounds that are throughout the site. But within this area, we removed 200 pounds of chemicals from the subsurface.

Now, this was so successful, this system is currently still operating here at the site, and then the pilot study does go on and will continue throughout the proposed plan stage and all the way through the record of decision stage until we decide the final, full-scale size of the technology that we'll put here at the site.

This is a conceptal diagram of how soil vapor extraction works. First you have here, as Peter described earlier, the seepage pits which are no longer existing here at the site. But this is where the chemicals came from, and then the VOCs, chemicals, became deposited here in the soil.

Now, soil vapor extraction is fairly simple. What we do is we apply a very strong vacuum, just like your vacuum cleaner, to suck these VOCs, these chemicals, right out of the soils and the soil vapor into this vapor extraction well right here.

Now, these vapors are -- since we're talking about volatile organic compound, the compound become in a vapor phase when we pull a vacuum on the soils and the soil vapor. So what you're extracting here is air and chemicals in vapor, which comes above the surface through this pump into a vapor treatment system.

The vapor extraction system consists of granular activated carbon. What it does is it captures the chemicals and holds them within the vapor treatment system, and then clean air is released from the system. What happens every three to six months, depending on how much chemicals we're removing from the system, we have to take those carbon filters that are inside this vapor treatment system and take them to either a recycling facility or dispose of them in some type of legal, regulatory manner. And then we take a new carbon treatment system and replace it and continue the vapor extraction phase. And that's generally how the vapor extraction system works.

So, based on our analysis, alternative one does not meet our remedial objective of keeping the chemicals from migrating to the groundwater; therefore, we're proposing soil vapor extraction as our proposed remedy.

There are several reasons why we're choosing soil vapor extraction from our proposed remedy.

First, it permanently removes the chemicals from the soil and soil vapor.

Secondly, it protects the groundwater from further migration of the VOCs.

Third, it's fairly simple to operate and fairly inexpensive to implement.

Fourth, the treatment period is relatively short, probably from one to five years, depending on how

effective the system is here at the site. But based our on pilot-scale results, it should have been very expected that the cleanup should not take very long.

And, finally, because this soil vapor extraction technology has all those qualities of being very effective in the type of soils here at JPL, in being very effective in removing this type of chemical from the soil, EPA says that this is what is called a presumptive remedy where basically this is the best technology that you can use at hundreds of other sites, including here at JPL, throughout the country. And so we call it what is deemed a presumptive remedy.

So based on our pilot study, and based on our ongoing analysis of the site, NASA proposes soil vapor extraction as the proposed remedy for OU-2.

MR. SAUNDERS: Thank you, Richard.

We are now available for comments and questions from you, the public. As a quick reminder to ensure that all participants providing comments or questions provide equal treatment, please limit your comments or questions to two minutes. We also ask you to please state your first and last name, and spell your last name for the court reporters.

Thank you.

Now, do we have any questions or comments

from the public? Please feel free to come up to the mike, and, again, state your first and last name and spell the last name for the reporters, court reporters.

Thank you, sir.

MR. STORK: My name is Edward Stork, and my last name is spelled S-t-o-r-k. And I actually am the president of the Rose Bowl Riders, which is right next door. And so I was interested to hear that the chemicals are apparently only within the boundaries of JPL; correct? Can you tell me where the soil vapor extraction wells will actually be located?

MR. ZUROMSKI: Sure. I can tell you that at this point in time, the one location that we are currently operating the soil vapor extraction is right where I was pointing at the highest levels of the chemicals that we found in the site.

The other wells -- what we're doing right now is we're doing continuing monitoring of the soil vapor levels at the site, and that actually -- I think Mark described the remedial design phase that occurs after we sign our record of decision where we actually look, at that point in time, where the highest levels of the chemicals are and then we place the wells.

So, no, we don't know exactly where they would be right now; but we would focus on where the highest

levels of the chemicals are.

MR. RIPPERDA: But the level of contamination as you move south -- you're here from the riding stables; right?

MR. STORK: Yeah, just below here, yeah.

MR. RIPPERDA: As he said, the highest level of contaminants -- and can you put that back up. But the highest level of contaminants are up in the northern part, and in itself, it's negligible.

MR. ZUROMSKI: Right. About there where my light is shining is where the current vapor extraction pilot study is operating, and that's where the highest levels of the chemicals were found.

MR. STORK: Just out of curiosity, how much area does one of these vapor extraction wells take up when you install it?

MR. ZUROMSKI: The actual well itself is usually probably from four to six inches just for the well itself; however, the radius of influence from the vacuum at the site can be anywhere from four to eight, seven or eight hundred feet from the center of the well.

MR. STORK: Thank you.

MR. ROBLES: The size of the site, you also want to know how big is that. It's about 45 acres. That yellow spot. None of the wells that we're talking about for soil vapor will be off-site. It's all on-site because that's where all the soils are at.

But understand also, everybody, that we revisit this periodically. Every five years we go back and revisit so we make sure we're doing the right thing with the regulators.

Any other questions?

MR. RIPPERDA: Also something about --

MR. ROBLES: Because of the comments on Saturday, I want to thank the young lady, we are planning to have a third meeting. And we want to have it in Altadena. And what we want to do is probably -- we're trying to set it up ahead -- I haven't talked to anybody over there -- we'll probably host it in the middle of June so that we can make sure that the whole community has a chance.

I didn't know this, and this is one of the reasons why we have public meetings, is that the folks in Altadena can't make it over here at night because there's no bus service. So we want to know if there are any concerns out there.

So if you get another proposed plan in the mail, please don't get angry at us. We're just announcing that we're going to have a third meeting in Altadena so we can make sure we have the public comments in there. We want to solicit comments. We want to make sure that the

public is comfortable with this. They might have better suggestions, so that's what we're going to shoot for. So I want to thank the lady on Saturday, that was a good comment that we had.

And we have talked to some water purveyors, and they're willing to put it in their billing. So we're going to work on that.

MR. SAUNDERS: All right. Quick feedback from Saturday's meeting.

What other questions do we have, comments? Please feel free to come up to the mike and express your feelings your opinions, your comments, your questions at this time.

MR. CLAIRDAY: Good evening. John Clairday, with the -- and the last name spelled C-l-a-i-r-d-a-y. I'm a board member with the Lincoln Avenue Water Company, which is a neighbor, right next door. We appreciate the opportunity to come over here for this meeting.

Just one statement, and then one question, as well. And I don't think this is inconsistent with what Mr. Robles said, but we already do have a groundwater problem, and I think that's been recognized. But just wanted to emphasize that since it's an area that we're interested in.

And then a second one, I'm wondering about

the effectiveness of this extraction program. Is it a hundred percent effective? How do you know how well you're doing, and does the testing continue throughout that term? And, also, if it's not a hundred percent effective, does that mean that a certain percentage will ultimately reach groundwater and continue to contaminate it?

MR. ZUROMSKI: I'll answer your question.

First of all, every technology that we attempt, we choose because it is the most effective. Hundred percent effective, I don't think we could guarantee. But it is the most effective technology for the types of chemicals at the site and for the types of soils that we have at the site.

Now, what we do to ensure that that is the most effective technology for the site is, number one, we conduct a regular monitoring program of the soil vapor around the site to see -- and to actually watch, we've actually seen some of the data is in the back of the room, you can watch the chemicals that have been removed slowly disappear from the soil. And we do that on a very regular basis. And during our pilot study, we actually did it monthly to see what the effect of the system is on the chemicals in the soil.

Now, what we do for the long term is once we've signed our record of decision, and once we've

installed the system throughout the site, we do -- again, we have a regular monitoring program to see how effective it is. And then at least every five years, we do what is called a five-year review where the regulatory agencies, NASA, sits down, looks at the results, how well the technology is looking. Looks at new possible innovative technologies, if the technology we've chosen was not as effective as we thought it would be, and basically says, "Are we still doing the best thing that we can do to remove the chemicals from the environment?"

And that's generally how we monitor how effective the technology is over the long term.

Now, if you look in the back of the room, we have an estimate, I think. I can't read from here, but it looks like it's a little over $3 million. That's a present value cost of what it will take to operate the system from our estimate one to five years and then monitor for another 25 years after that. So we do continuously monitor this throughout the entire period to make sure that what we've done is the best thing for the site.

As far as a level that we remove the chemicals to, that level is determined during the record of decision where we, as Mark said, we all sit down and agree to a level that we will clean the site to. And that's based on all the regulatory requirements that we're required to meet.

MR. RIPPERDA: And on an ongoing -- you know, the groundwater that they're also responsible for so over time whatever the recommended decision for the groundwater remedy has, that will include monitoring and clean up of the aquifer. So they're removing the source to protect it from going into the aquifer in the future, but for the contaminants that have already gotten into the groundwater, NASA will, of course, still be responsible for that in the future.

MR. SAUNDERS: Thank you.

Any other questions, comments? Please feel free to take this opportunity.

Thank you.

MS. COMPTON: My name is Cynthia Compton, C-o-m-p-t-o-n. I'll try to be easier on you. I gave a lot of comments on Saturday, and I appreciate your response to my comments.

My first comment is that two minutes is not enough time for my questions and my comments.

MR. RIPPERDA: Can we give her a little extension?

MR. SAUNDERS: Well, again, we can get her more time after the other folks have responded, she can come back up again.

MS. COMPTON: There you go. Quickly, I know that

there was some testing done in building 107 in the basement for the air atmosphere, and I wonder if that has turned into one of the 37 permanent test points.

Another question I have is: I'm interested in a record of the public notices that were sent out in the newspapers and the mailings. And I'm still having a little trouble distinguishing the difference between contamination in particles of soil versus contamination in the vapors, and if maybe we could clarify that a little bit with me.

And the other thing is my same comments I made Saturday, I think we, the public, deserve a little bit earlier notice, and thank you for offering another meeting. I'm going to put that in my official comments, but a little earlier notice and something to the JPL employees that says public meeting may be in the subject title.

MR. RIPPERDA: I'm going to say one thing to the last thing that Cindy said. She showed me a copy of the E-mail that went out, and I don't know how many JPL employees are here, but the actual E-mail didn't say anything about the meeting. It just said, "The proposed plan is available at a website," and she had a great comment that the actual E-mail needs to announce when and where the meetings are. So we'll make sure that NASA, in the E-mail that goes out in the next week or two for the

next meeting, has right in the text of the E-mail that this is a public meeting and when and where it will be.

Oh, and he wants me to talk about soil particles, also.

MS. COMPTON: He's already tried of me.

MR. RIPPERDA: Yeah. So her question pertains to the fact that in the slides it almost always says "soil vapor." It didn't say "VOCs in the soil"; It always said, "Soil vapor." And that's because the actual measurements we take are of the soil vapor.

When the contaminants are 50 feet, a hundred feet below the surface, you actually have to drill a bore hole to get down to it, and the act of drilling that bore hole, the heat and the air that you have to inject to bring the cuttings, the dirt, back up out of the hole, basically blow away all the VOCs that you're trying to sample for. So you can't take a soil very well from a hundred feet deep and analyze that soil for how much contamination it has in it.

So instead what you do is you drill your bore hole, and let it sit for a few weeks, reach equilibrium, and then suck some air out. And because the VOCs are attached to the soil particles and all the soil around your bore hole, they evaporate naturally. And then they'll fill the bore hole when you suck the air out you

see, "Oh, we have VOCs in the air that we're sucking out," so therefore we know that the VOCs in the soil in this location.

So you can do kind of rough correlations between the amount that's in the soil vapor you're measuring to what actually in the soil.

So it's just the physics of not being able to measure the actual particles in the soil; we have to do a correlation between the soil vapor and the soil. So we're always going to talk about soil vapor, even though what we're really concerned about is what is attached to the soil because what gets attached to the soil is what gets dissolved in rainwater, and ultimately brings it on the drinking water aquifer.

MS. COMPTON: But you're talking about cleaning --

MR. RIPPERDA: But when we're sucking, we're sucking the vapor out, but as we suck the vapor out, the particles of the chemicals that are attached to the soil are always evaporating. As we suck more air, more particles evaporate out of the soil, and relatively quickly, you suck those particles of contamination out.

MR. ROBLES: You asked about the building. We're not familiar with that, and I know --

MR. RIPPERDA: You have to talk louder in your answer for the court reporter.

MR. ROBLES: Which building are you in?
THE WITNESS: Building 107.
MR. ROBLES: 107. It must be in our proposed plan. I don't remember it exactly. I can get back to you with that information.
MR. ZUROMSKI: We'll have to respond to that.
MR. ROBLES: Yeah, we'll have to respond to you. Again, I appreciate that. It's not familiar to me after looking at the document. I'll have to research it and get back to you.
MR. SAUNDERS: Thank you.
What other questions, comments, do we have? I'm sure there are plenty of other folks out there that have some feedback for us. Please feel free to come up to the mike and provide your comments, questions.
If there's no other comments or questions, ma'am, if you'd like to come back up and get your next three minutes in, you're welcome to come up at this time.
MS. COMPTON: I'm okay.
MR. SAUNDERS: Well, if there are no other questions or comments, we're going to wrap this up in a moment.
I want to thank you for attending. We encourage you to review and comment on the proposed plan, and there are copies on the back table of the proposed

plan.
Final decisions regarding cleanup will be made after public comments have been received and considered. The public comment period started May 7 and runs through June 11. Keep in mind the comments and questions asked tonight, as well as responses, not only the ones given here but further, more in-depth responsive answers to your comments and questions included in a responsiveness summary which will be included with a RoD into the admin record.
Yes.
MR. ZUROMSKI: The comment period will be extended in accordance with the new meeting.
MR. ROBLES: Okay. We're going to extend the comment period, all right.
MR. ROBLES: We've extended the comment period past the third meeting so, therefore, it's fair for everyone.
MR. SAUNDERS: So instead of waiting for the public to request an extension, we've already extended the comment period at this time.
Do we have a date as of yet?
MR. ROBLES: That will be in the mail.
MR. SAUNDERS: It will be in the information sent out to the public as to how long the comment period has been extended.

And if you could put that slide back up. It's already been mentioned, if there are any further comments, questions, the last slide has Peter's address. Feel free to send your comments, your questions, mail them, E-mail them, to Richard at this address. It's also included in the proposed plan fact sheet.
MR. ROBLES: Peter.
MR. SAUNDERS: And we look forward to any further feedback you may have at this time. And before we close, I will give you one other chance if there are any comments or questions.
If not, thank you for coming and have a good evening.
(Whereupon, at 9:00 P.M., the HEARING was adjourned.)
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STATE OF CALIFORNIA)
) ss
COUNTY OF LOS ANGELES)

I, Vickie Blair, Certified Shorthand Reporter, number 8940, RPR-CRR, for the State of California, do hereby certify;
That the foregoing transcript is a true record of the proceedings.
I hereby certify that I am not interested in the event of the action.
IN WITNESS WHEREOF, I have subscribed my name this 4th day of June, 2001.

Certified Shorthand Reporter for
the State of California

PUBLIC MEETING AND PUBLIC COMMENT PERIOD

MONDAY, MAY 14, 2001

6:00 P.M.

NASA JET PROPULSION LABORATORY

4800 OAK GROVE DRIVE

PASADENA, CALIFORNIA

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MONDAY, MAY 14, 2001; 6:00 P.M.

MR. SAUNDERS: Good evening. We're going to start a couple minutes early. Welcome to the Jet Propulsion Laboratory. Thank you for taking the time tonight for attending this meeting.

My name is Lee Saunders. I am an environmental public affairs officer for the U.S. Navy and the facilitator for tonight's meeting about the proposed plan to select a remedy to clean up soils at the National Aeronautics Space Administration Jet Propulsion Laboratory, located here in Pasadena.

During this portion of the meeting you, the community, can provide questions and comments to these representatives and their agencies on the proposed plan.

Excuse me. Let me backtrack just a moment. Prior to the meeting you had the opportunity to speak with NASA federal and local lead and regulatory agency representatives on a one-to-one basis about the proposed cleanup actions. During this portion of the meeting you, the community, can provide questions and comments to

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these representatives and their agencies on the proposed plan. These comments and questions will be included in a meeting transcript and become part of the final decision for soil cleanup at JPL.

Representing the agencies responsible for cleanup and talking to you about the proposed plan and its remedial alternatives are agency representatives, who will each introduce themselves. To my left ...

MR. ROBLES: Peter Robles, of NASA, representing the Superfund cleanup group.

MR. ZUROMSKI: Hi. I'm Richard Zuromski from the Naval Facilities Engineering Command.

MR. GEBERT: I'm Richard Gebert, with the state of California Department of Toxic.

MR. RIPPERDA: And I'm Mark Ripperda, with the United States Environmental Protection Agency.

MR. YOUNG: Hi. David Young, with the Los Angeles Regional Water Quality Control Board.

MR. SAUNDERS: Ground rules for today's meeting are as follows: This evening's format will consist of presentations by our representatives about the proposed plan and remedial

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alternatives, followed by a formal comment session where you, the community, can provide us with your comments and questions.

I'm going to ask you to please hold your questions until the presentations have been completed. Once we've heard from all representatives, we will open the floor for questions and comments. You may want to use the comment sheets that are in the back, to write your questions down during the formal comment session, while we're waiting for that opportunity.

To ensure that everyone that wishes to make a comment or ask a question has a fair and equal opportunity do so, we ask that you limit your comments or questions to two minutes. At the end of that time, please take your seat. If you have not finished your remarks, you may continue for another three-minute period after we've heard from all the other speakers.

We have court reporters, two of them, here tonight. So we ask you to please state your first and last name and spell your last name before you begin your comments. If you do not wish to provide verbal comments or questions, you may also submit your comments and questions in writing.

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There are comment sheets available on the tables in the back, for those of you in the audience that would prefer to submit your input by this method.

For those of you wondering why the U.S. Navy is involved with the environmental cleanup of a NASA facility, the explanation is fairly simple. In 1999 NASA and the Naval Facilities Engineering Command, more commonly known by the acronym NAVFEC, reached a memorandum of agreement establishing roles and responsibilities that state NASA may procure environmental engineering and consultancy services from NAVFEC and its subordinate commands. In late 1999 NAVFEC became heavily involved in providing environmental services to NASA-JPL.

Peter Robles, remedial project manager from NASA, is our first presenter.

Peter?

MR. ROBLES: Good evening.

What we're going to present today is a site description, give a little history of why this site is on the Superfund list, then we're going to have Mark Ripperda talk about regulatory framework, coming up with Richard Zuromski talking about site assessment and investigation activities and the remedial activities and the proposed remedial alternatives for OU-2 soils.

We will, at a later date, talk about groundwater. We'll have another public meeting in the near future. But right now what we're focusing on is the soils underneath JPL and how to remediate the contaminants in the soil, to minimize any migration into the groundwater. And that's what we're going to do right now.

The site that we call JPL has been active since the late '30s, early '40s. It was owned by the Army Ordinance, and then it was owned by NASA in '59 to '60, when we took it over.

During the '40s and 50s seepage pits were the main method to dispose of waste. At that time it was the most accepted practice. It was within the regulations, no problem at all. We found out later that that was a mistake and we had to correct that. In the late '50s, early '60s we, NASA, started programming to replace these seepage pits with sewer lines.

Now, in the cas- -- in the question that came in on Saturday was: So contaminants are going down the sewer line. No, they're not. That's a good question. Very little gets put into

landfills. We usually destroy or recycle the chemicals that we use today, or they are used up in the operational processes. We do not do that. Regulatory requirements require us to make sure of that. So from the standpoint today, we are all within regulations. But at the time, the main reason why the contaminants got into the ground soil is because of these seepage pits.

In 1992 the site became a Superfund site. It was put on the national priorities list, and the EPA will talk a little more about that. We are talking about trying to remediate Operable Unit 2, which is the soils.

As I said before, currently all operations meet federal, standard, local requirements. We have a host of regulations that we have to follow and so, therefore, we are assured that we're doing what's right. What we're dealing with is past practices that we have to take care of.

Here is a conceptual model of what we're talking about. What you have here is a VOC plume, volatile organic carbons, that have gone through the soils because of past practices from JPL. The area that we're most concerned with is 50

feet below the surface to about 200 feet, which is the groundwater zone that we're talking about.

In the soils we're talking about chlorinated solvents, and when we say "vadose zone" we mean in the vapors stayed in the soil. NASA wants to address this issue tonight. We will be addressing groundwater in the future.

Now we'll have the EPA talk about regulatory framework.

MR. ZUROMSKI: I just want to ask the court reporters really quick: Can you hear me okay without having to use the microphone?

Okay. We're going to try -- Mark and I are going to try to do ours without the microphone.

MR. RIPPERDA: So I can stand out of the light.

So what's it mean to be a Superfund site and, for that matter, what's -- cool. I get a toy. What's it mean to be a Superfund site. For that matter, what's Superfund.

About 20 years ago Congress passed a law, it's called CERCLA, I won't talk about what the acronym means, that authorized a tax on the chemical industry, and that tax all went into a trust fund

which is called the Superfund, which EPA can spend to clean up abandoned hazardous waste sites. That same law passed by Congress also gave EPA the authority to go to existing, ongoing sites such as NASA-JPL that have contamination that might pose a serious threat to public health.

And we have the authority to force them to clean it up. In order for us to use that authority, we have to rank how bad the potential hazard might be. If it scores high enough, the site's put on a national priorities list, also called the NPL. And, like Peter said, that happened with NASA-JPL in 1992.

So what was it that first got NASA-JPL on the national priorities list? In the late, very late '80s the city of Pasadena found some chemicals in their drinking water wells, right here across the arroyo, just through their standard compliance testing that they have to do with the state of California, and that's what got all of us regulators, the state of California, Richard and David and myself -- well, actually, our predecessors, but that got us involved looking over their shoulders, making sure that they're doing the cleanup appropriately.

Right when the contamination was first found, the city of Pasadena put treatment systems on their wells immediately, which means that anybody who is drinking the water was protected right from the beginning. But to clean up the actual release, to clean up both the aquifer and the source here on site is a long, lengthy process.

And that -- the majority of that process is called the remedial investigation and feasibility study, which means that they have to go out, drill bore holes all over the site, take soil samples, soil vapor samples, that included monitoring wells, take groundwater samples, both on the site -- they also went out into the neighborhoods, put monitoring wells out there, sampled them. They also worked with the water purveyors, to look at their water analyses. And with all of that, they figured out where the contamination is now, where it came from originally, and they go through a process of deciding how best to clean it up.

You usually clean up groundwater contamination by looking at the source, where the contamination is coming from, and at the aquifer itself in two separate stages because you're using

different physical mechanisms to clean up the two. And so what they're working on now and what this whole meeting about is the actual cleaning up of the source here on site, as Peter says, to keep it from going into the water, which means that ultimately the water can be cleaned up faster.

So in the feasibility study, they look at various alternatives on how best to clean something up. And in some cases, such as here at JPL, there is only one real option. I don't know if you've read the proposed plan, but it looks like you were given two choices: Do nothing or do what NASA wants to do.

And that may look like you don't really have a choice, but Congress said that we always have to look at the do nothing alternative because they didn't want EPA out there spending money willy-nilly, making facilities and industry spending money if doing nothing might work. I don't know why they didn't trust us to be good stewards of public money, but they didn't. So in this case, they had to look at the do nothing alternative.

And the other alternative that they've shown to you in the proposed plan, which is called soil vapor extraction, is something that EPA has

found, over the 20 years that we've been doing Superfund cleanups, to be the one system that really works in a case like this, where you've got volatile organic compounds in the soil deep beneath the site. You can't really dig up the site. You know, one alternative might be dig up the whole site, take the soil away. But, obviously, you can't do that here because you'll be digging up all of JPL.

There's some other technologies, such as heating the soil with large electrical currents to actually -- what's called vitrify it, so you turn it into one solid lump, you melt the soil, and you can't do that here. So technology like that, which exists but they don't really make sense for a site, you know, we, the government, don't make NASA do a detailed evaluation of.

So they essentially cut right to the chase and said, "What we're proposing is the one and only system that really works best now. There might be something else that comes along in the future, but for now this is what makes sense."

So once they select a remedy, they have to do a legal document which is called a record of decision. Before you get to that point -- I forgot the most important part. The yellow box,

where we are now, they have to go out to the public and say, "This is what we are proposing. What do you think?" So you can comment both on, you know, their selection of a remedy, but you can also make whatever comments you want on, you know, how they random process, how well they've involved the public, if you think they've been hiding things from you or whatever, which they haven't, but anything you might think, you can make comments on now. It doesn't just have to be on their remedy.

They then have to respond to your comments, they have to check with the regulators, make sure that the state of California and EPA is happy with how they've responded to the public. And at that point, if we're all happy with each other, they do the record of decision, and then they go on for the remedy implementation.

And eventually, if the site gets completely cleaned up, there's no longer a Superfund site, you get delisted from the national priorities list. But even if that happens, there's still always going to be long-term monitoring and review of what the situation is here at JPL.

And, you know, this is just kind of what we've already said. This is a chance for you to ask us questions, and also make comments on what you think about both the remedy and the process, you know, everything that's going on right now. You can always call Peter. Peter's name and number is in the documentation you got. I don't think my phone number is there but -- it is. Good. You can also feel free to call me. And I'll even say feel free to call the state of California guys, if you feel like you're not getting responses from NASA.

MR. ZUROMSKI: Thank you, Mark.

Hi. My name is Richard Zuromski. I'm with the Naval Facilities Engineering Command and, as Lee described earlier, I'm here to assist NASA in their cleanup efforts here at JPL.

In 19- -- from 1994 through 1998 JPL conducted what's called a remedial investigation, as Mark described earlier. During the remedial investigation, over nine different sampling events, JPL took 45 soil vapor wells, 35 soil borings and three test pits throughout the site to investigate where the chemicals may be found in what we're calling Operable Unit 2. Further, over 37 -- or 37 of those points were turned into permanent monitoring -- soil vapor monitoring points that we now monitor on a regular basis, to see how the

contaminants are moving, or not moving in this case, within the subsurface.

Now, during the remedial investigation, samples identified the extent to which the chemicals were in the soil, and the results showed that there were elevated levels of four different volatile organic compounds. They were carbon tetrachloride, trichloroethene, Freon 113 and 1,1-dichloroethene.

Now, these were -- these chemicals were used back, as Peter described earlier, in the '30s, '40s and '50s to clean out the inside of rocket motors that they were testing back in those days, which they don't use here any more, and that's where the chemicals came from that are now in OU-2. OU-2 risk assessment, the human health risk assessment, determined that there were no risks above regulatory thresholds from exposure to soils or soil vapor.

Now, the primary reason that this risk was so low was the fact that, as Peter described earlier, these chemicals are now more than 50 feet below the ground surface. So exposure to humans is very much unlikely. However, there is a risk that these chemicals will continue to migrate through the

soils and eventually reach the groundwater. And that's the purpose of the remedy that we're talking about here today, is to make sure that those chemicals do not enter the groundwater and pose a further problem in groundwater.

Now, we are currently studying how to remove these chemicals from groundwater. And that's going to be the subject of a meeting very similar to this, probably within a year from now. However, the groundwater and the risks from chemicals in the groundwater, there's no risk because the water purveyors, or those people who deliver the water to the public, have to meet very, very strict regulatory requirements. So today's meeting is focused on removing this source of contaminants, what we call source reduction, from the soils before they reach the groundwater. And that's the purpose of our meeting today.

Now, this graphic shows the extent to which any level of a volatile organic compound was detected here at the site during the remedial investigation. Now, the hottest or most -- the highest levels of these chemicals were found in the north central part of the site, right up here, where most of the laboratory activities took place. And

that's where we focused a lot of our efforts to date doing some pilot studies, which I'll talk about in just a moment.

Now, based on the results of the remedial investigation and our ongoing monitoring program of the soil vapor, we have found that the soil vapor and the chemicals in the soil vapor have not migrated off the JPL site boundary but it does encompass roughly 45 acres on the site.

So based on the analysis, and the remedial investigation, and also the continuing monitoring we do here at the site, the remedial objective for Operable Unit 2 is to remove the chemicals or the VOCs from the soils before they migrate to the groundwater.

To meet this objective, kind of as Mark had talked about earlier, JPL evaluated several alternatives to remove the chemicals. And of those alternatives, two were selected for a very detailed evaluation. If you look in your proposed plan, I think it's on the third or fourth page, there's a list of nine criteria that we have to go through when evaluating each technology in detail.

The first is called no further action. As Mark talked about earlier, this is a baseline that all other technologies are compared to. Now, at this site no further action would entail continuing our regular soil vapor monitoring program, to see how the contaminants are behaving in the subsurface.

The second, and the proposed alternative for OU-2, is soil vapor extraction with granular activated carbon treatment and, also, the continuation of our regular monitoring program.

To help evaluate these two alternatives, JPL conducted a pilot test of the soil vapor extraction technology, and this started back in 1998. In over 14 months of operation of this pilot test, we removed roughly 200 pounds of VOCs, these chemicals, out of roughly up to a maximum of 5,000 pounds that are throughout the site. But within this area, we removed 200 pounds of chemicals from the subsurface.

Now, this was so successful, this system is currently still operating here at the site and the pilot study does go on and will continue throughout the proposed plan stage, all the way through the record of decision stage, until we decide the final full scale size of the technology that we'll put here at the site.

This is a conceptual diagram of how soil extraction works. First, you have here, as Peter described earlier, the seepage pits, which are no longer existing here at the site. But this is where the chemicals came from, and then the VOCs, chemicals, became deposited here in the soil.

Now, soil vapor extraction's fairly simple. What we do is, we apply a very strong vacuum, just like your vacuum cleaner, to suck these VOCs, these chemicals, right out of the soils and the soil vapor into this vapor extraction well, right here. Now, these vapors are -- since we're talking about volatile organic compounds, the compounds become, in a vapor phase, when we pull a vacuum on the soils and soil vapor. So what you're extracting here is air and chemicals in vapor, which comes above the surface through this pump, into a vapor treatment system. And the vapor treatment system consists of granular activated carbon. What it does, is it captures the chemicals and holds them within the vapor treatment system, and then clean air is released from the system.

What happens every three to six months, depending on how much chemical we're removing from the system, we have to take those

carbon filters that are inside this vapor treatment system and take them to either a recycling facility or dispose of them in some recon- -- some type of legal, regulatory manner. And then we take a new carbon treatment system, and replace it, and continue the vapor extraction phase. That's generally how the soil vapor extraction works.

So based on our analysis, alternative one does not meet our remedial objective of keeping the chemicals from migrating to the groundwater. Therefore, we're proposing soil vapor extraction as our proposed remedy. There are several reasons why we're choosing soil vapor extraction for our proposed remedy.

First, it permanently removes the chemicals from the soil and the soil vapor.

Secondly, it protects the groundwater from further migration of the VOCs.

Third, it's fairly simple to operate and fairly inexpensive to implement.

Fourth, the treatment period is relatively short, probably from one to five years depending on how effective the system is here at the site. But based on our pilot site scale results, it should be very exact and the cleanup should not take

very long.

And, finally, because this soil vapor extraction technology has all those qualities, being very effective in the types of soils here at JPL and being very effective in removing this type of chemical from the soil, EPA says that this is what is called a presumptive remedy. Or basically, this is the best technology that you can use at hundreds of other sites, including here at JPL, throughout the country. And so we call it what is -- what's deemed to be a presumptive remedy.

So based on our pilot study and based on our ongoing analysis of the site, NASA proposes soil vapor extraction as the proposed remedy for OU-2.

MR. SAUNDERS: Thank you, Richard.

We are now available for comments and questions from you, the public.

As a quick reminder, to ensure that all participants providing comments or questions receive equal treatment, please limit your comments or questions to two minutes. We also ask you to please state your first and last name, and spell your last name for the court reporters. Thank you.

Do we have any questions or comments

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from the public? Please feel free to come up to the mike and, again, state your first and last name and spell the last name for the reporters -- court reporters.

MR. ROBLES: Somebody ask a question, please.

MR. SAUNDERS: Well, we have some comments from the public.

Thank you, sir.

MR. ZUROMSKI: Thank you.

MR. STORK: My name is Edward Stork, and my last name is spelled S-t-o-r-k, and I actually am the president of the Rose Bowl Riders, which is right next door. And so I was interested to hear that the chemicals are apparently only within the boundaries of JPL, correct?

Can you tell me where the soil vapor extraction wells will actually be located?

MR. ZUROMSKI: We -- I can tell you that at this point in time the one location that we are currently operating the soil vapor extraction is right where I was pointing, at the highest levels of the chemicals that we found on the site.

The other wells -- what we're doing right now is we're doing continuing monitoring of

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the soil vapor levels at the site. And that, actually -- I think Mark described the remedial design phase that occurs after we sign our record of decision, where we actually look -- where we actually look, at that point in time, where the highest levels of the chemicals are and then we place the well.

So, no, we don't know exactly where they would be right now, but we would focus on where the highest levels of the chemicals were.

MR. RIPPERDA: But the level of contamination as you move south -- you're here from the riding stables, right?

MR. STORK: Right. Just below here, yeah.

MR. RIPPERDA: As he said, the highest level of contaminants -- can you put --

MR. ZUROMSKI: Sure.

MR. RIPPERDA: You might want to put the example up.

The highest level of contaminants are up in the northern part.

MR. STORK: Right.

MR. RIPPERDA: And as you move south, it's negligible to undetectable.

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MR. ZUROMSKI: Right.

MR. STORK: Okay.

MR. ZUROMSKI: Right up here's where -- right about there, where my light's shining?

MR. STORK: Uh-huh.

MR. ZUROMSKI: Is where the current vapor extraction pilot study's operating. And that's where the highest levels of the chemicals were found on the site.

MR. STORK: And just out of curiosity, how much area does one of these vapor extraction wells take up, when you install it?

MR. ZUROMSKI: The actual well itself is usually probably from four to six inches, just for the well itself. However, the radius of influence from the vacuum at the site can be anywhere from four to eight -- seven or eight hundred feet from the center of the well.

MR. STORK: Thank you.

(Inaudible.)

MR. ROBLES: The site -- the size of the site, they also want to know how big is that. It's about 45?

MR. ZUROMSKI: 45 acres.

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MR. ROBLES: 45 acres. That yellow spot.

MS. COMPTON: You said none of the wells --

MR. ROBLES: Yes. None of the wells that we're talking about the soil vapor will be off-site, it's all on-site because that's where all the soils are at.

But understand also, everybody, that we revisit this periodically. Every five years we go back and revisit, so that we make sure that we're doing the right thing with the regulators.

Any other questions?

(Inaudible.)

Oh, because of the comments on Saturday -- I thank the lady -- we are planning to have a third meeting. And we want to have it in Altadena. And what we want to do is probably -- we're trying to set it up, I haven't talked to anybody over there. We'll probably host it in the middle of June, so that we can make sure that the whole community has a chance. I didn't know this, and that was one of the things why we have public meetings, is that the folks in Altadena can't make it over here at night because there is no bus

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service. So we want to know if there's any concerns out there.

