SDMS Doc ID 2002620

Response Action Contract IX

THIRD FIVE-YEAR REVIEW REPORT

FOR
NORTH HOLLYWOOD OPERABLE UNIT
SAN FERNANDO VALLEY (AREA 1) SUPERFUND
LOS ANGELES COUNTY, CALIFORNIA

September 2003

Prepared for

U.S. Environmental Protection Agency
Contract No. 68-W-98-225

CH2M HILL, Inc.
and Team Subcontractors:
URS Greiner Woodward Clyde Federal Services, Inc.
E2 Consulting Engineers, Inc.

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FOR
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SAN FERNANDO VALLEY (AREA 1) SUPERFUND SITE
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Contract No. 68-W-98-225/WA NO. 052-TBTA-09DM
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

Approved by: Date:

Elizabeth Adams
Chief, Site Cleanup Branch
U.S. EPA, Region 9

SEPTEMBER 30, 2003

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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	constituents of concern
DCE	dichloroethene
DHS	California Department of Health Services
DOH	California Department of Health (currently DHS)
EPA	United States Environmental Protection Agency
FS	Feasibility Study
GAC	granular activated carbon
gpm	gallons per minute
LADWP	Los Angeles Department of Water and Power
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MtBE	methyl *tertiary*-butyl ether
MWD	Metropolitan Water District
µg/L	micrograms per liter
mg/L	milligrams per liter
NHOU	North Hollywood Operable Unit
NPL	National Priority List
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OU	operable unit
PCE	perchloroethylene
PHG	Public Health Goal
PRP	potentially responsible party

RCRA	Resource Conservation and Recovery Act
RA	Remedial Action
RI	Remedial Investigation
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SAL	State Action Level
SARA	Superfund Amendments and Reauthorization Act
SCAQMD	South Coast Air Quality Management District
SDWA	Safe Drinking Water Act
SFV	San Fernando Valley
TBC	to be considered
TCE	tricholoethylene
ULARA	Upper Los Angeles River Area
VOC	volatile organic compound

Five-year Review Summary Form

Site name : North Hollywood Operable Unit (NHOU), San Fernando Valley (Area 1) Superfund Site

EPA ID: 09N1 **CERCLIS ID :** CAD980894893

Region: IX **State:** CA **City/County:** Los Angeles / Los Angeles

NPL status: ■ Final ❑ Deleted ❑ Other (specify) _____

Remediation status (choose all that apply): ■ Operating ❑ Complete

Multiple OUs? ■ YES ❑ NO **Construction completion date:** N/A

North Hollywood OU, Burbank OU

Has site been put into reuse? ❑ YES ■ NO

Reviewing agency: ■ EPA ❑ State ❑ Tribe ❑ Other Federal Agency _____

Author name: Robert Fitzgerald

Author title: Remedial Project Manager **Author affiliation:** EPA Region IX

Review period: June – September 2003

Date(s) of site inspection: June 30 and July 1, 2003

Type of review: ■ Statutory

❑ Policy ❑ Post-SARA ❑ Pre-SARA ❑ NPL-Removal only

❑ Non-NPL Remedial Action Site ❑ NPL State/Tribe-lead

❑ Regional Discretion)

Review number: ❑ 1 (first) ❑ 2 (second) ■ 3 (third) ❑ Other (specify)
Triggering action: ❑ Actual RA Onsite Construction at OU __ ❑ Actual RA ■ Previous Five-year Review Report 1998 ❑ Construction Completion ❑ Other (specify) _____
Triggering action date: July 1998
Due date (five years after triggering action date): 2003

Issues and Recommendations:

Issue
Complete containment of the TCE groundwater plume is in question based on preliminary modeling results from the first draft of the NHOU enhancement study. It appears that there may be some westward movement of the upper northeast portion and some southern movement of the TCE contaminant plume in the NHOU area. The draft final enhancement study is due at the end of September 2003.

Recommendation
1. Evaluate TCE plume capture based on the final NHOU enhancement study.
2. If plume growth or migration is confirmed, design and implement actions to increase capture. These recommendations should be presented in the Burbank OU 5-year review which will be completed as an addendum to this report during 2004.

Issue
NHOU treatment system operations and maintenance issues are complex. Management of reporting requirements for various agencies involves multiple departments within LADWP, which further complicates the project as a whole. The five-year review process conducted for this Site has revealed that there is not a central project manager to track all of the activities and personnel involved with this project.

Recommendation
Within the next three months, expand the responsibilities of the current LADWP project manager to include all aspects of the NHOU remedy, specifically, but not restricted to:

1. Managing any and all operation and maintenance problems.
2. Ensuring the preventive maintenance schedule is followed and completed.
3. Managing all sampling (air and water) activities related to the Site.
4. Managing all reporting for the NHOU remedy (EPA and DHS).
5. Managing evaluation of hydraulic containment.
6. Effectively communicating redefined roles and responsibilities within LADWP (refers to tasks 1 through 5 above).
7. Arranging and attending regularly scheduled meetings to discuss the NHOU remedy.

Issue
The material presented in EPA quarterly reports from LADWP is not comprehensive in terms of performance of the treatment system for the NHOU.

Recommendation
In the fourth quarter 2003 quarterly report, and all subsequent quarterly reports, the following information should be included:

1. Add a column which provides a status report to the preventive maintenance table of the

annual workplan, presented in this report as Table 4-2.

2. Present and evaluate all air monitoring data collected while using the current GAC filters. Discuss the plan for future sampling events and anticipated GAC change-out.
3. Present and summarize all water monitoring data collected during the previous quarter, particularly data for new potential COCs such as nitrate, chromium, hexavalent chromium, and perchlorate (if monitored).
4. Summarize hydraulic evaluation (groundwater elevation and modeling efforts) performed during the previous quarter and any expected issues for the following quarter. This is particularly important given the influence that pumping the North Hollywood well field (west of the NHOU treatment system) apparently has on TCE plume migration.

Issue
GAC change-out has occurred after exceeding SCAQMD air quality limits.

Recommendation
The following recommendations should be implemented within the next six months.

1. Initiate procedures to obtain a new agreement with a GAC contractor in October 2004.
2. Increase air quality sampling frequency once the GAC has been in use for six months and two rounds of quarterly data have been obtained.
3. Provide summaries of air quality data for the current GAC unit in the quarterly report, as stated previously.
4. Ensure that GAC change-out occurs prior to exceeding SCAQMD air quality limits.
5. If TCE air concentrations increase during initial months of use following GAC change-out, investigate this issue further and perform additional sampling as needed.

Issue
There is no vent low to the ground in the chlorine storage building and the chlorine scale is not accurate when tanks are at low levels.

Recommendation
The following recommendations should be implemented as soon as possible to ensure the safety of site workers, but no later than the next six months:

1. Install a vent low to the ground in the chlorine storage building, in accordance with health and safety regulations for chlorine storage facilities.
2. Replace or repair the chlorine tank scale.

Issue
The reviewers found excessive white particulate dust in the blower room of the NHOU treatment system, possibly originating from the adjacent property.

Recommendation

1. Submit a Public Records Request to SCAQMD to find out the type of permit under which the adjacent property operates, what constituents are emitted, and if there is any monitoring

requirements associated with the permit (within the next six months).

2. Request that Site operators note when particulate is seen being emitted from the adjacent property (immediately).
3. If necessary, plan and conduct particulate air monitoring at the Site at a time scheduled in accordance with observations made during task 2. Analyze air particulate samples if warranted (within the next twelve months).
4. The packing material within the aeration tower should be inspected to see if the particulate dust within the blower room is entering the tower (within the next six months).

Issue
The flow meters for wells 4, 6, and 8 are broken.

Recommendation
1. Repair the flow meters by October 31, 2003.

Protectiveness Statement:

The interim remedy at the NHOU currently protects human health and the environment because the concentration of TCE and PCE in treated groundwater is less than ROD selected clean-up goals and no other potential COCs currently exceed health-based standards. However, in order for the remedy to be protective of human health and the environment in the long-term, VOC plume containment should be addressed to control potential exposure pathways to ensure continued protectiveness. In addition, there should be ongoing reporting of extraction well concentrations of total chromium, hexavalent chromium, and perchlorate, COCs not previously identified in the ROD. Additional sampling and reporting is recommended. In order to provide continued protectiveness in the long-term, periodic review of emergent chemical concentrations and their associated MCLs or risk-based treatment standards should be made.

A protectiveness determination for Area 1 as a whole cannot be made at this time until the five-year review report is complete for the Burbank OU. It is expected that at this will be completed during 2004. This site-wide review will address the long-term protectiveness issues noted above.

Report

Five-year Review Report
San Fernando Valley (Area 1) Superfund Site
North Hollywood Operable Unit
Los Angeles County, California

Executive Summary

Executive Summary

A five-year review of the North Hollywood Operable Unit (NHOU or the Site) of the San Fernando Valley (SFV) (Area 1) Superfund Site in Los Angeles County, California was completed in September 2003. The five-year review was required by statute and performed because hazardous substances, pollutants, or contaminants remain at the Site above levels that do not allow for unrestricted use and unlimited exposure. The triggering action for this review was the second five-year review, completed in June 1998.

Area 1 encompasses approximately 4 square miles and contains an area of volatile organic compound (VOC)-contaminated groundwater that defines the NHOU and the Burbank Operable Unit (OU). The Burbank OU will be evaluated in a separate five-year review scheduled for 2004.

Los Angeles Department of Water and Power (LADWP) produces water for public use from five well fields surrounding the NHOU. In 1980, the California Department of Health (DOH, currently called the California Department of Health Services (DHS)) requested that all major water providers sample and analyze groundwater for contamination. Trichloroethylene (TCE) and perchloroethylene (PCE) were detected consistently in a large number of production wells at concentrations greater than the maximum contaminant level for drinking water (MCL; EPA, 2003). As a result, the EPA provided federal funding for LADWP to conduct a two-year study to define the extent of contamination. The results of the study, published in 1983, revealed widespread VOC-contaminated groundwater in the SFV.

In 1985, the EPA placed the Site on Fast-Track evaluation. Area 1 was added to the National Priorities List in 1986. LADWP signed a Cooperative Agreement with the EPA that provided federal funding for the Fast-Track evaluation and obtained a South Coast Air Quality Management District (SCAQMD) permit to "construct and operate" and a DHS operating permit for the treatment system to remediate contaminated groundwater within the NHOU.

The Record of Decision (ROD) for the NHOU was signed September 1987. The selected interim remedy addressed the VOC-contaminated groundwater plume in the North Hollywood area. The objective of the interim remedy included VOC plume containment and treatment of extracted groundwater to selected levels using groundwater extraction, air-stripping, and vapor-phase granulated-activated carbon (GAC). Current system operations include pumping groundwater from seven extraction wells to a vertical column containing a packing medium (to increase surface area) through which a countercurrent flow of air is introduced. Air emissions are filtered through GAC to remove VOCs, prior to release to the atmosphere. Construction of the groundwater treatment system was completed March 1989, and operation commenced December 1989 (CH2M HILL, 1998).

The groundwater treatment system has operated intermittently from 1989 to the present, with downtime attributed to maintenance issues and delays in maintenance response. Groundwater effluent from the treatment system, which is served to consumers, has met all

DHS contaminant goals set forth in the operating permit, as well as ROD cleanup goals. The treatment system has never operated at the intended 2,000 gallons per minute design capacity due to extraction well design, decreasing water table, the presence of new potential constituents of concern in extraction wells, and delayed maintenance issues. Complete containment of the TCE groundwater plume is in question based on preliminary modeling results from the first draft of an NHOU enhancement study. It appears that there may be some westward movement of the upper northeast portion of the contaminant plume in the NHOU area. The draft final enhancement study is due at the end of September 2003. In addition, the NHOU exceeded SCAQMD air quality limits twice during the past five years. Additional sampling was performed when erroneous data was suspected. GAC change-out occurred when additional sampling was not performed or when additional sampling confirmed initial results.

Information that may influence the protectiveness of the remedy identified during the five-year review includes the presence of new contaminants and evidence of potential expansion of the VOC plume. Issues identified during the five-year review process relate to management of the NHOU remedy, health and safety issues for site workers, air quality, and operating capacity.