So if you get another proposed plan in the mail, please don't get angry at us. We're just announcing that we're going to have a third meeting in Altadena so that we can make sure that we have the public comments in there. We want to solicit comments. We want to make sure that the public is comfortable with this. We might have better suggestions and that's what we want to shoot for.

So we want to thank the lady on Saturday, that was a good comment that we had. And we have talked to some of the purveyors, and they're willing to put it in their billings. We're going to work on that, as well.

MR. SAUNDERS: All right. Quick feedback from Saturday's meeting.

What other questions do we have? Comments. Feel free to come on up to the mike and express your opinions, your comments, your questions at this time.

MR. CLAIRDAY: Good evening. John Clairday with the -- and the last name is spelled C-l-a-i-r-d-a-y. I'm a board member with the Lincoln Avenue Water Company, which is a neighbor,

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right next door. We appreciate the opportunity to come over here and -- for this meeting.

Just a coup- -- one statement and then one question, as well. One -- and I don't think this is inconsistent with what Mr. Robles said, but we already do have a groundwater problem, and I think that's been recognized, but I just wanted to emphasize that, since it's an area that we're interested in.

And then a second one. I'm wondering about the effectiveness of this extraction program. Is it 100 percent effective? How do you know how well you're doing, and is the testing continue throughout that term?

And then, also, if it's not 100 percent effective, does that mean that a certain percentage will ultimately reach groundwater and contaminate it?

MR. ZUROMSKI: I'll answer your question.

First of all, every technology that we attempt, we choose because of -- because it is the most effective. 100 percent effective, I don't think we could guarantee, but it is the most effective technology for the types of chemicals at

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the site and for the types of soils that we have at the site.

Now, what we do to ensure that that is the most effective technology for the site is, No. 1, we conduct a regular monitoring program of the soil vapor around the site, to see and actually watch, we've actually seen -- some of the data is in the back of the room. You can watch the chemicals that have been removed slowly disappear from the soil, and we do that on a very regular basis. And during our pilot study, we actually did it monthly to see what the effect of the system is on the chemicals in the soil.

Now, what we do for the long-term is once we've signed our record of decision and once we install the system throughout the site, we do -- again, we have a regular monitoring program to see how effective it is, and then at least every -- just -- every five years we do what is called a five-year review, where the regulatory agencies, NASA, sits down, looks at the results, how well the technology is looking, looks at new, possible innovative technologies if the technology we've chosen was not as effective as we thought it would be, and basically says, "Are we still doing the best

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thing that we can do to remove the chemicals from the environment?" And that's generally how we monitor how effective the technology is over the long-term.

Now, if you look the back of the room, we have an estimate, I think -- I can't quite read it from here -- but it looks like it's about three -- little over $3 million. That's a present value cost of what it's going to take to operate the system, from our estimate, one to five years and then monitor it for 25 years after that. So we do continuously monitor this throughout the entire period, to make sure that what we've done was the best thing for the site.

As far as a level that we remove the chemicals to, that level is determined during the remedial or -- excuse me -- the record of decision, where we -- as Mark said, we all sit down and agree to a level that we will clean the site to. And that's based on all the regulatory requirements that we're required to make.

MR. RIPPERDA: And on an ongoing -- you know, the groundwater, you know, they're also responsible for. So over time, you know, whatever the record of decision for the groundwater remedy has, that will include monitoring and clean up of the aquifer. So they're removing the source to protect it from going into the aquifer in the future.

But for the contaminants that have already gotten into the groundwater NASA will, of course, still be responsible for that in the future.

MR. SAUNDERS: Thank you.

Any other questions, comments? Please feel free to take this opportunity.

Thank you.

MS. COMPTON: My name is Cynthia Compton, C-o-m-p-t-o-n. I'll try to be easier on you. I gave you lot of comments Saturday and I appreciate your response to my comments.

My first comment is that two minutes is not enough time for my questions and my comments.

MR. ZUROMSKI: Can we give her a little extension?

MR. SAUNDERS: Well, again, she can -- we can give her more time after the other folks have responded --

MS. COMPTON: There you go.

MR. SAUNDERS: -- she can come back

for three minutes.

MS. COMPTON: Okay.

Quickly. I know that there was some testing done in Building 107, in the basement, for the air atmosphere, and I wonder if that has turned into one of the 37 permanent test points.

Another question I have is: I'm interested in a record of the public notices that were sent out, in the newspapers and mailings, and I'm still having a little trouble distinguishing the difference between contamination in the particles of soil versus contamination in the vapors. And if maybe you could clarify that a little bit with me.

And the other thing is, that my -- same comments I made Saturday. I think we, the public, deserve a little bit earlier notice -- and thank you for offering another meeting, I'm going to put that in my official comments. But a little earlier notice and something to the JPL employees that says "Public Meeting," maybe, in the subject title.

MR. RIPPERDA: I'm going to say one thing to the last thing.

She showed me a copy of the e-mail that went out, and -- I don't know how many JPL

employees are here, but the actual e-mail didn't say anything about the meeting, it just said the proposed plan is available at a web site. And she had a great comment that the actual e-mail needs to announce when and where the meetings are. So we'll make sure that NASA -- any e-mail that goes out in the next week or two for the next meeting has right in the text of the e-mail that this is a public meeting, when and where it will meet.

And he wants me to talk about soil particles, also. (Laughter.)

MS. COMPTON: He's already responded.

MR. RIPPERDA: Yeah.

So her question pertains to the fact that in the slides it almost always said "soil vapor," it didn't say "VOCs in the soil," it always said "soil vapor," and that's because the actual measurements we take are of the soil vapor.

When the contaminants are 50 feet, 100 feet below the surface, you actually have to drill a bore hole to get down to it. And the act of drilling that bore hole, the heat and the air that you have to inject, bring the cuttings, the dirt back up out of the hole, basically blow away all the VOCs that you're trying to sample for. So you can't

take a soil sample very well from 100 feet deep and analyze that soil for how much contamination it has in it.

So, instead, what you do is you drill your bore hole and then you let it sit for a few weeks, reach equilibrium, and then you suck some air out. And because the VOCs are attached to the soil particles and all the soil around the bore hole, they evaporate naturally and they'll fill the bore hole. And as you suck the air out, you see "Oh, we've got VOCs in our air that we're sucking out," so, therefore, we know that there's VOCs in the soil of this location. You can do kind of rough correlations between the amount that's in the soil vapor you're measuring to what's actually in the soil.

So it's just -- it's the physics of not being able to measure the actual particles of soil, we have to do a correlation between the soil vapor and the soil. So we're always going to talk about soil vapor, even though what we're really concerned about is what's attached to the soil. Because what's attached to the soil is what gets dissolved in rain water as it infiltrates down. That's what ultimately brings it to the drinking

water aquifer.
MS. COMPTON: But when you're sucking it and cleaning --
MR. RIPPERDA: Right. So when we're sucking, we're sucking the vapor out. But as we suck the vapor out, the particles of the chemicals that are attached to the soil are always evaporating. As we suck more air, more particles evaporate off the soil and, relatively quickly, by keeping on sucking, you have sucked most of the particles of contamination out.
MR. ROBLES: I mean, you asked about the building. I'm not familiar with that. I know that samples have been taken.
MR. RIPPERDA: You have to talk louder in your answer, for court reporter.
MR. ROBLES: Oh. You were saying about which building again?
MS. COMPTON: 107, I think.
MR. ROBLES: 107. It must be in our plan. I don't remember it exactly. I can get back to you with that information.
MR. ZUROMSKI: We'll have to respond to that.
MR. ROBLES: Yeah, we'll have to

respond to that.
MS. COMPTON: I'd appreciate it.
MR. ROBLES: I don't -- it's not familiar to me within the document, so we'll have to get back with you.
MR. SAUNDERS: Thank you.
What other questions, comments do we have? I'm sure there's plenty of other folks out there that have some feedback for us. Please feel free to come up to the mike and provide your comments, questions.
If there's no other comments or questions, ma'am, if you'd like to come back up and get your next three minutes in, you're welcome to come back up at this time.
MS. COMPTON: I'm all set.
MR. SAUNDERS: Okay.
Well, if there's no other questions or comments, we're going to wrap this up in a moment. I want to thank you for attending, encourage you to review and comment on the proposed plan, and there's copies on the back table of the proposed plan.
The final decision regarding cleanup will be made after public comments have been received and considered. The public comment period

started May 7 and runs through June 11.
Keep in mind, the comments and questions asked tonight, as well as responses, not only the ones given here but, furthermore, in-depth responses, answers to your comments and questions will be included in a responsiveness summary which will be included with the ROD into the annual record.
Yes.
MR. ZUROMSKI: The time period has been extended.
MR. SAUNDERS: Okay. You're going to extend the comment period. All right.
MR. ROBLES: We're going to extend the comment period past the meeting coming up so, therefore, it's fair for everybody.
MR. SAUNDERS: Okay. So instead of waiting for the public to request an extension, we've already extended the comment period at this time.
Do we have a date as of yet? Or that will be --
MR. ROBLES: It will be in the --
MR. SAUNDERS: It will be in the information sent out to the public, as to how long

the comment period has been extended.
And if you could put that slide back up?
As has already been mentioned, if there is any further comments, questions, the last slide that has Peter's address, feel free to send your comments, your questions, mail them, e-mail them to Richard at this address. It's also included in the proposed plan fact sheet. And we look forward to any further feedback that you have may have at this time.
And before we close, I will give you one last chance. If there's any other comments or questions.
If not, thank you for coming and have a good evening.

CERTIFICATE

I, LESLIE A. MAC NEIL, RPR, CSR No. 7187, in and for the State of California, do hereby certify:

That the foregoing ___-page proceedings were taken down by me in shorthand at the time and place stated herein, and represent a true and correct transcript of the proceedings.

I further certify that I am not interested in the event of the action.

WITNESS my hand this _____ day of __________, 2001.

____
Certified shorthand
reporter in and for the
State of California

PUBLIC MEETING AND PUBLIC COMMENT PERIOD
COMMENTS AND QUESTIONS GIVEN TO COURT REPORTER
MONDAY, MAY 14, 2001
8:45 P.M.

NASA JET PROPULSION LABORATORY
4800 OAK GROVE DRIVE
PASADENA, CALIFORNIA

PASADENA, CALIFORNIA
MONDAY, MAY 14, 2001; 8:45 P.M.

BY TERRI FORMICO:

Is there any intent to do an anonymous survey of LaCanada residents and employees at JPL of incidences of tumors, cancers, unusual cancers, deaths due to cancer over the last 20 years? That's my question.

Also, employees of La Canada, as well. People who have worked here at least 10 years or so.

The survey should be offered to all members of the community, all employees of the community of both JPL and La Canada, not a random or public event to gather data.

CERTIFICATE

I, LESLIE A. MAC NEIL, RPR, CSR No. 7187, in and for the State of California, do hereby certify:

That the foregoing ___-page proceedings were taken down by me in shorthand at the time and place stated herein, and represent a true and correct transcript of the proceedings.

I further certify that I am not interested in the event of the action.

WITNESS my hand this _____ day of __________, 2001.

____
Certified shorthand
reporter in and for the
State of California

PUBLIC MEETING AND PUBLIC COMMENT PERIOD
ELIOT MIDDLE SCHOOL
ALTADENA, CALIFORNIA

WEDNESDAY, JUNE 20, 2001
6:00 P.M. TO 9:00 P.M.

Reported by:
Vickie Blair
C.S.R. No. 8940, RPR-CRR

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ALTADENA, CALIFORNIA; WEDNESDAY, JUNE 20, 2001
6:00 P.M.
---000---

MR. SAUNDERS: Good evening. Can you hear me?

Welcome to Eliot Middle School. Thank you for taking the time to attend our meeting this evening. It's a rather hot evening, as you can tell. I am going be a little informal and go without my sports coat this evening, and I invite all of you to relax. In fact, while I know you all have comfortable seats back there right now, in order to get a little more intimate atmosphere, if you don't mind all moving up a little bit and we'll have a little bit better contact and dialogue. If everybody just moves up a little closer, I really would appreciate that. Plenty of seats to choose from.

My name is Lee Saunders. I'm an Environmental Public Affairs Officer with the U.S. Navy and a facilitator for tonight's meeting about the proposed plan to select a remedy to clean up soils at the National Aeronautic Space Administration, Jet Propulsion Laboratory, located nearby here in Pasadena.

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Prior to this meeting, you had the opportunity to speak with NASA, federal, local lead and regulatory agency representatives on a one-to-one basis about the proposed cleanup actions.

During this portion of the meeting, you, the community, can provide questions and comments to these representatives and their agencies on the proposed plan. These comments and questions will be included in a meeting transcript and become part of the final decision made for soil cleanup at JPL. Representing the agencies responsible for the cleanup and talking to you about the proposed plan and its remedial alternatives are agency representatives who will each introduce themselves starting down here.

MR. YOUNG: David Young with the Los Angeles Regional Water Quality Control Board.

MR. RIPPERDA: I'm Mark Ripperda from the U.S. Environmental Protection Agency.

MR. ROBLES: Peter Robles from NASA.

MR. ZUROMSKI: Hi. I'm Richard Zuromski with the Naval Facilities Engineering Command.

MR. SAUNDERS: Can everybody hear all of them? No problems? Okay, good.

Ground rules for tonight's meeting are

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as follows: This evening's format will consist of presentations by our representatives about the proposed plan and remedial alternatives, followed by a formal comment session where you, the community, can provide us with the comments and questions.

I'm going to ask you to please hold your questions until the presentation has been completed. Once we've heard from all the presenters, we will open the floor to questions and comments. You may want to use the comment sheets that you picked up in the back while you hear the presentation to write down your questions so they stay fresh in your mind.

To ensure that everyone that wishes to make a comment or ask a question has a fair and equal opportunity to do so, we ask that you limit your comments and questions to five minutes. At the end of that time, please take your seat. If you have not finished your remarks, you may continue for another five-minute period after we've heard from all the other speakers.

We have a court reporter over here to my left, your right, this evening; so we ask you to please state your first and last name and please spell your last name before you begin your comments

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for the record.

If you do not wish to provide verbal comments or questions, you may also submit your comments and questions in writing. These comment sheets that I mentioned are available on the tables in the back for those of you in the audience that would prefer to submit them by this alternate method.

For those of you wondering why the U.S. Navy is involved with the environmental cleanup of the NASA facility, the explanation is fairly simple. In 1999, NASA and the Naval Facilities Engineering Command, more commonly known by the acronym NAFAC, reached a memorandum of agreement establishing the roles and responsibilities that state NASA may procure environmental engineering and consulting service from NAFAC and its subordinate commands.

In late 1999, NAFAC became heavily involved in providing environmental services to NASA JPL. Peter Robles, remedial project manager for NASA, is our first presenter.

Peter.

MR. ROBLES: Good afternoon. I'm Peter Robles from NASA, and I wanted to just go over the site description. Here is a list of the participants with the exception of one person, Richard Gebert with the State of California Department of Toxic Substances Control. Everyone else is here.

We are going to do a summary presentation, and the first thing we want to do is a site description, so we will go to that.

The site called JPL has been active since 1939. And it was basically under the auspices of the Corps of Engineers with the Army, and Cal Tech was the organization; JPL was operating the site.

In the '40s and '50s, the way that most disposal was done on-site was through seepage pits, and this was the accepted practice at the time. When NASA took over in the late '50s, early '60s, NASA replaced the seepage pits with sewage systems, and took out the seepage pits, which we believe are the main causes of the migration of chemicals in soils.

In '92, the site was put on the SuperFund list, and at that time it started with the SuperFund process, which will be explained a little later.

Currently, the site meets all of the federal, state, and local requirements. And I

reiterate that at the time in the past those methods were acceptable. We know better now that that was not the best way to do that. But today, we take care of our waste. It's usually used up in the process, basically destroyed in the process, and very little gets disposed of, so we have regulatory controls on how we handle our chemicals on the facility.

Now, the site itself, tonight what we want to talk about is Operable Unit Number 2, which consists of what we call the vadose zone, which is from surface level down to about 200 feet just above the water table. Where our main concern is are the 50 feet to 200 feet under the ground where we have found chemicals from the past are still there in the soils. This creates a potential source of future migration of chemicals into groundwater, and so tonight we want to focus on how to alleviate the vadose zone or the soil located in that area.

NASA intends to address in the future groundwater, hopefully in another year, on what we want to do with the chemicals that are in the groundwater. But for tonight we want to work on OU-2, and get your comments or a recommendation of what way to deal with this site for cleanup.

And now what we wanted to do is go

through the SuperFund process, and I will turn it over to EPA, mark Ripperda.

MR. RIPPERDA: Thanks, Peter, and thanks everybody for coming out tonight.

Peter mentioned that this is a SuperFund site, and that leads to the question: What is SuperFund and what does it mean to be a SuperFund site? A little quick history. Back in the 1980s, congress passed a law that authorized a tax on the chemical industry. That money all remains in a trust fund which is called SuperFund. It's several billion dollars, and that money can be used by EPA to clean up toxic sites, and Congress also gave the EPA authority to oversee existing either government agencies or private companies that have contamination.

But EPA will only get involved if the site goes through a ranking process and it scored badly enough that it's listed on the national priorities list, which is just the national list for all the sites that are SuperFund sites.

So once the site goes through that process and it becomes a SuperFund site, if it's an existing site like JPL, they have to go out, take soil samples, groundwater samples, evaluate how bad

the problem is, what chemicals are there, how the chemicals got there. We're supposed to interview old employees and neighbors around the site. And from that they get a conceptual model, a picture of where the chemicals are, where they came from, where they're going to. And that's called the remedial investigation and a feasibility study portion. That's what JPL just recently completed. So they know where the chemicals are; in this case we're talking about soils.

And the feasibility study, they study how best to clean it up, and that's called the adjustment period. And now they're in the proposed plan and public comment period where they're going to say, "This is what we think the problem is, this is what we're going to do about it, and what do you think?"

So from there, they go to the Record of Decision, to the actual legal document, after public comments have been received or responded to. Then the regulators, such as the State of California Regional Water Quality Control Board, the State of California Department of Toxic Substances Control, and EPA, these are the three regulatory agencies. If we all buy off on the proposed plan, they do the

Record of Decision, then go on to the remedy implementation.

We won't even talk about the agency standards. That's after the site is cleaned up, and that's years from now. But even if the site does get completely cleaned and delisted from the SuperFund list, there still has to be long-term monitoring and review. So in a case like this, you can't call it perpetuity, but they would be required to monitor the water for almost forever.

So in this process, the public -- we like to see the public involved as much as possible. So in things like this we're going to try to do a better job in the future of getting information out more regularly, making sure that documents are all in the local libraries and depositories so you can actually look for yourself to see what JPL, what NASA is doing. But tonight we would just love if you have any questions or comments, and either do it at the microphone or write something down, write something afterwards, if you want, but let us know what you think.

MR. ZUROMSKI: Hi. My name is Richard Zuromski. I'm with the Naval Facilities Engineering Command, and I'm going to talk to you tonight about

site assessment and investigation activities that were done at JPL.

And before I start, I was just reminded to remind you here tonight that the public comment period for JPL has been extended through July 11th. So I just wanted everybody to know that your comments, if you don't get them in tonight or you don't want to do them in front of everyone tonight, please get your comments in to us by mail or by E-mail by July 11th.

First I want to talk about the remedial investigation. From 1994 through 1998, we conducted a remedial investigation at JPL. During that time, in over nine different sampling events, we took samples at 45 soil vapor locations, 35 soil bores, and three test pits. Now, 37 of those soil vapor monitoring locations are now part of a regular monitoring program that we conduct at the JPL site.

The samples that we took from 1994 through 1998 identified the extent of the chemicals in the soils and the soil vapor under JPL. The results showed that there were elevated levels of four volatile organic compounds beneath and in the soils at JPL. Those four compounds were carbon tetrachloride, trichlorethene, 1,1-cichloroethene,

and Freon 113. Some of these compounds, especially carbon tetrachloride, were used to clean, as Peter mentioned earlier, the inside of rocket motors back in the '30s, '40s, and '50s, a lot of the work that they used to do here at JPL. However, that work does not happen here at JPL anymore.

Part of the risk assessment was a human health risk assessment that showed that there were no risks above regulatory limits associated with exposure to soils or soil vapor at the JPL site. The primary reason for this was that the chemicals that we're talking about are more than 50 feet below the ground surface, so exposure to humans is very much unlikely.

However, as Peter mentioned earlier, there is a risk that these chemicals will continue to migrate through the soils to the groundwater table, and so that's what we're concentrating our efforts on here tonight is removing these chemicals from the soils before they reach the groundwater table. The technical term for that is source removal, as again protecting the groundwater from the chemicals that are in the soil.

Now, we are currently studying how to remove the VOCs that have reached the groundwater

table; but that's going to be the subject, as Peter mentioned earlier, of a future meeting probably, in early 2002. However, there is no risk from VOCs in the groundwater because the regulatory agencies mandate -- your water carriers or those who deliver your drinking water to you have to meet very, very strict regulatory requirements. But, again, tonight's meeting is focused on source reduction, removing the chemicals from the soil.

Now, this graphic shows the extent to which VOCs were detected in soil vapor at the JPL site. Now, the extent of the VOCs in the soil there are the extent to which any detection of VOCs were found at the site from the most minuscule all the way up to the highest levels, which are concentrated in the north central part of the site. But based on the results of the remedial investigation and our ongoing soil vapor monitoring program, we found that the VOC plume has not migrated off the site, but does encompass roughly 45 acres on JPL.

So based on the analysis that we did in the remedial investigation, the remedial objective for Operable Unit 2 vadose zone soils is to prevent the VOCs from migrating to the groundwater or, again, what we're calling source removal.

To meet this objective, we evaluated several alternatives, and this was done, in what Mark Ripperda talked about earlier, a feasibility study.

Of the alternatives, two were selected for further detailed evaluation where we go through nine different criteria and evaluate each of the technologies in that nine criteria, and those were the ones that were in the proposed plan mailed to the public and is also available on the table in the back.

The first of these is called "No Further Action." This is a default alternative that is mandated by Congress, and it's the alternative that all other alternatives are compared against. It would really only consist of continuing our ongoing soil vapor monitoring program at the JPL site, and any incidental natural degradation of the chemicals in the soil.

The second, soil vapor extraction with granular activated carbon treatment, would involve installing up to five soil vapor extraction wells and systems to remove the chemicals from the soil vapor before they reach the groundwater.

So to help us evaluate the alternatives, we conducted a pilot test of the soil

vapor extraction technology. During the pilot test in over 14 months of operation we removed over 200 pounds of chemicals from the soil. And the operation of the extraction system continues to date. And since it has been so successful, and we had a lot of good data and good results from that, we're going to discuss that in a little bit more detail here in the next slide.

This is a conceptual diagram of how soil vapor extraction works. First, as you can see, there are VOCs which are the chemicals that came from the seepage pits that are in the soil and the soil vapor. Now, these VOCs from the past disposal practices are then drawn by a vacuum through the well -- over to the right -- into the well and are basically just like a vacuum; they're sucked out of the soil and the soil vapor into that well and then pulled aboveground by the pump into the vapor treatment system.

The VOCs are then sent through the VOC treatment system, which is comprised of granular activated carbon. The activated carbon basically absorbs -- what we would technically calls adsorbs -- the chemicals in the carbon and then holds them inside the vapor treatment system and clean air is

released from the system. The chemicals that remain in the carbon are then taken off-site and recycled, and the new carbon is brought into the system as needed.

So based on our analysis, alternative one, no further action, wasn't chosen because it did not adequately prevent migration of the VOCs to groundwater; therefore, the proposed alternative method is soil vapor extraction.

Soil vapor extraction would be used to reduce the migration of the VOCs to groundwater. The advantages to using soil vapor extraction are, first, it removes and actually reduces the amount of VOCs in the soil and soil vapor.

Secondly, it works very, very well in the types of soils that we have at JPL, which was shown during our pilot study.

Third, again, it protects the groundwater from further migration of these chemicals.

Fourth, it's very simple to operate and fairly inexpensive, as well.

Fifth, the treatment period is relatively short, probably from one to five years.

Now, since this soil vapor extraction

technology has all these qualities, and is so effective at sites very similar to JPL, it's one of the best and most accepted technologies by the EPA and the state regulatory agencies. Therefore, the EPA gives this technology the term "presumptive remedy," and soil vapor extraction is the presumptive remedy that we're using here for Operable Unit 2.

So based on the soil vapor data and the soil extraction on the site and ongoing monitoring program of the soil vapor at the site, NASA proposes soil vapor extraction as the proposed alternative for Operable Unit 2.

Lee.

MR. SAUNDERS: Thank you. We're now open to comments and questions from you. As a quick reminder to make sure that all participants' questions or comments receive equal treatment, please limit your comments or questions to five minutes. We also ask that you please state your first and last name and spell your last name for the court reporter.

In regards to basic information up here for people to contact afterwards if you do not want to provide any questions or comments for you tonight for you to send the questions or comments to.

Do we have any speakers tonight that would like to ask any questions or provide any comments?

MR. RIPPERDA: The two microphones.

MR. SAUNDERS: And please come up to the microphones so everyone can hear you. We have one up here and one back here. This is a great opportunity for you to provide feedback for us. This is a very important process.

Yes, sir.

MR. CRIPPEN: Hi. I'm Bob Crippen. I'm a JPL employee. I also live a couple blocks from the JPL property in La Canada.

MR. SAUNDERS: Sir, please spell your last name.

MR. CRIPPEN: Certainly. C-r-i-p-p-e-n.

My question relates to the topography at the site. You say that the VOCs are 50 feet deep, but the property across the site is more than 50 feet. How does the depth relate to the property? Do the VOC's come closer to the surface as you go down?

MR. ROBLES: Fifty feet measured from the top of the topography.

MR. CRIPPEN: But you're on a hillside.

MR. ROBLES: I know. And we know that the bedrock is to a thousand feet, but what we're saying is that it's below -- wherever the topography is standing, it is not within the first 50 feet anywhere at JPL. It's usually below that, and gets much more higher as you go closer to that 50 feet. And we measured that and wanted to make sure of that simply because we were concerned about exposure to the public. And that's one of the reasons why we tested that first layer all the way through and we sampled the whole -- I know what you're saying. It's 50 feet from the surface wherever the topography is.

MR. CRIPPEN: Fifty feet or more is what you're saying?

MR. ROBLES: Right, right. In some places, 50 feet. If you're on the private road, topography, 50 feet down at south gate, that's correct. But it's still -- because it falls down. It just doesn't come to the surface anywhere on that.

MR. CRIPPEN: Okay. Another question. Where were the pits and how deep were they? Were the pits more than 50 feet deep?

MR. ROBLES: Some of the pits -- first of all, good question. The location was in the north -- I want to say northeast portion of the old farmland;

that's where most of the seepage pits were. We found the old bricks in the seepage pits in some places. Some of them have been taken out over the years. We went and did some investigation. But those pits went about, I'd say, as far down as 30 feet. They were pits. And the key was the chemicals migrated through the surface of it to the ground, sank down below. But that's where all the seepage pits were, in the northeast portion of the land.

MR. CRIPPEN: Is a seepage pit generally near the --

MR. ROBLES: Yes, yes, generally near the east gate.

MR. CRIPPEN: Another question. Your distribution map looks like the distribution went pretty far to the west of the map.

MR. ROBLES: Oh, mostly south. Mostly south because there were some buildings that still were doing some work. It was not just the seepage pits only. There was other work going on in other buildings closer to where the library was -- where it is now. There was some work done there, as well, and you see less as you go there. And the water table rises and causes this [unintelligible] issue within the soil. And that's where the spring came out

there, so it's not like a point source where you wonder where it came through.

MR. CRIPPEN: Recently the sewer system was put into the eastern part of La Canada, and I'm in that area. I live in that area. It's sort of the easternmost part of La Canada. They were putting in a sewer there. And I was taking to the guys when they put the sewer on my street, and I live up on the hill. They said they were going to have -- I didn't follow up on this, but when they were putting the sewers [unintelligible] area because the water table was only about 10 feet below the surface. That's the part of La Canada that's immediatly adjacent to JPL, and you're saying the water table is 200 feet below the surface.

MR. ROBLES: Right. We tested it.

MR. CRIPPEN: Did you verify it?

MR. ROBLES: That's beyond me.

MR. SAUNDERS: One thing you have to keep in mind tonight, while you can ask questions and write comments, the purpose is really to take those comments and questions and give you a formal response back. So they can give you just some general responses, but we really can't expect him to give you a formal answer tonight. So they will give you those

formal remarks back in the official response.
MR. CRIPPEN: Okay.
MR. RIPPERDA: And, also, there is another hour after this informally.
MR. CRIPPEN: That's fair. These are just questions that came up in your presentation, the numbers, the topography, the depth.
MR. SAUNDERS: And you will definitely get answers back in detail.
MR. CRIPPEN: Thanks.
MR. SAUNDERS: Thank you.
Who else would like to ask some questions tonight or provide some comments to us? Great opportunity, a great time to do this. Please feel free to come up. Thank you.
MS. COMPTON: Hi. I am Cynthia Compton, C-o-m-p-t-o-n. I am also a JPL employee. Most of you know me. I've been at all three meetings. I thank you for increasing your comment and question period to five minutes, although I have lots of questions this time. You've incorporated the answers to my questions in most of your presentation.
Back to the seepage pits. I heard you say that they took out the seepage pits, and I'm not really sure if that is technically correct about all

seepage pits because from what I understand, some of them are under the parking lots, some of them are under buildings, and some of them are literally undiscovered and some of them may even be lost. So I just want to bring that out. Is there a plan to go back and identify as many seepage pits as possible and maybe pulling everything out, pulling them out, like you said?
Another question I have is the -- the plume, also. When you talked about the vadose zone, is that the entire area from the surface to the groundwater? Is that the definition of vadose zone? Okay.
And then I just want to comment again that the feasibility study is not at the Altadena Library. I went there after the first meeting, and it wasn't there. I mentioned this. And I went there again last night. And there are change pages there, but the actual feasibility study is not there. And I really don't want everyone to have to go to Pasadena, having to go out to La Canada, having to go to JPL to chase this down. It needs to be provided now. Some of the answers to some of my questions last meeting were -- it's in the feasibility study, so I need to go over there and find the answers.

Also, you mentioned afterwards when you're delisted from the NPL list, the long-term monitoring and review. I'd like to get some quantification of what does that mean, long-term monitoring? Do they come out and look at it once every five years or once every six months? I'm looking for some quantification there.
And then let's see here.
And also something about the EPA presumptive remedy, I'd like a clearer definition of what does that mean. And I guess that's pretty much most of my questions.
MR. RIPPERDA: I'll answer some of the questions, and then we'll get back to that -- so your last question was about presumptive remedies. It's not really a legal term -- it's more of a working term -- where certain types of contamination are seen at almost all the SuperFund sites around the country; and, you know, over the last 20 years, multiple things have been tried. And when you get down to using the same technology over and over again, we have volatile organic compounds in the soils, one tried and true technology is soil vapor extraction. So another presumptive remedy would be treating, processing plants, and a few other industries have

technologies where we always use the same thing over and over again. And when something has been called a presumptive remedy by EPA, it means that the people who are actually spending money -- they skip over a lot of the studies comparing alternative studies and then just cut to the chase, like they did here.
Your other question about long-term monitoring and the future aftermath after we've cleaned it all up, we're done. We don't just walk away. That's where EPA and the State of California says, "You still have to do long-term monitoring to be absolutely sure you got it all." There's something called the five-year review, so every five years they have to write a comprehensive report to summarize everything. That doesn't mean that they just monitor every five years. So when they actually implement the remedy and the remedy is completed, they then have to negotiate between them and us how much monitoring they're going to do, which groundwater wells are going to be monitored, how often they're going to monitor them. And it usually works out to be something like every six months.
Several water purveyor wells will be monitored, and those are all part of the [unintelligible]. I'm not sure that that's being

negotiated, but it's usually once every six months.
MS. COMPTON: Is that in the public depositories?
MR. RIPPERDA: Yes. All of that information is publicly available.
You asked about the seepage pits, and that's more a question for the NASA guys.
Is there anything else that I can answer? No?
Oh, and the incident with the library, I agree with you. I hate to hear that it's not there because, you know, we're absolutely supposed to make sure that they're out there. And the field checking person -- so if it's not there in the future, we'll get it there.
MR. ROBLES: And I apologize for that. There are people who love to take them home, so we have to constantly be checking, so -- that's not an excuse.
Just to get back to what Mark said about the sampling, one of the things that we had to do is submit to them a sampling plan of how we're going to sample long term. I will tell you, I have yet to see a site delisted, you know. So a site is usually studied, monitored, and usually they start monitoring every quarter, and if they don't find

anything, then expanding it and expanding it to six months. If that's working at the location, those documents are available to the public because that's the key. You say, "Well, I want it still to be every quarter," so those would [unintelligible].
On the seepage pits, the pits that were taken out, you probably were talking about the bricks. What we have found is that some of our what we call civilian structures -- and we compare those and we find red brick. Those are the old seepage pits. The plumbing is gone, everything was taken out, and we find the bricks. There's nothing connected to them. It's just the old site location.
We have done soil borings and soil analysis of all that, so we know generally -- we have pictures -- so we can see generally where the seepage pits were and all of that.
Some of them are under buildings, but wherever we have found them, we have done remediation on them and taken samples to see. And off we go, the chemicals that were in there we don't see. They've gone out [unintelligible]. But periodically we'll come across a seepage pit. So those were kind of in the office to see what the site looks like.
Any other items that we didn't

address? If nothing else, we'll answer you back formally, anyway.
MS. COMPTON: Right.
MR. ROBLES: Okay?
MS. COMPTON: Thank you.
MR. SAUNDERS: We had two people come in recently. Just to let you know, we're in a public comment and question period. This is an opportuinty for you to ask questions and provide comments to us about the proposed plan. And we have some microphones around the room for you to come up to the microphones, state your first and last name, and please spell your last name for the court reporter for the record. And, again, these questions and comments are on the record, and you will get formal responses, written responses back.
Any other questions or comments, please feel free to come up to the mike.
Yes, ma'am.
MS. GONZAL: Good evening. My name is Cynthis Gonzal. I'm a resident of Altadena, California. Two questions.
MR. SAUNDERS: Certainly. Would you please spell your last name.
MS. GONZAL: G-o-n-s-a-l. G- as in good

-o-n-z-a-l.
MR. SAUNDERS: Thank you.
MS. GONZAL: [Unintelligible.]
In terms of long term, will JPL actually be monitoring the site or would it be an outside company or agency doing that?
MR. ROBLES: Could you clarify what you mean by "monitoring."
MS. GONZAL: In terms of the toxicity levels.
MR. SAUNDERS: You're talking about that the agency is not doing it themselves?
MS. GONZAL: Yes.
MR. ROBLES: Yes, there are agencies. In fact, two of them are here. How the SuperFund works is that all the documents that we produce for our contractor has to go over to them for review. So we have U.S. EPA, Department of Toxic Substances, the State of California, and the Los Angeles Regional Water Quality Control Board. And they have contractors, subcontractors, that make a lot of comments on our documents.
We go through draft, draft finals. We discuss issues. "Hey, we need more sampling here. We need more lab analysis. Here we need to drill another well here." They are very active in the

process, and it's not just NASA doing its own thing. We have to coordinate through them. We have quarterly meetings called RPN meetings. We have project management meetings. Those are the meetings where we have working groups that decide on how we're going to do this. They have had them for the last 10 years.

MS. GONZAL: Okay. Second question. In the printed material where you talk about the risks associated with exposures to chemicals, and you indicated that there were no risks by regulatory standards.

MR. ROBLES: Right. In the soils.

MS. GONZAL: In the soils. The risk that usually is associated with that, will you be monitoring that aspect, also, as relates to the human element?

MR. ROBLES: Yes. They're called MCLs, maximum contaminant levels. And every time we take samples, quarterly take samples and telling where those levels are, and it's also to make sure that they're not coming to the surface. And we're always having to revisit this to make sure that the public health is addressed.

MS. GONZAL: What parameters are set for

that?

MR. ROBLES: Those are regulatory parameters set by the State of California and the U.S. EPA.

MS. GONZAL: Okay.

MR. RIPPERDA: Just to clarify that a little bit, most of what we've been talking about [unintelligible] is just in the soils, and that's all on-site at JPL. So in the printed material you have there are no risks from these chemicals. That means there's no risk of exposures to the soils at JPL.

But the other component to the whole site is groundwater underneath the site is migrating off-site. We're not really talking about that tonight, but I may as well say a little bit about it.

So some of these chemicals have gotten into the groundwater, and that's why NASA is proposing the cleanup of the soil with soil vapor extraction because they don't want to put any new chemicals into the groundwater. It's much cheaper to clean up the soil than it is to clean up groundwater. So the more you take out before it hits the groundwater, the quicker you can clean up the groundwater long term.

So the chemicals that are in the groundwater could pose a risk if you actually drank

the groundwater without it being treated. But all of the water purveyors, Lincoln Avenue, La Canada, City of Pasadena, if their water levels have contamination above health-based limits set by the State of California or by U.S. EPA, they install -- I think mostly it's carbon treatment around here. And so they treat the water before it gets sent out to anybody in the public. So even though the chemicals are in the groundwater, it's all being treated and taken care of before it's sent out to the public.

So even though it's in the groundwater, it's all being treated and taken care of before the water gets out to the public. So now that we say there's no risk from these chemicals, it's because the water purveyors are actually treating the water.

MR. SAUNDERS: We really appreciate your comments and questions. Who would like to comment or ask a question next? Ma'am.

MS. HIBNER: My name is Sara Hibner. The last name is H-i-b-n-e-r.

Actually, I'm talking about reaching the groundwater; however, many of us around here understand about groundwater and the rain basin and all of those kinds of complexities as to how our

local water is pumped. I think it would be helpful, and in the future when you are discussing groundwater, if you specify that what you are talking about is the rain basin. If there is such a setup by Lincoln Avenue Water that you mentioned or whatever you mentioned, those people that have to live in the area who are informed will be better able to understand exactly what it is you are saying.

Thank you.

MR. SAUNDERS: Thank you.

Who would like to speak next? Any other comments or questions from the public?

Yes, sir.

MR. O'KENE: My name is John O'Kene, O apostrophe K-e-n-e. I'm a resident of La Canada. I apologize for my lack of sophistication. I was born in West Virginia, and the first thing I ever heard back then is when the canary dies, it's time to get out of the mine.

And what you're not telling us or not explaining, and having read the report at the library, what he's not addressed is: What are the potential problems from a breakdown in the extraction system that permits the escape of any of these vapors into the atmosphere? What is the potential danger?

What is the catastrophe level possible? You have 3,000 school-aged students in the direct prevailing winds from where your cleanup site is.

The best laid plans of mice and men often go awry. Tell me that you're going to have monitoring systems set up around that will let you know that there is more come out than should have. These are the remedial actions. What are the preventative actions? And I think that the parents of the students who send their kids to those schools need to know what the potential dangers are. And that is not put out. That information is not made generally available. I understand that there's no risk while it's in the ground, unless your kid digs down in this dirt. But you're pulling it out of the ground, and you're not telling us what could go wrong, how you're going to prevent that from going wrong, and what remedial action needed to be taken in case it does go wrong. I would simply like to see that, not for myself, but for the general population who live in that area.

Thank you.

MR. SAUNDERS: We appreciate your comments on that. We will respond to that in the responses in the summary in detail.

MR. ZUROMSKI: And let me just say the level of detail as we were talking about earlier today is really for a written response because we don't have all that detail here in front of us today.

But what we can tell you, in general, is that, as we talked about earlier today, the systems are designed such as that when there are types of upsets in the system, such as the vacuum break or a vacuum leak or some other type of leak in the system, the system automatically shuts down. And we also have an operator that is on the site at least daily that is monitoring the system to make sure there are not those types of problems.

But we need to address that. The detail that you're asking for today, that really needs a written comment, and we will look back at the feasibility study and see exactly those types of detail that you're looking for. Thank you, though.

MR. SAUNDERS: Any other comments or questions?

Yes, sir. There's a mike right there.

MR. FIEDLER: My name is Dick Fiedler. My office is in Lincoln Avenue Water's domain. Also I live in [unintelligible]. Just a couple questions.

MR. SAUNDERS: Sir, could you please spell your last name.

MR. FIEDLER: F-i-e-d-l-e-r. Like Fiedler, but no baton. Some people recognize the name.

Is there SuperFund money being expended for this meeting?

MR. RIPPERDA: No. All the cleanup is being paid for by NASA.

MR. FIEDLER: Where is the SuperFund money in this cleanup?

MR. ROBLES: Actually, the answer, Mark, all money is being spent by NASA. Not the SuperFund, the federal SuperFund. It's being paid through NASA. We have to put a line item in Congress and get appropriate funds, and that's what we do. But Congress appropriated funds to come through NASA for cleanup.

MR. FIEDLER: Great. NASA, not JPL or Cal Tech?

MR. ROBLES: Right. NASA is paying 100 percent of the bill right now.

MR. FIEDLER: There were, I think, two proposed systems that were shown on the slides up there. The first one shows to preventing the VOCs from entering the atmosphere as that young man --

(Discussion held off the record.)

MR. FIEDLER: There were two descriptions, alternative A and B up there. I'm just kind of wondering which one are we talking about, the first one that had extraction and removing the VOCs before they go into the atmosphere or another one because I didn't see another one?

MR. ROBLES: The alternative number two. The first alternative was no action. And that includes air circulating. Base soil vapor extraction includes that.

MR. FIEDLER: Does the VOC removal require heat?

MR. ROBLES: No.

MR. FIEDLER: So, therefore, the VOCs that are underground basically live there until the pressure is such that they are volatized?

MR. ROBLES: They are in vapor form. They are particles -- the chemicals are around particles, and you pump air through the soil. They volatize and that comes up the pipe and you put them through a carbon system, like a Britta filter, but larger, and it's captured in there.

MR. FIEDLER: I think the VOCs are in a liquid form until you apply the pressure?

MR. ROBLES: Yes, they are in a liquid form.
MR. FIEDLER: And the Navy is going to be in charge of this operation?
MR. ROBLES: [Unintelligible.]
MR. FIEDLER: And they've been doing it out at Vandenberg?
MR. ROBLES: Yes.
MR. FIEDLER: Who else has been employed to do the work?
MR. ROBLES: Other subcontractors that we've had are Force Wheeler.
MR. FIEDLER: But they're doing some analysis work. Who is doing the actual VOC removal? The Navy?
MR. ROBLES: The Navy.
MR. FIEDLER: Under contract with someone else?
MR. ROBLES: No. Under contract to NASA.
MR. FIEDLER: So it's Navy equipment?
MR. ROBLES: Navy equipment, and they sub it out to other subcontractors. One of them is Geofund here who is actually doing the on-site work.
MR. FIEDLER: The on-site work removal?
MR. ROBLES: Yeah
MR. ZUROMSKI: I'm Richard Zuromski from the

Navy.
How it works is NASA sends money to my office, the Navy office, and my office then contracts out with Navy contractors to do the work. The contractor who is actually doing the field work for the [unintelligible] soil vapor extraction and is also doing -- taking the soil vapor samples is Geofund Incorporated, and we have a couple of representatives from them here today. And if you talk to them, they're out there in the field at least four, five, six days a week operating the system, taking samples, and running the system under contract with the Navy. But we get our money from NASA. And it's all under a big -- what Mr. Saunders said earlier, a memorandum agreement between NASA and the Navy.
MR. FIEDLER: I appreciate that, and I'm glad everybody is getting paid.
Are they going to do the rest of the cleanup, or does that go out to bid to the lowest bidder?
MR. ZUROMSKI: No. What's happening is we have two separate contractors. Geofund is one contractor that is actually doing the fieldwork under an existing Navy contract. So they're doing the

actual fieldwork.
We have another contractor, Patel, Patel Engineering Institute, who is the contractor who set up this meeting here today; and they also do the [unintelligible] plan and the mailings that were sent out. But they're also doing the detailed technical analysis of the way the soil extraction wells that are going to be put on the site are going to go. So we have two contractors out working to do this work. First there's Patel. When they try to decide where those wells are going to go, and then once we've decided where they're going to go, we'll give the rest of the work back to Geofund to install the wells and install the systems. And that's the great scheme of how it all works.
MR. FIEDLER: So Patel, under your auspices, is the consulting engineers?
MR. ZUROMSKI: Yes.
MR. FIEDLER: And Geofund is at the site, is actually going to do the work?
MR. ZUROMSKI: Yes.
MR. FIEDLER: Congratulations.
Now, what is the assumption that this soil remediation removing what's in the soil will have no effect on what has gone into the groundwater

as of now? Increased VOCs into the groundwater could result from this vaporization process? Decreased VOCs, I know that would be the hope, but what do you think really reality means?
MR. ZUROMSKI: The reality is, as Mark Ripperda said earlier today and I said, the reality is that this technology actually removes the chemicals from the soil and pulls them above ground for treatment so that they never reach the groundwater.
And as you can see from the results of our preliminary results, from just our pilot test of the soil vapor extraction at the JPL site, we did actually physically remove 200 pounds of these chemicals from the soils before they ever reached the groundwater. So it will actually remove the chemicals from the soil.
MR. FIEDLER: I understand the theory. I think I can almost guarantee you that we've probably, at Lincoln Avenue, removed over 200 pounds of the VOCs that you're talking about that you extracted by vapor extraction. And I imagine the City of Pasadena has removed more than that in their groundwater treatment.
My question is: If you really don't

know what's going to go down versus what's coming up, even though you know what's coming up, it might be more that goes down, I think NASA should do increased testing at the Pasadena water sites and at Lincoln Avenue sites to find out if this is going to be a factor. Because if we have to start using more activated carbon to remove those VOCs, as far as I'm concerned, it's -- there's going to be hell raised on who's paying for it. You understand? So I just don't think you really know. I don't know. I've tried to study the process at length. I don't think anybody necessarily knows what is going to happen to all those VOCs, but you already know they've gone down there and they've contaminated the groundwater. So now -- I mean, we may think that this soil remediation is a Godsend, you know; it's going to solve all the problems. Don't bet too many martinis on it.

MR. SAUNDERS: And Richard --

MR. ZUROMSKI: We're going to have to --

MR. FIEDLER: I really would like to have a transcript of this meeting -- not in the library, but sent to Lincoln Avenue so we can understand and have it in our books.

Is that permissible?

MR. ZUROMSKI: We can take that request under advisement.

MR. FIEDLER: That's all I have to do.

MR. ZUROMSKI: Thank you.

MR. FIEDLER: I thank you very much.

MR. ZUROMSKI: Thank you.

MR. SAUNDERS: Any other questions or comments.

Yes, ma'am.

MS. SCHRANHAZON: My name is Randi Schrahazon, S-c-h-r-a-h-a-z-o-n. Down where I'm [unintelligible] I have two children at the La Canada High School. And are any of the four chemicals that you mentioned, is it possible in the event, say, of an earthquake when monitoring the leaks would no longer be a leak, it would be a crack, would these four chemicals come together and produce something like when a train has a crash and they have the cloud of smoke and they have to evacuate an area?

I mean, not to be personal. I just got out of jury duty today -- because I taught chemistry, but I would not even begin to use that excuse to solve this problem. But could those chemicals, once turned into a gas, combine and create

a cloud which could mean evacuating not only the high school children, but the children above? And then there's a riding stable, and it's pretty difficult to evacuate a hundred and some horses. Then we have quite a bit of evacuation going on a very narrow and crowded street, on La Canada Boulevard.

Is there some kind of a chemical problem here?

MR. SAUNDERS: Well, ma'am, again, we have your comment and it's something that we should respond to in a written response in more detail, and that's what we want, to wait for the responsive summary. I think that would be more appropriate.

MR. ZUROMSKI: I think that leads right into the level of detail as far as chemicals combining and forming toxic clouds are really beyond what we can answer for you right now. But what we can, with the limited response I can give you right now, is that when and if there is an earthquake and when and if there are some power failures, the system operates all in a vacuum. When it shuts off, there's nothing -- you know, the chemicals stay in the ground. There's no more drawn to the surface. So there really couldn't be probably enough risk that they would escape to the atmosphere because none

would be drawn out anymore. But, again, as far as the formation that you're talking about, please submit those in written comment, and we'll give a detailed written response to your comment.

MS. SCHRAHAZON: I'm just curious -- when a carbon filter is removed, you said it's recycled. How? What's that process?

MR. ZUROMSKI: Sure. I'm really not sure of the cost. Actually, what we do is they're in a big carbon canister, and when the carbon canister becomes full of chemicals, we take it off-site to a recycling facility and basically a brand-new canister is put inside. I'm not sure of the actual costs, though, actually, of one those canisters. Again, if you like, I could give you --

MS. SCHRAHAZON: Again, I'm just saying as they're transporting the carbon filters with those very condensed chemicals, they would have to just about drive by the high school. And good luck if it's during pickup and drop-off. And if there was an accident and it did fall off the truck -- I mean, I know these are all what-ifs, but there's a lot of children there, a lot of panic. Maybe with all that in La Canada they should have have some kind of contingency plan here, knowing a truck with chemicals will be traveling by the school. Maybe do it after school. Maybe do it in the evening.

MR. ZUROMSKI: Again, we will respond to that in writing. But the transportation of hazardous waste and chemicals off-site, we do use a very [unintelligible] to do that. But for details like that, again, submit your questions and we'll respond to that.

MR. SAUNDERS: And just to reiterate a couple of things. What you're providing to us is official comment that's going into the record, and it will be responded to. If you want to write even more details, feel free to submit them, but we have your comments now for the record. And you will get a written response in response to some of them.

And just to clarify one other thing, again, our project managers here have been responding to some of the questions because they are dealing with information that's already out in fact sheets and it's very general information. When we get to hypotheticals and more detailed types of questions and comments, we are required to respond officially in response in a summary, and we can't really give a response here at this particular meeting.

Typically, in this situation, project

managers don't even respond at all to any of the questions. It's very general, but they want to give you some feedback.

Do we have any other questions or comments? Feel free to come on up. We really appreciate.

MR. SHOPTSBERGER: Terry Shoptsberger, S-h-o-p-t-s-b-e-r-g-e-r. I'm a little confused about what the SuperFund really is, if NASA is paying the bill. Also, the second question, [unintelligible] all the way through located in [unintelligible] with the current environmentally unfriendly administration in Washington, how can you begin and how do you guarantee that it's going to continue?

MR. RIPPERDA: So the first part about SuperFund and what is it. My whole description of Congress passing this law that created a tax, all that money is only paid for abandoned sites. So EPA spends that money when the site has been abandoned and nobody else is going to clean it up.

But the sites operating, then Congress gave EPA the authority to make the operating entity, in this case NASA or particularly operating with NASA's money, but we can make them spend their money to clean it up. Peter will talk about the budget.

But just, you know, the environmental climate in Washington [unintelligible], but funding for environmental cleanups has been pretty constant whether it be Democrats or Republicans. That doesn't get messed with that much. And EPA in California still has the authority to take action against NASA. So if Congress were to say, "We're not going to give you money to clean it up," then EPA can take an order against them, which maybe doesn't mean anything, but we have the authority to make them do it. But if Congress just flat out says no, we can't override Congress. But Peter has the information.

MR. ROBLES: Believe it or not, even though this is a friendly [unintelligible] administration they have been sending us, they are not adverse to environmental. They are supporting funding.

The way the funding works at NASA is like it works at other agencies. The actual funding for SuperFund or environmental issues is expensed. It can't be touched. You have to put in actual line item in the budget for that agency. So with NASA going off doing some rocket testing, doing some research, and at the bottom there is this SuperFund budget that you have to put down.

Once Congress funds that, and they

usually fund it at first, that is spent. We are programmed -- we've budgeted three and a half million a year. This year it will be a lot more because they feel that it's important to start the work here. We have been pretty consistent over the years to get something, and we've been cut a little bit and getting more, but we've never been totally axed out of any funding. So we're pretty sure that we'll be funded for that in that sense.

And just to get back to Mark, the SuperFund process is a way for the government to deal with these issues because it puts the onus on us. We can't put a line item in a budget until we get on the SuperFund list. So in one sense, we like the SuperFund because it allows us to immediately put a line item in the budget once we get in the SuperFund process, and that's what helps us.

Do you want to stand up and ask a question?

MS. GONZAL: Sure. What timeline are we talking about in terms of getting approval for the budget?

MR. ROBLES: Could you state your name for the record again.

MS. GONZAL: My name is Cynthia Gonzal.

MR. ROBLES: The budget -- we usually are talking a five-year cycle plan. Every five years. So this year we're planning for this year and the next five years, next year, next five years. So that's usually how the budgets work.

MS. GONZAL: But specifically in terms of when you begin the work -- to do the cleanup process.

MR. ROBLES: We are planning -- once we get approval [unintelligible] to expand what we're doing right now, the pilot study. So we are doing something. But we want to be able to start the whole work as soon as possible.

MS. GONZAL: But you don't know what date that is?

MR. ROBLES: In the next six months, we want to start the construction of the VOC treatment system.

MS. GONZAL: The second part of that: What is the rate of migration or absorption in the soil to the groundwater without this situation?

MR. ROBLES: I wouldn't even hazard a guess. We need to give a formal response to that. We will give you a formal response to that.

MR. SAUNDERS: Who would like to ask questions next? Please feel free to come up to the

mike.

Sir, before we let you come up, I'd like to get any other people first. You will get another chance once we get other speakers, unless there are no other speakers that would like to speak right now.

Yes, ma'am.

MS. SWAIN: My name is Barbara Swain, S-w-a-i-n. I'm not in this field at all, but I have a nephew at UC Berkley who has been involved in the steam extraction process. And I have sent him some information about this and asked him for his comments. And I sent him information that I took from the summary report. And I just wanted to pass along a couple of things. And, actually, I can pass along his whole response, which is --

MR. SAUNDERS: If you'd like to give it to the court reporter, sure.

MS. SWAIN: Okay.

MR. SAUNDERS: She can enter it into the record.

MS. SWAIN: The one comment was he's actively working on a project about removing perchlorate. And apparently this is a little more difficult than we might have thought, and so he wasn't sure that it

should be put on your chemicals of concern list. It's not on it right now because you didn't think it was a problem, but the work that they're doing there indicates that it goes into the fine particle soil and really doesn't come out that easily.

He was also thinking -- suggested that in the 40 years since we quit dumping into the wells, into these seepage tanks, why hasn't all of that already vaporized? And he's guessing that maybe it's tied up with some other product that really also needs to come out, which won't come out on a vaporization. I may not be reading this right, but I think that was the idea. So that perhaps needed to take a little more attention.

And there's a little more here, some of it, but I don't want to repeat it all without reading, and I won't try to do that now. I just want to say I absolutely feel that we need to remove this material from the earth and set an example for the entire country and for private industry. And do it and get it rolling so that it becomes a doable process for any old gas station and anybody who owns property. So I just want to express my own concern that we make this possible and to do it the best way we possibly can. And if we find more stuff than we

thought -- every project that the steam extraction has taken on, at least each of the reports I've read -- Livermore Lab, the Edison site, the Naval Air Station in Alameda, which the Navy people probably know all about -- it seems like there's more stuff than anybody ever expected no matter who was doing the estimate.

So thank you.

MR. RIPPERDA: I have a quick question: Is that a form you can turn in?

MS. SWAIN: Absolutely. I just printed it off the Internet. It was an E-mail. We were just going back and forth. So I will give it on the court reporter.

MR. SAUNDERS: Do we have anybody else that would like to provide any comments or questions? Feel free. This is your opportunity. We like the feedback from you. We really appreciate this. We have a lot of information. Any other comments or questions?

Well, we have comments and questions from the individual that already commented, so I'll go ahead and start with him if there's nobody else at this point in time.

Okay, sir, why don't you come on up.

MR. CRIPPEN: Bob Crippen again. C-r-i-p-p-e-n.

Earlier some of the discussion sounded like this was going to be the first time that something toxic had been removed from JPL. Clearly, it's a large facility. Toxic, hazardous materials are moved in and out of there on a regular basis, just like they are at a gas station. This is nothing new. It must meet current policies, and whatever materials are going past the high school -- there's lots of materials going past the high school on a regular basis. I just want you to keep that in mind.

Question: Is there an estimate of how much material has been dumped at the site? It's probably very difficult because it goes back to the '30s, '40s, and '50s. It probably wasn't monitored.

MR. ZUROMSKI: Actually, I can't tell you an estimate of what was dumped, but I can tell you an estimate of what we believe to be the actual VOCs in soil, soil vapor, which is estimated from two to five thousand pounds of VOCs. That's an estimate of how much is in the soil and soil vapor. I'm not sure how much was actually put into the seepage pits.

MR. CRIPPEN: Of two to five thousand pounds

in the soil, what percent do you think is recoverable?

MR. SAUNDERS: Again, that's something you can save to the response to his question.

MR. CRIPPEN: I guess you would probably have to try and experiment --

MR. ZUROMSKI: We try. Generally, I can't give you a number of how the number is going to be.

MR. CRIPPEN: I understand.

MR. ZUMROWSKI: A hundred percent. Ninety percent. What I can say is that we have regulatory levels that we have to meet. When we do the soil vapor extraction, we have to extract chemicals to those levels. And when we get below those levels, we can shut the system off. So when we meet those levels, that's when the cleanup is done. And those levels are set in a decision which we agreed with the state and the fellow from the EPA to clean up this site.

MR. CRIPPEN: Okay. I think a little earlier we talked about what if something goes wrong. What if gases escape into the air? It raises the question: You recovered 200 pounds in how many days? What is the rate? I mean, if the thing was wide open for a day, how much would escape? A half a

pound? A pound? A pound and a half?

MR. ZUROMSKI: That was a pilot study done over 14 months.

MR. CRIPPEN: So it would be half a pound a day?

MR. ZUROMSKI: [Unintelligible.]

MR. SAUNDERS: We can respond in more detail in the responses.

MR. CRIPPEN: One last question: Where is the -- what I wrote down here is currently operating extractor? I don't know if it's currently operating. Where was the testing well?

MR. ZUROMSKI: It's right next to the fire station in the parking lot of building -- right next to the security fire station from the parking lot.

MR. CRIPPEN: The new building?

MR. ZUROMSKI: Yes. The brand-new building.

MR. CRIPPEN: Thanks.

MR. SAUNDERS: Thank you.

And you had a question.

MS. COMPTON: Hi. Cynthia Compton, C-o-m-p-t-o-n. I heard a couple times -- I heard a couple comments, "That's a great question. Would you please write it down." And so my question is: Do we have to write up our spoken questions?

MR. SAUNDERS: Ma'am, I stated that. What you said verbally is for the record right now.

MS. COMPTON: Okay.

MR. SAUNDERS: If you want to submit any more detailed questions, you can. But what you have said right now is for the record, and it will be responded to.

MS. COMPTON: And it will be responded to. Okay. Those responses will be [unintelligible].

MR. SAUNDERS: No. They will be put together in a response [unintelligible].

MR. ZUROMSKI: However, if you do want a personal response sent to your home to your comment, just put your address on the comment card, and I think there's a little box you can check that says, "I want the written response," and we will mail you your response. So in addition to the responses in the summary, we will also mail the personal responses to your questions.

MS. COMPTON: So for me to receive a response to other people's questions, I have to find -- what is that document called again? -- response to summary?

MR. RIPPERDA: This is a pretty small group, and, hopefully, everyone signed in. Can you send the

responses to everybody that attended the meeting?
MR. COMPTON: That would be great if we could all read all the responses. I know there were some great questions I would like to see the responses to, as well.
MR. ZUROMSKI: Again, as Mark said, we can send it. If everybody does want a copy of the response in the summary that's here at the meeting -- when you signed in make sure you signed it before you leave today, and I guess as long as you're signing in we'll just make sure that the folks who have signed in and have attended these meetings will receive a copy.
MR. SAUNDERS: I just want to clarify something again. What Richard said, this comment sheet, if you fill it out and state at the bottom that you would like to get a written response back, that's perhaps the best way to do it. Otherwise, we will be sending these responsive summaries to people who don't want copies of it, and also wasting the taxpayers money in the process, so we don't want to send unsolicited material.
If they want solicited material, you can fill out the comment sheet here and state specifically when you turn it in that you would like

a written response.
(Discussion held off the record.)
MS. COMPTON: The soil vapor extraction operation, I heard you say that there will be an operator there daily. Does that mean he will be there continuously during the time of operation? So the concern about the gases leaking or anything like that, it won't necessarily be caught by a realtime person that's there at the site at the time it's operating?
And I was going to ask the same questions on the current presidential administration: Is the line item he's talking about or the NASA budget that's for the SuperFund cleanup efforts, is that limited to a certain percent and does that impact the overall NASA budget?
MR. ROBLES: It's called ECR, environmental compliance regulation. It's approximately 45 to 50 million a year, [unintelligible] -- excuse me. So it's a small amount, but it is a consistent amount, and it's always taken out as part of that.
Congress won't let us [unintelligible]; so it's not impacted from the standpoint of, you know, it's always there. It's always required. It's always been filled in one form

or another. Sometimes you get more, but it's never been you're not going to get. Because understand that SuperFund is a continual process. You can't just stop it in the middle. Plus the regulators will get real mad at us.
MR. SAUNDERS: I think there was a comment that each budget is planned five years in advance. You don't just plan for that for the next year. The process is already started, the money funds for five years.
Any other questions or comments?
MR. FIEDLER: It just came to my mind. Dick Fiedler again. Since the Navy has been involved in this for some time now, I was just wondering from a material standpoint, material balance standpoint, these wonderful chemical engineers the Navy has, if you estimated, as you already said, 2,000 to 5,000 pounds of VOCs, question mark, question mark, have you calculated, just for the heck of it, for the last years that JPL has funded the Pasadena [unintelligible] and well water and the stuff that Lincoln has been doing just on activated carbon liquid absorption, have you calculated just how many pounds of VOCs Pasadena and Lincoln has removed from the groundwater compared to what you were saying now

remains in the groundwater? Hasn't that calculation been made?
MR. ZUROMSKI: No. But that will be part of our summary. But no. That would be some of the work.
Again, put your comment in writing. That is something that -- I'm not sure -- let me just say overall how the SuperFund process works is even if -- when we respond to your comments, we're not only responding to you; we're also responding to EPA and the state regulators. And what happens is when we do our Record of Decision, which is the final binding agreement for cleanup at JPL, what is taken into account are the facts that we already decided on as far as the type of technology to use but also other factors. One, community input, which is what you're doing tonight, and also regulatory acceptance, which considers how they feel about the technology plus how they addressed questions like you're raising tonight. So those type of questions and input are things that the regulators may now ask us to go back and do before they'll sign a Record of Decision.
MR. FIEDLER: With all the questions that have been asked tonight, I presume that on the record --

MR. SAUNDERS: Your questions are on the record.

MR. FIEDLER: -- there are going to be some answers?

MR. ZUROMSKI: Yes.

MR. SAUNDERS: Yes. You don't have to submit them in writing unless you want to submit something in more detail. We have them for the record.

Do we have any other questions or comments from the public?

Yes, ma'am. Please step up to the mike.

MS. UNDERWOOD: My name is Nancy Lee Underwood, and I am Underwood Loss Control Environmental

MR. SAUNDERS: Would you spell your last name.

MS. UNDERWOOD: Underwood. Underwood.

I just wanted to make a comment to one of the young ladies, and I know when you're -- I'm a [unintelligible] driver contractor, and I've been around for 19 years, but I wanted to ask a question pertaining to how CPR transporting -- he mentioned something about transporting hazardous waste near the school. There are -- I'd like to answer that

question.

It's not done [unintelligible]; it's done under a controlled environment. The Department of Transportation has hazardous regulations that any hazardous waste contract must apply to before transporting on any local streets. So all the plans are made in advance, you know. The director has to write a whole plan and all the regulatory requirements have to be in line with that so it's safely done.

Another area I just want to [unintelligible], and then I'll be done. Anytime there's an environmental contract that [unintelligible], you have your geologists, hydrogeologists, who I report to at our [unintelligible] on a regular basis. I operate all the time monitoring the environmental -- environment -- getting [unintelligible]. This is so they know exactly, if it goes anywhere near, there are engineering controls if you have any exposure to the environment.

MR. SAUNDERS: Thank you.

Any other comments or questions, feedback from the public? Again, this is a great opportunity.

MS. GONZAL: Last question.

MR. SAUNDERS: Again, please state your name for the record.

MS. GONZAL: Sorry. Gonzal, G-o-n-z-a-l, last name.

This doesn't in any way affect the community by virtue of the number of people that are here. My concern is: How public will this hearing be made to the community?

MR. ZUROMSKI: Are we talking about how we advised of this meeting?

MS. GONZAL: How we responded to the concerns of the community that are present in the meeting?

MR. ZUROMSKI: That is what we call a response summary, what we've been referring to tonight. What happens is we collect all the comments that were received either in writing or given orally here tonight. And what we do is we take each of those comments by themselves and in response to your written responses, and we put together a document that's called a responsiveness summary. And as we mentioned earlier tonight, we're going to mail it to everybody that has been present at this meeting. We're going to mail you a copy of this responsive summary. However, that responsive summary is also

put into what we call our information depositories which are about three or four libraries that are mentioned in the pamphlet that's up at the front desk of the proposed plan. We put a copy of that in there for anybody else who maybe did not come to the meeting. They can come and look at it there.

MS. GONZAL: How about the local newspapers like "The Star News"?

MR. SAUNDERS: You have a reporter right over here.

MS. GONZAL: Okay. Just asking.

MR. SAUNDERS: Any other comments? Questions? Feedback? Please feel free to step up and express yourself at this time. No one else that would like to ask any further questions? No other comments. Yes.

MS. SUTLAFF: This is just a comment just to let you guys know, I am a reporter with the "Pasadena Star News." And I may or may not write a story from today's, but I did write a story for Sunday's paper. And I just wanted to tell people about it just -- you can get it off the web, and I encourage you to buy "The Star News." But it is a concise explanation of what they're planning to do, and it gives a little history. So our website is www.Pasadenastarnews.com.

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And they did place advertisements for this, as well. So I wrote that article so that people in the community would know about the meeting.

MR. SAUNDERS: Could you state your name.

MS. SUTLAFF: I broke the rules. It's Visha, V-i-s-h-a, Sutlaff, S-u-t-l-a-f-f, as in Frank.

MR. SAUNDERS: And this is also the third public meeting we've had, and I know that she has attended at least two of the public meetings. And we've had them at roughly two different locations. Two of them were in two different locations in JPL, and this is the third meeting. Which is rather unique. Most public meetings for remedial action for proposed plans do not have three meetings, public meetings. In fact, the guidance from U.S. EPA is basically one public meeting, and we've had three of them. I just wanted to tell you.

MR. ZUROMSKI: And in addition to the article that Visha did in Sunday's paper, she also did an article previously from the first public meeting in the "Pasadena Star News." And also I believe it's Saturday's "Foothill Leader" edition, there's another article, interview with Peter Robles and myself about the actions that we're taking at OU-2. So there are circulating out there some articles that have been

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done on the site.

And you can speak with us about those afterwards. We're going to be available right after this comment period is closed. You can speak with us on a one-on-one basis. And also back to our information depositories, all of those newspaper articles and clippings can be found in our information depositories, as well. So you can go back and read those articles at a later date.

MR. SAUNDERS: Any other comments, questions, feedback from the public? This is your great opportunity to give us feedback. We appreciate it, everything that you say. It makes us do our job better. Any other questions?

If not, I want to thank you for attending tonight's meeting. I encourage you to review and comment on the proposed plan. Final decision regarding cleanup will be made after public comments have been received and considered.

Keep in mind, as stated, that the public comment period started May 7th and runs through July 11th, 65 days, which is, again, a rather unusual time. It's longer than normal that's recommended for a public comment period.

So feel free, if you didn't want to

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provide any verbal comments or questions tonight, to submit your questions and comments to Peter Robles remedial project manager here at JPL. You have his address up here. It's also listed in the proposed plan fact sheet that is available in the back where we have the poster board displays.

If there's nothing else at this time, thank you for attending. Good night.

APPENDIX E

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA) VALUES ASSESSMENT FOR OPERABLE UNIT 2

CONTENTS

FIGURES

ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CAA	Clean Air Act
Cal-EPA	State of California, Environmental Protection Agency
CalTech	California Institute of Technology
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CCl_4	carbon tetrachloride
DCE	1,1-dichloroethene
DOJ	Department of Justice
DTSC	Department of Toxic Substances Control
FFA	Federal Facilities Agreement
Freon 113	1,1,2-trichloro-1,2,2-trifluoroethane
FS	Feasibility Study
FWEC	Foster Wheeler Environmental Corporation
HHRA	human health risk assessment
JPL	Jet Propulsion Laboratory
MCL	maximum contaminant level
NA	no action
NAAQS	National Primary and Secondary Ambient Air Quality Standard
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act of 1969
NPL	National Priorities List
OU	operable unit
PTO	permit to operate
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision

RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SIP	State Implementation Plan
SVE	soil vapor extraction
SWRCB	State Water Resources Control Board
TCE	trichloroethene
EPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

E.1: INTRODUCTION

This National Environmental Policy Act of 1969 (NEPA) Values Assessment accompanies the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) remedial documentation for Operable Unit 2 (OU-2) at the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL). The NASA JPL is located near Pasadena, CA. The Council on Environmental Quality (CEQ) and the Department of Justice (DOJ) have advised that federal agencies should integrate NEPA values into the CERCLA process when feasible and appropriate (DOJ, 1995).