The interim remedy at the NHOU currently protects human health and the environment because the concentration of TCE and PCE in treated groundwater is less than ROD selected clean-up goals and no other potential COCs currently exceed health-based standards. However, in order for the remedy to be protective of human health and the environment in the long-term, VOC plume containment should be addressed to control potential exposure pathways to ensure continued protectiveness. In addition, there should be ongoing reporting of extraction well concentrations of total chromium, hexavalent chromium, and perchlorate, COCs not previously identified in the ROD. Additional sampling and reporting is recommended. In order to provide continued protectiveness in the long-term, periodic review of emergent chemical concentrations and their associated MCLs or risk-based treatment standards should be made.

A protectiveness determination for Area 1 as a whole cannot be made at this time until the five-year review report is complete for the Burbank OU. It is expected that at this will be completed during 2004. This site-wide review will address the long-term protectiveness issues noted above.

1.0 Introduction

1.0 Introduction

The United States Environmental Protection Agency (EPA) conducted a five-year review of the remedial actions implemented at the North Hollywood Operable Unit (NHOU or the Site) of the San Fernando Valley (SFV) (Area 1) Superfund Site, in Los Angeles County, California (Figure 1-1). This review was conducted from June to September 2003. To assist the EPA, CH2M HILL has prepared this report documenting the results of the five-year review.

The five-year review process evaluates whether the remedy at the Site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify any deficiencies found during the review and provide recommendations for addressing these deficiencies.

This review is required by federal statute. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). CERCLA Section 121(c), as amended, states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the Site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

Consequently, this five-year review report has been completed because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure.

Area 1 includes two operable units (OU): North Hollywood and Burbank. This is the third five-year review report for the NHOU. The triggering action for this review was the second five-year review report dated July 1998 (CH2M HILL, 1998). This report evaluates the NHOU interim remedy (remedy) objectives as stated in the Record of Decision (ROD) and the progress since the last five-year review.

A ROD was signed for the Burbank OU in 1989. The Burbank OU was designed as a 9,000-gallon-per-minute (gpm) treatment system and began treating groundwater impacted with volatile organic compounds (VOCs) in 1996 (ULARA Watermaster, 2003a). The triggering action for the Burbank five-year review report is the remedial action start date of November 22, 1993. A five-year review for the Burbank OU will be performed during 2004 and reported as an addendum to this report. As a result, the protectiveness statement pertaining to Area 1 as a whole will be deferred until completion of the Burbank OU five-year review report in 2004.

This report is organized into sections that describe the history and setting of the Site, remedial actions decisions and implementation, and an evaluation of remedial actions. These sections are:

- Section 2.0 - Chronology of Site events.
- Section 3.0 - Land use, Site setting, the history of contamination, and initial response.
- Section 4.0 - The remedial action implemented at the NHOU, current status of the remedy, and treatment system operations and maintenance (O&M) activities and cost.
- Section 5.0 - Progress since the last five-year review
- Section 6.0 - Activities performed during the five-year review process.
- Section 7.0 - Technical assessment of the remedial action implemented at the Site.
- Section 8.0 - Issues at the Site are identified and recommendations provided.
- Section 9.0 - Protectiveness statement for the NHOU.
- Section 10.0 - List of works cited during the preparation of this document.

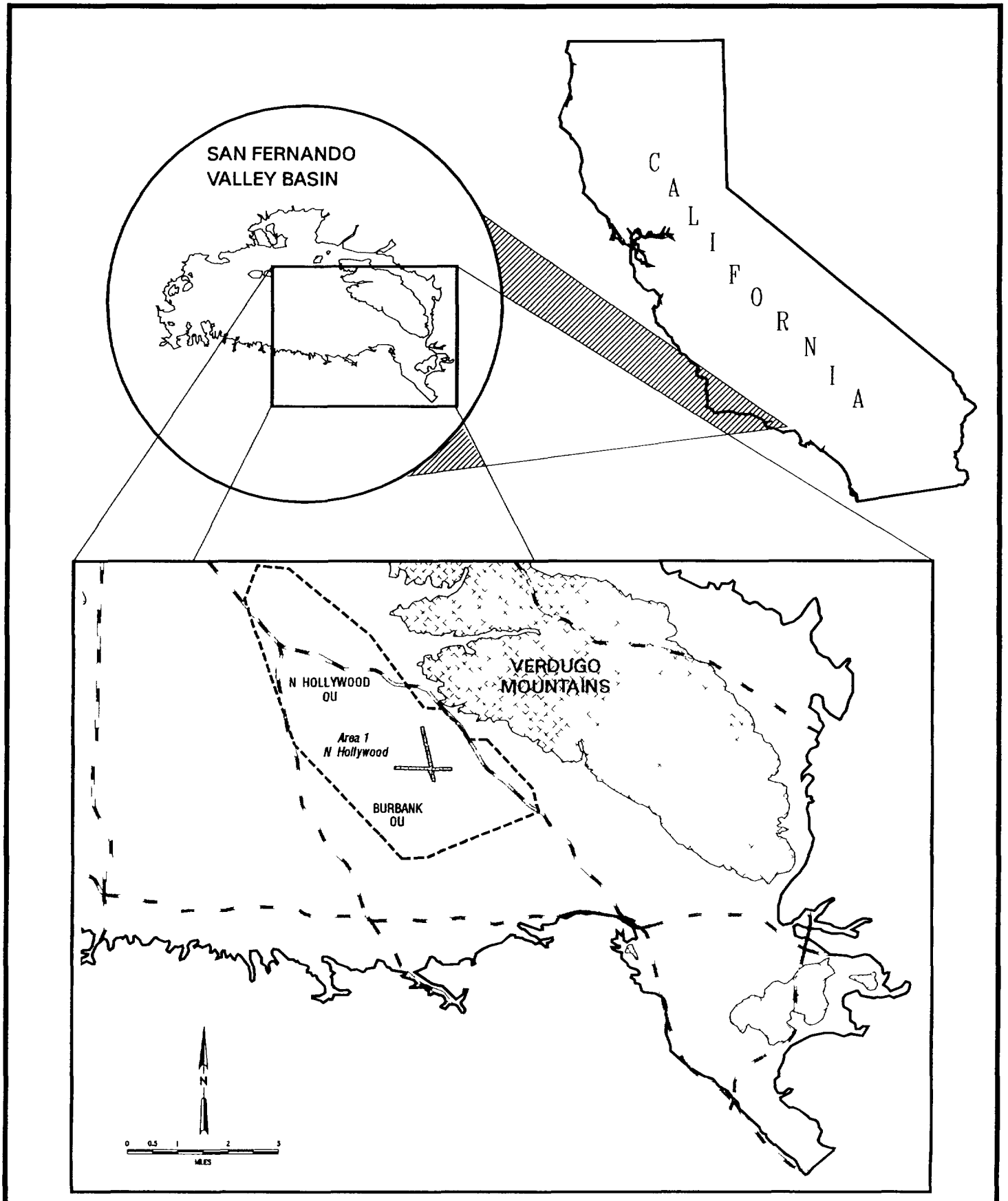


Figure 1-1
Site Location Map

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

//cabernet/gis/projects/sfplume/nhou2003/plots/locmap.aml
14 Aug 03 11:03:27 Thursday

2.0 Site Chronology

2.0 Site Chronology

Table 2-1 provides a chronology of events at the Site.

TABLE 2-1
Chronology of Site Events
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Event	Date
First production wells in the North Hollywood well fields constructed.	1924
Water Rights in the Upper Los Angeles River Area (ULARA) set forth in the Final Judgement. Supreme Court appoints Watermaster.	1979
Organic chemicals were found in the groundwater within the San Gabriel Valley. California Department of Health Services (DHS) requested all major groundwater users to test for industrial chemicals.	1979
Congress enacted CERCLA.	1980
DHS detected trichloroethylene (TCE), perchloroethylene (PCE), and other VOCs in a large number of production wells exceeding the maximum contaminant levels (MCLs); those wells were removed from service. Alternative water supply was obtained from the Municipal Water District (MWD) where needed.	1980
Los Angeles Department of Water and Power (LADWP) and Southern California Association of Governments began a 2-year study funded by the EPA entitled *Groundwater Management Plan – San Fernando Valley Basin.*	1981
LADWP conducted depth-specific packer sampling at well number 24. Results indicated that TCE concentrations were fifty times greater in the upper zone to that of all other zones.	1982
Groundwater Management Plan – San Fernando Valley Basin completed. The study detected widespread VOC contamination in the eastern San Fernando Valley and also located a contaminant plume migrating to the southeast at 300 feet per year.	July 1983
San Fernando Valley (Area 1) Superfund Site proposed for listing on the National Priorities List (NPL).	1984
Groundwater samples from 27 of 38 of LADWP's most active wells in the North Hollywood well fields had a concentration of TCE greater than the MCL, and four wells had PCE concentrations greater than the MCL. LADWP shutdown several contaminated wells in the eastern portion of the well field.	1985
NHOU was put on a Fast-Track evaluation. LADWP conducted NHOU feasibility study.	1985
EPA's contractor identifies nine potentially-responsible parties (PRPs).	August 1985
A cooperative agreement between the EPA and LADWP authorized the LADWP to proceed with a Fast-Track evaluation.	March 1986
San Fernando Valley (Area 1) Superfund Site was placed on the NPL.	1986
LADWP commissioners approved a Negative Declaration for the project.	July 1986

TABLE 2-1
Chronology of Site Events
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Event	Date
A permit to "construct and operate" the NHOU treatment system was obtained from South Coast Air Quality Management District (SCAQMD).	August 1986
Amended water system permit obtained from California Department of Health (DOH) (currently DHS) for the NHOU treatment system.	October 1986
Congress passed Superfund Amendments and Reauthorization Act (SARA) and added $8.5 billion to the Superfund (CERCLA) program.	1986
LADWP signed a cooperative agreement with the EPA providing federal funds for a remedial investigation. The SFV is subdivided into OUs to provide a discrete interim remedy.	1987
EPA signed cooperative agreement with LADWP allowing the use of federal moneys to define the extent of groundwater contamination.	July 1987
ROD signed for NHOU. ROD-selected groundwater remedy includes extraction and treatment.	September 1987
LADWP, EPA, and DOH enter into a three-party agreement to define agency responsibilities.	September 1987
Construction of NHOU remedy completed, including eight extraction wells.	March 1989
Regular operation of NHOU treatment facility began.	December 1989
Remedial investigation of entire San Fernando Valley completed (including Area 1).	December 1992
Basin-wide groundwater monitoring program established (sampling of 84 wells).	1992
LADWP installed digital groundwater level recorders in the majority of remedial investigation wells associated with the NHOU.	1997
EPA initiated chromium source investigation by providing funds to Los Angeles Regional Water Quality Control Board (RWQCB) to investigate 4,040 potential chromium users in the San Fernando Valley.	January 1999
SFV groundwater was analyzed for methyl *tertiary*-butyl ether (MtBE).	1999
The Office of Environmental Health Hazard Assessment (OEHHA) of California EPA formally adopted a public health goal (PHG) for total chromium of 2.5 micrograms per liter (µg/L). The PHG assumed a concentration of 0.2 µg/L for hexavalent chromium.	February 1999
OEHHA withdrew PHG of 2.5 µg/L after a study by Chromium Toxicity Review Committee concluded that the California total chromium MCL of 50 µg/L is protective.	November 2001
Discovery of a total chromium and hexavalent chromium source upgradient of proposed additional NHOU well locations at concentrations greater than 4,000 µg/L and 5,000 µg/L, respectively.	2001 - 2002
RWQCB completed *Chromium Investigation: San Fernando Valley Phase I; Inspections Final Report*; further assessment was recommended for 105 sites. RWQCB issued four Cleanup and Abatement orders.	August 2002
Honeywell International Inc. named as one PRP for chromium contamination associated with the NHOU; RWQCB issues a Cleanup and Abatement Order.	February 2003
Chromium PHG planned to be established by the OEHHA and subsequent MCLs are to be issued by the DHS.	2003 – 2004

3.0 Site Background

3.0 Site Background

Area 1 is an area of VOC-contaminated groundwater which encompasses approximately four square miles beneath the Cities of Los Angeles and Burbank within the Upper Los Angeles River Area (ULARA). The treatment facility for the NHOU is located at 11845 Vose Street, North Hollywood. The eight extraction wells associated with the treatment system are located in an existing electrical transmission line right-of-way and Los Angeles Department of Water and Power (LADWP) property along Kittridge Avenue, North Hollywood (LADWP, 1993) (Figure 3-1). Extraction wells 2, 3, and 4 are located on land owned by LADWP and currently leased for use as a garden nursery (personal communication, Nancy Wigner/LADWP, June 30, 2003). The NHOU treatment facility is approximately 3.8 miles north of the Los Angeles River.

3.1 Land and Resource Use

Land use in the vicinity of the NHOU is a mix of residential, commercial, and industrial.

The SFV (also referred to in this report as "the basin") is an important source of drinking water for the Los Angeles metropolitan area. The SFV is located in the ULARA which is under adjudicated water rights regulated by the ULARA Watermaster (California RWQCB, 2002). There are 10 production well fields in the SFV and more than 60 drinking water supply wells located within Area 1. The LADWP produces groundwater for public distribution from five well fields in the vicinity of the NHOU, in addition to the NHOU extraction wells. The well fields are: North Hollywood, Rinaldi-Toluca, Tujunga, Verdugo, and Whitnall (Figure 3-2). The North Hollywood well field is located directly west of the NHOU treatment system. Of these well fields, North Hollywood, Rinaldi-Toluca, and Tujunga are the primary production areas accounting for approximately 88 percent of LADWP's total extraction from the SFV, which was 10 percent of LADWP's total water supply at the time of the ROD (EPA, 1987). The NHOU treatment system accounts for approximately 2 percent of LADWP's total extraction from the SFV (ULARA Watermaster, 2003a).

3.2 Physical Setting

The NHOU lies within the SFV, which is a 112,000-acre broad trough in the south-central portion of the Transverse Ranges. The SFV is bordered on the east by the Verdugo Mountains, on the west by the Simi Hills, on the north by the Santa Susana and San Gabriel Mountains, and on the south by the Santa Monica Mountains. Precipitation in the SFV during Water Year 2001-2002 (October 1 to September 30) was 7.07 inches in the mountain areas and 6.44 inches in the North Hollywood area (ULARA Watermaster, 2003b).

3.2.1 Geology/Hydrogeology

The uplands surrounding the SFV comprise crystalline and sedimentary rocks that eroded during the Quaternary Period (approximately 10,000 years ago) and resulted in deposited

alluvium up to 2,000 feet thick in the SFV (California RWQCB, 2002). Lateral zonation is present due to the migration of the Tujunga fan (drainages) at the northeast corner of the SFV, which deposits alluvium from the San Gabriel Mountains (Figure 3-3). Faults form the bedrock boundaries of aquifer depth regions described below (CH2M HILL, 1996).

The NHOU is located in the eastern half of the SFV, where alluvial fill is present to more than 1,200 feet below ground surface (bgs) (CH2M HILL, 1998). The alluvial fill is comprised of sand and gravel, interbedded with localized lenses of clay and silt (EPA, 1987). The Verdugo fault crosses the northeast portion of the North Hollywood area. Aquifer transmissivity increases where the base of the alluvium deepens from northeast to southwest across the fault, resulting in variations in groundwater elevations (CH2M HILL, 1996). Geologic cross-sections are provided in the 1992 remedial investigation (RI) (James M. Montgomery Consulting Engineers, Inc., 1992).

Depth-to-water in the North Hollywood area ranges from approximately 100 to 300 feet bgs (CH2M HILL, 2003). In the Site vicinity, alluvium below the water table is divided into depth regions that exhibit flow boundaries similar to that of the remainder of the basin (CH2M HILL, 1996). Region 1 is present from 200 to 280 feet bgs—this is where shallow RI wells, older production wells, and facility monitoring wells (i.e., sites under the jurisdiction of the RWQCB) are screened. Region 2 is present from 270 to 420 feet bgs and has a high hydraulic conductivity. Most production wells are screened in this region. Region 3 occurs from 400 to 700 feet bgs. Newer production wells such as the Rinaldi-Toluca and Tujunga, both located north of the NHOU treatment system, and the western North Hollywood wells are screened in Region 3 (CH2M HILL, 1998). NHOU extraction wells are screened in Regions 1 and 2.

Regionally, groundwater flow is southeast towards the Los Angeles River Narrows (CH2M HILL, 1998). Locally, groundwater flow is influenced by pumping well fields and groundwater recharge at the Hansen, Branford, and Tujunga spreading grounds (CH2M HILL, 1996). Generally, LADWP pumping from SFV well fields occurs during the summer months when demand is high.

3.3 History of Contamination

In 1979, industrial contamination was found in groundwater in the San Gabriel Valley, prompting the California Department of Health (DOH, later renamed Department of Health Services (DHS)) to request that all major water providers sample and analyze groundwater for contamination. Trichloroethylene (TCE) was consistently detected in a large number of production wells at concentrations greater than the maximum contaminant level (MCL) (EPA, 2003).

Solvents (TCE and perchloroethylene (PCE)) were widely used from 1940 to 1967 for dry cleaning and degreasing machinery, and their disposal was not well regulated.

Source areas are addressed and managed by the Regional Water Quality Control Board (RWQCB) and therefore will not be evaluated in this document. However, source control will be addressed in the SFV final ROD prepared by EPA.

3.4 Initial Response

CERCLA was passed in 1980, the year that contamination was found to have impacted drinking-water supply wells in the North Hollywood area. As a result, the EPA provided federal funding for LADWP to conduct a two-year study to define the extent of contamination. The results of the study, published in 1983, revealed widespread VOC-contaminated groundwater in the SFV, specifically a contaminant plume migrating to the southeast at a rate of 300 feet per year. In 1986, Area 1 was added to the National Priority List (NPL). The area and OU boundaries were based on VOC-contaminated groundwater plume boundaries.

In August 1985, samples from 27 of LADWP's 38 most active wells in the NHOU area contained TCE concentrations greater than the MCL. LADWP shutdown several contaminated wells in the North Hollywood (east) well field (CH2M HILL, 1998). LAWDP obtained additional water from the Metropolitan Water District (MWD) to blend with extracted groundwater to reduce the concentrations of contaminants to values less than the MCL (EPA, 1999).

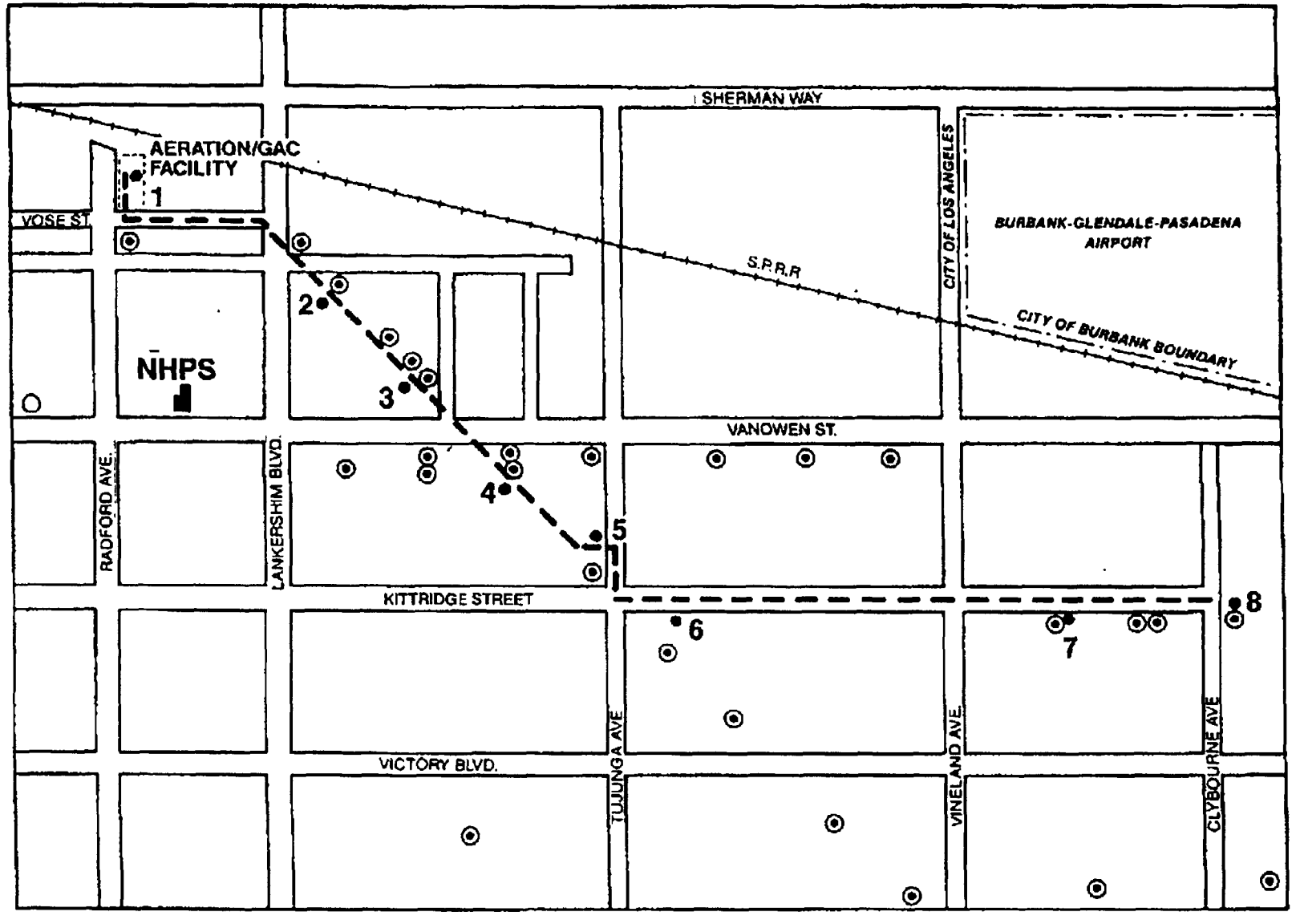
In 1985, the EPA placed the Site on Fast-Track evaluation, and the EPA contractor identified nine PRPs. During 1986, the LADWP signed a Cooperative Agreement with the EPA that provided federal funding for the Fast-Track evaluation. Also during 1986, LADWP obtained a permit to "construct and operate" from the South Coast Air Quality Management District (SCAQMD) and an operating permit from DOH for the NHOU treatment system.

A basin-wide RI was completed in 1992, and 87 groundwater monitoring wells were installed throughout the eastern SFV. In an effort to collectively manage the SFV groundwater contamination as a whole, a basin-wide feasibility study (FS) is currently being completed.

3.5 Basis for Taking Action

TCE and PCE were discovered in the groundwater in the NHOU area, with TCE concentrations greater than the MCL. The VOC-impacted groundwater is a known and active drinking-water supply aquifer. As a result, the primary human health risk posed is the potential for direct ingestion of contaminated groundwater. Source areas were not evaluated; only direct ingestion of contaminated groundwater was considered in terms of risk.

TCE and PCE are contaminants of concern due to the potential risk from ingestion, dermal contact, and inhalation of volatilization fractions during showering or bathing. TCE and PCE are classified as probable human carcinogens, based on laboratory studies performed on animals.