E..1.1 Background

JPL is located within the city boundaries of La Cañada Flintridge, California; however it has a Pasadena mailing address. JPL comprises about 176 acres of land and more than 150 buildings and other structures. Most of the northern half of JPL is not developed because of steeply sloping terrain. The main developed area is the southern half of the site. The northeastern part of JPL is currently used for project support, testing, and storage. The southwestern part is used mostly for administrative, management, laboratory, and project functions.

JPL is a NASA-owned facility where the California Institute of Technology (CalTech) performs research and development projects. JPL also serves as the federal government's lead center for research and development related to robotic exploration of the solar system. In addition to work for NASA, tasks are conducted at JPL for other federal agencies in areas such as remote sensing, astrophysics, and planetary science.

During execution of past projects, various chemicals (including laboratory chemicals, solvents, solid and liquid rocket propellants, and cooling tower chemicals) and other materials were used at JPL. During the 1940s and 1950s, many buildings maintained "seepage pits," which are subsurface areas used to dispose of liquid and solid sanitary wastes collected from drains and sinks within the buildings. Some of the seepage pits may have received volatile organic compounds (VOCs) and other waste materials that currently are found in vadose zone soil and groundwater at JPL. In the late 1950s and early 1960s, a sewer system was installed at JPL, and the use of seepage pits for waste disposal was discontinued.

In 1980, VOCs were detected in groundwater from City of Pasadena water-supply wells located in the Arroyo Seco, near JPL. At about the same time, VOCs also were detected in two water-supply wells at the Lincoln Avenue Water Company, located downgradient of JPL. Subsequently, site investigations were conducted at JPL (Ebasco, 1990a and 1990b) and VOCs were detected in on-facility groundwater at levels above drinking water standards. In 1992, JPL was placed on the U.S. Environmental Protection Agency's (EPA's) National Priorities List (NPL) of CERCLA sites (47189-47187 *Federal Register*, 1992, Vol. 57, No. 199).

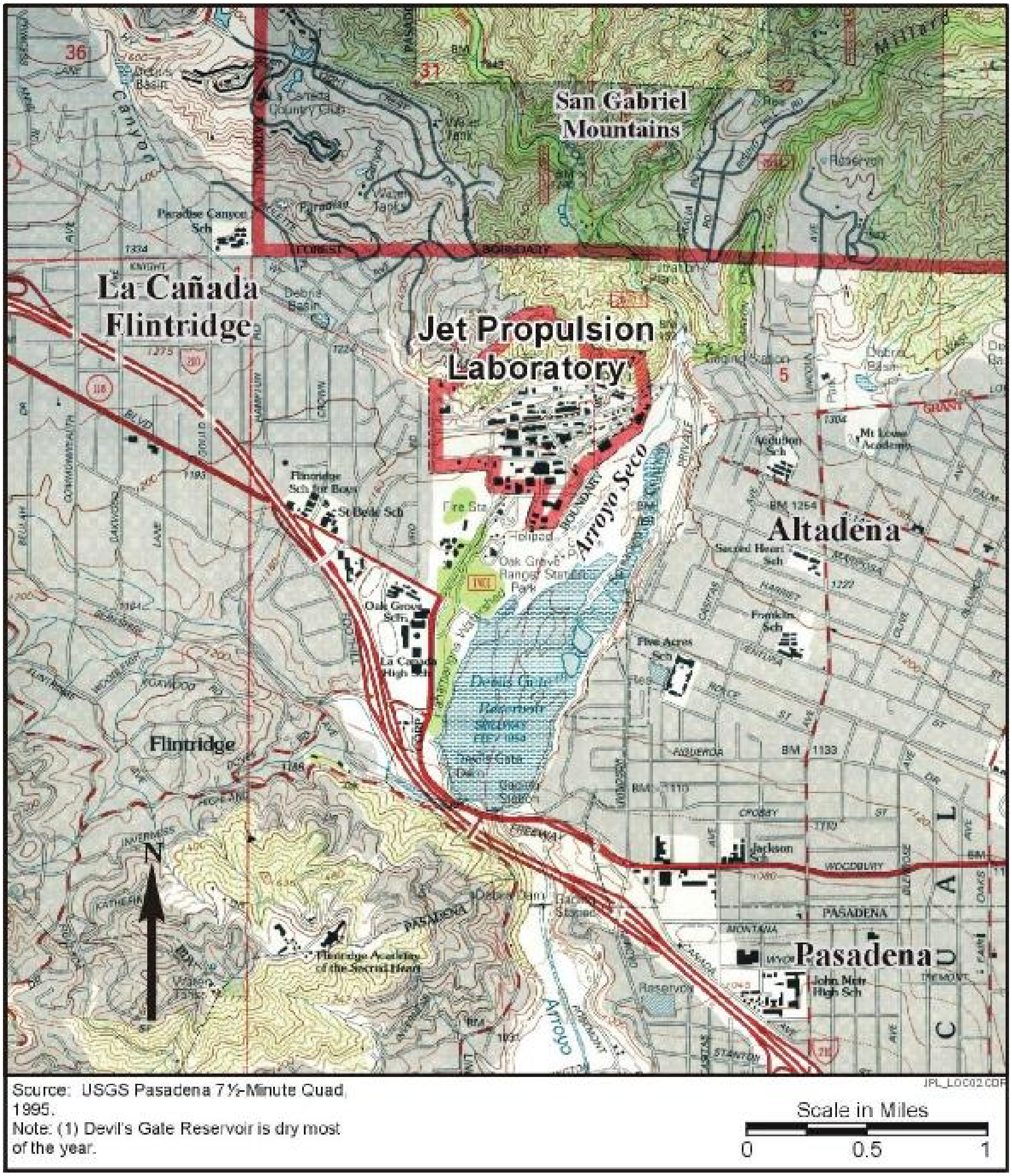


Figure E-1. Map of JPL and Surrounding Area

After being placed on the NPL, potential source areas were investigated from 1994 to 1998 during the Remedial Investigation (RI) phase, which included nine sampling events. The RI phase was followed by the Feasibility Study (FS) phase, which involved risk evaluation, data interpretation, and evaluation of an ongoing soil vapor extraction (SVE) pilot test.

The operable unit addressed in this NEPA Values Assessment, OU-2, is the second of three operable units at JPL. OU-2 consists of all on-facility vadose zone soil at JPL. The first operable unit, OU-1, encompasses all on-facility groundwater. The third operable unit, OU-3, consists of all off-facility groundwater adjacent to JPL. OU-1 and OU-3 will be addressed separately from OU-2, and not in this NEPA Values Assessment.

E.1.2 Purpose and Need

Under CERCLA, NASA must determine the appropriate action to remediate VOCs in vadose zone soil at JPL. This document accompanies CERCLA documentation for OU-2 and serves to integrate NEPA values into the CERCLA process for the remedial action.

E.1.3 Applicable Statutes and Regulations

This section discusses the federal, state, and local environmental statutes and regulations that are applicable or relevant and appropriate requirements (ARARs) to the remedial action at OU-2. A complete discussion of ARARs can be found in Appendix F of this Record of Decision (ROD).

E.1.3.1 National Environmental Policy Act of 1969, as Amended

This document is prepared in compliance with NEPA, as amended, and the Council on Environmental Quality Regulations for Implementing NEPA (40 CFR Parts 1500-1508). It is prepared to comply with NEPA through the assessment of selected NEPA values associated with the remediation of OU-2 at JPL.

E.1.3.2 Other Federal Regulations

A Federal Facilities Agreement (FFA) under CERCLA Section 120 was executed in 1992 by NASA, EPA Region IX, State of California, Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB), Los Angeles Region (EPA, 1992). The FFA lists JPL as a Resource Conservation and Recovery Act (RCRA)/CERCLA site requiring further evaluation using an investigation/assessment process that integrates and combines the RCRA Facility Investigation Process with the CERCLA RI process to determine the actual or potential impacts.

Federal environmental regulations considered to be ARARs were identified as part of the CERCLA process. These ARARs will be used to establish standards, consistent with the National Oil Hazardous Substance and Pollution Contingency Plan (NCP), for any remedial actions at OU-2, unless waived. Appendix F of this ROD provides a summary of all identified federal ARARs and the impacts that those requirements will have on the design and administration of the JPL OU-2 remediation activities.

E.1.3.3 State and Local Regulations

State and local environmental regulations that are considered ARARs have been identified and will be used to establish standards that are consistent with the NCP for any remedial actions at JPL OU-2, unless waived. Appendix F of this ROD provides a summary of all identified state ARARs and the impact that those requirements will have on the design and administration of the JPL OU-2 remediation activities.

E.2: PROPOSED ACTION AND ALTERNATIVES

During the RI of OU-2, the following four VOCs were detected frequently at elevated concentrations in soil vapor samples: carbon tetrachloride (CCl_4); 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113); tricholorethene (TCE); and 1,1-dichloroethene (DCE). These compounds generally were located beneath the north-central part of JPL, and were detected in soil vapor at depths extending to the water table, which ranges up to 200 ft or more below ground surface (bgs). The *Final Remedial Investigation Report for Operable Unit 2: Potential On-Site Contaminant Source Areas* (Foster Wheeler Environmental Corporation [FWEC], 1999) and the *Final Feasibility Study Report for Operable Unit 2: Potential On-Site Contaminant Source Areas* (FWEC, 2000) contain detailed information and data for all of the environmental media samples taken in the characterization of OU-2.

Based on the evaluation performed as part of the FS, the selected alternative for OU-2 remediation involves installation of an SVE system. SVE is the most widely used technology at CERCLA NPL sites and has been identified by the EPA as a presumptive remedy for remediation of VOC-impacted soil. Presumptive remedy status is granted to technologies with proven effectiveness, eliminating the requirement to evaluate competing technologies. SVE systems are designed to remove VOCs by applying a vacuum through a network of underground wells. The soil vapor extracted from the subsurface is then treated to remove VOCs before discharge to the atmosphere. The proposed system for OU-2 will consist of up to five vapor extraction wells and vapor treatment systems. The actual number of wells will depend on the results of the soil vapor monitoring program and an ongoing SVE pilot test. VOCs in the extracted soil vapor will be treated in accordance with the South Coast Air Quality Management District (SCAQMD) requirements. The SVE system will be operated until the performance objectives are achieved (see Section 11.4 of the ROD).

A soil vapor monitoring program, currently in place, will be used to track VOC concentrations and areal extent of VOCs in the vadose zone over time. The monitoring program will consist of the periodic collection and analysis of soil vapor samples from existing soil vapor monitoring point network. This program will be used to evaluate SVE system effectiveness and progress toward achieving the remedial action objective (RAO). The RAO for OU-2 is to prevent, to the extent practicable, further migration of VOCs at potential levels of concern from the vadose zone to groundwater to protect an existing drinking water source. The soil vapor monitoring program will be terminated upon achieving the RAO.

NASA expects that the selected alternative, SVE, will satisfy the statutory requirements in CERCLA section 121(b) that the selected alternative:

- Be protective of human health and the environment
- Comply with ARARs
- Be cost-effective

- Use permanent solutions and alternative treatment technologies to the maximum extent practicable

- Satisfy the statutory preference for treatment as a principal element, or justify not meeting the preference.

Because SVE is an EPA presumptive remedy, the only other alternative considered for OU-2 was “no further action” (NFA). This alternative includes the soil vapor monitoring program described above as part of the selected alternative, but no treatment technologies to remediate VOCs in vadose zone soil.

E.3: AFFECTED ENVIRONMENT

The JPL site is located within the San Gabriel Valley, in the eastern part of Los Angeles County. It is located between the city of La Cañada Flintridge and the unincorporated city of Altadena, CA, northeast of the 210 Foothill Freeway near Pasadena, CA. Figure E-1 is a map of JPL and the surrounding area.

JPL is situated on a south-facing slope along the base of the southern edge of the east-west trending San Gabriel Mountains at the northern edge of the metropolitan Los Angeles area. The Arroyo Seco, an intermittent streambed, lies immediately to the east and southeast of JPL. Within the Arroyo Seco is a series of surface impoundments used as surface water collection and spreading basins for groundwater recharge. Residential development, an equestrian club (Flintridge Riding Club), and a Los Angeles County Fire Department Station (Fire Camp #2) border the JPL along its southwestern and western boundaries. Residential development also is present to the east of JPL, along the eastern edge of the Arroyo Seco.

E.3.1 Land Use

JPL comprises about 176 acres of land. Of these 176 acres, about 156 acres are federally owned. The remaining land is leased for parking from the City of Pasadena and the Flintridge Riding Club. The main developed area of JPL is the southern half, which can be divided into two general areas, the northeastern early-developed area and the southwestern later-developed area. Most of the northern half of JPL is not developed because of steeply sloping terrain.

Currently, the northeastern early-developed part of JPL is used for project support, testing, and storage. The southwestern later-developed part is used mostly for administrative, management, laboratory, and project functions. Further development of JPL is constrained because of steeply sloping terrain to the north, the Arroyo Seco to the south and east, and residential development to the west.

Located at the northern boundary of JPL is the Gould Mesa area. This area has widely separated, small buildings and is used primarily for antenna testing. The distance between buildings is a result of the terrain and the need to isolate transmitting and receiving equipment. The relatively steep mountainside between Gould Mesa and the developed area at JPL is unpopulated.

Presently, more than 150 structures and buildings occupy JPL. Total usable building space is approximately 1,330,000 ft^2. Figure E-2 is a facility map for JPL.

The primary land use in the areas surrounding JPL is residential and light commercial. Industrial areas, such as manufacturing, processing, and packaging, are limited. The closest residential properties are those located along the western fence line of JPL. The nearest off-facility buildings are the Flintridge Riding Club and Fire Camp #2, both located approximately 100 yards from the southern border of JPL. The total number of buildings within two miles of JPL is about 2,500, primarily residential and community (e.g., schools, day-care centers, churches).

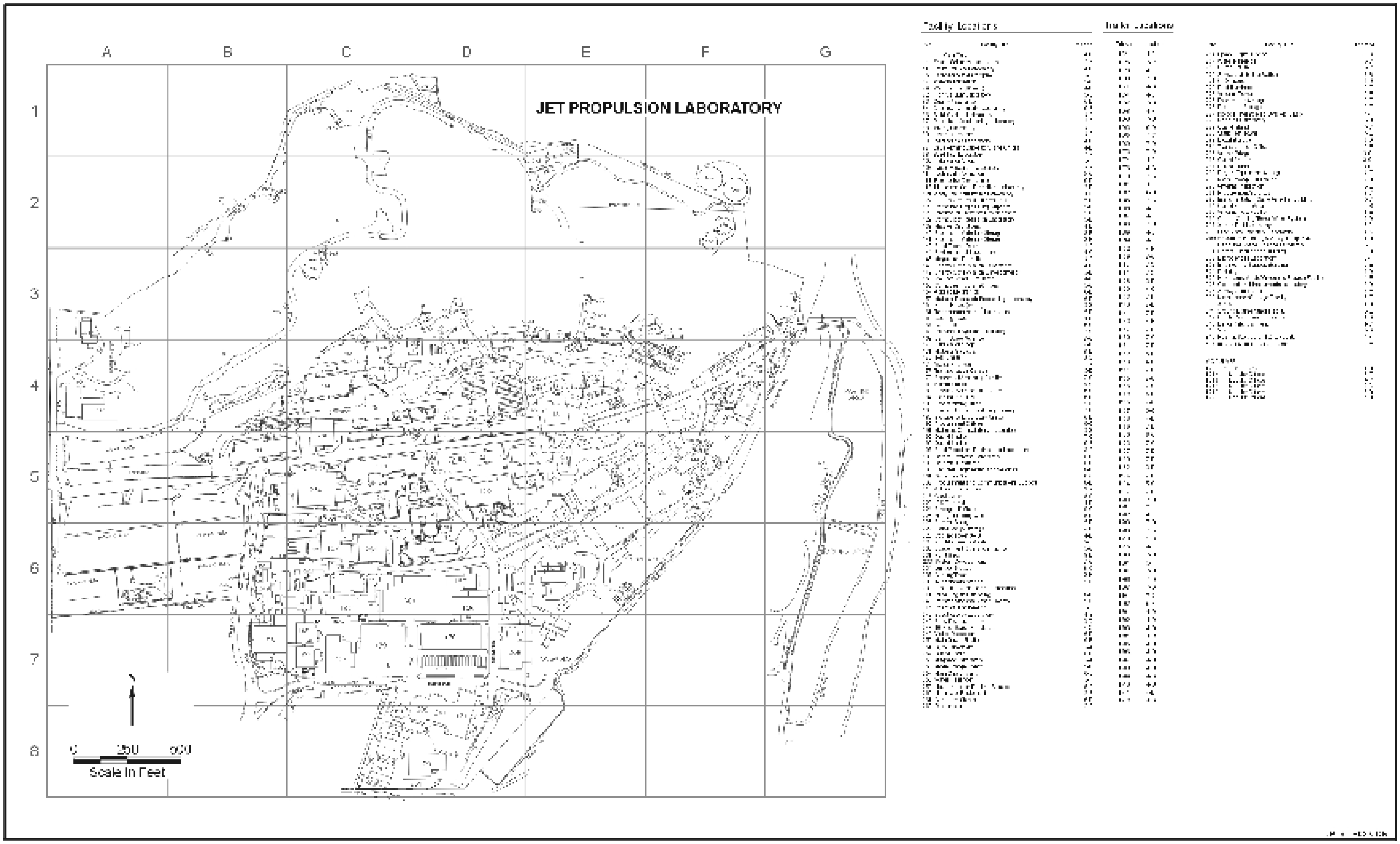


Figure E-2. Facility Map of JPL

E.3.2 Regional Demographics

Based on the United States Census 2000, the total population residing within 1 mile of JPL is 9,500 people. The population residing within 2 miles of JPL is 22,500 people, and the population residing within 3 miles is 44,000.

In 2001, the JPL workforce consisted of approximately 5,175 employees and contractors. Major sources of employment in the area surrounding JPL are office, retail, and service centers, primarily located within Pasadena. Residents of Altadena and La Cañada Flintridge generally are employed outside their home community, except those conducting retail businesses or professional services for their respective communities.

In 2000, the population of Pasadena was approximately 133,936 and was broken down into the following demographics: 71,469 Caucasian; 19,319 Black or African-American; 952 American Indian; 13,399 Asian; 132 Pacific Islander; and 28,665 multiracial or other racial group.

In 2000, the population of Altadena was approximately 42,610 and was broken into the following demographics: 20,156 Caucasian; 13,388 Black or African-American; 247 American Indian; 1,807 Asian; 56 Pacific Islander; and 6,956 multiracial or other racial group. The population of La Cañada Flintridge in 2000 was approximately 20,318 and was broken into the following demographics: 15,142 Caucasian; 73 Black or African American; 36 American Indian; 4,180 Asian; 9 Pacific Islander; and 878 multiracial or other racial group.

According to the United States Census 2000, 33.4% of the Pasadena population identifies their ethnic group as Hispanic, while 20.4% of Altadena residents and 4.8% La Cañada Flintridge residents identify themselves as Hispanic.

E.3.3 Meteorology and Climatology

The San Gabriel Valley has a semiarid Mediterranean climate characterized by mild, rainy winters and warm, dry summers. Rainfall in the area is variable, although it typically averages about 15 inches per year overall (Boyle Engineering, 1988). Rainfall in the vicinity of JPL is slightly higher than for the City of Los Angeles, averaging about 20 inches per year. The higher amount of rainfall near JPL results from the orographic effects generated along the southern slope of the San Gabriel Mountains. Roughly 80% of the precipitation occurs between the months of November and April.

Temperatures in the San Gabriel Valley are relatively mild, with August typically being the warmest month and January the coolest. Extremes for the area range from about 30^{o}F in January to 105^{o}F during the summer months. Wind patterns change seasonally in both strength and direction in response to normal seasonal variations in barometric pressure systems. Generally, winds are mild throughout the year, characterized by ocean breezes (onshore) during the day and land breezes (offshore) at night.

Occasionally during the fall, the area is affected by the Santa Ana winds. These winds occur as a result of strong high-pressure systems moving into parts of Nevada and Utah, creating strong, hot, dry winds from the northeast. Santa Ana wind speeds through Arroyo Seco have reached more than 100 miles per hour.

E.3.4 Geology and Seismology

This section discusses the geology and seismology of the area surrounding JPL. Figure E-3 is a map of the regional geology and physiography. Figure E-4 is a geologic map of JPL and the surrounding area.

JPL is located immediately south of the southwestern edge of the San Gabriel Mountains (see Figure E-3). The San Gabriel Mountains, together with the San Bernadino Mountains to the east and the Santa Monica Mountains to the west, make up a major part of the east-west trending Transverse Ranges province of California. This province is dominated by north-south compressional deformation.

The San Gabriel Mountains are primarily composed of crystalline basement rocks. These rocks range in age from Precambrian to Tertiary and include various types of diorites, granites, monzonites, and granodiorites with a complex history of intrusion and metamorphism (Dibblee, 1982). The northwest part of the San Gabriel Valley, near JPL, is composed of about 1,500 to 2,000 ft of Cenozoic alluvial-fan deposits that unconformably overlie the crystalline basement complex exposed in the San Gabriel Mountains (Smith, 1986). These alluvial deposits typically consist of poorly sorted, coarse-grained sands and gravels, with some finer sand and silty material. Clasts within the alluvial deposits range from silt size to boulders more than 3 ft in diameter.

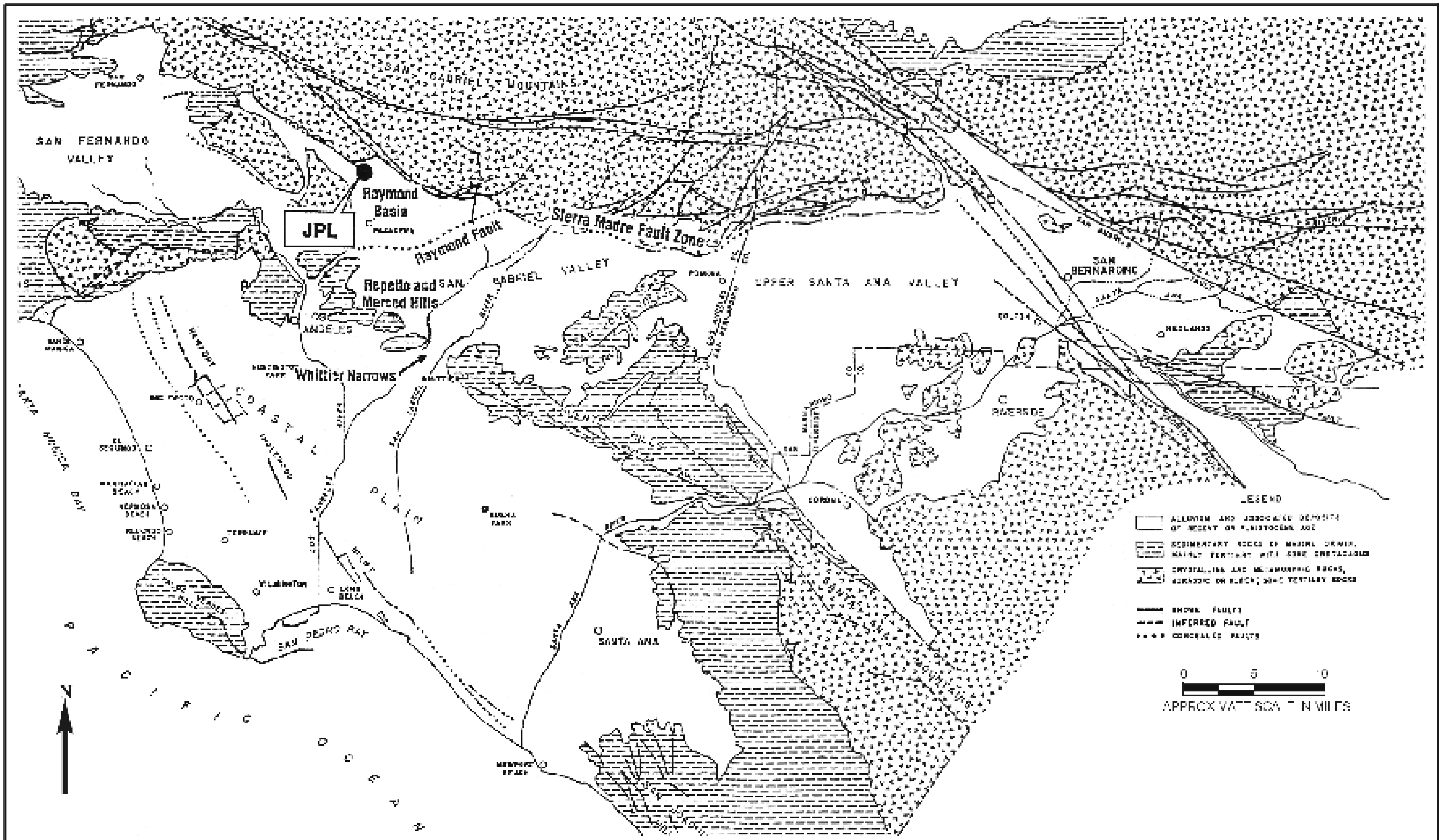
Periodic tectonic uplift of the San Gabriel Mountains has occurred during the past 1 to 2 million years. This uplift is responsible for the present topography of the area (Smith, 1986). Most of this uplift has occurred along north- to northeast-dipping reverse and thrust faults located along the south to southwest edges of the San Gabriel Mountains. This system of faults along the southern edge of the San Gabriel Mountains is the Sierra Madre Fault system. The Sierra Madre Fault system separates the San Gabriel Mountains to the north from the San Gabriel Valley to the south.

E.3.5 Hydrology

This section discusses the hydrology of JPL and the surrounding area. JPL is located in the northwest part of the Raymond Basin watershed (see Figure E-3).

E.3.5.1 Surface Water

There are no permanent surface water bodies within the boundaries of JPL. The northernmost part of JPL consists of Gould Mesa, a flat-topped southern promontory of the San Gabriel Mountains that rises 300 ft above the main part of the JPL complex. The remainder of JPL is moderately sloped and has been graded extensively throughout its development. The Arroyo Seco Creek intermittently flows through the Arroyo Seco wash on the east side of JPL. Within the Arroyo Seco, a series of surface impoundments are used as surface water collection and spreading basins for groundwater recharge.



SOURCE: CALIFORNIA WATER RESOURCES BULL NO. 104, PLANNED UTILIZATION OF THE GROUND WATER BASINS OF THE COASTAL PLAIN OF LA COUNTY, 1961.

Figure E-3. Map of Regional Geology and Physiography

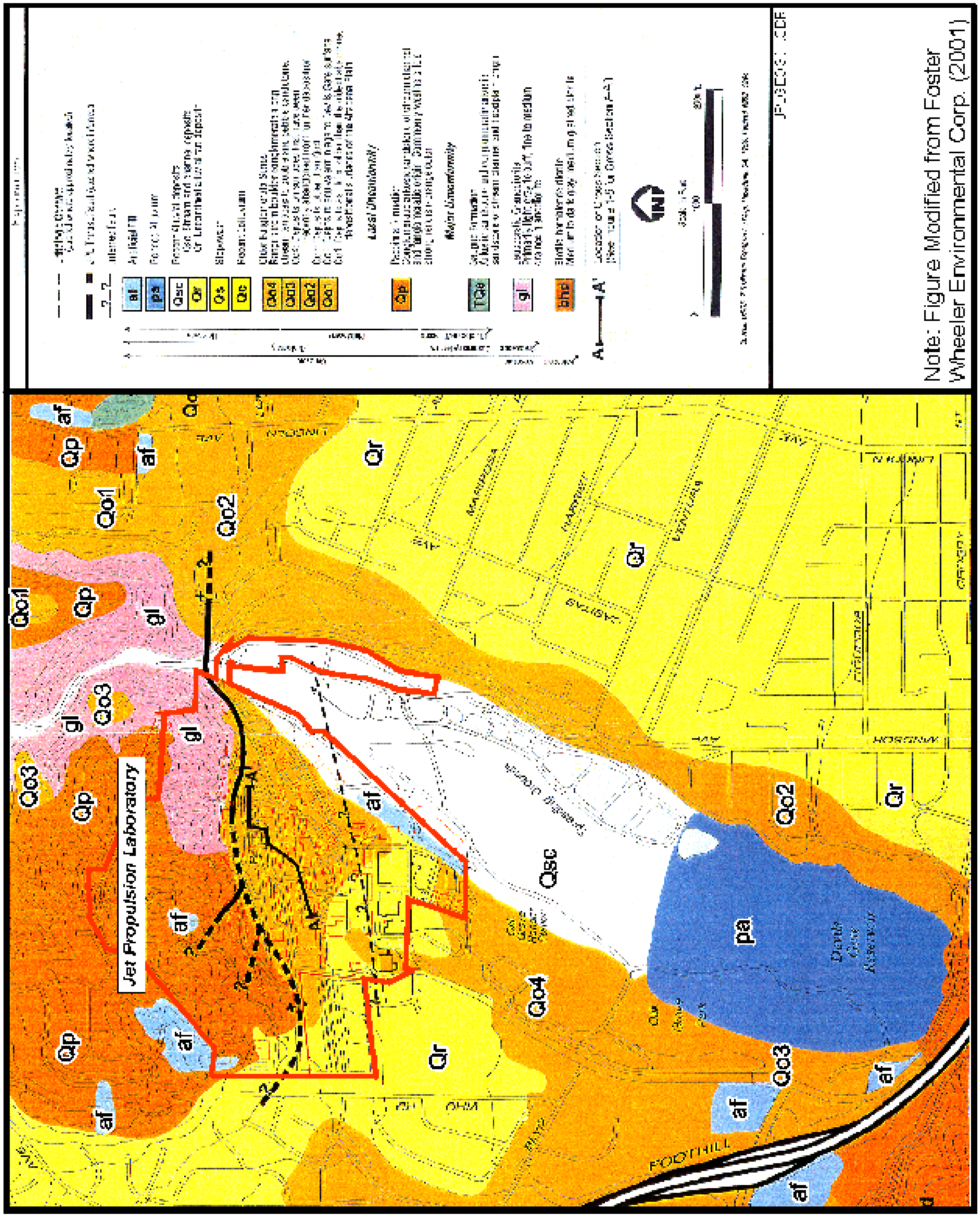


Figure E-4. Geologic Map of the JPL and Surrounding Area

E.3.5.2 Groundwater

The San Gabriel Valley contains distinct groundwater basins, including the Raymond Basin, where JPL is located (see Figure E-3). The Raymond Basin is bordered on the north by the San Gabriel Mountains, on the west by the San Rafael Hills, and on the south and east by the Raymond Fault. The Raymond Basin provides an important source of potable groundwater for many communities in the area around JPL, including Pasadena, La Cañada Flintridge , San Marino, Sierra Madre, Altadena, Alhambra, and Arcadia.

North of the JPL Thrust Fault (see Figure E-4), groundwater primarily occurs in joints and fractures in the bedrock. Because the bedrock is of low porosity, it is considered non-water-bearing. South of the JPL Thrust Fault, groundwater occurs in alluvial deposits.

The aquifer below JPL consists of four layers that are separated by noncontiguous, low-permeability silt layers (see Figure E-5). Layer 1 consists of the upper 75 to 100 ft of saturated alluvium. Layer 2 underlies Layer 1 and is about 150 to 200 ft thick. Layer 3 is about 200 to 300 ft thick and generally overlies crystalline basement rock beneath JPL. Layer 4 occurs only at the far eastern end of JPL, is about 150 ft thick, and rests on crystalline basement rocks.

Depth to groundwater at JPL ranges from 22 ft bgs to 270 ft bgs. This wide range of depth to water is attributed to steep topography in the northern part of the site and to seasonal groundwater recharge. The depth to groundwater under most of the JPL complex averages approximately 200 ft.

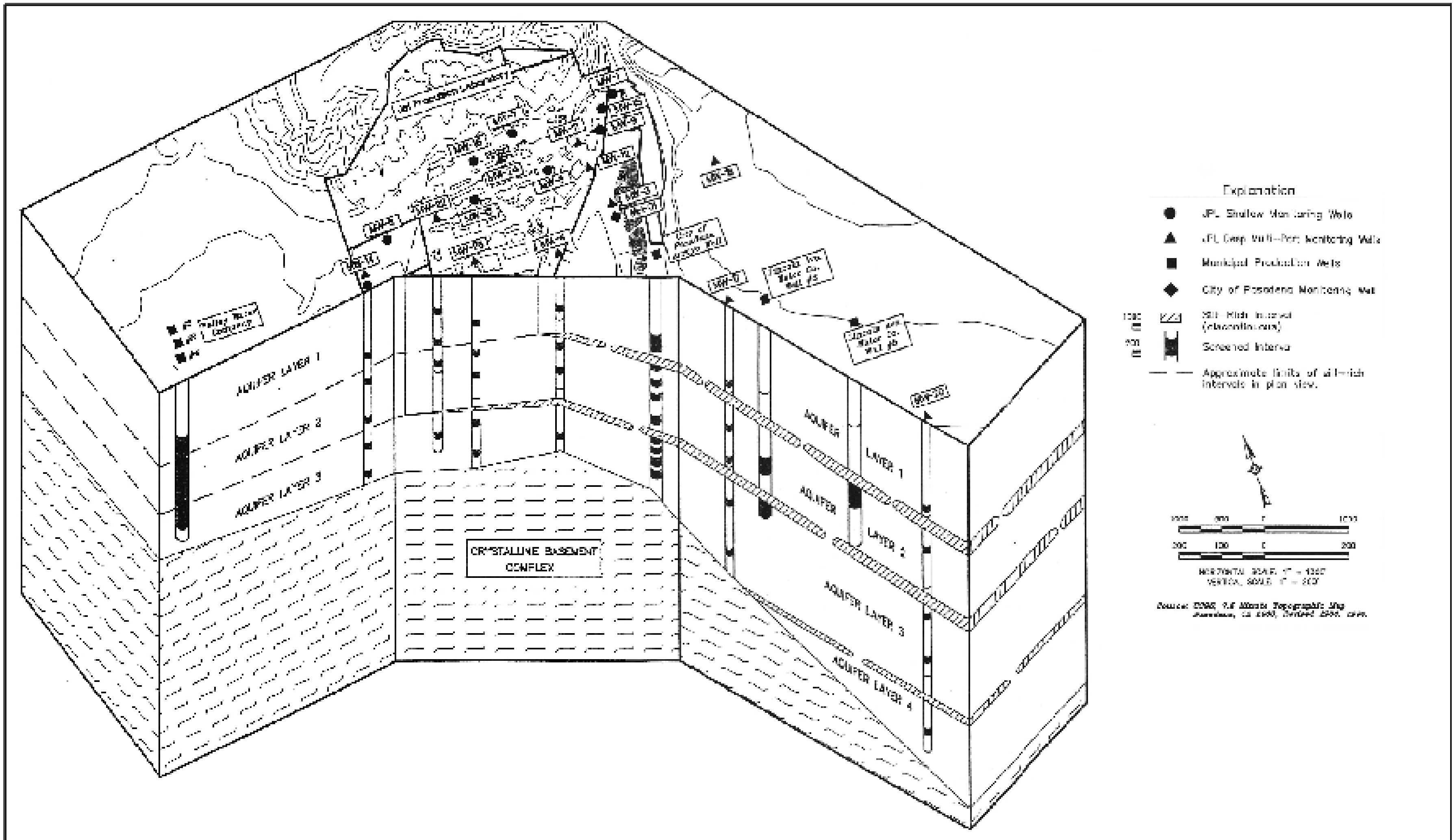
E.3.6 Natural and Ecological Resources

JPL is located along the northern edge of the San Gabriel Valley in the central part of Los Angeles County. The San Gabriel Valley is bounded to the north by the San Gabriel Mountains, which consist of relatively steep, rocky ridges with numerous canyons. The northernmost part of JPL consists of Gould Mesa, a flat-topped, southern promontory of the San Gabriel Mountains that rises 300 ft above the main JPL complex. Chaparral covers the convex slopes of the mesa in this part of JPL as well as the upland banks of the Arroyo Seco, east of JPL.