LEGEND

- EXISTING PRODUCTION WELL
- SHALLOW PUMPING WELL SITES
- COLLECTOR LINE ROUTE
- NHPS NORTH HOLLYWOOD PUMPING STATION

Reference LADWP, 2003b

FIGURE 3-1
Shallow Well Locations and Collector Line Route
North Hollywood Operable Unit
Area 1, San Fernando Valley Superfund Site
Los Angeles County, California

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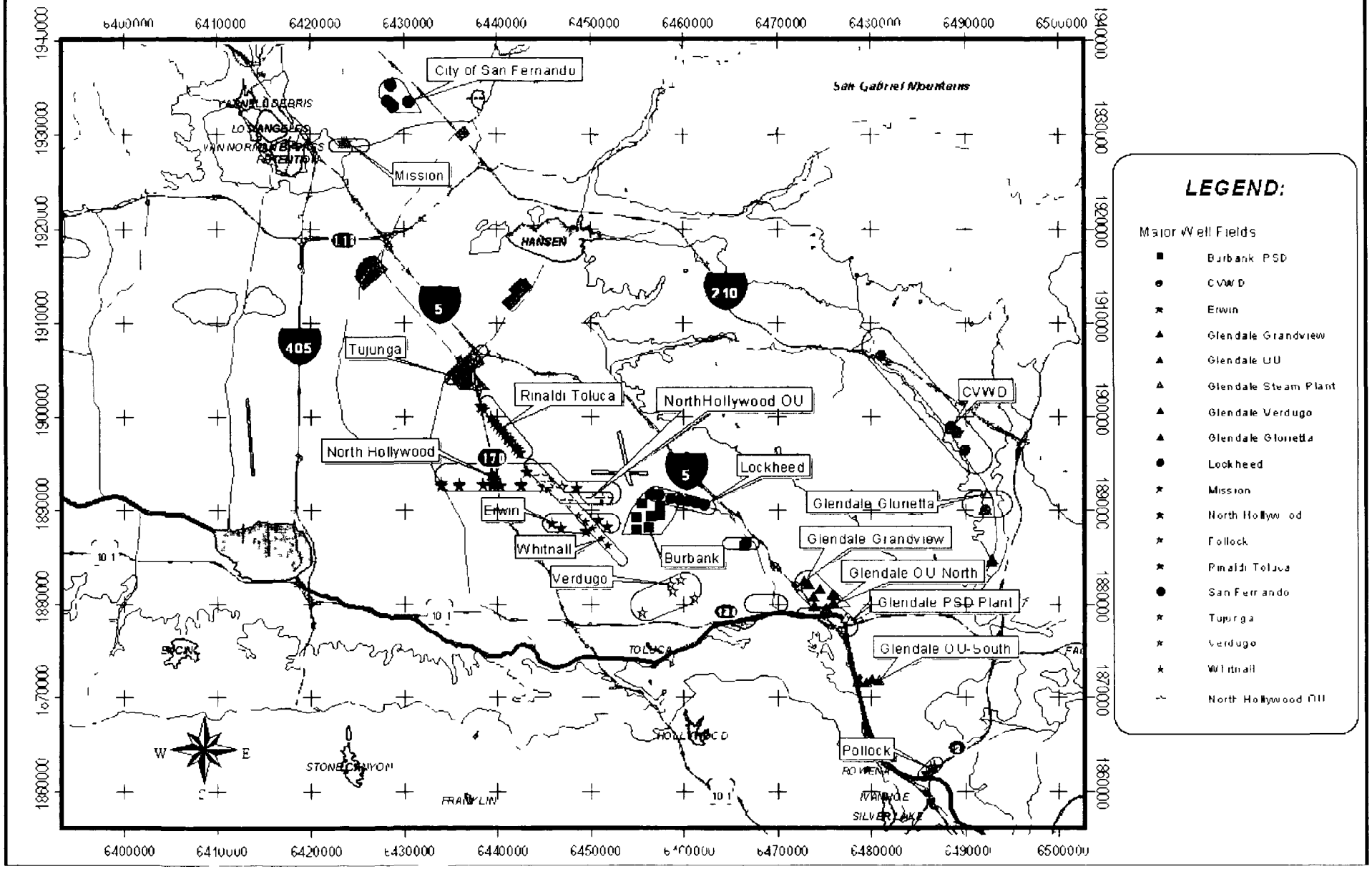

Source ULARA Watermaster Report 2003b

FIGURE 3-2
Major Production Well Fields
Upper Los Angeles River Area
North Hollywood Operable Unit
Area 1 San Fernando Valley Superfund Site
Los Angeles County California

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181982 FR 01 Fig 3 2 Major Well Fields 8 15 03 ez SFO

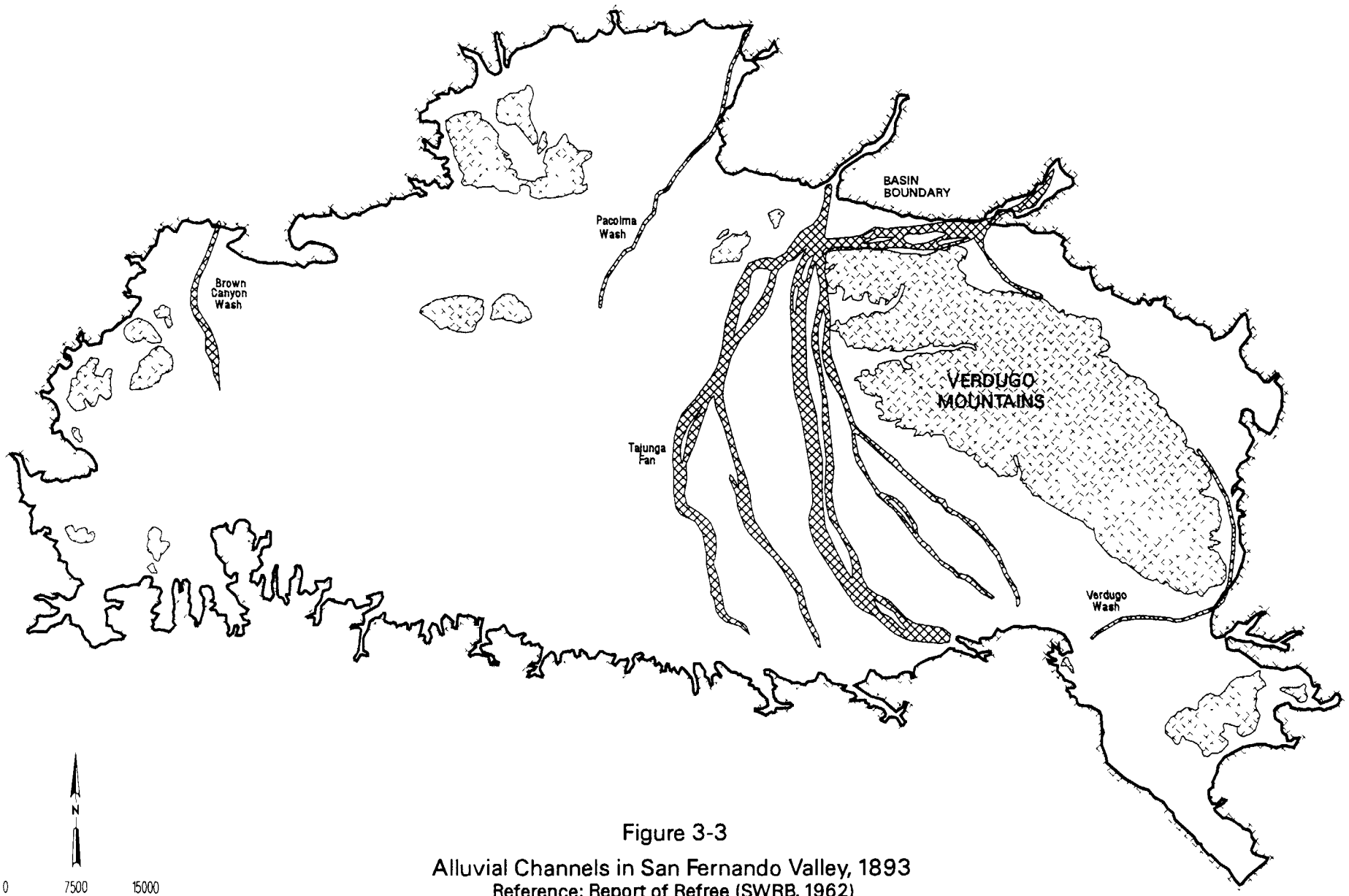

Figure 3-3

Alluvial Channels in San Fernando Valley, 1893

Reference: Report of Refree (SWRB, 1962)

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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4.0 Remedial Actions

4.0 Remedial Actions

The following section summarizes the remedial actions selected and implemented at the NHOU, as well as the operations and maintenance of the remedy since the last five-year review. The ROD for the NHOU was signed in September 1987. The selected interim remedy addressed the VOC-contaminated groundwater plume in the North Hollywood area. An interim remedy was noted as such because it was to be implemented prior to completion of the basin-wide RI/FS, given the Fast-Track status of the site. The objective of the interim remedy was VOC plume containment. The ROD selected groundwater extraction and treatment by air-stripping (aeration). Specifically, groundwater is pumped from extraction wells to a vertical column containing a packing medium (to increase surface area) over which a countercurrent flow of air is introduced to strip VOCs from the groundwater. The VOCs in the air emissions are then filtered through granular activated carbon (GAC) prior to discharge to the atmosphere (EPA, 1987).

4.1 Remedial Action Implementation

Given the Fast-Track status of the NHOU, LADWP obtained all necessary permits for NHOU treatment system construction in 1986, a year prior to ROD approval. The two permits included: a SCAQMD permit to construct and operate the treatment system and a permit from DOH (later DHS) to operate the treatment system. Construction of the treatment system was completed March 1989, and operation commenced December 1989 (CH2M HILL 1998).

Figure 4-1 presents a schematic diagram of the NHOU treatment system. Treatment system components include:

Extraction Wells and Piping

- Eight extraction wells originally designed to pump 300 gpm (see Table 4-1 and Figure 3-1).
- Approximately 11,000 feet of 12-inch-diameter conveyance (influent) pipeline from extraction wells to the treatment system.
- Approximately 460 feet of 16-inch-diameter conveyance effluent pipeline from the treatment system to the North Hollywood Pumping Station Complex (blending point).

Treatment System

- Twelve-foot-diameter, 45-foot-high air-stripping tower filled with packing material; designed at 2,000 gpm capacity.
- Air blower with 8,000 cubic-foot-per-minute capacity.
- Chemical storage and feed facility for sodium hexametaphosphate and chlorination system.

- Two 10-foot-diameter and 8-foot-high vapor-phase GAC vessels.
- Air heater/dehumidifier.

Extracted groundwater is treated with approximately 1 milligram per liter (mg/L) of sodium hexametaphosphate prior to entering the tower to minimize scaling of the packing material (CH2M HILL, 1998). Once VOCs vaporize to the air stream, the air stream is heated to reduce its relative humidity and then passes through two parallel 7,000-pound GAC units where VOCs are adsorbed prior to releasing the air to the atmosphere. Treated groundwater (effluent) is disinfected with chlorine and piped to the North Hollywood Pumping Station Complex (North Hollywood Sump). Here the groundwater is blended with water from the Los Angeles Aqueduct Filtration Plant, MWD, and groundwater from other LADWP-operated pumping fields in the vicinity of the NHOU area prior to serving consumers (CH2M HILL, 1998).

TABLE 4-1
North Hollywood Operable Unit Extraction Well Information
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Well Number	Location	Screened Interval (feet below ground surface)
1	11845 Vose Street	190 to 276
2	11599 ½ Dehougne Street	190 to 300
3	11604 ½ Higgins Street	190 to 286
4	6720 ½ Camellia Avenue	180 to 280
5	6649 ½ Tujunga Avenue	180 to 266
6	11326 ½ Kittridge Street	180 to 378
7	10852 ½ Kittridge Street	180 to 270
8	6558 ½ Clybourne Avenue	180 to 280

Reference: LADWP, 2002a

4.2 Operation and Maintenance

Operation and maintenance of the treatment system is necessary to achieve the objectives set forth in the ROD: containment of VOC-contaminated groundwater in the North Hollywood area and treatment of captured groundwater to ROD specified levels. Specifically, appropriate and efficient O&M maximizes the operational time of wells and the treatment plant. The main four areas of the treatment system that require O&M are: extraction wells, groundwater treatment plant, North Hollywood Sump, and the chlorine station. Additionally, DHS and SCAMQD permit conditions must be met.

Until April 1, 2001, O&M activities were guided by the original O&M manual, dated September 1988 (James M. Montgomery Consulting Engineers, Inc., 1988). Since April 2001,

LADWP has submitted to the EPA annual work plans that detail anticipated O&M activities and costs for the coming year (April 1 to March 30) (LADWP, 2001, 2002b, and 2003a).

The treatment system is currently operating under a LADWP performance goal of continuous 1,346 gpm flow from seven extraction wells. Well 1 has not been operating since 1989 because the well is too shallow and there is not sufficient head above the pump. Well 5 is sensitive to the drawdown of the groundwater table and sometimes shuts down when all seven wells are pumping. The screened interval depths of each well are presented in Table 4-1.

LADWP monitors and internally reviews groundwater elevations to evaluate drawdown at the NHOU extraction wells in relation to treatment system pumping and that of nearby production well fields. The data are input into a database linked to a basin-wide groundwater model; the data are evaluated regularly in terms of plume capture and basin-wide drawdown. Monitoring wells are fitted with pressure transducers that automatically record groundwater elevation; the data are downloaded every six months and evaluated. Additionally, LADWP manually monitors groundwater elevation monthly in five select wells located in nearby pumping fields. The monthly data are evaluated promptly to ensure there is reasonable head above pump levels, and production field pumping rates are modified where necessary (personal communication, Hadi Jonny/LADWP, July 31, 2003).