The Arroyo Seco, which borders the east side of JPL, is about 1,000 ft wide. It contains mostly riparian and desert wash habitat, interspersed with chaparral. The Arroyo Seco Creek intermittently flows through the Arroyo Seco wash. The Arroyo Seco collects runoff from the north, east, and west. Several groundwater recharge ponds are located on the east side of the Arroyo Seco and west of the extended parking area (see Figure E-2). Groundwater beneath the Arroyo Seco is a current source of drinking water.

Riparian areas are located directly northeast and east of the JPL along the Arroyo Seco Creek. Riparian trees are thicker at the drain outfalls on the eastern boundary of JPL, where runoff from landscaped areas and pavement is year-round. However, there are no forest resources at JPL.

The predominant habitat type at JPL is urbanized landscape, with paved roads, parking lots, and buildings. Vegetation used in landscaping includes native and nonnative plant species.



NOTE: GRAPHIC PREPARED BY FOSTER WHEELER ENVIRONMENTAL CORPORATION (2001).

Figure E-5. Conceptual Model of JPL Aquifer Layers

Species of special concern that potentially occur in the vicinity of JPL include the southwestern arroyo toad, the southwestern pond turtle, the San Diego horned lizard, the peregrine falcon, the bank swallow, the western yellow-billed cuckoo, and the least Bell's vireo. These species were identified using the California Department of Fish and Game Natural Diversity Database (California Department of Fish and Game, 1995) and the California Native Plant Society's list of rare, threatened, or endangered plant species (Skinner and Paulik, 1994). However, none of these species have been identified at the JPL site. If necessary consultation under Section 7 of the Endangered Species Act will be accomplished directly with the U.S. Fish and Wildlife Service.

E.3.7 Archaeological and Cultural Resources

NASA has an obligation to determine if any building, structure, or object listed or eligible to be listed on the National Register of Historic Places would be affected by the OU-2 remedial activities. It also has the obligation to determine whether any historical or archaeological data could be destroyed through alteration of terrain as a result of implementation of the selected remedial action.

It is unlikely that property with historic, architectural, archaeological, or cultural value, located within the vicinity of JPL, will be impacted by the selected remedial action. However, a historical, archaeological, architectural, and cultural resource review of surrounding and on-facility property will be conducted prior to implementation if remedial actions involve intrusive groundwork.

E.4: NEPA VALUES ASSESSMENT OF PROPOSED ACTION AND ALTERNATIVES

The results of soil vapor sampling conducted at JPL (FWEC, 1999) revealed the presence of VOCs in the vadose zone at levels that may impact groundwater above drinking water standards. These chemicals have the potential to migrate to groundwater, thus causing further groundwater impact. Therefore, the RAO was established to prevent, to the extent practicable, further migration of VOCs at potential levels of concern from the vadose zone to groundwater to protect an existing drinking water source. Two alternatives, the NFA alternative and SVE, were identified to address the RAO.

Under the NFA alternative, no remediation of OU-2 would be planned except that which occurs naturally due to chemical/biological degradation, dispersion, advection, and sorption. The NFA alternative would have no further impacts on the environment except those from VOCs in the vadose zone that could potentially impact groundwater. Ecology would not be disturbed, but VOCs in the vadose zone might act as a source of further groundwater contamination and may not provide long-term protection of the environment.

Under the selected alternative, SVE would be used to remediate vadose zone soil at JPL OU-2. SVE would be conducted to remove VOCs from the subsurface, and SVE systems would operate until the performance objectives are achieved.

Air emissions from SVE would be limited to possible dust generation during well installation and discharge of treated vapors extracted from the subsurface. The dust generation during well installation would be minimal and occur over a short duration; therefore, these emissions are expected to have negligible impacts on local air quality. The VOCs in the extracted vapor will be removed by an aboveground treatment system in accordance with state and local ARARs. These ARARs ensure protection of human health and the environment.

SVE system installation and operation would also result in negligible impacts because the system is in situ (i.e., removal of vegetation and grading would be minimal). Any vegetation removed or species temporarily displaced would have the potential to recolonize the area following completion of the remediation. However, given the small size of the SVE system above ground, the net impact to wildlife species would be negligible.

Solid waste, in the form of spent carbon from the vapor treatment system, would be transported and treated off site. Thus, implementation of the selected alternative would have negligible impacts and, during operation, would be protective of human health and the environment.

In addition, because the SVE process permanently removes VOCs from the vadose zone, the potential for further groundwater contamination is significantly reduced. After remediation is completed, residual VOCs would not be expected to further impact groundwater. Thus, long-term protection and reliability are provided to the environment.

This section evaluates the two remedial alternatives for OU-2, including the NFA alternative and the selected alternative (i.e., SVE), according to their potential effects on the environment.

E.4.1 Socioeconomic Impacts

Installation of an SVE system at OU-2 is expected to employ a maximum of five people on a part-time, temporary basis. Operation and maintenance of the system is expected to employ fewer than two people full time. These numbers are small compared to the total present employment at JPL (approximately 5,175), as well as employment at local businesses and industries in the surrounding area.

The workforce needed to implement the selected alternative would be derived from the ranks of subcontractor companies. No measurable impact on the local economy would be expected. Thus, direct and indirect socioeconomic impacts of the remediation of OU-2 using the selected alternative are expected to be negligible.

The NFA alternative would have no direct socioeconomic effects on JPL or the surrounding area. However, because no action would be taken under the NFA alternative to protect the beneficial uses of the groundwater at JPL, potential indirect socioeconomic effects could accrue to JPL and the surrounding area due to the degradation of groundwater quality.

E.4.2 Transportation Impacts

Three major freeways serve the Pasadena, Altadena, and La Cañada Flintridge communities (see Figure E-3). The Pasadena Freeway (California Route 110) connects Pasadena to Los Angeles. The Foothill Freeway (Interstate 210) links communities to the north and east of Pasadena. The Ventura Freeway (U.S. Route 134) leads to Ventura County and beyond.

Remediation of OU-2 at JPL using the selected alternative would create a very small, short-term increase in traffic flow to and from the site as a result of the movement of equipment and supplies. However, based on current traffic volume associated with the 5,175 JPL employees and various activities, the increased traffic associated with remediation efforts under the selected alternative would be negligible.

Most of the traffic on and around JPL is associated with morning and evening rush hours, 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. Most of the traffic associated with the movement of equipment and supplies for the selected alternative would not be present at those peak periods of traffic flow. Further, all truck traffic associated with implementation of the selected alternative would be during daylight hours, which would further reduce the potential for accidents. Similarly, removal and transport of spent carbon waste during daylight, non-rush hours are expected to have a negligible impact over the entire course of treatment.

The NFA alternative would have no effects on transportation at JPL or in the surrounding area.

E.4.3 Natural and Ecological Resources

Groundwater beneath the JPL is a current source of drinking water. The selected alternative for OU-2, on-facility vadose zone soil at JPL, considers the soil-to-groundwater migration pathway and requires the remedial action to be protective of beneficial uses of the groundwater. Thus, the selected alternative is expected to have a beneficial effect on groundwater near JPL.

No threatened or endangered species have been identified at the JPL site.

The areal extent of VOCs in soil and the proposed area for installation and operation of SVE are located within the main JPL complex in previously disturbed and developed areas. These areas contain no wetlands and provide minimum wildlife habitat. The minimal land disturbance caused by installation of an SVE system is expected to have negligible impacts on vegetation and wildlife.

There is no floodplain or wetland involvement in the remediation of OU-2; therefore, a floodplains/wetlands assessment is not required.

Under the NFA alternative, no action would be taken to protect the beneficial uses of the groundwater at JPL. Thus, the NFA alternative would have no effects on natural or ecological resources at JPL or in the surrounding area.

E.4.4 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

As part of the RI (FWEC, 1999), NASA conducted a human health risk assessment (HHRA) to determine the need for action to protect human health. The HHRA assessed cancer and noncancer risks associated with human exposure to surface soils, which represents the only direct human exposure route at OU-2. Conservative assumptions with respect to VOCs and other chemical concentrations in soil vapor, exposure parameters, and toxicity ensured that the calculated risks were protective of human health. Exposure parameters included both commercial and residential land use scenarios, and risks were assessed for on-facility human receptors.

The results of the HHRA showed that the risks associated with exposure to vadose zone soil are negligible and are within regulatory thresholds. In addition, results indicated that VOCs detected in soil vapor samples do not cause unacceptable risks to humans.

The risks from implementation of the SVE treatment technology are low. Therefore, NASA expects little to no adverse human health impacts from implementation of the selected alternative to occur in any off-facility community, including minority and low-income communities.

E.4.5 Irreversible and Irretrievable Commitment of Resources

The commitment of a resource is considered irreversible if primary or secondary impacts of the remedial action limit future options for the use of the resource. Under the selected action, SVE would be conducted to remove VOCs from vadose zone soil at JPL. The primary objective of SVE would be to reduce the potential for further groundwater impacts. Thus, under the selected action, there would be no irreversible commitment of resources. Rather, groundwater would be recovered as a resource under this action.

The commitment of a resource is considered irretrievable if the action uses or consumes the resource during the course of implementation. Again, under the selected action, SVE would be conducted to remove VOCs from vadose zone soil and reduce the potential for further groundwater impacts. This action would lead to potential recovery of the groundwater resource. Thus, under the selected action, there would be no irretrievable commitment of resources.

E.4.6 Cost-Benefit Analysis

Costs associated with the selected action, SVE, were evaluated in detail in the Final FS Report (FWEC, 2000). Capital costs associated with SVE include installation of up to five extraction wells and five off-gas treatment systems. Operating and maintenance costs include operation and maintenance of the SVE systems and implementation of a soil vapor monitoring program. Total present worth cost for the selected action is estimated to be $3,735,000.

NASA and the regulatory authorities agree that the costs associated with SVE are justified because the selected action reduces and removes VOCs from vadose zone soil at JPL and reduces the potential for further groundwater impacts. Thus, the vadose zone soil resource at JPL is recovered, and the groundwater beneath JPL is protected, as required under both the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Section 300.430(e)(2)(B)) and State of California regulations for the beneficial use of groundwater, including groundwater used as a source of drinking water.

E.5: CUMULATIVE IMPACTS

As described above, minimal environmental impacts are expected from the proposed implementation of the selected action. In particular, the selected action would have no adverse impacts on threatened or endangered species, cultural resources, floodplains, or wetlands. NASA expects no adverse human health impacts from the CERCLA action to occur in any off-facility community, including minority and low-income communities. Under the selected action, increases in JPL traffic would be minimal and consist of transportation of SVE equipment and supplies to and from the JPL site, resulting in insignificant transportation impacts. There would be no measurable impact on the local economy as a result of the selected action, and, thus, no socioeconomic impacts are anticipated. Also, under the selected alternative, there would be no irreversible and irretrievable commitment of resources and the cost of remediation is justified to protect the existing source of drinking water.

NASA has examined the potential cumulative environmental impacts of the selected action in addition to other past, present, and reasonably foreseeable future actions at the site. NASA has initiated cleanup activities to address VOC- and perchlorate-impacted groundwater both on facility (OU-1) and off facility (OU-3). Remedial activities have been and will continue to be conducted in accordance with all federal, state, and local regulations. Also, research and development related to robotic exploration of the solar system, remote sensing, astrophysics, and planetary science is performed at JPL. These activities are conducted in controlled settings in accordance with applicable regulations. NASA does not anticipate any cumulative environmental impacts from the activities conducted at JPL and remedial activities at OU-2. Rather, the remediation of OU-2, using SVE, would have a positive impact in preventing further negative impacts to the groundwater resource.

E.6: AGENCIES AND PERSONS CONTACTED

During the preparation of the RI (FWEC, 1999) and the FS (FWEC, 2000) for OU-2, NASA consulted with and received comments and recommendations from the Cal-EPA DTSC; RWQCB, Los Angeles Region; the EPA, Region IX; the U.S. Fish and Wildlife Service; and the Raymond Basin Management Board. In addition, the Naval Facilities Engineering Command (NAVFAC) is also providing technical assistance to NASA on cleanup decisions at JPL.

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APPENDIX F

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

CONTENTS

TABLES

ABBREVIATIONS AND ACRONYMS

ARARs	applicable or relevant and appropriate requirement(s)
BACT	best available control technology
CAA	Clean Air Act
CCC	California Coastal Commission
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DOI	Department of the Interior
EP	extraction procedures
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FS	Feasibility Study
H&SC	Health and Safety Code
HSWA	Hazardous and Solid Waste Amendments
IP	State Implementation Plan
JPL	Jet Propulsion Laboratory
LDRs	land disposal restrictions
MCL	maximum contaminant levels
mg/L	milligrams per liter
MICR	maximum individual cancer risk
NAAQs	National Primary and Secondary Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act of 1969
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
OU	operable unit
POC	point of compliance

RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SDWA	Safe Drinking Water Act
STLC	soluble threshold limit concentration(s)
SVE	soil vapor extraction
T-BACT	toxics best-available control technology
TBC	to be considered
TCE	trichloroethene
TCLP	toxicity characteristic leachate procedure
TDS	total dissolved solids
TTLC	total threshold limit concentration(s)
USC	United States Code
VOC	volatile organic compound
WET	waste extraction test
WQCP	water quality control plan
WQO	water quality objective

F.1 INTRODUCTION

This appendix identifies and evaluates potential federal and state of California applicable or relevant and appropriate requirements (ARARs) and sets forth National Aeronautics and Space Administration's (NASA's) determinations regarding those potential ARARs for the selected remedy described in this Record of Decision (ROD).

F.1.1 Summary of CERCLA and NCP Requirements

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

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

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed remedial action and are well suited to the conditions of the site (U.S. Environmental Protection Agency [EPA], 1988a). A requirement must be determined to be both relevant and appropriate in order to be considered an ARAR. The criteria for determining relevance and appropriateness are listed in 40 Code of Federal Regulations (CFR) § 300.400(g)(2) and include the following:

- The purpose of the requirement and the purpose of the CERCLA action;
- The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site;
- The substances regulated by the requirement and the substances found at the CERCLA site;
- Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site;
- The type of place regulated and the type of place affected by the release or CERCLA action;

- The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action; and

- Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resources at the CERCLA site.

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

Tables F-A, F-B, and F-C included at the end of this appendix present each potential ARAR with a determination of ARAR status (i.e., applicable, relevant and appropriate, or not an ARAR). For the determination of relevance and appropriateness, the pertinent criteria were examined to determine whether the requirements addressed problems or situations sufficiently similar to the circumstances of the release or remedial action contemplated, and whether the requirement was well suited to the site. A negative determination of relevance and appropriateness indicates that the requirement did not meet the pertinent criteria. Negative determinations are documented in the tables of this appendix and are discussed in the text only for specific cases. To qualify as a state ARAR under CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), a state requirement must be:

- A state law,
- An environmental or facility sitting law,
- Promulgated (of general applicability and legally enforceable),
- Substantive (not procedural or administrative),
- More stringent than the federal requirement,
- Identified in a timely manner, and
- Consistently applied.

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

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

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

As the lead federal agency, NASA has primary responsibility for identifying federal ARARs at the Jet Propulsion Laboratory (JPL). Potential federal ARARs that have been identified for Operable Unit (OU-2) are discussed below. Pursuant to the definition of the term on-site in 40 CFR § 300.5, this remedial action covers OU-2, which consists of on-facility vadose zone soil. Equipment related to implementation of the selected remedy including soil vapor extraction wells, volatile organic compound (VOC) vapor treatment equipment, and piping connecting those items are defined as "on-site." Regulatory requirements that apply to off-site actions are not ARARs. Off-site actions (i.e., off-site disposal) are required to comply with applicable requirements only and are not required to comply with relevant and appropriate requirements identified as ARARs for on-site actions.

Identification of potential state ARARs was carried out during the Feasibility Study (FS). Potential state ARARs that have been identified for OU-2 are discussed in Section F.1.2.3.

F.1.2 Methodology Description

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

F.1.2.1 General Approach

As the lead federal agency, NASA has primary responsibility for identification of potential ARARs for OU-2. In preparing this ARARs analysis, NASA undertook the following measures, consistent with CERCLA and NCP:

- Identified federal ARARs for the selected remedy addressed in the ROD, taking into account site-specific information for OU-2;

- Reviewed potential state ARARs identified during the OU-2 FS phase to determine whether they satisfy CERCLA and NCP criteria that must be met in order to constitute state ARARs; and

- Evaluated and compared federal ARARs and their state counterparts to determine which state ARARs are more stringent than the federal ARARs or are in addition to the federally required actions.

As outlined in Section 8.0 of this ROD, the remedial action objective (RAO) for OU-2 is to prevent, to the extent practicable, further migration of VOCs at potential levels of concern from the vadose zone to groundwater to protect an existing drinking water source. The selected remedial action, soil vapor extraction (SVE), will be implemented to achieve the RAO.

F.1.2.2 Identifying and Evaluating Federal ARARs

NASA is responsible for identifying federal ARARs as the lead federal agency under CERCLA and NCP. The federal government implements a number of federal environmental statutes that are the source of potential federal ARARs, either in the form of the statutes or regulations promulgated thereunder. Examples include the Resource Conservation and Recovery Act (RCRA), the Clean Water Act, the Safe Drinking Water Act, and their implementing regulations, to name a few. See NCP preamble at 55 Fed. Reg. 8764–8765 (1990) for a more complete listing.

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

F.1.2.3 Identifying and Evaluating State ARARs

EPA guidance (EPA, 1988b) recommends that the lead federal agency consult with the state when identifying state ARARs for remedial actions. In essence, the CERCLA/NCP requirements at 40 CFR § 300.515 for remedial actions provide that the lead federal agency request that the state identify chemical- and location-specific state ARARs upon completion of site characterization. The requirements also provide that the lead federal agency request identification of all categories of state ARARs (chemical-, location-, and action-specific) upon completion of identification of remedial alternatives for detailed analysis.

F.1.3 Waste Characterization

Selection of ARARs involves the characterization of wastes as described below.

F.1.3.1 RCRA Hazardous Waste Determination

RCRA is a federal statute passed in 1976 to meet four goals: 1) the protection of human health and the environment, 2) the reduction of waste, 3) the conservation of energy and natural resources, and 4) the elimination of the generation of hazardous waste as expeditiously as possible. The Hazardous and Solid Waste Amendments (HSWA) of 1984 significantly expanded the scope of RCRA by adding new corrective action requirements, land disposal restrictions, and technical requirements. RCRA, as amended, contains several provisions that are potential ARARs for CERCLA sites.

Substantive RCRA requirements are applicable to remedial actions on CERCLA sites if the waste is a RCRA hazardous waste, and either:

- The waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement; or
- The activity at the CERCLA site constitutes treatment, storage, or disposal, as defined by RCRA (EPA, 1988a).

The preamble to NCP indicates that state regulations that are components of a federally authorized or delegated state program are generally considered federal requirements and potential federal ARARs for the purposes of ARARs analysis (55 Fed. Reg. 8666, 8742 [1990]). The state of California received approval for its base RCRA hazardous waste management program on 23 July 1992 (57 Fed. Reg. 32726 [1992]). The state of California "Environmental Health Standards for the Management of Hazardous Waste," set forth in Title 22 California Code of Regulations, Division 4.5 (Cal. Code Regs. tit. 22, div. 4.5), were approved by EPA as a component of the federally authorized state of California RCRA program.

The regulations of Cal. Code Regs. tit. 22, div. 4.5 are, therefore, a source of potential federal ARARs for CERCLA remedial actions. The exception is when a state regulation is "either broader in scope or more stringent" than the corresponding federal RCRA regulations. In that case, such regulations are not considered part of the federally authorized program or potential federal ARARs. Instead, they are purely state law requirements and potential state ARARs.

The EPA 23 July 1992 notice approving the state of California RCRA program (57 Fed. Reg. 32726 [1992]) specifically indicated that the state regulations addressed certain non-RCRA, state-regulated hazardous wastes that fell outside the scope of federal RCRA requirements. Cal. Code Regs. tit. 22, div. 4.5 requirements would be potential state ARARs for such non-RCRA, state-regulated wastes.

Federal RCRA hazardous waste determination is necessary to determine whether a waste is subject to RCRA requirements at Cal. Code Regs. tit. 22, div. 4.5 and other state requirements at Cal. Code Regs. tit. 23, div. 3, Chapter (ch.) 15.

RCRA Listed Wastes- The first step in the RCRA hazardous waste characterization process is to evaluate contaminated media at the site and determine whether it constitutes a "listed" RCRA waste. The preamble to the NCP states that "…it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, if such documentation is lacking, the lead agency may assume it is not a listed waste" (55 Fed. Reg. 8666, 8758 [1990]).

This approach is confirmed in EPA guidance for CERCLA compliance with other laws (EPA, 1988a), as follows:

"To determine whether a waste is a listed waste under RCRA, it is often necessary to know the source. However, at many Superfund sites, no information exists on the source of wastes. The lead agency should use available site information, manifests, storage records, and vouchers in an effort to ascertain the nature of these contaminants. When this documentation is not available, the lead agency may assume that the wastes are not listed RCRA hazardous wastes, unless further analysis or information becomes available that allows the lead agency to determine that the wastes are listed RCRA hazardous wastes."

RCRA hazardous wastes that have been assigned EPA hazardous waste numbers (or codes) are listed in Cal. Code Regs. tit. 22, §§ 66261.30–66261.33. The lists include hazardous waste codes beginning with the letters "F," "K," "P," and "U."

Knowledge of the exact source of a waste is required for source-specific listed wastes ("K" waste codes). Some knowledge of the nature or source of the waste is required even for listed wastes from nonspecific sources, such as spent solvents ("F" waste codes) or commercial chemical products ("P" and "U" waste codes). These listed RCRA hazardous wastes are restricted to commercially pure chemicals used in particular processes such as degreasing.

P and U wastes cover only unused and unmixed commercial chemical products, particularly spilled or off-spec products (EPA, 1991). Not every waste containing a P or U chemical is a hazardous waste. To determine whether a CERCLA investigation-derived waste contains a P or U waste, there must be direct evidence of product use. In particular, all the following criteria must be met. The chemicals must be:

- Discarded (as described in 40 CFR § 261.2[a][2]),
- Either off-spec commercial products or a commercially sold grade,
- Not used (soil contaminated with spilled unused wastes is a P or U waste), and
- The sole active ingredient in a formulation.

RCRA Characteristic Wastes- The second step in the RCRA hazardous waste characterization process is to evaluate potential hazardous characteristics of the waste. The evaluation of characteristic waste is described in EPA guidance as follows (EPA, 1988a):

"Under certain circumstances, although no historical information exists about the waste, it may be possible to identify the waste as RCRA characteristic waste. This is important in the event that (1) remedial alternatives under consideration at the site involve on-site treatment, storage, or disposal, in which case RCRA may be triggered as discussed in this section; or (2) a remedial alternative involves off-site shipment. Since the generator (in this case, the agency or responsible party conducting the Superfund action) is responsible for determining whether the wastes exhibit any of these characteristics (defined in 40 CFR §§ 261.21–261.24), testing may be required. The lead agency must use best professional judgment to determine, on a site-specific basis, if testing for hazardous characteristics is necessary."

"In determining whether to test for the toxicity characteristic using the extraction procedures (EP) toxicity test, it may be possible to assume that certain low concentrations of waste are not toxic. For example, if the total waste concentration in soil is 20 times or less the EP toxicity concentration, the waste cannot be characteristic hazardous waste. In such a case, RCRA requirements would not be applicable. In other instances, where it appears that the substances may be characteristic hazardous waste (ignitable, corrosive, reactive, or EP toxic), testing should be performed."

Hazardous waste characteristics, as defined in 40 CFR §§ 261.21–261.24, are commonly referred to as ignitability, corrosivity, reactivity, and toxicity. California environmental health standards for the management of hazardous waste set forth in Cal. Code Regs. tit. 22, div. 4.5 were approved by EPA as a component of the federally authorized California RCRA program. Therefore, the characterization of RCRA waste is based on the state requirements.

The characteristics of ignitability, corrosivity, reactivity, and toxicity are defined in Cal. Code Regs. tit. 22, §§ 66261.21–66261.24. According to Cal. Code Regs. tit. 22, § 66261.24(a)(1)(A), "A waste that exhibits the characteristic of toxicity pursuant to subsection (a)(1) of this section has the EPA Hazardous Waste Number specified in Table I of this section which corresponds to the toxic contaminant causing it to be hazardous." Table I assigns hazardous waste codes beginning with the letter "D" to wastes that exhibit the characteristic of toxicity; D waste codes are limited to "characteristic" hazardous wastes.

According to Cal. Code Regs. tit. 22, § 66261.10, waste characteristics can be measured by an available standardized test method or be reasonably classified by generators of waste based on their knowledge of the waste provided that the waste has already been reliably tested or if there is documentation of chemicals used.

The requirements at Cal. Code Regs. tit. 22, § 66261.24 list the toxic contaminant concentrations that determine the characteristic of toxicity. The concentration limits are in milligrams per liter (mg/L). These units are directly comparable to total concentrations in waste groundwater and surface water. For waste soils, these concentrations apply to the extract or leachate produced by the toxicity characteristic leachate procedure (TCLP).

A waste is considered hazardous if the contaminants in the wastewater or in the soil TCLP extract equal or exceed the TCLP limits. TCLP testing is required only if total contaminant concentrations in soil equal or exceed 20 times the TCLP limits because TCLP uses a 20-to-1 dilution for the extract (EPA, 1988a).

OU-2 Waste Characterization- An evaluation will be conducted at the time of waste generation to determine whether or not waste generated from the remedial action at OU-2 is a RCRA-listed or characteristic hazardous waste.

F.1.3.2 California-Regulated, Non-RCRA Hazardous Waste

A waste determined not to be a RCRA hazardous waste may still be considered a state-regulated non-RCRA hazardous waste. The state is broader in scope in its RCRA program in determining hazardous waste. Cal. Code Regs. tit. 22, § 66261.24(a)(2) lists the total threshold limit concentrations (TTLCs) and the soluble threshold limit concentrations (STLCs) for non-RCRA hazardous waste. The state applies its own leaching procedure, waste extraction test (WET), that uses a different acid reagent and has a different dilution factor (tenfold). There are other state requirements that may be broader in scope than federal ARARs for identifying non-RCRA wastes regulated by the state. These may be potential ARARs for wastes not covered under federal ARARs. See additional subsections of Cal. Code Regs. tit. 22, § 66261.24. A waste is considered hazardous if its total concentrations exceed the TTLCs or if the extract concentrations from the WET exceed the STLCs.

A WET is required when the total concentrations exceed the STLC but are less than the TTLCs (Cal. Code Regs. tit. 22, div. 4.5, ch. 11, Appendix [app.] II [b]).

An evaluation will be conducted at the time of waste generation to determine whether or not waste generated from the remedial action at OU-2 is a California-regulated, non-RCRA hazardous waste.

F.1.3.3 Other California Waste Classifications

For waste discharged after 18 July 1997, solid waste classifications at Cal. Code Regs. tit. 27, §§ 20210, 20220, and 20230 are used to determine applicability of waste management requirements. These are summarized below:

A "designated waste" under Cal. Code Regs. tit. 27, § 20210 is defined at Cal. Water Code § 13173. Under Cal. Water Code § 13173, designated waste is hazardous waste that has been granted a variance from hazardous waste management requirements or nonhazardous waste that consists of or contains pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state.

A nonhazardous solid waste under Cal. Code Regs. tit. 27, § 20220 is all putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semisolid wastes, and other discarded waste (whether of solid or semisolid consistency), provided that such wastes do not contain wastes that must be managed as hazardous wastes or wastes that contain soluble pollutants in concentrations that exceed applicable water quality objectives or could cause degradation of waters of the state.

Under Cal. Code Regs. tit. 27, § 20230, inert waste is that subset of solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives and does not contain significant quantities of decomposable waste.

These state requirements may be more stringent than hazardous waste requirements and proper waste classification at the time of waste generation will determine their applicability.

F.2 Chemical-Specific ARARs

Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a cleanup level. Many potential ARARs associated with particular response alternatives (such as closure or discharge) can be characterized as action-specific, but include numerical values or methodologies to establish them so they fit in both categories (chemical- and action-specific). This section presents ARARs determination conclusions addressing groundwater, soil, and air.

The evaluation of potential federal and state chemical-specific ARARs is summarized in Table F-A, which is included at the end of this appendix. Groundwater, soil, and air are the environmental media potentially affected by the OU-2 remedial actions. The conclusions for chemical-specific ARARs pertaining to these media are presented in the following sections.

F.2.1 Groundwater ARARs Conclusions

This section summarizes potential ARARs for groundwater and identifies the controlling federal and state ARARs. Table F-1 summarizes the federal and state Maximum Contaminant Levels (MCLs) for the VOCs that have been detected in both the vadose zone and groundwater at JPL.

Table F-1. MCLs for VOCs Detected in Vadose Zone and Groundwater at JPL

Constituent	Federal MCL[(a)], mg/L	California MCL[(b)], mg/L
Carbon Tetrachloride	0.005	0.0005
1,1- Dichloroethylene	0.007	0.006
Freon 113™	NA	1.2
Trichloroethylene	0.005	0.005

(a) Based on the Safe Drinking Water Act
(b) Based on Title 22 of the California Code of Regulations
NA = Not applicable.

F.2.1.1 Federal

One of the significant issues in identifying ARARs for groundwater under the Safe Drinking Water Act (SDWA) is whether the groundwater at the site can be classified as a source of drinking water. EPA groundwater policy is set forth in the preamble to NCP (55 Fed. Reg. 8666, 8752–8756 [1990]). This policy uses the groundwater classification system set forth in the draft EPA Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986). Under this policy, groundwater is classified in one of three categories (Class I, II, or III), based on ecological importance, replaceability, and vulnerability considerations.

Irreplaceable groundwater that is currently used by a substantial population or groundwater that supports a vital habitat is considered to be Class I. Class II consists of groundwater that is currently being used or that might be used as a source of drinking water in the future. Groundwater that cannot be used for drinking water due to insufficient quality (e.g., high salinity or widespread, naturally occurring contamination) or quantity is considered to be Class III. The EPA guidelines define Class III groundwater as groundwater with total dissolved solids (TDS) concentrations over 10,000 mg/L and a yield of less than 150 gallons per day (EPA, 1986). Class III groundwater can also be classified based on economic or technological treatability tests as well as quality or quantity (both criteria are not needed, just one or the other).

The Regional Water Quality Control Board (RWQCB), Los Angeles Region has designated the aquifer underlying JPL as a drinking water source.

Safe Drinking Water Act- Federal MCLs developed by EPA under the SDWA are potential relevant and appropriate requirements for aquifers with Class I and Class II characteristics, and therefore are potential federal ARARs. The point of compliance (POC) for MCLs under the SDWA is at the tap. Therefore, the MCLs are not "applicable" ARARs for NASA sites. However, MCLs are generally considered relevant and appropriate as remediation goals for current or potential drinking water sources, and thus are commonly identified as potential ARARs for groundwater remedial actions under CERCLA.

MCLs are considered relevant and appropriate for OU-2 because VOCs in the vadose zone will be remediated to a level expected to protect groundwater quality. MCLs for the chemicals detected in the vadose zone and groundwater at OU-2 are found at 40 CFR § 141.61(a) and (c). Although MCLs are developed using cost and technical considerations, EPA considers them to be protective of human health as well.

F.2.1.2 State

The following potential state ARARs have been identified:

- California Safe Drinking Water Act of 1976 (Health and Safety Code §§ 4010.1 and 4026(c)) and State MCLs (Cal. Code Regs. tit. 22, §64444);
- Porter-Cologne Water Quality Control Act as implemented in the Comprehensive Water Quality Plan for the Los Angeles River Basin (Cal. Water Code § 13240);
- SWRCB Resolution (Res.) 92-49 and Res. 68-16; and
- Cal. Code Regs. tit. 23, div. 3, ch. 15, § 2550(a), 2550.4(d), (e), and (f), and 2550.5; and tit. 22 § 66264.94.

California Safe Drinking Water Act and State MCLs- 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]) and state MCLs for organic chemicals are set forth in Cal. Code Regs. tit. 22 § 64444. Some state MCLs are more stringent than the corresponding federal MCLs. In these instances, the more stringent state MCLs are applicable to the remedial action at JPL (See Table F-1). There are also some chemicals that lack federal MCLs. Where state MCLs exist, they are also applicable to these chemicals. NASA has determined that the substantive provisions of the standards in Cal. Code Regs. tit. 22, §64444 are relevant and appropriate because VOCs in the vadose zone will be remediated to a level expected to protect groundwater quality.

Porter-Cologne Water Quality Control Act- The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) became Division 7 of the California Water Code in 1969. The Porter-Cologne Act requires each regional board to formulate and adopt Basin Plans for all areas within the region (Cal. Water Code § 13240). It also requires each regional board to establish water quality objectives (WQOs) that will protect the beneficial uses of the water basin (Cal. Water Code § 13241 and to prescribe waste discharge requirements that would implement the Basin Plan for any discharge of waste to the waters of the state (Cal. Water Code § 13263[a]).

Other sections of the Porter-Cologne Act include Cal. Water Code § 13243, which allows regional boards to specify conditions or areas where waste discharge is not permitted. Cal. Water Code § 13269 provides the boards authority for waivers for reports or compliance with requirements as long as it is not against the public interest. Cal. Water Code § 13360 specifies circumstances for regional boards to order compliance in a specific manner.

NASA accepts the substantive provisions of Cal. Water Code §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act as enabling legislation as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the water quality control plan (WQCP) for the Los Angeles Region, SWRCB Res. 68-16 and Res. 88-63, and state primary MCLs as potential state ARARs. Where waste discharge requirements are specified in general permits, the substantive requirements in the permits, but not the permits themselves, are potential ARARs.

Cal. Water Code § 13304 sets forth enforcement authority and an enforcement process (orders issued by the state) and is procedural in nature. It does not constitute an ARAR because it does not itself establish or contain substantive environmental "standards, requirements, criteria, or limitations" (CERCLA § 121 [42 USC § 9621]) and is not in itself directive in intent. Through its enforcement authority and procedures, substantive state environmental standards set forth in other statutes, regulations, plans, and orders are enforced. In addition, Cal. Water Code § 13304 is no more stringent than the substantive requirements of other potential state ARARs identified above or potential federal ARARs for groundwater.

Comprehensive Water Quality Control Plan for Los Angeles River Basin (Water Code 13240)- The RWQCB, Los Angeles Region Basin Plan identifies 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 a 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 OU-2 at JPL will consider the soil to groundwater migration pathway to protect of beneficial uses of the groundwater.

State Water Resources Control Board Res. 92-49 and 68-16- State Water Resources Control Board Res. 92-49 (as Amended on 21 April 1994 and 02 October 1996) is titled Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304. This resolution contains policies and procedures for the regional boards that apply to all investigations and cleanup and abatement activities for all types of discharges subject to Cal. Water Code § 13304.

SWRCB Res. 68-16 Statement of Policy With Respect to Maintaining High Quality of Waters in California, 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 the required 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 necessary to ensure that a) pollution or a nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the state will be maintained (SWRCB, 1968).

Cleanup to below background water quality conditions is not required by the SWRCB under the Porter-Cologne Act. SWRCB Res. 92-49 II.F.1 provides that regional boards may require cleanup and abatement to "conform to the provisions of the Resolution No. 68-16 of the State Water Board, and the Water Quality Control Plans of the State and Regional Water Quality Control Boards, provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than background conditions."

NASA recognizes that the key substantive requirements of Cal. Code Regs. tit. 22, § 66264.94 (and the identical requirements of Cal. Code Regs tit. 23, § 2550.4 and Section III.G of SWRCB Res. 92-49) require cleanup to background levels of constituents unless such restoration proves to be technologically or economically infeasible and an alternative cleanup level of constituents will not pose a substantial present or potential hazard to human health or the environment. In addition, NASA recognizes that these provisions are more stringent than corresponding provisions of 40 CFR § 264.94 and, although they are federally enforceable via the RCRA program authorization, they are also independently based on state law to the extent that they are more stringent than the federal regulations.

NASA has also determined that SWRCB Res. 68-16 is not a chemical-specific ARAR for determining remedial action goals. However, SWRCB Res. 68-16 is an action-specific ARAR for regulating discharged treated groundwater back into the aquifer. NASA has determined that further migration of already impacted groundwater is not a discharge governed by the language in Res. 68-16. More specifically, the language of SWRCB Res. 68-16 indicates that it is prospective in intent, applying to new discharges in order to maintain existing high-quality waters. It is not intended to apply to restoration of waters that are already degraded.

NASA's position is that SWRCB Res. 68-16 and 92-49 and Cal. Code Regs. tit. 23, § 2550.4 do not constitute chemical-specific ARARs for this remedial action because they are state requirements and are not more stringent than federal ARAR provisions of Cal. Code Regs. tit. 22, § 66264.94. The NCP set forth in 40 CFR § 300.400(g)(4) provides that only state standards more stringent than federal standards may be ARARs (see also CERCLA § 121(d)(2)(A)(ii) [42 USC § 9621(d)(2)(A)(ii)]).

The substantive technical standard in the equivalent state requirements (i.e., Cal. Code Regs. tit. 23, div. 3, ch. 15 and SWRCB Res. 92-49 and 68-16) is identical to the substantive technical standard in Cal. Code Regs. tit. 22, § 66264.94. This section of Cal. Code Regs. tit. 22 will likely be applied in a manner consistent with equivalent provisions of other regulations, including SWRCB Res. 92-49 and 68-16. Cal. Code Regs. tit. 22, § 66264.94 is not applicable but is relevant and appropriate.

F.2.2 Soil ARARs Conclusions

The key threshold question for soil ARARs is whether or not the wastes located at OU-2 would be classified as hazardous waste. The soil may be classified as a federal hazardous waste as defined by RCRA and the state-authorized program, or as non-RCRA, state-regulated hazardous waste. If the soil is determined to be hazardous waste, the appropriate requirements will apply.

F.2.2.1 Federal

RCRA Hazardous Waste and Groundwater Protection Standards- The federal RCRA requirements at 40 CFR pt. 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are therefore considered potential federal ARARs. The applicability of RCRA requirements depends on whether the waste is a RCRA hazardous waste, whether the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement, and whether the activity at the site constitutes treatment, storage, or disposal as defined by RCRA. However, RCRA requirements may be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is a RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. The RCRA requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the TCLP. The maximum concentrations allowable for the TCLP listed in § 66261.24(a)(1)(B) are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste (see Section F.1.3.1).

The requirements at Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) are potential federal ARARs for the vadose zone (i.e., the unsaturated zone contamination). These sections set concentration limits for the unsaturated zone as well as for groundwater and surface water. These requirements are considered to be potential federal ARARs because they are part of the approved state RCRA program. Cal. Code Regs. tit. 22, § 66264.94 is not applicable but is relevant and appropriate.

RCRA land disposal restrictions (LDRs) at Cal. Code Regs. tit. 22, § 66268.1(f) are potential federal ARARs for discharging waste to land. This section prohibits the disposal of hazardous waste to land unless (1) it is treated in accordance with the treatment standards of Cal. Code Regs. tit. 22, § 66268.40 and the underlying hazardous constituents meet the Universal Treatment Standards at Cal. Code Regs. tit. 22, § 66268.48; (2) it is treated to meet the alternative soil treatment standards of Cal. Code Regs. tit. 22, § 66268.49; or (3) a treatability variance is obtained under Cal. Code Regs. tit. 22, § 66268.44. These are potentially applicable federal ARARs because they are part of the state-approved RCRA program. RCRA Treatment Standards for non-RCRA, state-regulated waste are not potentially applicable federal ARARs, but they may be relevant and appropriate state ARARs.

F.2.2.2 State

RCRA Requirements- State RCRA requirements included within the EPA-authorized RCRA program for California are considered to be potential federal ARARs and are discussed above. When state regulations are either broader in scope or more stringent than their federal counterparts, they are considered potential state ARARs. State requirements such as the non-RCRA, state-regulated hazardous waste requirements may be potential state ARARs because they are not within the scope of the federal ARARs (57 Fed. Reg. 60848). The Cal. Code Regs. tit. 22, div. 4.5 requirements that are part of the state-approved RCRA program would be potential state ARARs for non-RCRA, state-regulated hazardous wastes.

The site waste characteristics need to be compared to the definition of non-RCRA, state-regulated hazardous waste. The non-RCRA, state-regulated waste definition requirements at Cal. Code Regs. tit. 22, § 66261.24(a)(2) are potential state ARARs for determining whether other RCRA requirements are potential state ARARs. This section lists the TTLCs and STLCs. The site waste may be compared to these thresholds to determine whether it meets the characteristics for a non-RCRA, state-regulated hazardous waste.

F.2.3 Air ARARs Conclusions

South Coast Air Quality Management District (SCAQMD) Rules 201, 203, 401, 402, 403, 1303, and 1401 are potential ARARs for the remedial action outlined in this ROD. More specific information on these requirements is provided in the discussion of action-specific ARARs.

F.3: Location-Specific ARARs

Potential location-specific ARARs are identified and discussed in this section. The discussions are presented based on various attributes of the site location, such as whether it is within a floodplain. Additional surveys will be performed in connection with the remedial action design and implementation to confirm location-specific ARARs where inadequate siting information currently exists, or in the event of changes to planned facility locations.

Cultural resources, wetlands protection, floodplain management, hydrologic resources, biological resources, other natural resources, and geologic characteristics are the resource categories relating to location-specific requirements potentially affected by the OU-2 remedial actions. A discussion of these resource categories can be found in the National Environmental Policy Act (NEPA) Values Assessment included in Appendix E of this ROD.

The following subsections provide a discussion of federal and state ARARs by location-specific resources. Pertinent and substantive provisions of the potential ARARs listed and described below were reviewed to determine whether they are potential federal or state ARARs for the OU-2 ROD.

Federal and state requirements that are determined to be ARARs or TBCs are identified in Table F-B at the end of this appendix. ARARs determinations are presented in the column denoted by the heading ARAR Determination. Determinations of status for location-specific ARARs were generally based on the results of the OU-2 Feasibility Study (FWEC, 1999a).

F.3.1 Cultural Resources ARARs

The following are potentially applicable ARARs related to cultural resources:

- National Historic Preservation Act of 1966, as amended (16 USC §§ 470–470x-6, 36 CFR pt. 800, 40 CFR § 6.301[b]);

- Archaeological and Historic Preservation Act (16 USC § 469–469c-1, 40 CFR § 6.301[c]).

National Historic Preservation Act of 1966, As Amended- Pursuant to Sections 106 and 110(f) of the National Historic Preservation Act (NHPA) (16 USC §§ 470–470x-6, and its implementing regulations [36 CFR pt. 800]), as amended, CERCLA remedial actions are required to take into account the effects of remedial activities on any historic properties included on or eligible for inclusion on the National Register of Historic Places (National Register). The National Register is a list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. Section 110(f) of the NHPA of 1966, as amended, requires that before approval of any federal undertaking that may directly and adversely affect any National Historic Landmark, the head of the responsible federal agency will, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to the landmark, and will afford the Advisory Council a reasonable opportunity to comment on the undertaking.

Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus. However, a historic, archaeological, architectural, and cultural resource review of surrounding and on-site property will be conducted prior to implementation of remedial actions involving structure demolition, construction, or intrusive groundwork.

Archaeological and Historic Preservation Act- The Archaeological and Historic Preservation Act, 16 USC § 469–469c-1, provides for the preservation of historical and archaeological data that might otherwise be lost as a result of dam construction or alterations of the terrain. If activities in connection with any federal construction project or federally approved project may cause irreparable loss to significant scientific, prehistoric, or archaeological data, the act requires the agency undertaking that project to preserve the data or request the Department of the Interior (DOI) to do so. This act differs from the NHPA in that it encompasses a broader range of resources than those listed on the National Register and mandates only the preservation of the data (including analysis and publication).

Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus. However, a historic, archaeological, architectural, and cultural resource review of surrounding and on-site property will be conducted prior to implementation of remedial actions involving structure demolition, construction, or intrusive groundwork.

F.3.2 Wetlands Protection and Floodplains Management ARARs

This section includes an evaluation of the following potential ARARs relating to wetland or floodplains management:

- Executive Order (Exec. Order No.) 11990, Protection of Wetlands (40 CFR § 6.302[a]);
- Exec. Order No. 11988, Floodplain Management (40 CFR § 6.302[b]); and
- Clean Water Act, §404, 33 USC § 1344.

Protection of Wetlands, Exec. Order No. 11990- Exec. Order No. 11990 requires that federal agencies minimize the destruction, loss, or degradation of wetlands; preserve and enhance the natural and beneficial value of wetlands; and avoid support of new construction in wetlands if a practicable alternative exists. 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.

Floodplain Management, Exec. Order No. 11988- Under 40 CFR § 6.302(b), federal agencies are required to evaluate the potential effects of action they may take in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain. Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus and outside of the 100-year floodplain of Arroyo Creek.

Clean Water Act (33 USC § 1344)- Section 404 of the Clean Water Act of 1977 governs the discharge of dredged and fill material into waters of the United States, including adjacent wetlands. Wetlands are areas that are inundated by water frequently enough to support vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mudflats, natural ponds and similar areas. Both the EPA and the U.S. Army Corps of Engineers have jurisdiction over wetlands. EPA's Section 404 guidelines are promulgated in 40 CFR § 230, and the U.S. Army Corps of Engineer's guidelines are promulgated in 33 CFR § 320.

Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus and outside the area of any potential wetlands. Therefore, discharge of dredged or fill material to a wetland is not planned as part of the remedial action.

F.3.3 Biological Resources ARARs

The following is an evaluation of potential ARARs related to biological resources at the site:

- Endangered Species Act of 1973 (substantive provisions of 16 USC §§ 1531–1543)
- California Fish and Game Code.

Endangered Species Act of 1973- The Endangered Species Act (ESA) of 1973 (16 USC §§ 1531–1543) provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction. The ESA defines an endangered species and provides for the designation of critical habitats. Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. Under Section 7(a) of the ESA, federal agencies must carry out conservation programs for listed species. The Endangered Species Committee may grant an exemption for agency action if reasonable mitigation and enhancement measures such as propagation, transplantation, and habitat acquisition and improvement are implemented. Consultation regulations at 50 CFR § 402 are administrative in nature and are therefore not ARARs. However, they may be TBCs to comply with the substantive provisions of the ESA.

California Fish and Game Code- This code specifies actions which must be taken to protect or conserve wetlands, rare native plants, and endangered species and wildlife habitat.

Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus, which provide minimal wildlife habitat. The ESA and provisions of the California Fish and Game Code are not considered to be ARARs.

F.4: Action-Specific ARARs

Table F-C at the end of this appendix lists and evaluates federal and state potential action-specific ARARs for OU-2. A discussion of the requirements determined to be pertinent to the selected remedy for OU-2 is presented in this section. A discussion of how the selected remedy complies with each identified ARAR is also provided.

The selected remedy at OU-2 includes the use of SVE to effect VOC source removal from the vadose zone. The extracted soil vapor will be treated to remove VOCs prior to discharge to the atmosphere in order to meet air permit requirements. The SVE system will be located on facility.

F.4.1 Federal

Federal laws that give rise to potential ARARs for actions to be undertaken as part of the SVE remedy include RCRA and the Clean Air Act (CAA). These requirements are described below:

RCRA- Waste streams created in the course of implementing the remedial action will be subject to RCRA requirements for determining whether wastes will be classified as hazardous. Hazardous waste determinations for the soil cuttings generated from the installation of the SVE wells and the spent carbon generated from the off-gas treatment will be made at the time the waste is generated. If these wastes are determined to be hazardous, then the appropriate requirements for storing, manifesting, and transporting these materials for final disposal will be followed.

Clean Air Act- Several CAA requirements will apply to the operation of the SVE treatment system including standards set under the National Primary and Secondary Ambient Air Quality Standards (NAAQs) rules and the provisions of the State Implementation Plan (SIP). These CAA requirements are implemented by the California Air Resources Board through the local air quality management district. The designated district issues an air permit, which covers the air pollution control requirements from the federal CAA, the California Health and Safety Code, and local district rules. The local air district for JPL is the SCAQMD. The rules adopted by SCAQMD are discussed below.

F.4.2 State

California state requirements that are potential ARARs for actions to be undertaken as part the selected remedy are described in the following subsections.

SCAQMD Rules 201 and 203- These rules require a permit to construct and operate equipment causing the issuance of air contaminants and are ARARs for the implementation of SVE at OU-2.

SCAQMD Rule 401, 402, and 403- Rule 401 limits visible emissions from a point source. Rule 402 prohibits the discharge of any air emissions in quantities that may cause injury, detriment, nuisance, or annoyance to the public. Rule 403 limits downwind particulate concentrations.

Rule 402 does not qualify as an ARAR for this remedial action because of its vague and subjective nature of the nuisance rule (Rule 402) and the lack of objective "standards, requirements, criteria or limitations" within the meaning of Section 121(d)(2) of CERCLA. Other federal and state ARARs addressing actual and potential air emissions will ensure adequate protection of human health and the environment.

SCAQMD Rule 1303- This rule requires that all new sources of air pollution that result in a net increase of any nonattainment air contaminant or any halogenated hydrocarbons employ the best available control technology (BACT). Current SCAQMD policy (SCAQMD, 1988) sets the threshold of net emissions increase at one pound per day of any nonattainment air contaminant (including reactive organic gases such as trichloroethene [TCE]) for any permitted unit when BACT is required.

SCAQMD Rule 1401- Rule 1401 involves new source review of carcinogenic air contaminants. It requires that an applicant substantiate that the cumulative impacts of emissions from new, relocated, or modified permit units and from all other permit units located within 100 meters that are owned or operated by the applicant will not result in any of the following:

(a) A maximum individual cancer risk (MICR) of greater than 1 in 1 million (1×10^{-6}) at any receptor location, if the permit unit is constructed without toxics best-available control technology (T-BACT);

(b) A MICR of greater than 10 in 1 million (1×10^{-5}) at any receptor location, if the permit unit is constructed with T-BACT; and

(c) More than 0.5 excess cancer cases in the population that is subject to a risk of greater than 1 in 1 million (1×10^{-6}).

Furthermore, the MICR may not exceed 1/70 of the maximum allowable risk specified in item a) or b) above, in any one year at receptor locations within residential areas.

Rule 1401 specifies the risk assessment and emission calculation procedures to be used in determining compliance with the requirements. Currently, SCAQMD has no guidelines for what constitutes T-BACT; instead, the T-BACT determination will be made by the air quality engineer at SCAQMD who is reviewing the permit application.

F.5: Summary

The ARARs for OU-2 have been identified and are summarized in the following tables:

- Table F-A. Chemical-Specific ARARs
- Table F-B. Location-Specific ARARs
- Table F-C. Action-Specific ARARs

Table F-A. Potential Chemical-Specific ARARs Jet Propulsion Laboratory

Requirement	Prerequisites	Citation	ARAR Determination	Comments
		EPA		
Maximum contaminant levels for drinking water.	Remediation	Safe Drinking Water Act (40 CFR, Part 141)	Relevant and Appropriate	Soil will be remediated to a level expected to protect groundwater quality.
Preliminary Remediation Goals (PRGs) provide a risk-based criteria for evaluating soil contamination and cleanup actions.	Remediation	EPA Region IX Guidance	To be considered (TBC)	Soil will be remediated to a level expected to protect groundwater quality
Soil Screening Levels (SSLs) used to provide a risk-based criteria for screening soil contamination.	Soil Remediation	EPA Soil Screening Guidance	To be considered (TBC)	Soil will be remediated to a level expected to protect groundwater quality.
		California Department of Health Services		
Maximum contaminant levels for drinking water.	Remediation	California Safe Drinking Water Act (California Health and Safety Code, Division 5, Part 1, Chapter 7)	Relevant and Appropriate	Soil will be remediated to a level expected to protect groundwater quality.
		State and Regional Water Quality Control Board (RWQCB) *		
Standards for corrective action of waste management units	Remediation	Title 22, CCR, Section 66264.94	Relevant and Appropriate	Soil will be remediated to a level expected to protect groundwater quality.
Incorporated into all Regional Board Basin Plans. Requires that quality of water of the state that is better than needed to protect all beneficial uses be maintained unless certain findings are made. Discharges to high quality water must be treated using best practicable treatment or control necessary to prevent pollution or nuisance and to maintain the highest quality water. Requires cleanup to background water quality or to lowest concentrations technically and economically feasible to achieve. Beneficial uses must, at least, be protected.	Waters of the state	SWRCB Resolution No. 68-16 (Policy with Respect to Maintaining High Quality of Waters in California) (Water Code Section 13140, Clean Water Act 40 CFR, Part 131.12)	Not an ARAR	Soil will be remediated to a level expected to protect groundwater quality.
Establishes policies and procedures for the oversight of investigations and cleanup and abatement activities resulting from discharges of waste that affect or threaten water quality. It authorizes the Regional Water Boards to require cleanup of all waste discharged and restoration of affected water to background conditions. Requires actions for cleanup and abatement to conform to Resolution 68-16 and applicable provisions of Title 23 CCR, Division 3, Chapter 15 as feasible.	Remediation affecting water.	SWRCB Resolution 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304) (Water Code Section 13307)	Not an ARAR	Soil will be remediated to a level expected to protect groundwater quality.

Table F-A. Potential Chemical-Specific ARARs Jet Propulsion Laboratory (Continued)

Requirement	Prerequisites	Citation	ARAR Determination	Comments
Describes the water basins in Los Angeles River Basin region, establishes beneficial uses of ground and surface waters, establishes water quality objectives, including narrative and numerical standards, establishes implementation plans to meet water quality objectives and protect beneficial uses, and incorporates statewide water quality control plans and policies.	Remediation affecting water.	Water Quality Control Plan for the Los Angeles River Basin (Water Code 13240)	Potentially applicable	Soil will be remediated to a level expected to protect groundwater quality.
Approach for investigation and cleanup of soil in the Los Angeles River Basin.	Remediation	RWQCB Interim Site Assessment and Cleanup Guidebook	To be considered (TBC)	Soil will be remediated to a level expected to protect groundwater quality.

* 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 NASA accepts the entire statutes or policies as potential ARARs. Specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs.

ARAR = Applicable or relevant and appropriate requirements.
CCC = California Coastal Commission.
CCR = California Code of Regulations.
CFR = Code of Federal Regulations.
RWQCB = California Regional Water Quality Control Board.
SSL = Soil Screening Level
USC = United States Code.

Table F-B. Potential Location -Specific ARARs Jet Propulsion Laboratory

Location	Requirement	Prerequisites	Citation	ARAR Determination	Comments
Federal Facilities Compliance Act *					
Federal Facility	Facility must comply with federal , state, and local requirements concerning waste management.	Waste management	42 USC, Section 6901	Applicable	The facility will comply with federal, state, and local requirements concerning waste management.
Executive Order 11988, Protection of Floodplains*					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, and restore and preserve natural and beneficial resources.	Action that will occur in a floodplain (i.e., lowlands) and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 CFR 6, Appendix A (excluding Sections 6 [a][2], [4], and [6]); 40 CFR, Part 6.302	Potentially Applicable	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus and outside of the 100-year floodplain of Arroyo Creek.
Archaeological Resources Protection Act, 16 USC Section 469 at seq*					
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts	Construction on previously undisturbed land would require an archaeological survey of the area.	Alteration of terrain that threatens significant scientific, prehistoric, historic, or archaeologic data	36 CFR, Part 65	Potentially Applicable	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus. However, a historic, archaeological, architectural, and cultural resource review of surrounding and on-site property will be conducted prior to implementation of remedial actions involving structure demolition, construction, or intrusive groundwork.
National Historic Preservation Act, 16 USC Section 470*					
Historic project owned or controlled by federal agency	Action to preserve historic properties; planning of action to minimize harm to national historic landmarks	Property included in or eligible for the National Register of Historic Places	36 CFR, Part 800	Potentially Applicable	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus, but no buildings or structures are likely to be impacted by system installation or operation. However, a historic, archaeological, architectural , and cultural resource review of surrounding and on-site property will be conducted prior to implementation of remedial actions involving structure demolition, construction, or intrusive groundwork.
Native American Graves Protection and Repatriation Act of 1990					
Within area where Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony are found	Provides requirements for the identification and appropriate disposition of human remains, funerary objects, sacred objects, or objects of cultural patrimony.		43 CFR, Part 10	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus. Therefore, human remains, funerary objects, sacred objects, or objects of cultural patrimony are not expected. If found, however, the substantive provisions of this law will be followed.
Endangered Species Act of 1973*					
Critical habitat upon which endangered species or threatened species depend	Action to conserve endangered species or threatened species, including consultation with the Department of the Interior.	Determination of effect upon endangered or threatened species or their habitat	16 USC 1536(a)	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus.

Table F-B. Potential Location -Specific ARARs Jet Propulsion Laboratory (Continued)

Location	Requirement	Prerequisites	Citation	ARAR Developments	Comments
Executive Order 11990, Protection of Wetlands*					
Wetland	Action to minimize the destruction, loss, or degradation of wetlands	Wetland as defined by Executive Order 11990, Section 7	40 CFR, Part 6	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus and outside the area of any potential wetlands.
Clean Water Act, Section 404*					
Wetland	Action to prohibit discharge of dredged or fill material into wetland without permit. Mitigation may be required to avoid net loss of wetlands.	Wetland as defined by Executive Order 11990, Section 7	40 CFR, Part 230.10	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus and outside the area of any potential wetlands.
Fish and Game Code*					
Wildlife Species/Habitats	Action must be taken for he general protection and conservation of fish and wildlife resources.		Fish & Game Code Section 1600	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus.
Wetlands	Actions must be taken to ensure that there is "no net loss" of wetlands acreage or habitat value. Action must be taken to reserve, protect, restore, and enhance California's wetland acreage and habitat values.		Fish and Game Commission Wetlands Policy (adopted 1987) included in Fish and Game Code Addenda	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus.
Rare native plants	Action must be taken to conserve native plants; there can be no releases and /or actions that would have a deleterious effect on species or habitat.		Fish & Game Code Sections 2080	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus.
Endangered Species Habitat	No person shall import, export, take, possess, or sell any endangered or threatened species or part or product thereof.	Threatened or endangered species determination on or before 1 January 1985 or a candidate species with proper notification	Fish and Game Code Section 2080	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL Campus.
Endangered Species Habitat	Department policy and legislative findings and definitions for significant natural areas		Fish and Game Code Sections 2050-2068	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus.
Endangered Species Habitat	Procedures for listing endangered species		Fish and Game Code Section 2070	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus.

Table F-B. Potential Location -Specific ARARs Jet Propulsion Laboratory (Continued)

Location	Requirement	Prerequisites	Citation	ARAR Developments	Comments
Endangered Species Habitat	Ensures that action taken will not jeopardize the survival and reproduction of any threatened or endangered species		Fish and Game Code Sections 2090-2096	Not an ARAR	Areas identified for soil remediation system component installation are located on previously disturbed and developed areas of the JPL campus.

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ARAR = Applicable or relevant and appropriate requirements.
CCC =- California Coastal Commission.
CCR = California Code of Regulations.
CFR = Code of Federal Regulations.
RWQCB = California Regional Water Quality Control Board.
USC = United States Code.

Table F-C. Potential Action-Specific ARARs Jet Propulsion Laboratory

Action	Requirement	Prerequisites	Citation	ARAR Developments	Comments
		Clean Air Act (CAA) 40 USC 7401 et seq.			
Discharge to air	Provisions of State Implementation Plan (SIP) approved by EPA under section 110 of CAA.	Major sources of air pollutants	40 USC, Section 7410; portions of 40 CFR, Part 52.220, applicable to South Coast Quality Management District	Applicable	Appropriate protocols will be followed.
	National Primary and Secondary Ambient Air Quality Standards (NAAQS)- standards for ambient air quality to protect public health and welfare.	Contamination of air affecting public health and welfare	40 CFR, Parts 50.4-50.12	Applicable	Appropriate protocols will be followed.
		South Coast Air Quality Management District (SCAQMD)			
Discharge of air emissions	Requires a permit to construct for equipment causing the issuance of air contaminants.	Sources of air pollutants	SCAQMD Regulation II, Rule 201	Applicable	Equipment used for the removal action will meet the appropriate permit requirements.
	Requires a permit to operate for equipments causing the issuance of air contaminants.	Sources of air pollutants	SCAQMD Regulation II, Rule 203	Applicable	Equipment used for the removal action will meet the appropriate permit requirements.
	Requires that all new sources of air pollution in the district use Best Available Control Technology (BACT) and meet appropriate offset requirements.	Sources of air pollutants	SCAQMD Regulation XIII, Rule 1303	Applicable	Equipment used for the removal action will meet the appropriate permit requirements.
	Requires BACT 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.	Sources of air pollutants	SCAQMD Regulation XIII, Rule 1401	Applicable	Equipment used for the removal action will meet the appropriate permit requirements.
	Limits visible emissions from any point source.	Visible emission to atmosphere.	SCAQMD Regulation IV, Rule 401	Applicable	Air emissions will be controlled.
	Prohibits the discharge of any air emissions in quantities that may cause injury, detriment, nuisance, or annoyance to the public.		SCAQMD Regulation IV, Rule 402	Not an ARAR	Air emissions will be controlled.
Discharge of fugitive dust	Limits onsite activities so that the concentrations of fugitive dust at the property line shall not be visible and the downwind particulate concentration shall not be more than 100 micrograms per cubic meter, averaged over 5 hours, above the upwind particulate concentration. This rule also requires every reasonable precaution to minimize fugitive dust and the prevention and cleanup of any material accidentally deposited on paved streets.	Sources of fugitive dust	SCAQMD Regulation IV, Rule 403	Applicable	Dust generated during removal actions will be controlled

Table F-C. Potential Action-Specific ARARs Jet Propulsion Laboratory (Continued)

Action	Requirement	Prerequisites	Citation	ARAR Developments	Comments
		Resource Conservation and Recovery Act			
Hazardous waste generation, management, and disposal	Sets requirements for generations of hazardous waste concerning management, treatment, storage, and disposal. Authorizes California to enforce their own hazardous waste program under the California Hazardous Waste Act.	Generation of hazardous waste	40 CFR, Part 260-280 and 22 CCR, Sections 66260 - 66280.	Applicable	Implementation of the proposed remedy is not anticipated to generate significant amounts of hazardous waste. A determination of whether or not the waste is hazardous will be made at the time of generation.
		Regional Water Quality Control Board			
Soil Remediation	Presents performance standards for vapor extraction systems.	Vapor extraction and treatment	RWQCB Interim Site Assessment and Cleanup Guidebook	To be considered (TBC)	Appropriate protocols will be followed.
Soil Gas Sampling	Presents procedures and techniques for soil gas investigation survey design, sample collection, analysis, and reporting.	Soil gas investigation	RWQCB Interim Guidance for Active Soil Gas Investigations	To be Considered (TBC)	Appropriate protocols will be followed.

* 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 NASA accepts the entire statutes or policies as potential ARARs. Specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs.

ARAR = Applicable or relevant and appropriate requirements.
CCC = California Coastal Commission.
CCR = California Code of Regulations.
CFR = Code of Federal Regulations.
RWQCB = California Regional Water Quality Control Board.
USC = United States Code.
RCRA = Resource Conservation and Recovery Act.
EPA = U.S. Environmental Protection Agency.
NAAQS = National Ambient Air Quality Standards (primary and secondary)

SCAQMD = South Coast Air Quality Management District
SWRCB = California State Water Resources Control Board.
SDWA = Safe Drinking Water Act.
IP = State Implementation Plan.
TBC = To be considered.
NESHAPs = National emission standards for hazardous air pollutants.

F.6: REFERENCES

California State Water Resources Control Board. 1968. Resolution 68-16 – Statement of Policy with Respect to Maintaining High Quality Waters in California.

Foster Wheeler Environmental Corporation. 1999. *Final Remedial Investigation Report for Operable Unit 2: Potential On-Site Contaminant Source Areas*. National Aeronautics and Space Administration, Jet Propulsion Laboratory, Pasadena, CA. November.

FWEC, see Foster Wheeler Environmental Corporation.

South Coast Air Quality Management District. 1988. Policy on Implementation of Rule 1303. http://www.aqmd.gov/rules/html/r1303.html.

SCAQMD, see South Coast Air Quality Management District.

SWRCB, see California State Water Resources Control Board.

United States Environmental Protection Agency. 1986. EPA Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy.

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United States Environmental Protection Agency. 1991. Management of Investigation-Derived Wastes During Site Inspections. EPA/540/G-91/009. May.

EPA, see United States Environmental Protection Agency.

APPENDIX G

PUBLIC COMMENTS AND NASA RESPONSES

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on May 12, 2001)

Commenter	No.	Question or Comment	Response
Elaine S. Tutt	1	What I would like to ask is for the alternatives. There's alternative one and alternative two, and it seems like alternative one is not really an alternative, but it's just continuing not to do something.	EPA guidance requires that the feasibility study process include identification and evaluation of remedial options with respect to technical implementability, effectiveness, and cost. The EPA has developed a list of remedies that are presumed to be the most effective for sites with VOCs in soil based on the EPA's collective knowledge about site investigation and remedy selection for VOC-impacted soils. These presumptive remedies are soil vapor extraction (SVE), excavation/thermal desorption, and excavation /incineration. EPA encourages the use of one of these presumptive remedies at appropriate sites in order to expedite the remedy selection process. Each site must be evaluated to determine if using a presumptive remedy is appropriate. Both thermal desorption and incineration involve excavating and then treating the VOC-impacted soil. Due to the large extent (45 acres) and depth (up to 200 feet) of the VOC-impacted soil, as well as the placement of the existing surface structures, excavation is not feasible and therefore thermal desorption and incineration were discarded as remediation alternatives. SVE was chosen as the most suitable alternative for the JPL site based on the types of soil, the type of VOCs, and the likelihood of being able to effectively treat VOC waste in place and achieving the remedial action objective (RAO). The RAO for the JPL site is to prevent, to the extent practicable, migration of VOCs to groundwater to protect an existing drinking water source. Also, SVE is a feasible option for remediation of VOCs in soils at the JPL site based on the findings of the SVE pilot test, which removed more than 200 pounds of VOCs from the soil. *Continued on the next page.*

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Commenter	No.	Question or Comment	Response
		Question 1, continued.	Alternative 1, No Further Action (NFA), is considered an alternative at the JPL site because The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires that the NFA alternative be evaluated to establish a baseline against which to compare and evaluate other alternatives. Alternative 2, soil vapor extraction (SVE), is the preferred remedy. Additional information on the selection of alternatives can be found in the Feasibility Study for Operable Unit 2 (OU-2) and the document titled *Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils* (EPA, 1993), which are available in the information repositories.
Elaine S. Tutt	2	Commented on the short notice she received regarding the meeting date and time, and would like at least ten days advance notice in the future.	NASA apologizes for the short notice for the public meetings on May 12 and 14, 2001. The Proposed Plan was mailed on May 8, 2001, which did not provide enough time for the public to plan to attend. In response to these concerns, NASA held a third public meeting on June 20, 2001 to provide another opportunity for the public to comment on the Proposed Plan. The mailer for the public meeting held on June 20, 2001 was sent on May 31, 2001, hopefully providing adequate time to plan for attendance at the third public meeting. In addition, the public comment period was extended to July 11, 2001 to allow the public time to comment after the third public meeting. The public announcements for the June 20, 2001 meeting were published in the *Pasadena Star-News* from June 9 to June 15, 2001; in the *Glendale News-Press* on June 6, 9, 13, and 16, 2001; and in the *La Cañada Sun* on June 7 and 14, 2001. Announcements of the public meetings were broadcasted through KPCC radio on June 18 and 19, 2001. The public comment period ran from May 7 through July 11, 2001. Notices of future meetings will be sent out earlier to allow for better planning.