The treatment system and extraction wells are designed to shutdown during certain events to protect the integrity of the treatment system. Approximately three times per year, a "power bump" may occur that causes the well pumps to shutdown. The treatment plant will shutdown when temperature sensors "lock out" due to temperatures reaching above-normal operating standards. Planned LADWP response time to these events is between 3 hours to 2 days (LADWP, 2003b).

The SCAQMD air discharge permit dated August 29, 1986 requires air emissions to be less than maximum allowable daily limits set for 10 compounds and limits 2 pounds per day of total VOCs. The permit specifies the need for an air discharge monitoring program to maintain compliance. Ideally, when air emissions concentrations approach but do not exceed limits, the two 7,000-pound GAC filters are replaced; this occurs approximately every 8 to 12 months. Spent GAC is tested for VOCs using toxicity characteristics leaching procedures and, if categorized nonhazardous, the carbon may be regenerated at an off-site facility by the GAC contractor. If the carbon is categorized as hazardous, it is regenerated at an off-site facility in accordance with regulations.

Table 4-2 summarizes routine O&M for the NHOU treatment system. In 2003, the column "Concurrent Work" was added to the work plan to improve O&M management of the remedy, with the goal of decreasing unnecessary downtime.

The DHS operating permit for the treatment system requires treated water for domestic supply from the North Hollywood Sump (blend point) to have constituents of concern (COCs) concentration less than the MCLs and/or DHS Alternate Concentration Limits. LADWP has set operational concentration limits at 60 percent of MCLs due to blending requirements. Additionally, DHS requires chlorination of treated water at the treatment system, not downgradient.

TABLE 4-2
North Hollywood Operable Unit Preventive Maintenance
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Equipment	Description	Frequency	Shutdown Required?	Concurrent Work
Extraction Wells	Check operation of flow integrator and condition; lube drive gears as needed; check operation of check valve; test operation of vacuum lines check valve; check gravel chutes; operated discharge gates; inspect and clean air valves; remove cobbles on acid bath; lube valve and float linkage	Annually (February)	No	Not Necessary
Extraction Wells – Overhaul Flowmeters	Clean flowmeter; change gears and bearings; grease and adjust propeller shaft	Annually (Flowmeter for Well 5 and 7 February/ March; Wells 2-4, 6, & 8 August)	Yes	Repair when Necessary
Air-stripping Tower – Backflow Prevention Device	Test backflow prevention device	Annually (February)	No	Not Necessary
Air-stripping Tower – Chlorine Gas Leak Monitor	Mil Ram CL2 Gas Transmitters & Controllers - Check all controller sensors; calibrate; check relay settings; verify that local and remote measurements are being reported and accurate; replace battery backup system when necessary	Semi-annually (April & October)	No	Not Necessary
Air-stripping Tower - Air Tower Blower	(1) Blowers - clean all build-up off units; clean room inlet screen and change filters as needed; check V-belts & adjust as needed (2) replace emissions seal heater as needed (3) check oil level in valve motor housing (4) inspect tower packing & flow distributor for excessive scaling	Semi-annually (May & November)	Yes	GAC Change Out
Air-stripping Tower - Air Sample Ports	Inspect and clean air sample ports	Semi-annually (June & Dec)	Yes	GAC Change Out
Air-stripping Tower – Chlorine Distribution Station	Inspect and clean chlorine strainers, driplegs; inspect and clean injectors throat and tailway; install chlorinator preventive maintenance kit as needed (O-rings, springs, gaskets, etc.); replace pigtail; inspect and clean chlorine gas and liquid headers; inspect and overhaul chlorine header valves.	Annually (April)	No	Not Necessary
Air-stripping Tower - Air Sample Ports	Clean/replace air sample port tubing	Annually (June)	Yes	GAC Change Out
North Hollywood Sump	Clean walls and floor	Approximately every 3 years	Yes	When possible, Operations plans this activity

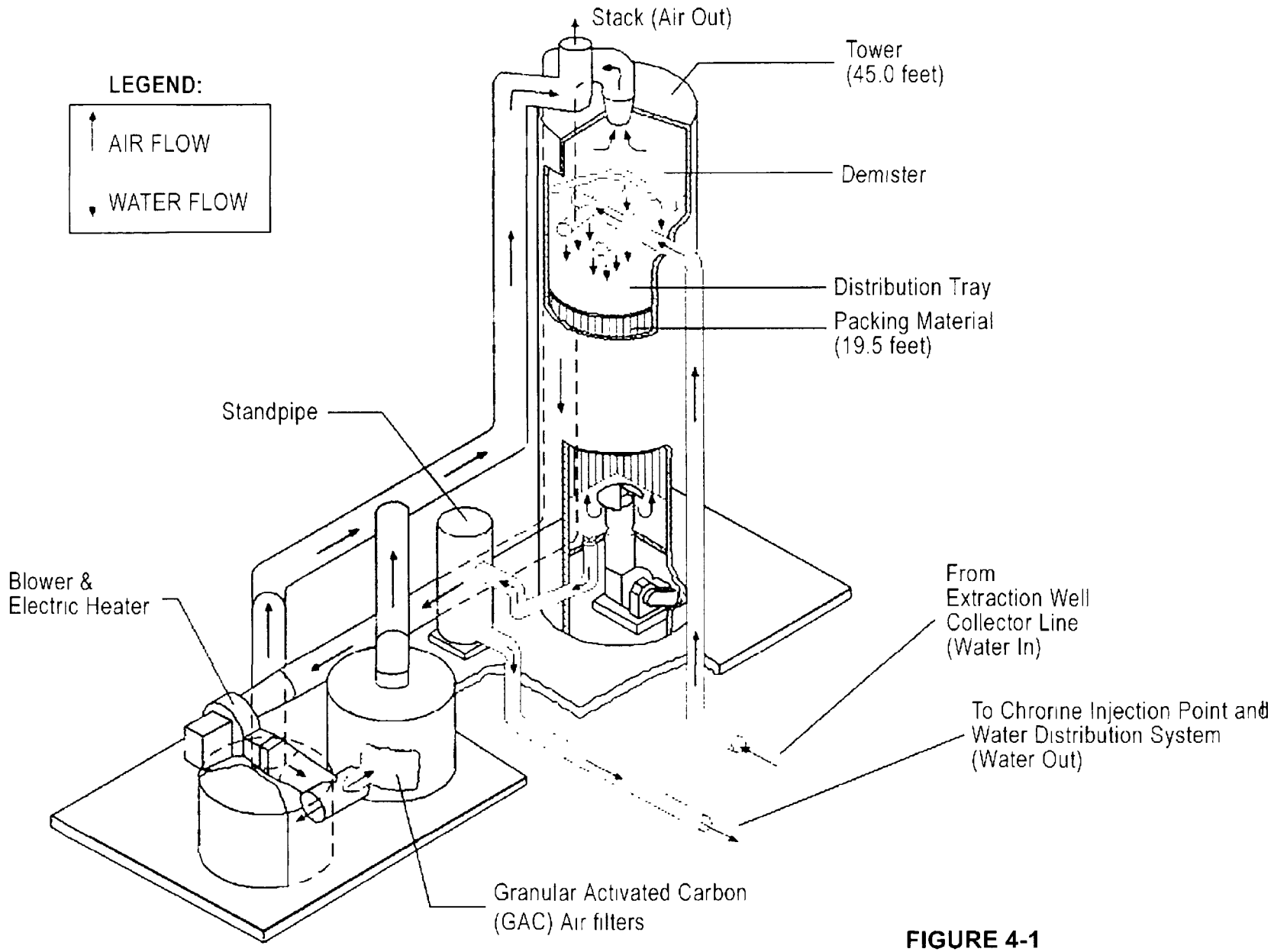

FIGURE 4-1
Schematic Diagram of
NHOU Groundwater Treatment Facility
North Hollywood Operable Unit
Area 1, San Fernando Valley Superfund Site
Los Angeles County, California

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5.0 Progress Since the Last Review

5.0 Progress Since the Last Review

The last five-year review was conducted in 1998 and included the conclusions and recommendations listed below.

Conclusion:

The ROD-mandated remedy is effective in achieving objectives and groundwater modeling efforts indicate plume capture.

Recommendations

1) Without the operation of LADWP's eastern North Hollywood wells, modeling indicates that a narrow, unhydraulically-controlled path between North Hollywood extraction wells 6 and 7 is possible.

2) Should operation become intermittent again due to O&M delays, an engineering review will be performed to evaluate the best way to achieve and maintain uptime.

3) LADWP should visibly post the facility sign.

The first recommendation refers to the North Hollywood (east) well field that is now inactive due to VOC contamination, located directly east of the currently active North Hollywood well field (west). As discussed Section 6.0, data indicates that the TCE plume has migrated southward during the past 5 years, and a small branch migrated to the east beyond well 6, south of well 7. Section 6.0 further evaluates the plume stability.

Regarding the second recommendation, operation of the treatment facility was intermittent during 1999, 2001, and 2002. From 2001 to the present, annual work plans have been submitted to EPA that detail O&M activities for the preceding year. These documents have addressed the causes for intermittent operations. Additionally EPA requested that LADWP submit in writing when individual extraction wells or the treatment system has been inactive for more than 2 weeks. LADWP has complied with this request by electronically communicating all periods of shutdown greater than 2 weeks to EPA.

The final recommendation, facility signage, was implemented at the time of the previous five year review. Post-September 11, 2001 security measures of public water suppliers, particularly at chlorination facilities, require more stringent security measures and less publicly available information. As a result, facility signage may not be an issue at this time.

6.0 Five-year Review Findings

6.0 Five-year Review Findings

The following sections discuss findings from the five-year review.

6.1 Five-year Review Process

Bob Fitzgerald, EPA Remedial Project Manager, led the NHOU five-year review. CH2M HILL provided technical support to the EPA.

The five-year review consisted of: a review of relevant documents (see Appendix A); a regulatory review; interviews with LADWP staff, DHS staff, and the Assistant to the Watermaster; and a site inspection.

Following the release of this document, EPA will produce and distribute a fact sheet to the community near the Site. The fact sheet will summarize the findings of the five-year review and instructions on how to access a copy of the review.

6.2 Documents Review

As a part of the five-year review process, CH2M HILL conducted a brief review of numerous documents related to site activities. The documents chosen for review primarily focused on progress since the last five-year review but ranged in publication date from 1987 to the present. Appendix A provides a list of the documents reviewed as part of this report.

6.3 Data Reviewed

The following sections describe the periodic reporting and/or monitoring at the treatment facility for the NHOU, as required by EPA, DHS, and SCAQMD.

6.3.1 Water

LADWP is responsible for submitting quarterly reports to the EPA that summarize O&M costs, treatment system operation time, estimates of pumping rates from individual extraction wells, O&M issues contributing to downtime of the system, and VOC analytical data (individual well, influent, and effluent). All quarterly reports were submitted from 1998 to 2003.

From 1992 to the present, CH2M HILL has submitted basin-wide annual and semi-annual groundwater monitoring reports to the EPA. The basin-wide groundwater monitoring reports contain analytical data from: RI monitoring wells, individual sites within the NHOU area managed by the RWQCB or Department of Toxic Substances Control, LADWP production wells, and Lockheed Aeronautical Systems Corporation. CH2M HILL manages all data in a Geographic Information Systems database. All groundwater monitoring reports were submitted from 1998 to 2003 and reviewed (CH2M HILL, 2001, 2002, 3003). Twelve select North Hollywood RI wells (noted as SFVRI cluster wells on Figure 6-1) are sampled during the first, second, and third quarter for VOCs including methyl *tertiary*-butyl

ether (MtBE), nitrate/nitrite, and hexavalent chromium. During the fourth quarter twenty two wells are sampled for the above-mentioned constituents, as well as: SVOCs, perchlorate, dissolved metals, and water quality/chemistry parameters. During the sampling events, groundwater elevation measurements are recorded.

The DHS operating permit for the treatment system requires regular sampling of groundwater influent, effluent, each extraction well, and the blend point (North Hollywood Pumping Station Complex). The sampling requirements are presented in Table 6-1. LADWP is responsible for monthly reporting of groundwater quality data to DHS. These reports must include: VOC monitoring results for wells, air-stripping tower influent and effluent and the blend point, amount of water treated, amount of chlorine used, and operational changes and problems. While LADWP analyzes treated groundwater for additional compounds in accordance with DHS water purveyor requirements, only VOC data are reported monthly and regulated in terms of the treatment system operations; additional data are reported separately and monitored by DHS. Water delivered from the blend point must comply with DHS MCLs and action levels. Between 1998 and 2003, there were no reported exceedences of MCLs or action levels in water samples from the blend point.