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Commenter	No.	Question or Comment	Response
Susan Blair	3	Once the gases come up through the pipe into the chamber where the carbon is and it absorbs the chemical, what happens to those carbons?	As VOCs are extracted from the soil, they are sent through a treatment system containing granular activated carbon (GAC). Once the carbon becomes full of the VOCs that are pulled from the soil vapor, that granular activated carbon canister is removed from the treatment system at JPL and either recycled or disposed of off site. New granular activated carbon is brought on site and the treatment process continues.
Cynthia Compton	4	In the '50s to the early '60s, a sewer system replaced the seepage pits. Does that mean the chemicals are now going into the sewer system, and where do they go from there?	NASA does not send hazardous waste down the sewer system. Chemicals used at the JPL site are recycled and reused where possible. If the chemicals are not recyclable, they are destroyed in the industrial process, or sent off site for disposal according to federal, state, and local regulations. Current regulations prevent the unauthorized disposal of hazardous waste into sewer systems. The hazardous waste produced at JPL is reported as part of the EPA's Biennial Reporting System (BRS), which is a national system that collects data on the generation, management, and minimization of hazardous waste. The generated waste and disposal methods used by JPL are reported to the EPA, where they are compiled and reported every other year as part of the BRS (EPA, 1997).
Cynthia Compton	5	Is there a record of what other alternatives were considered other than these one and two, and where can we read or find out about that?	Please see the response to Question 1 above regarding the presumptive remedy approach used at JPL.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on May 12, 2001)

Commenter	No.	Question or Comment	Response
Cynthia Compton	6	The pilot system has removed 200 pounds of VOCs. Out of how many is predicted or known to be at the site?	Two methods were used during the Feasibility Study for OU-2 (FWEC, 1999a, 1999c) to estimate the mass of VOCs in the vadose zone soil at JPL. The first method used estimated soil parameters to calculate the approximate soil vapor volume and extent of the VOCs in the soil. Method 2 used guidelines presented in the California Regional Water Quality Control Board guidebook (RWQCB, 1996). Method 2 involved a more rigorous calculation of the VOC concentrations in the soil and used physical soil parameters specified in the RWQCB guidebook. Method 1 estimated approximately 2,250 pounds of VOCs in the soil. Method 2 estimated 5,040 pounds of VOCs in the soil. The variation between these amounts is due to the difference inherent in the two methodologies. It should be noted that the above methods are used to obtain estimates only, and are intended to provide an idea of the order of magnitude of the mass of VOCs, rather than an actual value.
Cynthia Compton	7	Is there some kind of record of when notices are sent out to the public and where they're at?	The Record of Decision (ROD) contains a listing of notices sent to the public, including the date on which they were sent. Please see the response to Question 2 for further information.
Cynthia Compton	8	What about sending the [public meeting] notice to the customers of the water companies that are involved?	NASA believes this is a very good suggestion and it will be taken into consideration when planning the public meeting regarding OU-1 and OU-3.
Cynthia Compton	9	Please provide a list of public meeting notices that have been advertised with locations, dates, and preferably a copy of them.	Please see the response to Questions 2 and 7.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on May 12, 2001)

Commenter	No.	Question or Comment	Response
Cynthia Compton	10	I think what I'm hearing is that the VOCs are in the vapor or the pockets of the soil, so what about the soil itself, involving the VOCs in the soil particles, and once you remove it from the vapor, does it now migrate from the soil particles back into the vapors afterwards?	VOCs can exist in four phases in the vadose zone: in the soil vapor, in the soil moisture, on the soil grain surface due to adsorption, and as free product, which is the pure chemical in liquid form. During the SVE process, a vacuum is applied to withdraw the soil vapor containing VOCs. This process disturbs the equilibrium that existed between the four phases in the vadose zone, which in turn works to increase the natural tendency of the VOCs to volatilize into the vapor phase. As air flows through the soil, the free product and the VOCs in the soil moisture volatilize into the soil vapor and are withdrawn. VOCs also desorb from the soil grain surface, where they may either volatilize directly, or enter the soil moisture and then volatilize. This is the general process by which VOCs are removed from the vadose zone soil using SVE (Kuo, 1999).

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on May 14, 2001)

Commenter	No.	Question or Comment	Response
Edward Stork	11	Are the chemicals only within the boundaries of JPL?	Yes, soil vapor monitoring indicates that the entire soil vapor plume is located on-facility. However, the chemicals in the groundwater have migrated outside the boundaries of JPL.
Edward Stork	12	Can you tell me where the soil vapor extraction wells will actually be located?	The exact location of the wells will be determined during the remedial design phase. The remedial design phase begins after the Record of Decision is agreed upon and signed by the parties involved. The one SVE well that was operated as part of the pilot test is located in the parking lot between Buildings 18 and 79, in the area where the highest concentration of chemicals was found. There will not be any SVE wells located off-facility because all of the chemicals in the vadose zone soil are located within the confines of JPL. Workplans associated with remedial design will be made available to the public through the information repositories.
Edward Stork	13	How much area does one of these vapor extraction wells take up when you install it?	The installed SVE wells will be approximately 8 inches in diameter and up to 200 feet deep. The footprint of the SVE well around the wellhead at the ground surface will be up to 3 feet in diameter. The vapor extraction and treatment equipment will have a footprint of approximately 15 feet by 20 feet.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on May 14, 2001)

Commenter	No.	Question or Comment	Response
Cynthia Compton	14	I'm still having a little trouble distinguishing the difference between contamination in particles of soil versus contamination in the vapors.	Please see the response to Question 10.
Cynthia Compton	15	I know that there was some testing done in Building 107, in the basement, for the air atmosphere, and I wonder if that has turned into one of the 37 permanent test points.	No. In June 1998, in response to concerns raised by the Agency of Toxic Substances and Disease Registry (ATSDR), NASA performed indoor air quality sampling at Building 107 (Foster Wheeler, 1999a). This sampling was undertaken because VOC vapors in soil at relatively shallow depths have the potential to collect in the lower levels of buildings where they may pose a health hazard. The sampling results indicated that VOC vapors were not present in the building (ATSDR, 1998).
Cynthia Compton	16	Two minutes is not enough time for my questions and my comments.	The time was extended to three minutes at the third public meeting with an additional comment time of two minutes after everyone wishing to make comments was given the opportunity to speak. This time constraint was made to ensure everyone's opportunity to speak within the comment time given.
Cynthia Compton	17	I'm interested in a record of the public notices that were sent out in the newspapers and the mailings.	Please see the response to Questions 2 and 7.
Cynthia Compton	18	I think, we, the public, deserve a little bit earlier notice.	Please see the response to Question 2.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL (Public meeting held on May 14, 2001)

Commenter	No.	Question or Comment	Response
Terri Formico	19	Is there any intent to do an anonymous survey of La Cañada residents and employees at JPL of incidences of tumors, cancers, unusual cancers, deaths due to cancer over the last 20 years? Also employees of La Cañada as well. People who have worked here at least 10 years or so. The survey should be offered to all members of the community, all employees of the community of both JPL and La Cañada, not a random or public event to gather data.	The Agency for Toxic Substances and Disease Registry (ATSDR) conducted site visits in 1997 to assess the potential for public health hazards associated with this Superfund site. ATSDR identified two pathways where people could potentially be exposed to chemicals migrating from this location. The first pathway was exposure to impacted groundwater and the second pathway was exposure to impacted soils. ATSDR also identified two primary community concerns through their public surveys. The first concern was future groundwater and drinking water quality, and the second concern was increased incidence of Hodgkin's disease in the community. Following a careful evaluation of the available data, ATSDR determined that VOC-impacted groundwater migrating from this location does not present a past, present, or future public health risk to JPL employees or nearby residents. On-facility groundwater at JPL has never been used as a source of drinking water, and area water purveyors, who are aware of the presence of chemicals in the water basin, regularly monitor their municipal water and take steps (e.g., well water blending, VOC treatment, or well closure) to ensure that drinking water distributed to consumers meets applicable drinking water standards. ATSDR also determined that exposure, if any, to VOC-impacted soils associated with the JPL site is unlikely to cause either short-term or long-term adverse health effects to employees or the public due to low levels of VOCs, the depth of the VOCs, and/or infrequent or unlikely exposure. ATSDR has assigned this Superfund site a "No Apparent Public Health Hazard" category for past, present, and potential future human exposure to VOC-impacted groundwater processed for drinking water and surface soils or soil gases (ATSDR, 1998). In general, the process for reporting a suspected cancer cluster is for a concerned individual to contact their local health department. Epidemiologists can identify certain circumstances that would indicate a cancer cluster. These circumstances include a large number of cases of one type of cancer, rare cancers, or a certain cancer type occurring in an age group not usually affected by that type of cancer. The local health department will refer the caller to the state health department, if necessary (CIS, 1999).

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Commenter	No.	Question or Comment	Response
John Clairday	20	We already do have a groundwater problem, and I think that's been recognized.	NASA acknowledges and appreciates the feedback. Groundwater will be addressed in the Proposed Plan for OU-1 and OU-3.
John Clairday	21	I'm wondering about the effectiveness of the extraction program. Is it one hundred percent effective? If it's not one hundred percent effective, does that mean that a certain percentage will ultimately reach the groundwater and continue to contaminate it?	No technology is 100% effective. Soil vapor extraction was chosen because it is the most effective technology for the constituents of interest and for the types of soils found at JPL. The SVE system will be operated until the performance objectives provided in Section 11.4 of the ROD are achieved. The SVE system will be evaluated based on a reduction in the concentration of the VOCs, not total or percentage of VOC mass removed. Because the VOCs are permanently removed from the soil by the SVE process, existing and future risks to groundwater are reduced. The SVE system is expected to effectively remove the VOCs in soil to levels that are protective of the groundwater

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
John Clairday	22	How do you know how well you're doing, and does the testing continue throughout that term?	During operation of the soil vapor extraction system, regular monitoring is conducted around the site to evaluate VOC removal from the vadose zone. An operator checks on the SVE system periodically (weekly at a minimum) to ensure that the system is running properly. After the performance objectives for the SVE system are achieved the SVE system will be shut down. The proposed monitoring program consists of the collection and analysis of soil vapor samples from the soil vapor monitoring points on a periodic basis both during and after SVE system operation. The frequency and duration of the monitoring program will depend on the ongoing soil vapor monitoring results. Monitoring will be discontinued after the remedial action objective is achieved. The constituents of concern that are already present in the groundwater will be a part of a separate cleanup remedy.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on June 20, 2001)

Commenter	No.	Question or Comment	Response
Bob Crippen	23	My question relates to the topography at the site. How does the depth relate to the property? Do the VOCs come closer to the surface as you go down?	The JPL facility varies in elevation from approximately 1,070 to 1,550 feet above mean sea level. In general, in the western portion of the JPL site, the VOCs are not detected within the first 20 feet of the vadose zone as measured from the ground surface. As the surface elevation of the JPL site increases to the east, the VOCs are not detected in the first 40-50 feet of the vadose zone as measured from the ground surface. In general, the higher concentrations of VOCs are located over 50 feet below the ground surface. Topography maps and horizontal-vertical distribution diagrams of total VOCs may be found in the Feasibility Study and the Remedial Investigation documents (FWEC 1999a, 1999c, 2000).
Bob Crippen	24	Where were the pits and how deep were they? Were the pits more than 50 feet deep?	The identified 40 seepage pits, 5 waste pits, and 4 discharge points are located primarily in the northeastern portion of the JPL site. The exact locations may be found in Figure 5-1 of the ROD. The pits are estimated to be not more than 30 feet deep.
Bob Crippen	25	Your distribution map looks like the distribution went pretty far to the west of the map.	The VOC plume distribution map is an extrapolation of the results from the quarterly soil vapor monitoring program. The soil vapor monitoring reports can be found in the information repositories. In general, the VOCs are predominantly located in the northeast portion of the JPL site.
Bob Crippen	26	Recently the sewer system was put into the eastern part of La Cañada, and I'm in that area. They [the sewer installation crew] said …the water table was only about 10 feet below the surface. That's the part of La Cañada that's immediately adjacent to JPL, and you're saying the water table is 200 feet below the surface.	In general, the depth to groundwater over much of the JPL site averages approximately 200 feet. Shallow groundwater depths have been observed in areas near the mouth of the Arroyo Seco and in the vicinity of the spreading grounds, where groundwater mounding is known to occur. It is possible that the extremely shallow depth to groundwater observed by the sewer installation crew was due to the presence of water perched above a shallow, impermeable lens, which is not directly connected to the regional aquifer below.

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Commenter	No.	Question or Comment	Response
Bob Crippen	27	Toxic, hazardous materials are moved in and out of there [JPL] on a regular basis, just like they are at a gas station. This is nothing new. It must meet current policies, and whatever materials are going past the high school – there's lots of materials going past the high school on a regular basis. I just want you to keep that in mind.	NASA acknowledges and appreciates the feedback.
Bob Crippen	28	Is there an estimate of how much material has been dumped at the site?	The quantity of VOCs that was disposed into the seepage pits is unknown.
Bob Crippen	29	Of 2,000 to 5,000 pounds, what percent do you think is recoverable?	Cleanup levels are not based on the amount or percent of VOC mass recovered. The levels NASA must meet are based on reductions in the concentration of the VOCs in the vadose zone until they are no longer impacting the groundwater beneath the JPL. The cleanup levels, which are yet to be determined, will be agreed upon by NASA and the regulatory agencies involved with the JPL site.
Bob Crippen	30	Where is the currently operating extractor [pilot test SVE well]?	The one SVE well that was operated as part of the pilot test is located in the parking lot next to the fire station between Buildings 18 and 79, in the area where the highest concentration of chemicals was found. The pilot testing system was placed on standby in the summer of 2000 and then reactivated from January to May 2001.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
Bob Crippen	31	What if gases escape into the air? It raises the question: You recovered 200 pounds [of VOCs] in how many days? What is the rate? I mean, if the thing was wide open for a day, how much would escape?	To investigate the appropriateness of using SVE at JPL, a pilot test was conducted in a series of tests that lasted approximately 14 months. During that time, more than 200 pounds of VOCs were removed from the soils surrounding the pilot test area. A general decline in the rate of VOC removal over time was noted during all tests. In general, the rate of VOC mass removal will decrease as the amount of VOCs in the vadose zone decreases. Because the SVE system operates under a vacuum, air from the atmosphere would be drawn into the system if a leak in the pipeline developed while the system was operating. VOCs cannot escape into the atmosphere from a leak in the pipeline. In the event of a system malfunction, the SVE system would stop extracting VOCs and soil vapor from the ground. Safety controls are in place to prevent exposure to VOCs. There is minimal risk that the VOCs already sorbed to the granular activated carbon would desorb. The carbon must be subjected to very high temperatures (600-2,000 °C) before VOCs begin to desorb from the carbon. There is very little threat of catastrophe associated with the soil vapor extraction system. As a presumptive remedy, SVE is a proven technology that presents minimal risks to workers, the public, or the environment. In addition, the levels of VOCs being treated are low and do not present an imminent danger to human health. The maximum soil vapor concentrations for the four primary constituents of interest (carbon tetrachloride, Freon™ 113, TCE, and DCE) that were recorded during seven soil vapor sampling events were found to be significantly lower than the acceptable maximum peak exposure levels set by these agencies: *Continued on the next page.*

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
		Question 31, continued.	Occupational Safety and Health Administration (OSHA), American Conference of Governmental Industrial Hygienists (ACGIH), and the National Institute for Occupational Safety and Health (NIOSH) (Foster Wheeler, 1999a; OSHA, 2000). If any release of soil vapors were to occur before they were treated, they would not only be less than these acceptable safety limits, but they would be diluted immediately into the ambient air and not pose a threat. In addition, the South Coast Air Quality Management District (SCAQMD) requires that all discharges to the atmosphere meet certain standards to protect ambient air quality for the public health and welfare. Vapors extracted by the SVE process have been and will be treated as required by the South Coast Air Quality Management District.
Cynthia Compton	32	Is there a plan to go back and identify as many seepage pits as possible and maybe pulling them out?	No. The seepage pits were identified as part of the Remedial Investigation. Please refer to Question 24 for more information regarding the location of the seepage pits. There are no plans to remove the seepage pits because they are no longer functioning as a continuing source of VOCs to the vadose zone.
Cynthia Compton	33	When you talked about the vadose zone, is that the entire area from the surface to the groundwater? Is that the definition of the vadose zone?	The vadose zone soil consist of the soils from the ground surface to the water table.
Cynthia Compton	34	I just want to comment again that the Feasibility Study is not at the Altadena Library.	A copy of the Feasibility Study for OU-2 was placed in the Altadena Library on June 28, 2001.
Cynthia Compton	35	I'd like to get some quantification of what does that mean, long-term monitoring?	Please see the response to Question 22.
Cynthia Compton	36	About the EPA presumptive remedy, I'd like a clearer definition of what does that mean.	Please see the response to Question 1 regarding the presumptive remedy approach used at JPL.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
Cynthia Compton	37	Do we have to write up our spoken questions?	No. Questions that are asked during a public meeting are recorded by the court reporter and included in a transcript of the meeting. These questions, as well as any that are submitted in writing during the public comment period, will be responded to as part of the Responsiveness Summary. The Responsiveness Summary is part of the Record of Decision.
Cynthia Compton	38	Can you send the responses to everybody that attended the meeting?	Yes. Copies of the Responsiveness Summary were sent to the attendees of the public meetings held in regard to the Proposed Plan for OU-2 at the NASA JPL site on August 27, 2001.
Cynthia Compton	39	The soil vapor extraction operation, I heard you say that there will be an operator there daily. Does that mean he will be there continuously during the time of operation? So the concern about the gases leaking or anything like that, it won't necessarily be caught by a person that's there at the site at the time it's operating?	The operator checks on the system periodically (weekly at a minimum) to ensure that it is running properly and to take samples. The potential for leaks is low in this type of system because the SVE well operates under a vacuum. Please see the response to Question 31 for further information.
Cynthia Compton	40	Is the line item or the NASA budget that's for the Superfund cleanup efforts, is that limited to a certain percent and does that impact the overall NASA budget?	The budget to pay for NASA's cleanup is called the Environmental Compliance and Restoration Account (ECR). This account for Fiscal Year 2001 is approximately $40 million and includes funding for all of NASA's environmental programs. The JPL site receives a portion of the account every year.
Cynthia Gonzal	41	In terms of long-term, will JPL actually be monitoring the site [in terms of toxicity levels] or would it be an outside company or agency doing that?	NASA has contractors that perform the sampling at the JPL site. The documents that contain the sampling results are reviewed by regulatory agencies to ensure completeness.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
Cynthia Gonzal	42	In the printed material where you talk about the risks associated with exposures to chemicals, and you indicated that there were no risks by regulatory standards. The risk that usually is associated with that, will you be monitoring that aspect, also, as relates to the human element? What parameters are set for that?	No. There are no plans to continue monitoring for human health risks. The Human Health Risk Assessment (HHRA) conducted as part of the remedial investigation determined that the risks associated with vadose zone soil were negligible and below regulatory threshold guidelines. In addition, the VOCs detected in the soil vapor samples did not cause unacceptable risk to humans. Details from the Human Health Risk Assessment may be found in the Remedial Investigation report located in the information repositories (FWEC, 1999c). Regular monitoring is conducted around the JPL to evaluate VOC concentrations in the soil. After the Record of Decision is signed, a review is done by the regulatory agencies every five years to examine how well the SVE technology is doing at this site. If the 5-year reviews determine the remedy is not accomplishing the remedial action objective, then the Record of Decision may need to be amended through a document called an Explanation of Significant Differences (ESD). In addition, if the Applicable or Relevant and Appropriate Requirements (ARARs) pertaining to the JPL site are altered in the future, then the SVE remedial action alternative will be reviewed to ensure all related federal and state environmental statutes and requirements continue to be met. Correspondingly, the HHRA results will be reviewed to ensure human health continues to be protected under the new ARARs. *Continued on the next page.*

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
		Question 42, continued.	The South Coast Air Quality Management District (SCAQMD) requires that all discharges to the atmosphere meet certain standards to protect ambient air quality for the public health and welfare. Vapors extracted by the SVE process have been and will be treated as required by the SCAQMD. NASA is currently working with the State of California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC), the California Regional Water Quality Control Board (RWQCB)-Los Angeles Region, and the EPA to finalize the cleanup goals for on-facility soil at the JPL.
Cynthia Gonzal	43	What timeline are we talking about in terms of getting approval for the budget? Specifically in terms of when you begin the work, to do the cleanup process. [Do you] know what date that is?	The budget is based on a five-year cycle plan. Planning for this year and the next five years is completed. Next year, fiscal year 2003 and the subsequent five years will be planned.
Cynthia Gonzal	44	What is the rate of migration or absorption in the soil to the groundwater without this situation?	Modeling will be used in part to conservatively estimate VOC transport in the vadose zone soil during the remedial design phase. Determination of the rate of migration is complicated by many variables, such as the depth to the groundwater table, and the physical and chemical properties of the soil and the VOCs.
Cynthia Gonzal	45	How public will this hearing be made to the community? How we responded to the concerns of the community that are present in the meeting? How about the local newspapers like "The Star News"?	The purpose of this Responsiveness Summary is to provide written responses to the comments received during the public comment period for the Proposed Plan for OU-2. In addition, the ROD will be made available at each of the information repositories. Media representatives were present at the public meetings.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
Scarlett Hibner	46	I think it would be helpful, and in the future when you are discussing the groundwater, if you specify that what you are talking about is the Raymond Basin. If there is such a setup by Lincoln Avenue Water that you mentioned or whatever you mentioned, those people that have to live in the area who are informed will be better able to understand exactly what it is you are saying.	NASA acknowledges and appreciates the feedback.
John O'Kene	47	What are the potential problems from a breakdown in the extraction system that permits the escape of any of these vapors into the atmosphere? What is the potential danger? What is the catastrophe level possible? What are the preventative actions?	Please see the response to Question 31.
Dick Fiedler	48	Is there Superfund money being expended for this meeting?	The Superfund is available to be used by EPA to investigate and remediate impacted sites. However, Superfund money may not be used to address properties owned by the federal government. Remediation of the JPL site and other related activities are being conducted using NASA money. NASA receives Congressional appropriations to pay for remediation at the JPL site. Please see Comment No. 40 for further information.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL (Public meeting held on June 20, 2001)

Commenter	No.	Question or Comment	Response
Dick Fiedler	49	Where is the Superfund money in this cleanup?	NASA is currently paying for the cleanup of soil at JPL.
Dick Fiedler	50	There were two descriptions, alternative A and B up there. I'm just kind of wondering which one are we talking about, the first one that had the extraction and removing the VOCs before they go into the atmosphere or another one because I didn't see another one?	Soil vapor extraction is the proposed alternative for the cleanup of soil at the JPL site. Please see the response to Question 1 for more information.
Dick Fiedler	51	Does the VOC removal require heat?	No, the soil vapor extraction unit does not require heat to remove the volatile organic compounds from the soils at JPL.
Dick Fiedler	52	The VOCs that are underground basically live there until the pressure is such that they are volatilized? Are the VOCs in a liquid form until you apply the pressure?	Please see the response to Question 10 for more information.
Dick Fiedler	53	Is the Navy going to be in charge of this operation?	NASA sends money to the Navy and the Navy then contracts companies to do the work. The contractor who is actually doing the fieldwork for the soil vapor extraction system is Geofon Incorporated.
Dick Fiedler	54	What is the assumption that this soil remediation removing what's in the soil will have no effect on what has gone into the groundwater as of now? Increased VOCs into the groundwater could result from this vaporization process?	SVE does not increase VOCs in groundwater. Rather, soil vapor extraction removes the chemicals from the soil and pulls them above ground for treatment so that they do not reach the groundwater. Please see the response to Questions 10 and 21 for more information.
Dick Fiedler	55	Have you calculated just how many pounds of VOCs Pasadena and Lincoln has removed from the groundwater compared to what you were saying now remains in the groundwater?	No. This has not been evaluated. The VOCs in the groundwater are being studied as part of OU-1 and OU-3. Public meetings will be held to discuss the groundwater issues at a later date

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Commenter	No.	Question or Comment	Response
Dick Fiedler	56	With all the questions that have been asked tonight, I presume that on the record – there are going to be some answers?	The answers to all comments made during the public comment period for the Proposed Plan for OU-2 are addressed in this Responsiveness Summary.
Randy Strapazon	57	Are any of the four chemicals that you mentioned, is it possible in the event, say, of an earthquake when monitoring the leaks would no longer be a leak, it would be a crack, would these four chemicals come together and produce something like when a train has a crash and they have the cloud of smoke and they have [to] evacuate an area?	No. Chemicals will not escape the system at any level that could pose a threat, even during a catastrophic failure. Also, the chemicals do not react with each other and therefore would not create any additional hazards if they were combined. Please see the response to Question 31 for more information.
Randy Strapazon	58	When a carbon filter is removed, you said it's recycled. How? What's that process?	Reactivation is a process designed to remove the VOCs and restore the adsorption capacity of granular activated carbon (GAC) using a special furnace operating at over 800ºC. This process is conducted at licensed facilities away from JPL.
Randy Strapazon	59	Maybe with all that in La Cañada they should have some kind of contingency plan here, knowing a truck with chemicals will be traveling by the school.	The Department of Transportation and other agencies have regulations that govern the transportation of hazardous materials or hazardous waste. NASA and its contractors adhere to these regulations. Transfer of the granular activated carbon canisters will likely only occur a few times a year. There is minimal risk that the VOCs sorbed to the granular activated carbon would desorb. Granular activated carbon must be subjected to very high temperatures (600-2,000ºC) before VOCs begin to desorb from the carbon.

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Commenter	No.	Question or Comment	Response
Terry Shoptsberger	60	What is Superfund for if NASA is paying the bill?	Please see the response to Question 48.
Terry Shoptsberger	61	With the current environmentally unfriendly administration in Washington, how can you begin and how do you guarantee that it's going to continue?	Funding for environmental cleanup has been consistent and independent of the political climate in Washington. Please refer to Comment No. 40 for more information.
Barbara Swain	62	I just want to say I absolutely feel that we need to remove this material from the earth and set an example for the entire country and for private industry. And do it and get it rolling so that it becomes a doable process for any old gas station and anybody who owns property. So I just want to express my own concern that we make this possible and to do it the best way we possibly can. And if we find more stuff than we thought – every project that the steam extraction has taken on, at least each of these reports I've read—Livermore Lab, the Edison site, the Naval Air Station in Alameda, which the Navy people probably know all about – it seems like there's more stuff than anybody ever expected no matter who was doing the estimate.	NASA acknowledges and appreciates the feedback.

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Commenter	No.	Question or Comment	Response
Nancy L. Underwood	63	I'd like to make a comment, responding to the question regarding hazardous waste transportation. It is done under a controlled environment. The Department of Transportation has hazardous regulations that any hazardous waste contract must apply to before transporting on any local streets. So all the plans are made in advance, you know. The director has to write a whole plan and all the regulatory requirements have to be in line with that so it's safely done.	NASA acknowledges and appreciates the feedback.
Visha Sutlaff	64	This is just a comment just to let you guys know, I am a reporter with the "Pasadena Star News." And I may or may not write a story from today's, but I did write a story for Sunday's paper. And I just wanted to tell people about it just – you can get it off the web, and I encourage you to buy the "Star News." But it is a concise explanation of what they're planning to do, and it gives a little history. So our website is www.Pasadenastarnews.com. And they did place advertisements for this as well. So I wrote that article so that people in the community would know about the meeting.	NASA acknowledges and appreciates the feedback.
Cynthia Compton	65	*Written Comment:* I would like to see answers to all the public questions. Would you please send me a copy of the Responsiveness Summary?	Yes. Also, please see the response to Question 38.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
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Commenter	No.	Question or Comment	Response
Cynthia Compton	66	*Written Comment:* Please make sure Feasibility Study (and any other missing documents) are available in Altadena Library.	Please see the response to Question 34.
Cynthia Compton	67	*Written Comment:* Please send me a copy of these question cards.	All questions that were sent to NASA in the mail, or via e-mail, and all questions received at the public meeting (either verbal or written) are included in this Responsiveness Summary.
Cynthia Compton	68	*Written Comment:* Please provide a list of public meeting notices that have been advertised with locations, dates and preferably a copy of them.	Please see the response to Questions 2 and 7.
Scarlett Hibner	69	*Written Comment:* It is incorrect and misleading to say "NASA JPL is located <u>between</u> the city of La Cañada-Flintridge [sic-there is no hyphen in city name] and the unincorporated city of Altadena…" Nearly ALL of JPL lies within the boundaries of La Cañada Flintridge. This failure to acknowledge the true geographical location of JPL has been a political sore point with La Cañadans ever since incorporation of the city in 1976. We lost the battle to Cal Tech/Pasadena on JPL's mailing address-but this kind of geographical mis-use is ridiculous. The Planning Dept. in the city offices can provide further info.	NASA acknowledges and appreciates the feedback.

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Commenter	No.	Question or Comment	Response
Randy Strapazon	70	*Written Comment:* What provisions have been made in the event of – say an earthquake – to evacuate the surrounding population (H.S. students and staff) if a chemical cloud becomes present and is a threat.	Please see the response to Questions 31 for more information.
James Hunt (A copy of the comment was provided by Barbara Swain)	71	*Written Comment:* Extracted from Proposed Plan mailer- "During characterization studies of JPL, the following four VOCs were detected frequently at elevated concentrations in soil vapor samples: CCl_4, Freon 113, TCE, and DCE. These compounds are generally located beneath the north-central part of JPL and were detected in soil vapors at depths extending to the water table, which ranges up to 200 feet or more below ground surface. The total mass of these VOCs in vadose zone soil as estimated to be no greater than 5,040 pounds". *These compounds were likely released into the soil from a leaking tank, pipeline, or waste collection system. If they were released as pure organic solvents, then the compounds will exist initially as non-aqueous phase liquids, NAPLs (like the gasoline in your car). These liquids move into the soils and volatilize since they have a high vapor pressure (like gasoline).* Continued on the next page.	NASA acknowledges and appreciates your feedback.

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Commenter	No.	Question or Comment	Response
		Question 71, continued: *If enough are released, the liquids can migrate to the water table where they continue to sink since they are denser than water. If the pure phase liquids were released, then most of the compounds will be found within the gas phase due to their volatility. However, it is highly likely that these solvents were used to clean machines or electronics equipment. These waste solvents probably had a lot of oily materials dissolved in them and were not missed when they were "lost" after use, unlike the original clean solvents. In this case, the combination of the oil and the volatile solvents lowers the volatility of the solvents, and less of the material is found within the gas phase and more is within the liquid. Without seeing anything more than the above paragraph, I am guessing that the estimate of 5000 pounds is unreasonably low.* Continued on the next page.	

Commenter	No.	Question or Comment	Response
		Question 71, continued. Extracted from Proposed Plan mailer- "Although perchlorate has been identified as a potential chemical of concern (COC) in groundwater, it is not a COC for vadose zone soil at JPL. Perchlorate moves through the vadose zone quickly until it reaches groundwater, making it unlikely to be found in the vadose zone soil. Therefore, issues relating to perchlorate will be addressed in the remedial action documentation for groundwater at JPL." *This is an area a graduate student and I are actively studying. What they say is conventional wisdom based on hope more than data. Perchlorate is a very soluble anion that moves as fast or faster than water. If water is introduced into dry soil, it tends to wet the soils and get pulled into the finer materials just as water is taken up by a paper towel. A spill of dissolved perchlorate at the land surface will then move downward through the soils. As it migrates it tends to get absorbed into the finer soils. This is just the opposite of groundwater flow where the water will move quickly through the gravels and very slowly in the fine sands and clays.* Continued on the next page.	NASA acknowledges and appreciates the feedback.

(Public meeting held on June 20, 2001)

Commenter	No.	Question or Comment	Response
		Question 71, continued. *Since they have perchlorate in their groundwater, they will have it in the soils above groundwater and there might be a long-term source of perchlorate from the soils to the aquifers. If they clean up all the groundwater now, in a few years it could be a problem again if the soils continue to leach out this material. It does not degrade under these conditions.*	

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on June 20, 2001)

Commenter	No.	Question or Comment	Response
James Hunt (A copy of the comment was provided by Barbara Swain)	72	*Written Comment:* -Extracted from Proposed Plan mailer- "The PREFERRED REMEDIAL ALTERNATIVE for soils located between the ground surface and the groundwater table (vadose zone soil) at the JPL site is based on an evaluation of results from sampling and analyzing soils and soil vapors at the site. Analytical results showed no risks to humans or plant and animal life from the chemicals known as volatile organic compounds (VOCs) present in soils. However, the VOCs were detected elevated concentrations in soil vapor samples beneath the north-central part of the site at depths extending to the water table. These VOCs have the potential to migrate to the groundwater at the site. Therefore, soil vapor extraction (SVE) is the preferred remedial alternative to remove the VOCs and prevent them from migrating to groundwater." "SVE is a two-step treatment process. In the first step, VOCs are removed from soil vapors by a vacuum applied to an underground well. In the second step, the VOC vapors are treated to prevent their release to the atmosphere. The EPA has identified SVE as a presumptive remedy for sites with VOCs present in soil. *Continued on the next page.*	Total petroleum hydrocarbons (TPHs) believed to consist of lubricating or mineral oils were detected in 13 soil borings. The concentrations ranged from less than 1 mg/kg to 150 mg/kg. An anomalous sample contained 6,500 mg/kg due to the presence of asphalt granules used to backfill one of the seepage pits. The types of petroleum compounds believed to be present in JPL soil are generally considered relatively insoluble and strongly sorbing to soil particles, which limits their mobility in the soils. Analysis of the groundwater quality indicated that total petroleum hydrocarbons were not present at concentrations exceeding state and federal interim action levels. In light of this, total petroleum hydrocarbons were not identified as a constituent of concern for OU-2. Information regarding the exact concentrations of total petroleum hydrocarbons and the location of the samples may be found in the Feasibility Study. The presence of significant amounts of free-phase petroleum hydrocarbons may affect the efficiency of the SVE technique by lowering the rate of removal of other VOCs also present. This could potentially result in longer remediation times. However, it is not anticipated at this time that conventional SVE will be negatively affected by the presence of the low levels of total petroleum hydrocarbons found in the vadose zone at OU-2. This issue will be taken into consideration during the remedial design phase and actual operation of the SVE treatment system.

Commenter	No.	Question or Comment	Response
		Question 72, continued. A presumptive remedy is a technology that is commonly used to clean up sites similar to JPL and has been given a special status by EPA. Moreover, SVE was shown to be effective in a pilot study at JPL." Soil vapor extraction is a very good method for the removal of volatile compounds since they are present in the gas phase. It is widely used and appropriate for the compounds found at JPL. Two issues ought to be of concern: 1) If the solvents were disposed of as part of a waste solvent tank leakage, then there is lots of oil also present, and the liquid oil will lower the amount of solvents in the gas phase compared to the liquid. The existence of the oil would require longer soil vapor extraction treatment times. This is OK since it would stop any release to the atmosphere and pick up the gases before they contaminate any more groundwater. You might want to ask two questions: a) What levels of petroleum hydrocarbons have been found in the soils where the solvent spills occurred? (Their response may that they were not required to look for petroleum hydrocarbons since they are not part of the Superfund remediation. Chances are their consultants spent lots of money analyzing for everything.) *Continued on the next page.*	

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on June 20, 2001)

Commenter	No.	Question or Comment	Response
		Question 72, continued. If the concentration is greater than 10 to 100 mg of hydrocarbons per kilogram of soil, then there is a very good chance that liquid oil phase exists where the contaminants of interest reside. This means a long clean up time and groundwater contamination. b) How well do they understand the location of the contamination and the flow paths of the air during soil vapor extraction? We really do not understand what the subsurface looks like, in spite of having hundreds of borings. It is likely that the oils and solvents will not be found where the air is moving, and thus there is some inefficiency in this process, but it is a reasonable approach. Steam injection is not an obvious solution to their problem from the data presented. If there is a lot of oil present, it could be mobilized by the steam, and in the process, remove the contaminants. There has been some concern with using steam in the vadose zone since some liquid water is produced when the steam condenses, and this water and associated contaminants might tend to sink down to make things worse. For any remedial scheme to work, it is essential to understand the source term, but that is pretty hard.	

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Public meeting held on June 20, 2001)

Commenter	No.	Question or Comment	Response
James Hunt (A copy of the comment was provided by Barbara Swain)	73	*Written Comment:* How well do [you] understand the location of the contamination and the flow paths of the air during soil vapor extraction?	The location of the VOCs in the vadose zone were extensively identified and characterized as part of the remedial investigation at OU-2. The airflow paths that are created during operation of the SVE system are observed by measuring the vacuum created at nearby soil vapor monitoring points. The vacuum measurements allow determinations of the radius of influence of the SVE system.
John Holt	74	*Written Comment:* I'm sorry, but I don't understand all the fuss over this issue. If based on the assessments presented, there is no danger to human or animal life, why are we going to the time and expense?	As stated in the Proposed Plan for OU-2, the remedial action objective (RAO) for the cleanup of on-facility soils is to prevent, to the extent practicable, the migration of VOCs to groundwater to protect an existing drinking water source. Since migration may continue if the source is not removed, NASA is working to prevent, to the extent practicable, that migration. Alternative 1, No Further Action, does not meet chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs) because the VOCs are left in place, which does not protect the groundwater at JPL and therefore could not achieve the RAO. Alternative 2, SVE, complies with all identified applicable and appropriate requirements and reduces migration of soil vapors containing VOCs into the groundwater. Therefore SVE is the preferred alternative for remediating the vadose zone soil at JPL.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
John Holt	75	*Written Comment:* The area in question is relatively remote from any residential structures and the natural cleansing action of soil will in time, solve the problem. I'm of the opinion that "alternative No 1" is the preferable choice. This "making the world safe" from every possible contamination is a hysterical absurdity.	NASA acknowledges and appreciates your feedback. Please see the response to Question 74 for more information.
Lauren Oakes	76	*Written Comment:* How long did it take for demo well to recover 200# VOCs?	Please see the response to Question 31 for further information.
Lauren Oakes	77	*Written Comment:* How did 5 wells get decided?	NASA is currently in the process of gathering data for the remedial design phase. As stated in the Proposed Plan for OU-2, the remedial action will include the installation and operation of up to five extraction wells; the final number has not yet been determined. Five were chosen based on the number of wells that would be needed to provide areal coverage of the VOC plume.
Lauren Oakes	78	*Written Comment:* Where is the 45-acre plume exactly? Reference using helipad, stables, Oak Grove Ave. entrance, kiosk, etc., for non-JPL people.	The 45-acre plume is depicted in Figure 5-2 of the ROD. The plume is primarily located in the northeast portion of the JPL site, near the eastern gate and central part of the site. It is located northeast of the Oak Grove Avenue entrance and southeast from the heliport.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Lauren Oakes	79	*Written Comment:* How much VOCs will be recovered, from what depths?	In general, VOCs have been detected in the vadose zone soil at depths ranging from 50 feet below ground surface to the groundwater table, which is approximately 200 feet below the ground surface. The SVE system will be operated until the performance objectives are achieved. The criteria by which the SVE performance is evaluated are based on a reduction in the concentration of the VOCs, not total or percentage of VOC mass removed.
Lauren Oakes	80	*Written Comment:* How long will it take?	As stated in the Proposed Plan for OU-2, "when operation of the SVE system is no longer cost-effective and/or necessary to reduce the potential migration of VOCs to groundwater, vapor monitoring would be implemented for a period of time to evaluate compliance with the remedial action objective." NASA's expectation is that it should take from one to five years to achieve the SVE performance objectives. Please see the response to Question 22 for more information regarding monitoring of the vadose zone soil.
Lauren Oakes	81	*Written Comment:* Could LCF (La Cañada Flintridge) get more clean up bang for these $3.75 million by getting EPA to use them to assist LCF in say, covering 210 FWY and cleaning that exhaust instead? Which would provide greater protection (and other benefits) to the community?	The Superfund program goal is to meet the challenge of protecting human health and the environment from the dangers of hazardous waste. Congress mandates that when a site is on the National Priorities List, the money allocated for that site must be spent on the cleanup and on nothing else.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Lauren Oakes	82	*Written Comment:* Received this SAT 05/13. Read MON 14th. Not enough notice to make meetings on 12th, presence required at another mtg. on the 14th. More time next mailing. Please.	Please see the response to Question 2.
Mary Ann and Joe DeBriyn	83	*Written Comment:* My husband and I are strongly in favor of Alternative 2, SVE, because it will help protect the water in La Cañada and is the best long-term solution.	NASA acknowledges and appreciates the feedback.
Tony Schwarz	84	*Written Comment:* Meeting notification did not arrive until five days before the public meeting – does this meet legal and reasonable requirements?	Please see the response to Question 2.
Tony Schwarz	85	*Written Comment:* There is no mention in the information brochure regarding the significant aquifer adjacent to and below JPL. This aquifer is used for drinking water. If it is not currently impacted by the VOCs as defined by the ARARs, what assurance is there that it will not be impacted in the future?	The aquifer beneath and adjacent to JPL has been found to contain VOCs that have migrated from, among other sources, sources located within the boundaries of JPL. All groundwater withdrawn from the basin is tested and treated, if necessary, to remove these chemicals before the water is distributed. The preferred alternative for OU-2 is designed to achieve the remedial action objective for the vadose zone. A separate remedy for groundwater is being handled as part of OU-1 and OU-3, and will be the subject of future public meetings.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Samuel E. Hooker	86	*Written Comment:* Your SVE proposal appears to be a valid alternative and I agree; however, it only mildly guarantees significant removal of contaminants on their way to the ground water, my question is what is significant?	Soil vapor extraction is called a presumptive remedy by the EPA because of its effectiveness in removing these types of chemicals from soil similar to those found at JPL. NASA also proved the effectiveness of this technology on the soils at JPL during pilot testing of the technology at the site. Therefore, there is no reason to expect this technology will not be very effective in removing VOCs from the soil. However, if soil vapor extraction is ineffective, the EPA and NASA will reassess the situation with the goal of identifying a more effective remedy for the VOC-impacted soil. Please see the response to Questions 1, 21, and 22 for more information.
Samuel E. Hooker	87	*Written Comment:* Will there be subsequent efforts to increase that "significant amount" and if so how many attempts will be made to increase eradication so that the bottom line is zero?	No. When operation of the SVE system is no longer cost-effective and/or necessary to reduce the potential migration of VOCs to groundwater, vapor monitoring would be implemented for a period of time to evaluate compliance with the remedial action objective. This should take from one to five years, with periodic soil vapor monitoring during and after remediation. Please see the response to Question 22 for more information.
Samuel E. Hooker	88	*Written Comment:* Also, in your "reduction of toxicity…" you mention "can be" is there a "will" in the equation, seems like a hope is there but not a surety.	The extent to which VOC removal by SVE "can be" or "will be" significant cannot be evaluated until the SVE system has been installed and is operating. Please see the response to Questions 1, 21, and 22 for more information.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL (Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Samuel E. Hooker	89	*Written Comment:* Another concern is that the focus seems to be cancer. Are there any other health concerns, primarily short-term effects in health especially birth defects, etc.?	Section 6.0 of the Remedial Investigation for OU-2 contains the baseline Human Health Risk Assessment (HHRA) prepared for OU-2 at JPL (FWEC, 1999c). The purpose of the HHRA is to define the magnitude and probability of threats to the public health posed by chemicals in soils at the JPL site. The HHRA evaluates all potentially relevant current and future conditions at the site. Both cancer and noncancer health concerns are considered in the HHRA. The HHRA determined that direct exposure to soils at JPL does not pose risks to humans. The HHRA was conducted in accordance with State of California Environmental Protection Agency Department of Toxic Substances Control (DTSC) guidance provided in the *Preliminary Endangerment Assessment Guidance Manual* (DTSC, 1994) and standard EPA guidance, including *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A)* (EPA, 1989a), and *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part D)* (EPA, 1989b). Please see the response to Question 19 for further information.
Samuel E. Hooker	90	*Written Comment:* Thank you for your information, I appreciate your notification and updates.	NASA acknowledges and appreciates the feedback.
Anonymous Citizen	91	*Written Comment:* What are the VOC concentration levels for regulation (MCL)?	Maximum Contaminant Level (MCL) refers to the highest level of a contaminant that is allowed in drinking water. Thus, there are no MCLs specified for vadose zone soil. MCLs for the VOCs at JPL apply only to groundwater, which will be discussed as part of OU-1 and OU-3.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Anonymous Citizen	92	*Written Comment:* What are the VOC concentration levels for the "negotiated" goals of clean up?	EPA issued the Soil Screening Guidance as a tool to help standardize and accelerate the evaluation and cleanup of impacted soils at sites on the National Priorities List, which includes JPL. NASA is currently working with the State of California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC), the California Regional Water Quality Control Board (RWQCB) – Los Angeles Region, and the EPA to determine the cleanup goals for the vadose zone at the JPL site.
Anonymous Citizen	93	*Written Comment:* What are the VOC concentration levels in the test site soil before and after test clean up?	The purpose of the pilot test was to determine the feasibility of using SVE at the JPL site. Concentrations for each of the four target VOCs in the soil vapor at JPL can be found in the Remedial Investigation Report and Feasibility Study for OU-2, which is located in the information repositories. For example, the maximum soil vapor concentration near the extraction well was 284 μg/L for carbon tetrachloride and 51 μg/L for Freon™ 113 prior to the start of the pilot test in May 1998. After the system was placed on standby in August 2000, both compounds were no longer detectable in the soil vapor. Please see the response to Question 10 for information regarding the use of soil vapor as a surrogate for soil VOC concentrations.
Anonymous Citizen	94	*Written Comment:* Does the 200 lbs of VOC extracted include the weight of the charcoal or is it pure VOC?	The mass of extracted VOCs does not include the weight of the granular activated carbon.
Cynthia Compton	95	*Written Comment:* I would like to recommend: earlier notice of public meeting to the public and JPL employees.	Please see the response to Question 2 for further information.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Cynthia Compton	96	*Written Comment:* Would you consider another public meeting on this OU-2 Proposed Plan after appropriate earlier notice, but prior to the end of the public comment period?	Please see the response to Question 2 for further information.
Cynthia Compton	97	*Written Comment:* For public meetings notice for ground water OUs, include customers of water purveyors on mailings.	Please see the response to Question 8 for further information.
Cynthia Compton	98	*Written Comment:* Since Alternative 1 is do nothing the Alternative 2 is really the only option being offered. What other alternatives were considered and why were they rejected? Is there a list of these somewhere?	Please see the response to Question 1 for further information.
Cynthia Compton	99	*Written Comment:* Where is a list of the notices of these public meetings?	Please see the response to Question 7 for further information.
Cynthia Compton	100	*Written Comment:* Please modify notices sent to JPL employees via e-mail to say 'Public Meeting' in the subject title along with 'Superfund Plan Proposed'.	NASA acknowledges and appreciates the feedback.
Cynthia Compton	101	*Written Comment:* Two minutes for my public comments and questions is too restrictive, especially when there are not many public people here.	Please see the response to Question 16 for further information.
Cynthia Compton	102	*Written Comment:* Samples for measurements in basement of building 107? Are these part of the permanent test points? What are the findings from these measurements?	Please see the response to Question 15 for further information.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Dorothy and Carl Thorman	103	*Written Comment:* At Lincoln Avenue, Water Co. Annual Meeting 5 or more years ago we were told by the Board Members of Lincoln Ave. Water Co. that at that time JPL would not share with them the analysis of water tests done by JPL. My husband worked at JPL and I felt ashamed of the arrogant attitude of JPL.	NASA is not aware of the circumstances surrounding the incident you describe. Information is made available to the public through the information repositories after it is reviewed and approved for public release by the agencies involved with the JPL site. The public may also request information under the Freedom of Information Act for information not found in the information repositories. OU-2 covers the vadose zone soil at the JPL site. Any information regarding water analysis is handled through OU-1 and OU-3. NASA is not aware of any instance in which Lincoln Avenue Water Company made a request for such information and it was not provided.
Dorothy and Carl Thorman	104	*Written Comment:* As shareholders of Lincoln Avenue Water Company, we are dependent on that company for our water supply. The VOCs in the groundwater supply have been a severe problem. When do you expect to address the "adjacent groundwater problems" or to reimburse the company for the remedial costs we have already incurred?	Groundwater from the Lincoln Avenue well is treated before being distributed to the public. The treatment system was installed and operating by 1992. NASA and the Lincoln Avenue Water Company recently reached a settlement covering cost reimbursement for that treatment system. The final remedy for groundwater will be determined as part of the remedial activities of OU-1 and OU-3.
Mary K. Fairbanks	105	*Written Comment:* What will be done to verify that the air vented during the SVE process is truly clean?	The air will be treated as part of the SVE process before it is released to the atmosphere. The discharges from the SVE system will be monitored to confirm that the discharged air is within permitted limits. These discharges must meet standards set by the South Coast Air Quality Management District (SCAQMD), which requires that all discharges to the atmosphere meet certain standards to protect ambient air quality for the public health and welfare. Vapors extracted by the SVE process have been and will be treated as required by the SCAQMD.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL (Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Mary K. Fairbanks	106	*Written Comment:* What will be done with the treated VOCs?	Please see the response to Question 3 for further information.
Forest Fisher	107	*Written Comment:* Is this the reason the well drilling crew outside of bldg. 126 is drilling a hole in the ground?	No. The NASA Superfund program is not doing any work in the vicinity of Building 126.
Forest Fisher	108	*Written Comment:* What are the risks/side effects to having one of these SVE wells so close to a building (where we work, walk, breathe, have doors that allow air flow from the well area into the building…)	Soil vapor extraction presents minimal risks to workers, the public, or the environment. Systems are designed so that extraction wells and associated piping are under vacuum. The VOCs in the extracted air will be removed by the aboveground treatment system in accordance with state and local regulations. The South Coast Air Quality Management District (SCAQMD) requires that all discharges to the atmosphere meet certain standards to protect ambient air quality for the public health and welfare. Vapors extracted by the SVE process have been and will be treated as required by the SCAQMD.

Questions and Comments Received During the Public Comment Period on the Proposed Plan for OU-2, NASA JPL
(Written Comments Received During the Public Comment Period)

Commenter	No.	Question or Comment	Response
Laura Simonek Metropolitan Water District of Southern California	109	*Written Comment:* *Excerpted from a letter dated July 10, 2001:* Our review of the project indicates that Metropolitan's Arroyo Seco Property, Parcel 1602-1-1 in the City of Pasadena, is located directly south of the site proposed for cleanup. Due to the proximity of Metropolitan's property to the proposed cleanup site and the proximity of the Arroyo Seco River to both properties, there is concern that VOCs or other contaminants may have migrated from JPL property to Metropolitan property via groundwater flows or vapor migration. Therefore Metropolitan is requesting the locations of all of the test borings conducted for this project and their soil and water results before completion of the Plan. Metropolitan also requests that the Plan evaluate the potential impacts of the cleanup of the JPL site and the JPL site, itself, to Metropolitan property.	VOCs in the vadose zone soil underlying JPL have not migrated beyond the boundaries of JPL. Therefore the VOC-impacted soils in the vadose zone and the remediation of those soils are not expected to impact Metropolitan property. However, VOCs in groundwater have migrated beyond the boundaries of JPL. The groundwater is part of a separate investigation that is currently being conducted. The final remedy for groundwater will be described in the OU-1 and OU-3 Proposed Plan. The location of the soil vapor monitoring wells and the results of soil vapor analyses may be found in the Remedial Investigation and Feasibility Study documents for OU-2, which are located in the information repositories described in the Proposed Plan. The location of the groundwater monitoring wells and the results of groundwater analyses may be found in the Remedial Investigation report for OU-1 and OU-3. Any potential impact the groundwater remediation may have on adjacent properties would be addressed as part of the Feasibility Study for OU-1 and OU-3.

APPENDIX H

NASA'S RESPONSES TO COMMENTS FROM U.S. EPA AND DTSC ON THE DRAFT FINAL RECORD OF DECISION

Responses to Comments on the Draft Final Record of Decision (ROD) and Remedial Action Plan for Operable Unit 2
March 7, 2002

No.	Comment	Response
	U.S. Environmental Protection Agency (EPA) – Submitted February 28, 2002	
1	Page iii, last paragraph. Change "the" to "a" in the second sentence. "In addition, the EPA has designated SVE as a presumptive..."	The change has been made as requested.
2	Page iv, second paragraph of Statutory Determinations and also in Section 13.6. Please change this to match the statutory language, i.e., NASA intends to remediate VOCs in vadose zone soil at JPL to prevent, to the extent practicable, further migration of VOCs to groundwater. A Five-Year review will be conducted if hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. This site and remedy review will be conducted no later than five years after the start of the remedial action.	The text in the Declaration, Statutory Determinations (page iv) and Section 13.6 Five Year Review Requirements (page 35) has been modified as follows: "NASA intends to remediate VOCs in vadose zone soil at JPL to prevent, to the extent practicable, further migration of VOCs to groundwater. A Five-Year review will be conducted if hazardous substances, pollutants, or chemicals remain at the site above levels that allow for unlimited use and unrestricted exposure. This site and remedy review will be conducted no later than five years after the start of the remedial action (See, 42 USC 9621(c))."
3	Page 12, Section 5.2.2.5. Please add a sentence that provides a justification for not considering cyanide as a COC. Is it below PRGs, not mobile, an acceptable risk because it was only found at one location, etc.	The text in Section 5.2.2.5 Other Compounds has been modified as follows: "Cyanide was detected in three samples collected from one soil boring at concentrations ranging from 0.074 mg/kg to 0.085 mg/kg. These detections were limited to one location and were well below the residential soil PRG of 11 mg/kg (U.S. EPA, 1998)."
4	Page 19, top of the page. The first full sentence on this page should read, "HQs less than 1 are not..." The HQ reference in the next paragraph should also be an HQ of 1. All of EPA's guidance on ecological risk says that the screening level is 1. If the HQ is above 1, the site may still be acceptable for reasons including habitat, bioavailability, range, uptake assumptions, etc. Thus, this paragraph should also say that JPL is an industrial complex and does not provide quality habitat, in addition to the current discussion on diet, only one sample exceeded, etc.	Section 7.2 has been modified as follows: "The screening-level ERA in the OU-2 RI report (FWEC, 1999a) evaluated the potential risks to ecological receptors exposed to chemicals in on-facility soil at JPL. Chemical of potential concern for the ERA included chromium, lead, mercury, molybdenum, vanadium, and zinc. The ecological risks associated with exposure to these chemicals were quantitatively evaluated for the deer mouse and American kestrel through the calculation of HQs (FWEC, 1999a). The HQ for lead from one soil sample location exceeded 1 for both the deer mouse and the American kestrel. However, uncertainty regarding the form of lead in the sample, as well as the conservative exposure parameters used in the evaluation, likely overestimated the risk from the sample. Animals with large home ranges, such as the American kestrel, are not likely to be at risk because they would potentially obtain only a small fraction of their diet from this location. JPL is a developed, non-wilderness area, so it is not likely to provide high quality habitat for these species. In addition, lead concentrations found at JPL are within the range of background values for California and western U.S. soils. Thus, potential ecological risks from lead are likely to be lower than indicated by the estimated value. All other constituents had HQs less than 1 for

Responses to Comments on the Draft Final Record of Decision (ROD)
and Remedial Action Plan for Operable Unit 2
March 7, 2002

No.	Comment	Response
		the American kestrel and less than 10 for the deer mouse. Constituents, which yielded an HQ above 1 for the deer mouse included chromium, molybdenum, and zinc. Since JPL is a developed industrial complex, these HQs represent an acceptable risk."
5	The response to comments contains several excellent explanations on how the SVE system works, but some of this should be in the remedy description in the main text of the ROD. Include language on the GAC similar to the second paragraph from NASA's response in Section 3.1. Also state what the Air Board monitoring requirements are (frequency, location of samples, etc.). Also state in the ROD that the off-site shipments for regeneration must comply with all DOT requirements (no need to list them).	The second paragraph of Section 11.2 has been modified as follows: "The soil vapor extracted from the subsurface will contain VOCs at levels that may require treatment before being discharged to the atmosphere. Several different options for vapor treatment of chlorinated VOCs are available, including granular activated carbon (GAC) adsorption, VOC-adsorbing resins, and catalytic oxidization. Currently, the preferred choice for off-gas treatment is GAC, which is a technology proven to be effective for VOC treatment. Once the GAC becomes saturated with VOCs, it will be removed and replaced with fresh GAC. The spent GAC will then be transported (in compliance with Department of Transportation [DOT] requirements) off-site to a permitted facility to be regenerated or disposed. The preferred method of VOC vapor treatment may be modified based on the concentrations of VOCs in extracted soil vapor. "The current SCAQMD air permit requires collection of daily SVE system influent and effluent (stack) vapor samples, which are analyzed for VOCs using a hand-held meter. In addition, every two weeks SVE system influent and effluent vapor samples are collected and analyzed by a laboratory for VOCs using EPA Method TO-14."
6	Page F-16, first Paragraph. Change sitting to siting.	The change has been made as requested.
7	Page F-19/20. Our attorneys believe that the SCAQMD rules must apply as ARARs. This shouldn't change your operations, since you were planning to comply anyway.	All SCAQMD Rules have been accepted as ARARs, except SCAQMD Rule 402, which prohibits the discharge of any air emissions in quantities that may cause injury, detriment, nuisance, or annoyance to the public. This was determined to be not an ARAR based on Department of the Navy Guidance.
8	ARARs. DOT requirements for off-site transport should also be listed as an action specific ARAR.	Based on further correspondence with the EPA "DOT does not have to be listed as an ARAR. However, still mention that all DOT requirements will be met in the remedy description." Please see response to comment number 5.
Department of Toxic Substances Control (DTSC) – Submitted February 28, 2002		
9	Could you double check the stated health based action level of 30 mg/kg for hex chrome (sec 5.2.2.1, page 11)? This value seems high to me.	The 30 mg/kg level for Chromium VI is the EPA Region 9 PRG and was incorporated into the ROD based on a comment on the Draft ROD from the EPA.

Responses to Comments on the Draft Final Record of Decision (ROD) and Remedial Action Plan for Operable Unit 2
March 7, 2002

No.	Comment	Response
10	Part III, sec 3.4, page 39, add the word "Federal" to EPA to differentiate it from CAL-EPA.	The change has been made as requested.
	Ronald C. Palmer, Raymond Basin Management Board – Submitted February 28, 2002	
11	Based on our review, this is to advise you that we endorse adoption of the draft action plan for Operable Unit No. 2. During our evaluation, we noted that no implementation schedule for this process was provided. We request that we be furnished with the implementation schedule for this action plan as well as schedules for subsequent stages leading to groundwater cleanup. We look forward to cooperative efforts in bringing this cleanup process to successful completion.	The implementation schedule will be provided upon finalization during the remedial design phase of work.

August 8, 2002

United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

NASA's Response to EPA's Request for Modification to the Record of Decision for Operable Unit 2 at NASA-JPL

Dear Mr. Ripperda

The National Aeronautics and Space Administration (NASA) has evaluated the modifications requested by the United States Environmental Protection Agency (EPA) and prepared responses (see attached table). Soil vapor extraction (SVE) is an EPA presumptive remedy for remediation of volatile organic compounds (VOCs) in soil[1] and the best available technology for VOC removal at NASA's Jet Propulsion Laboratory (JPL). As such, NASA has established performance objectives rather than numeric cleanup standards to utilize SVE to an economic and technical limit of feasibility appropriate for the site. NASA's goal is to utilize SVE as a tool to optimize cost effectiveness of the entire site remediation process. The flexibility provided by performance objectives, as opposed to numeric cleanup standards, is necessary for making wise remediation decisions at NASA-JPL.

The EPA made four major points in the cover letter to the requested Operable Unit 2 Record of Decision (ROD) modifications. NASA's response to each is provided as follows:

EPA Point No. 1. EPA believes that the soil vapor extraction system is an interim action with the ultimate goal being the final remediation of the groundwater aquifer.
NASA's Response. While NASA agrees that the purpose of SVE is to expedite and improve cost-effectiveness of groundwater remediation (i.e., removing VOCs from the vadose zone via SVE prevents having to treat the chemicals after they have migrated to groundwater), NASA considers SVE the remedy for Operable Unit 2.

EPA Point No. 2. The remedial goal of this action should be reevaluated once a final groundwater remediation goal has been selected in the future Record of Decision for OUs 1/3. At that time, final cleanup standards for the vadose zone should be established.
NASA's Response. As stated in NASA's response to EPA Point No. 1, the remediation objective in implementing a vadose zone remedy was to expedite and improve cost-effectiveness of the groundwater remediation process. Based on this objective, NASA established performance objectives for the SVE system, which better reflect the intent of the remedy (as opposed to developing numerical cleanup standards). The performance objectives ensure that the SVE system is operated only as long as it is cost-effective in achieving the remediation objective and apply as follows:

[1] United States Environmental Protection Agency. 1993. *Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils*. Quick Reference Fact Sheet. Office of Emergency and Remedial Rsponse, EPA 540-93/048. September.

- Performance Objective No. 1 – Protectiveness of groundwater is based on fate and transport modeling. This objective limits the use of cleanup standards since the standards would vary spatially (e.g., the cleanup goals would be different for VOCs located 20 feet above the water table than for those located 120 feet above the water table).
- Performance Objectives No. 2 and No. 3 – SVE system performance typically follows an asymptotic decline in concentrations. If cleanup standards are below the asymptote, the SVE system is likely not to be cost-effective once asymptotic conditions are achieved. NASA needs the flexibility to stop operation when the additional cost of continuing to operate the SVE system is not anticipated to significantly increase the cost of the groundwater remedy. This determination will be dependent on performance of both the soil and groundwater remedies and will vary with time.

EPA Point No. 3. A reevaluation [of vadose zone cleanup goals] will ensure that the SVE system can achieve standards that will be selected for groundwater, or that the system will run to a technical or economic limit of feasibility.
NASA Response. It is not practical to make the connection of attainment of groundwater standards and implementation of a vadose zone remedy, since SVE is not a groundwater remediation technology. In addition, the performance objectives documented in the ROD for Operable Unit 2 provide the framework necessary to run the system to its technical or economic limit of feasibility at NASA-JPL.

EPA Point No. 4. Final vadose zone remediation goals should not be determined until the final groundwater ROD is signed.
NASA Response. NASA intends to complete a final ROD for each operable unit.
Please feel free to contact me if you would like to discuss these items further.

Sincerely,

Peter Robles, Jr.

Responses to Comments on the Final Record of Decision (ROD) and Remedial Action Plan for Operable Unit 2
August 2002

No.	Comment	Response
1	Section 8.0 Remedial Action Objectives. Add a footnote at the end of the second paragraph: "EPA's position is that final vadose zone cleanup standards will need to be determined when the final groundwater cleanup standards are set."	The remediation objective for implementing soil vapor extraction (SVE) is to expedite and improve cost-effectiveness of the groundwater remediation process. Based on this objective, NASA established performance objectives (see Section 11.4 of the Final Record of Decision (ROD) for Operable Unit 2) for the SVE system, which better reflect the intent of the remedy (as opposed to developing numerical cleanup standards). The performance objectives ensure that the SVE system is operated only as long as it is cost-effective in achieving the remediation objective and apply as follows: ❑ Performance Objective No. 1 – Protectiveness of groundwater is based on fate and transport modeling. This objective limits the use of cleanup standards since the standards would vary spatially (e.g., the cleanup goals would be different for VOCs located 20 feet above the water table than for those located 120 feet above the water table). ❑ Performance Objectives No. 2 and No. 3 – SVE system performance typically follows an asymptotic decline in concentrations. If cleanup standards are below the asymptote, the SVE system is likely not to be cost-effective once asymptotic conditions are achieved. NASA needs the flexibility to stop operation when the additional cost of continuing to operate the SVE system is not anticipated to significantly increase the cost of the groundwater remedy. This determination will be dependent on performance of both the soil and groundwater remedies and will vary with time.
2	Section 13.2. Compliance with Applicable or Relevant and Appropriate Requirements. Add a footnote at the end of the paragraph: "See footnote 1 under Section 8.0"	See response to comment No. 1.
3	Appendix F. Applicable or Relevant and Appropriate Requirements, Section F.2.1. [Chemical Specific] Groundwater ARARs and Conclusions. Add the following sentence: "The cleanup standards, including ARARs, for groundwater will be determined when the groundwater remedies are selected, and will be documented in later Records of Decision. At that time, NASA will use the groundwater cleanup standards to establish the final vadose zone cleanup standards."	See response to comment No. 1.

Responses to Comments on the Final Record of Decision (ROD)
and Remedial Action Plan for Operable Unit 2
August 2002

No.	Comment	Response
4	Appendix F. Applicable or Relevant and Appropriate Requirements, Section F.2.1.2. State [Chemical-Specific Groundwater ARARs]: fourth bullet—add reference to "22 California Code of Regulations 66264.94"; also, under the heading State Water Resource Control Board Res. 92-49 and 68-16, last paragraph – change last sentence to read "Cal. Code Regs. Tit. 22 Section 66264.94 is not applicable but is relevant and appropriate under the circumstances. A final cleanup standard for the vadose zone will be established pursuant to this requirement when the final groundwater cleanup standards are set."	The text of the fourth bullet under Section F.2.1.2 has been modified as follows: "Cal. Code Regs. tit. 23, div. 3, ch. 15, § 2550(a), 2550.4(d), (e), and (f), and 2550.5; and tit. 22 § 66264.94." The paragraph under the heading State Water Resource Control Board Res. 92-49 and 68-16 has been amended with the following sentence: "Cal. Code Regs. Tit. 22 Section 66264.94 is not applicable but is relevant and appropriate." In addition the paragraph with the heading Cal. Code Regs. tit. 23, div. 3, ch. 15, § 2550 has been removed.
5	Appendix F. Applicable or Relevant and Appropriate Requirements, Section F.2.2. [Chemical Specific] Soil ARARs Conclusions. Add a sentence "Final vadose zone cleanup standards will be determined when final groundwater cleanup standards are set."	See response to comment No. 1.
6	Appendix F. Applicable or Relevant and Appropriate Requirements, Section F.2.2.1. Federal [Chemical Specific Soil ARARs], Third paragraph – add a sentence "Cal. Code Regs. Tit. 22 Section 66264.94 is not applicable, but is relevant and appropriate under the circumstances. A final cleanup standard for the vadose zone will be established pursuant to this requirement when the final groundwater cleanup standards are set."	The following sentence has been added to the third paragraph in Section F.2.2.1: "Cal. Code Regs. Tit. 22 Section 66264.94 is not applicable but is relevant and appropriate."
7	Appendix F. Applicable or Relevant and Appropriate Requirements, Table F-A Potential Chemical Specific ARARs. Under "California Department of Health Services", change the requirement entitled "Standards for Corrective Action of Waste Management Units" to read as follows: Requirement: Standards for cleanup of vadose zone at waste management units Prerequisites: Soil remediation Cititation: Title 22 CCR. Sec. 66264.94 ARAR Determination: Relevant and Appropriate Comments: A final cleanup standard for the vadose zone will be established pursuant to this requirement when the final groundwater cleanup standards are set."	Table F-A has been modified as by replacing "Title 23, CCR, Division 3, Chapter 15, Article 5, Section 2550" with "Title 22, CCR, Section 66264.94."

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 18, 2002

Peter Robles
NASA Management Office
JPL
4800 Oak Grove Drive, M/S 180-801
Pasadena, CA 91109

Re: EPA's concurrence on the Record of Decision for Operable Unit 2 at NASA-JPL

Dear Mr. Robles,

The U.S. EPA agrees with the soil vapor extraction remedy selected at NASA-JPL to remove volatile organic compounds from the vadose zone soils below JPL. This action is necessary and appropriate to help protect the underlying drinking water aquifer. We have signed the Record of Decision and have enclosed the signature page. However, we believe that the soil vapor extraction system is an interim action with the ultimate goal being the final remediation of the groundwater aquifer. Therefore, the remedial action goal for the SVE remedy must be re-evaluated once a final groundwater remedy has been selected in the future Record of Decision for OUs 1 and 3. Cleanup standards, including ARARs, for groundwater will be determined when the groundwater remedies are selected, and will be documented in these later Records of Decision. At that time, NASA will use the groundwater cleanup standards to establish the final vadose zone cleanup standards, including concentration limits for the contaminants of concern in the vadose zone soil.

EPA looks forward to working with NASA and the State of California in implementing this current remedy and in progressing towards a final groundwater remedy. Please call me at (415) 972-3133 or Mark Ripperda (415) 972-3028, or have your counsel call Karen Goldberg at (415) 972-3951 if you have any questions concerning this matter.

Sincerely,

Deborah Jordan
Chief, Federal Facility and Site Cleanup Branch

encl: ROD Signature Page

cc: Richard Gebert, DTSC
David Young, RWQCB