TABLE 6-1
North Hollywood Operable Unit Extracted Groundwater Monitoring and Sampling Schedule
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Location	Sampling Schedule for Volatile Organic Compounds
Each Well	Quarterly
Tower Influent	Monthly
Tower Effluent	Monthly
Blend Point (River Supply Conduit)	Weekly

Reference: LADWP, 2002c

Data presented in the groundwater monitoring reports are discussed in terms of shallow and deep zones, both of which are within Region 1 (200 to 280 feet bgs). Wells are categorized as "shallow" zone when the wells' screened interval is within 50 feet of the water table. Conversely, wells are considered "deep" when the screened interval is greater than 50 feet from the water table. Plume map figures presented in this section were created for the SFV groundwater monitoring program, and rationale used for their development can be found in *2002 RI Monitoring Well Sampling, San Fernando Valley, Los Angeles County, California* (CH2M HILL, 2003).

Elevation. Groundwater elevation has decreased in the North Hollywood area since the start of the remedial action in 1988. Since 1998, the reduction ranges from no significant change to approximately 40 feet. This finding is consistent with basin-wide trends presented by the ULARA Watermaster (2003a) and LADWP (2002a). As mentioned previously, decreased water level elevation is due to the combined effect of NHOU treatment system extraction

well pumping and, to a greater extent, the pumping of well fields in the vicinity of the NHOU. Varied effects on water level elevations are expected, owing to the depth of alluvium across the fault.

TCE. TCE concentrations are relatively consistent with concentrations in groundwater as discussed in the previous five-year review. Table 6-2 summarizes groundwater monitoring and extraction well data from 1998 to 2002. The average concentration of TCE in groundwater monitoring wells from 1998 to 2002 ranged from 20 micrograms per liter (µg/L) to 55 µg/L. The maximum concentration of TCE in groundwater monitoring wells from 1998 to 2002 ranged from 99 µg/L to 810 µg/L.

Influent concentration has shown little change during the past five years, as seen in Table 6-2. The average concentration of TCE in extraction wells from 1998 to 2002 ranged from 70 µg/L to 104 µg/L with the maximum ranging from 240 µg/L to 610 µg/L, respectively.

The maximum recorded TCE concentration from 1998 to 2003 in NHOU extraction well groundwater was at well 2 as 610 µg/L in July 2002, the time period during which this well was not pumping. Concentrations subsequently decreased to 180 µg/L, indicating the arrival of a contaminant pulse resulting from ongoing contaminant transport. Overall, TCE concentrations have been consistent at extraction wells 3 through 6 and 8. However, TCE concentrations at well 7 are generally increasing from 53 µg/L during February 1999 to 208 µg/L during February 2003.

The shallow zone plume area—classified as TCE concentrations greater than the MCL—has had an increase in TCE concentration since 1998, as shown in Figures 6-3 through 6-7. The shallow TCE plume appears to be migrating in a southeasterly direction, in accordance with local groundwater flow direction and the previous five-year review modeling results. However, in the northern portion of the plume, west of extraction well 1 (inactive) and 2 (inactive from September 2000 to December 2002), the plume appears to be migrating west—northwest. This migration may be due to the combined effect of a lack of pumping at well 1 and 2 and the North Hollywood production well field directly west of the treatment system. Currently, maximum TCE concentrations in the shallow zone are in the vicinity of extraction wells 2, 3, 4, 7, and 8.

The deep zone TCE plume area has remained relatively consistent (Figures 6-3 through 6-7). The highest concentration of the plume is in the vicinity of active extraction wells 4 through 8. The treatment system appears to be effective in controlling plume migration beyond well 8.

TABLE 6-2
North Hollywood Operable Unit Trichloroethylene Concentration (µg/L) in Groundwater
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Sample Type	Year	Average Concentration (values above the detection limit only) µg/L	Maximum Concentration µg/L
Monitoring (RI) Wells	1998	55	810
	1999	34	100
	2000	21	99
	2001	30	260
	2002	20	170
Extraction Wells	1998*	70	240
	1999*	104	417
	2000	76	303
	2001	86	442
	2002	96	610

Notes:
*incomplete data set available
µg/L: micrograms per Liter

PCE. The PCE concentrations in the NHOU area have slightly decreased since remedy implementation, as evidenced in the groundwater monitoring reports and individual extraction well data. Groundwater monitoring and extraction well analytical data from 1998 to 2002 are summarized in Table 6-3.

The average PCE concentration in groundwater monitoring wells from 1998 to 2002 ranged from 6.5 µg/L to 20 µg/L with a corresponding maximum range of 28 µg/L to 250 µg/L. The PCE concentration in NHOU extraction wells ranged from 13 µg/L to 21 µg/L from 1998 to 2002 with a maximum concentration range of 39 µg/L to 62 µg/L.

Plume definition and migration patterns for PCE are similar to that of TCE in the shallow zone, but much less defined due to the lower concentration of PCE present throughout the NHOU area (Figures 6-8 through 6-12). There was very little change in deep zone plume extent from 1998 to 2003.

TABLE 6-3
North Hollywood Operable Unit Perchloroethylene Concentration (µg/L) in Groundwater
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Sample Type	Year	Average Concentration (values above the detection limit only) µg/L	Maximum Concentration µg/L
Monitoring (RI) Wells	1998	20	250
	1999	8.4	28
	2000	7.6	47
	2001	6.5	41
	2002	18	39
Extraction Wells	1998*	13	44
	1999*	21	50
	2000	14	62
	2001	16	62
	2002	15	39

Notes:
*incomplete data set available
µg/L: micrograms per Liter

Nitrate. Nitrate has been consistently detected in extraction and RI wells in the NHOU area at concentrations greater than the MCL of 45 mg/L since the first available data set in 1990. Figures 6-13 though 6-17 show the estimated plume areas in shallow and deep zones from 1998 to 2002, respectively. The maximum concentration of nitrate in a NHOU RI well during 2002 was 132 mg/L in well NH-CO1-325 (CH2M HILL, 2003). In the shallow zone during the past five years, the nitrate plume has divided. Nitrate in extraction wells 2 and 8 consistently exceeded the MCL for nitrate throughout 2002, with a maximum concentration of 61 mg/L during 2002.

Chromium. Total chromium was first reported in the basin-wide groundwater monitoring reports in 1992. The MCL for total chromium is 50 µg/L. There were no total chromium concentrations in North Hollywood RI monitoring wells that exceeded the MCL from 1998 to 2003.

LADWP extraction well total chromium data are available from 1999 to present. Total chromium concentrations in extraction well 2 exceeded the MCL during the sampling events of 2000 and 2002. The maximum concentrations recorded for well 2 were 97 µg/L in March 1999 and 60 µg/L in April 2002. Total chromium has been detected in extraction wells 3, 4, and 5, but concentrations have never exceeded the MCL.

Figures 6-18 and 6-19 show the total chromium concentration plume for the shallow and deep zones during 2001 and 2002, respectively. According to the 2002 monitoring data, total chromium was present in the deep zone groundwater in the vicinity of extraction wells 4 through 6.

Hexavalent Chromium. Hexavalent chromium was first analyzed for in RI wells during 1998 and first reported for LADWP NHOU extraction wells in 2000. There is neither an established MCL nor a DHS action limit for hexavalent chromium. Hexavalent chromium has been detected in a number of RI monitoring wells during the past five years but consistently in well NH-C06-160 during 1998, 2001, and 2002, with maximum concentrations of 20 µg/L, 8.6 µg/L, and 10 µg/L, respectively. Hexavalent chromium has been consistently detected in extraction well 2 at a maximum concentration of 50 µg/L during 2001 and 2002. Hexavalent chromium has also been detected intermittently in extraction wells 3 through 5 at a maximum concentration of 10 µg/L.

Other Metals. Other metals are analyzed for in RI monitoring wells during every fourth quarter. NHOU extraction wells are analyzed for other metals in accordance with DHS water purveyor requirements; however, these results are not reported in the monthly reports.

Total thallium in North Hollywood RI wells have regularly exceeded the MCL of 2 µg/L. The maximum exceedence was detected in 2001 at well NH-CO3-580, with a concentration of 6.8 µg/L. These results are not considered representative of water quality because often the detection limits ranged from 4 µg/L to 9 µg/L and, in some instances, thallium was detected in the associated laboratory blank. This conclusion is consistent with that presented in the previous five-year review. There were no other reported MCL exceedences for other metals in RI wells from 1998 to 2003.

Other VOCs. There were no reported concentrations of other VOCs greater than the detection limit in NHOU extraction wells detailed in monthly DHS reports from 1998 to 2003. However, cis-1,2-dichloroethene (DCE), carbon tetrachloride, and 1,1-DCE have been detected at concentrations greater than the MCLs in North Hollywood RI well NH-C02-520 during the past five years. Cis-1,2-DCE was detected once at a concentration of 8 µg/L, exceeding the MCL of 6 µg/L during 2000. The MCL for carbon tetrachloride of 5 µg/L was exceeded in 1998, 1999, 2000, 2001, and 2002 at concentrations of 9 µg/L, 8 µg/L, 10 µg/L, 15 µg/L, and 14 µg/L, respectively. The concentration of 1,1-DCE exceeded the MCL of 7 µg/L during 1999, 2001, and 2002 as 8 µg/L, 14 µg/L, and 14 µg/L, respectively. The NHOU treatment system was designed to treat VOC-impacted groundwater.

Perchlorate. Perchlorate data was not presented by LADWP in monthly neither quarterly reports for extraction wells nor influent. Perchlorate was first analyzed and reported for the NHOU RI wells in 1998 at a maximum concentration of 5 µg/L in well NH-VPB-12. There is no established MCL for perchlorate. Current EPA Interim Guidance (January 22, 2003) provides an action level range from 4 – 18 µg/L. In 2002, the DHS action level for perchlorate was reduced from 8 µg/L to 4 µg/L. Samples from RI monitoring well NH-VPB-12 contained the highest perchlorate concentration in the NHOU area during 1999, 2000, 2001, and 2002 with concentrations of 4.4 µg/L, 5.3 µg/L, 6 µg/L, and 2 µg/L, respectively. Perchlorate was also detected in three other RI wells during the 2002 sampling event.

MtBE. MtBE was first analyzed in 1999. During 1999 the DHS action limit for MtBE was 5 µg/L; this was raised to 13 µg/L in 2000. There is no federal MCL for MtBE. MtBE was not detected in any NHOU extraction wells from 1998 to 2003, according to the DHS monthly reports. MtBE has been consistently detected in RI well NH-VPB-01 during 1999, 2000, 2001, and 2002, with concentrations decreasing as 32 µg/L, 30 µg/L, 12 µg/L, and 13 µg/L, respectively. The NHOU treatment system is capable of treating MtBE impacted groundwater.

SVOCs. There were no reported SVOCs in RI or extraction wells from 1998 to 2003.

6.3.2 Air

The NHOU remedy blows air at VOC contaminated groundwater which transfers VOCs to the air; two GAC units then filter the air prior to discharge into the atmosphere. The GAC units have three internal sample ports, an inlet sampling port, and an outlet sampling port where air emissions are monitored quarterly, at a minimum, to ensure compliance with the SCAQMD permit. Monitoring is necessary to determine VOC loading on the GAC vessels, efficiency of the GAC vessels, and to plan when GAC change-out is necessary (LADWP, 2003b). LADWP is responsible for self-regulation to ensure compliance with the terms of the SCAQMD permit. Reporting is not required; however, regular air-quality monitoring of emissions is required to ensure that the quantity of total VOCs does not exceed 2 pounds/day, and that the following individual limits are not exceeded: 0.02 pounds/day benzene, 0.5 pounds/day chloroform, and 0.2 pounds/day 1,1-DCE (James M. Montgomery Consulting Engineers, Inc., 1988). There have been two known air quality discharge exceedences of the 2 pounds/day limit during the past 5 years.

In November 1998, total VOC concentrations in emissions were calculated as 2.05 pounds/day. During the following sampling event, January 1999, total VOC concentration in emissions was 1.9 pounds/day, less than the permit limit of 2 pounds/day. Results of the subsequent sampling event on April 5, 1999 indicated total VOCs in emissions exceeding permitting requirements again at 3.1 pounds/day. The treatment system was shutdown from April 19, 1999 to January 10, 2000 for GAC change out.

The most recent air emissions permit exceedence occurred February 20, 2003. The total VOC emission quantity was 7.81 pounds/day, exceeding the 2 pounds/day limit. According to LADWP, the GAC influent airstream heater was being repaired at the time of sampling and the system was not shutdown, resulting in high emissions (personal communication, Lucik Melikian/LADWP, July 30, 2003). The SCAQMD permit requires 60 percent humidity for all influent air prior to GAC treatment. During the subsequent sampling event on March 1, 2003, the total VOC emission quantity was 0.33 pound/day, substantially less than the permitted emissions limit.

On two occasions during the past five years, there were anomalous quantities of TCE in air emissions greater than intake TCE quantities. According to a CH2M HILL engineer, the occurrences of TCE emissions quantities greater than intake may be due to a residence time of a contaminant slug or improper carbon regeneration. Regardless, the data indicate early breakthrough of TCE in some instances which should be scrutinized and addressed as a part of overall operations and maintenance.

6.3.3 Operations and Maintenance Activities, 1998 to 2003

The treatment system for the NHOU has not operated at the LADWP goal of 1,346 gpm since 1998. O&M delays have been common, causing less than 75 percent operational time during 1999, 2001, and 2002. However, during 2000 and 2003, all wells were operating at above 75 percent operational time.

Table 6-4 summarizes treatment system operations from May 1998 to May 2003. From 1998 to 2003, the facility was shutdown for varied durations due to the following routine maintenance:

- GAC change-out (approximately 193 days)
- North Hollywood Sump maintenance (approximately 26 days), and
- air-stripping tower cleaning (1 day).

The facility was also shutdown for unexpected maintenance such as:

- repairs to the influent totalizer during 1998 (5 days);
- mechanical problems with influent valve during 1999 (6 months);
- nearby construction caused a vacuum line break associated with the chlorination system that caused a 4-month shutdown during 2002;
- maintenance of air heater during 2002 (68 days);
- a bearing failure in a blower motor during 2002 (13 days); and
- flow problems during 2002 (2 days).

The sixth, seventh, and eighth GAC change-outs took place between 1998 and 2003 during the following periods: April 19, 1999 to July 1999; November 28, 2000 to March 22, 2001; and March 5 to 11, 2002.

Excessive delays during 1999 and 2000 were due to LADWP contract procurement procedures. This process was improved by initiating a 3-year contract with an approved contractor, as evident in the 2002 change-out, which took only 6 days. The current GAC agreement will expire October 2005, and LADWP plans to initiate the process of acquiring a new agreement in October 2004.

Individual well O&M activities rarely caused shutdown of the entire system; however, the volume of treated groundwater was decreased. All seven extraction wells operated at above 75 percent of the time that the treatment system was operational during 1998 and 1999. From 2000 to 2003 the largest factor influencing the operational time of individual wells was management of new potential COC concentration. Well 2 was shutdown from September 2000 to December 2002 because total chromium concentration exceeded LADWP's internal standard of 20 µg/L, and during April 2000 and April 2002 exceeded the MCL of 50 µg/L. Well 4 was shutdown from September 2000 to June 2001 because the total chromium concentration exceeded 20 µg/L but was less than the MCL. Total chromium is not a ROD COC, and the treatment system is not capable of removing total chromium from groundwater.

All required sampling outlined in DHS and SCAQMD operational permits was performed from 1998 to 2003. Results are discussed in Section 6.3.

LADWP collected and evaluated water-level data from 1998 to 2003. These data are not required to be presented to EPA.

TABLE 6-4
North Hollywood Operable Unit Treatment System Operations Summary, 1998 to 2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Quarter	Reporting Month/Year	Days of Operation	Average Flow (gpm unless otherwise noted)	Well I.D. Number Days of Well Operation							Operational Problems
				2	3	4	5	6	7	8	
2Q03	May-03	30	1,227	0	29	29	29	0	0	29	
	Apr-03	30	1,227	30	29	29	29	30	30	29	
1Q03	Mar-03	24	1,096	24	24	24	24	24	9	24	
	Feb-03	23	1,223	23	23	23	23	23	21	23	
	Jan-03	27	1,115	27	27	27	27	27	27	27	
Summary Statistics:			Avg Monthly Treatment*	Well Efficiency							
Operational Efficiency		89%	51,158	78%	99%	99%	99%	78%	65%	99%	

TABLE 6-4
North Hollywood Operable Unit Treatment System Operations Summary, 1998 to 2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Quarter	Reporting Month/Year	Days of Operation	Average Flow (gpm unless otherwise noted)	Well I.D. Number Days of Well Operation							Operational Problems
				2	3	4	5	6	7	8	
4Q02	Dec-02	31	1,122	31	31	15	31	31	31	31	Well 4 off because of electrical problems.
	Nov-02	30	1,057	0	30	24	30	30	30	30	Well 2 total chromium as of August 27, 2002 = 35.8 µg/L; well turned off.
	Oct-02	28	800	17	28	17	28	28	17	28	Well 2 total chromium as of August 27, 2002 = 35.8 µg/L; well turned off. Well 7 mechanical problems. *System shutdown October 18-22, 2002 due to repairs at the North Hollywood Sump.*
3Q02	Sep-02	30	803	0	30	23	30	30	23	30	Well 2 total chromium as of 8/27/02 = 35.8 µg/L; well turned off.
	Aug-02	31	825	0	31	31	31	31	31	31	
	Jul-02	25		0	25	25	25	6	2	25	*July 5 – 11: shutdown due to maintenance of air heater; Well 2 shut off due to total chromium levels as of March 18, 2002 = 30.0 µg/L.* Well 6 out of service from July 11 to August 23, 2002 the pump and motor were replaced.
2Q02	Jun-02	4	5.48 million gallons	0	4	4	4	4	4	4	*June 6 – 28: facility shutdown due to broken air heater; April 24 - June 3rd: inspection of air sampling port - shutdown;* May 22 & 23: facility briefly on for testing.
	May-02	2	1.52 million gallons	0	2	2	2	2	2	2	
	Apr-02	24	942	0	24	24	24	24	0	24	Well 2 off, total chromium as of March 18, 2002 = 30.0 µg/L. Well 7 off.
1Q02	Mar-02	19	1,104	0	19	19	19	19	1	19	Well 2 off, total chromium as of March 18, 2002 = 30.0 µg/L. Well 7 off March 13-25, 2002 due to electrical problems. *March 5 to 11, 2002 system shutdown for GAC change-out. March 13-14 system shutdown due to problem with flow from area.*
	Feb-02	25	1,239	0	25	25	25	25	25	25	Well 2 off, total chromium as of December 5, 2001 = 25.0 µg/L.
	Jan-02	17	1,168	0	17	17	17	17	17	17	Well 2 off, total chromium as of December 5, 2001 = 25.0 µg/L. *System down January 2 to January 15, 2002 due to bearing failure in blower motor.*
Summary Statistics:			Avg Monthly Treatment*	Well Efficiency							
Operational Efficiency		73%	36.823	18%	100%	85%	100%	93%	69%	100%	

TABLE 6-4
North Hollywood Operable Unit Treatment System Operations Summary, 1998 to 2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Quarter	Reporting Month/Year	Days of Operation	Average Flow (gpm unless otherwise noted)	Well I.D. Number Days of Well Operation 2	3	4	5	6	7	8	Operational Problems
4Q01	Dec-01	31	862	0	31	15	31	31	31	31	Well 2 off, total chromium as of December 5, 2001 = 25 µg/L.
	Nov-01	0	--	0	0	0	0	0	0	0	*System not operating since Oct. 4 due to vacuum line break, caused by nearby construction; restarted December 1, 2002.*
	Oct-01	4	8.001 million gallons	0	4	4	4	4	4	4	*Treatment facility turned off Oct. 4 due to vacuum line break caused by nearby construction.*
3Q01	Sep-01	30	1,065	0	30	30	30	30	30	30	
	Aug-01	31	1,142	0	31	0	31	31	31	31	
	Jul-01	NA		0	NA	NA	NA	NA	NA	NA	Well 2 off due to chromium concentration > 20 µg/L.
2Q01	Jun-01	30	971	11	12	11	30	30	30	30	June 20, 2001: wells 2 and 4 were returned to service. Well 3 returned to service June 19, 2001.
	May-01	31	839	0	0	0	31	31	31	31	
	Apr-01	8	11.75 million gallons	0	0	0	8	8	8	8	*April 2 to 22: 2001 facility shutdown for work at North Hollywood Pumping Station.* Well 3 off April to June 19, 2001 due to electromechanical problems.
1Q01	Mar-01	10	13.795 million gallons	0	10	0	5	10	10	10	*Facility shutdown November 28, 2001 through Marc 22, 2001 for GAC replacement in the Emission Control Unit (ECU).*
	Feb-01	0	--	0	0	0	0	0	0	0	*Facility shutdown November 28, 2001 through 3-22-01 for GAC replacement in the ECU.*
	Jan-01	0	--	0	0	0	0	0	0	0	
Summary Statistics:			Avg Monthly Treatment*	Well Efficiency							
Operational Efficiency		48%	20.701	6%	67%	34%	97%	100%	100%	100%	

TABLE 6-4
North Hollywood Operable Unit Treatment System Operations Summary, 1998 to 2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Quarter	Reporting Month/Year	Days of Operation	Average Flow (gpm unless otherwise noted)	Well I.D. Number Days of Well Operation							Operational Problems
				2	3	4	5	6	7	8	
4Q00	Dec-00	0	–	0	0	0	0	0	0	0	*Facility shutdown November 28, 2000 through March 22, 2001 for GAC replacement in the ECU*
	Nov-00	27	38 375 million gallons	0	27	0	27	27	27	27	*Facility shutdown November 28, 2000 through March 22, 2001 for GAC replacement in the ECU*
	Oct-00	31	1,003	0	31	0	31	31	31	31	
3Q00	Sep-00	30	980	0	30	0	30	30	30	30	
	Aug-00	31	1,030	16	29	20	29	29	29	29	Well 2 shutdown due to chromium concentrations Well 4 was also shutdown until June 2001
	Jul-00	31	1,126	31	31	31	26	30	28	25	Wells 2 and 4 out of service due to chromium concentrations
2Q00	Jun-00	30	1,159	30	30	30	0	30	30	30	Well 5 out of service due to a repair on a check valve on the discharge line
	May-00	31	1 020	31	31	31	0	31	31	31	Well 5 out of service due to a repair on a check valve on the discharge line
	Apr-00	25	39 852 million gallons	25	25	25	0	25	25	25	*Facility shutdown from June 6, 2000 through June 10, 2000 for the installation of sample taps on each well head* Well 5 out of service due to a repair on a check valve on the discharge line
1Q00	Mar-00	31	1,123	31	31	31	0	31	31	31	
	Feb-00	29	1 150	29	29	29	0	29	29	29	
	Jan-00	21	51 408 million gallons	21	21	21	0	21	21	21	*July 1999 to Jan 10, 2000 facility shutdown due to mechanical problem with main influent valve Facility shutdown from April 19, 1999 to July 1999 for GAC replacement in the ECU*
Summary Statistics			Avg Monthly Treatment*	Well Efficiency							
Operational Efficiency		87%	42 091	68%	99%	69%	45%	99%	98%	97%	

TABLE 6-4
North Hollywood Operable Unit Treatment System Operations Summary, 1998 to 2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Quarter	Reporting Month/Year	Days of Operation	Average Flow (gpm unless otherwise noted)	Well I.D. Number Days of Well Operation							Operational Problems
				2	3	4	5	6	7	8	
4Q99	Dec-99	0	--	0	0	0	0	0	0	0	*July 1999 to Jan 10, 2000 facility shutdown due to mechanical problem with main influent valve. Facility shutdown from April 19, 1999 to July 1999 for GAC replacement in ECU.*
	Nov-99	0	--	0	0	0	0	0	0	0	
	Oct-99	0	--	0	0	0	0	0	0	0	
3Q99	Sep-99	0	--	0	0	0	0	0	0	0	
	Aug-99	0	--	0	0	0	0	0	0	0	
	Jul-99	0	--	0	0	0	0	0	0	0	
2Q99	Jun-99	0	--	0	0	0	0	0	0	0	
	May-99	0	--	0	0	0	0	0	0	0	
	Apr-99	19	46.512 million gallons	19	16	16	19	19	19	19	*Facility shutdown April 19, 1999 for replacement of GAC in ECU.*
1Q99	Mar-99	29	70.992 million gallons	29	29	25	29	29	29	29	*Facility shutdown March 6 and 7 – cause unknown.*
	Feb-99	28	1,700	28	28	17	28	28	28	28	
	Jan-99	28	68.544 million gallons	28	25	25	25	28	28	28	*Facility shutdown from January 19 to 21 to repair the North Hollywood Sump.*
Summary Statistics:			Avg Monthly Treatment*	Well Efficiency							
Operational Efficiency		28%	21.216	100%	94%	80%	97%	100%	100%	100%	

TABLE 6-4
North Hollywood Operable Unit Treatment System Operations Summary, 1998 to 2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Quarter	Reporting Month/Year	Days of Operation	Average Flow (gpm unless otherwise noted)	Well I.D. Number Days of Well Operation							Operational Problems
				2	3	4	5	6	7	8	
4Q98	Dec-98	31	1,700	31	31	31	31	31	31	31	*Facility shutdown from December 17 through December 22 for repairs to influent water flowmeter.*
	Nov-98	22	53.856 million gallons	22	22	22	22	22	22	22	
	Oct-98	31	1,700	31	31	30	31	31	31	31	
3Q98	Sep-98	28	68.544 million gallons	28	27	24	28	28	28	28	*Facility shutdown for September 2 and 3 to remove scaling on interior of air vent hood and improve VOC removal efficiency.*
	Aug-98	31	1200 – 1700	31	16	4	31	31	31	31	
	Jul-98	31	1400 – 1700	31	28	10	31	31	31	31	
2Q98	Jun-98	30	1500 – 1700	30	30	18	27	27	27	27	
	May-98	31	1200 – 1500	20	20	0	31	31	31	31	
Summary Statistics:			Avg Monthly Treatment*	Well Efficiency							
Operational Efficiency		96%	67.185	95%	87%	59%	99%	99%	99%	99%	

Notes:
-- = indicates no pumping activity.
NA = indicates data is unavailable.
µg/L = micrograms per liter.
italicized text indicates times when facility was shutdown.
* Average monthly treatment = millions of gallons per month.

6.3.4 Operations and Maintenance Costs, 1998 to 2003

Table 6-5 presents the O&M costs for the five-year review period (1998 to 2003). It is not practical to compare these costs with those established in the 1987 ROD. The treatment system is now 15 years old; therefore, maintenance costs are anticipated to be higher than during initial startup. Overall, the costs appear to be reasonable. However, the operational efficiency can be improved.

TABLE 6-5
North Hollywood Operable Unit Groundwater Treatment System Operations and Maintenance Costs, 1998-2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Dates		Total Cost Rounded to the Nearest $100	Percentage of Time in Operation	Approximate Total Flow (millions of gallons)
From	To			
4/1998	6/1998	$114,100		
7/1998	9/1998	$56,300		
10/1998	12/1998	$82,000		
TOTAL (April – Dec)		**$252,400**	**96 %**	**537.48**
1/1999	3/1999	$68,200		
4/1999	6/1999	$70,000		
7/1999	9/1999	$46,800		
10/1999	12/1999	$34,300		
ANNUAL TOTAL		**$219,300**	**28%**	**254.59**
1/2000	3/2000	$37,000		
4/2000	6/2000	$107,300		
7/2000	9/2000	$113,300		
10/2000	12/2000	$51,300		
ANNUAL TOTAL		**$308,900**	**87%**	**505.09**
1/2001	3/2001	$29,000		
4/2001	6/2001	$46,300		
7/2001	9/2001	$156,700		
10/2001	12/2001	$56,000		
ANNUAL TOTAL		**$288,000**	**48%**	**248.41**
1/2002	3/2002	$61,900		
4/2002	5/2002	$67,600		
6/2002	6/2002	$20,100		
7/2002	9/2002	$90,400		
10/2002	12/2002	$52,600		
ANNUAL TOTAL		**$292,600**	**73%**	**441.87**
1/2003	3/2003	$116,200		
TOTAL (Jan – Mar)		**$116,200**	**82%**	**192.49**

6.4 Regulatory Review

Section 121(d) of CERCLA requires that remedial actions implemented at CERCLA sites attain any Federal or more stringent State environmental standards, requirements, criteria, or limitations that are determined to be Applicable or Relevant and Appropriate Requirements (ARARs).

Applicable requirements are those cleanup standards, criteria, or limitations promulgated under Federal or State law that specifically address the situation at a CERCLA site. A requirement is applicable if the jurisdictional prerequisites of the environmental standard show a direct correspondence when objectively compared with the conditions at the site.

If a requirement is not legally applicable, 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 sufficiently similar to the circumstances of the proposed response action and are well-suited to the conditions of the site. The criteria for determining relevance and appropriateness are listed in Title 40, Code of Federal Regulations (CFR), Section 300.400(g)(2) [40 CFR 300.400(g)(2)].

Pursuant to EPA guidance, ARARs generally are classified into three categories: chemical-specific, location-specific, and action-specific requirements. These classification categories were developed to help identify ARARs, some of which do not fall precisely into one group or another. These categories of ARARs are defined below:

- **Chemical-specific ARARs** include those laws and requirements that regulate the release to the environment of materials possessing certain chemical or physical characteristics or containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limitations for specific hazardous substances. If, in a specific situation, a chemical is subject to more than one discharge or exposure limit, the more stringent of the requirements should generally be applied.

- **Location-specific ARARs** are those requirements that relate to the geographical or physical position of the site, rather than the nature of the contaminants or the proposed site remedial actions. These requirements may limit the placement of remedial action, and may impose additional constraints on the cleanup action. For example, location-specific ARARs may refer to activities in the vicinity of wetlands, endangered species habitat, or areas of historical or cultural significance.

- **Action-specific ARARs** are requirements that apply to specific actions that may be associated with site remediation. Action-specific ARARs often define acceptable handling, treatment, and disposal procedures for hazardous substances. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Examples of action-specific ARARs include requirements applicable to landfill closure, wastewater discharge, hazardous waste disposal, and emissions of air pollutants.

To-Be-Considered (TBC) Criteria are requirements that may not meet the definition of an ARAR as described above, but still may be useful in determining whether to take action at a site, or to what degree action is necessary. This can be particularly true when there are no

ARARs for a site, action, or contaminant. TBC criteria are defined in 40 CFR 300.400(g)(3). Chemical-specific TBC requirements are applied in the absence of ARARs or when the existing ARAR is not sufficiently protective to develop cleanup levels (EPA, 1988). TBC documents are non-promulgated advisories or guidance issued by Federal or State government that are not legally binding, but that may provide useful information or recommended procedures for remedial action. Although TBC criteria do not have the status of ARARs, they are considered together with ARARs to establish the required level of cleanup for protection of human health or the environment. The critical difference between a TBC and an ARAR is that one is not required to comply with or meet a TBC when deciding on a remedial action.

6.4.1 Five-year Review of ARARs

The ARARs, presented in the ROD signed on September 24, 1987, and the amendments in the five-year review report dated July 1998, were reviewed for any changes, additions, or deletions. Any findings that differ from the ROD are explained.

This review focuses on the identification of any changes to the ARARs provided in the ROD or subsequent five-year reviews. Additionally, regulations promulgated since the previous five-year review that may impact the protectiveness of the remedy on human health and the environment were reviewed to determine whether these requirements should be ARARs for the remedy in place. In the preamble to the final National Contingency Plan, EPA states that it will not reopen remedy selection decisions contained in RODs (i.e., ARARs are normally frozen at the time of ROD signature) unless a new or modified requirement calls into question the protectiveness of the selected remedy (55 FR 8757, March 8, 1990).

The original 1987 ROD identified the following requirements as ARARs:

- **Safe Drinking Water Act (SDWA)** – Requires that treated water from the remedy meet the MCL for TCE (5 µg/L) and State Action Level (SAL) for both TCE (5 µg/L) and PCE (4 µg/L).
- **Resource Conservation and Recovery Act (RCRA)** – Requires that spent hazardous carbon generated from the treatment process, if any, be disposed of at a RCRA Class I disposal facility.
- **Clean Air Act** – Requires the groundwater treatment facility to meet all substantive conditions stipulated in the SCAQMD permit.

In 1993, a five-year review was conducted that identified the following requirements as additional ARARs for the remedy in place:

- **California Risk Management and Prevention Program (California Health and Safety Code, Division 20, Chapter 6.95, Article 2)** – Requires compliance with a Risk Management and Prevention Program plan designed to ensure the safe handling of chlorine at the groundwater treatment facility.
- **California Hazardous Materials Release Plans and Inventory (California Health and Safety Code 25500 to 25520)** – The substantive requirements of this regulation call for reporting releases of hazardous materials to the local fire or environmental health department and providing training to employees regarding emergency responses involving hazardous materials.

6.4.2 Changes to existing ARARs

MCLs and State Action Levels

Table 6-6 presents the updated chemical-specific ARARs for water, arranged by contaminated media and chemical compound. A few MCLs and maximum contaminant level goals (MCLGs) have changed since the signing of the ROD, and the new standards are marked with an asterisk in the table.

In 1989 , the California DHS set the State's MCL for PCE to 5 µg/L. In 1991, the EPA followed DHS's resolution, and established national primary drinking-water regulations, setting an MCL of 5 µg/L for PCE and an MCLG of zero. EPA has indicated that "the establishment of an MCLG at zero does not imply that actual harm necessarily occurs to humans at a level somewhat above zero, but rather that zero is an aspirational goal, which includes a margin of safety, within the context of the Safe Drinking Water Act."

California DHS and EPA's new standards for PCE are both above the former SALs specified in the ROD as a cleanup level; therefore, it does not change the protectiveness of the remedy.

TABLE 6-6
Comparison of EPA-selected Groundwater Cleanup Levels and Current ARARs
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Media Component	COCs Addressed By 1987 ROD	ARARs		Revised ARARs	
		SDWA MCL[a] (µg/L)	State Action Levels[b] (µg/L)	MCL (µg/L)	State Action Levels (µg/L)
Groundwater	TCE	5	5	5	5
	PCE	--	4	5*	5*

Notes:
* Value changed from ARARs in the ROD.
a. 40 CFR 141.
b. California Title 22.

Title 19, Division 2, Chapter 4, Article 4 - California Health and Safety Code 25500 to 25520

The provisions of this subchapter are intended to be implemented in coordination with existing local hazardous materials planning efforts. This article provides minimum standards for the hazardous materials business plan including: hazardous material inventory, emergency response plans and procedures, and training program information. Therefore, it does not question the protectiveness of the remedy.

Air-stripping Operations SCAQM Rule 1167

On January 8, 1988, SCAQMD adopted Rule 1167 for air-stripping operations. The purpose of this rule is to limit emissions of organic compounds from contaminated groundwater and soil. The provisions of this rule apply to new and existing air-stripping equipment used for the treatment of water contaminated with VOCs.

Rule 1167 was rescinded by the Board on December 2, 1988, in accordance with the decision of Los Angeles Superior Court case number C677420. No other rule has been identified as a replacement.

A review of these existing ARARs indicates that, to date, there have been no significant changes or updates that would impact the protectiveness of the remedial actions. Therefore, they remain applicable, relevant and appropriate for the treatment of groundwater at the treatment system.

6.4.3 Review of Potential ARARs Not Previously Identified

A summary of chemical-specific potential ARARs and TBCs is provided in Table 6-7. The specific regulations cited for each ARAR contained in Table 6-7 were reviewed for changes since the 1987 signing of the ROD.

In addition to the chemical-specific ARARs summarized in Table 6-7, the action-specific ARARs contained in the 1987 ROD were reviewed to determine if requirements had been changed or updated. A summary of action-specific potential ARARs and TBCs is provided in Table 6-8.

No location-specific ARARs were identified during this review that would require a substantive change to the current remedy.

The current versions of the California Code of Regulations (CCR), Title 40 of the CFR, the RWQCB *Water Quality Control Plan for the Los Angeles Region, San Fernando Basin Water Management Plan, California Drinking Water Source Assessment and Protection Program Report* (California RWQCB, 1995), South Coast Air Management District Rule Book, and the Superfund Amendment Reauthorization Act were consulted via the internet or in hardcopy to review pertinent updates.

Based on the review, none of the requirements contained in Tables 6-5 and 6-6 have been changed or updated in a way that would impact the protectiveness of the remedial actions or require a change in the existing ARARs.

TABLE 6-7
Chemical-specific Potential ARARs
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Findings and Comments
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13160, 13267, 13304	Title 27, CCR, Section 20410, Title 23, CCR, Section 2550 6	Applies to groundwater remediation and monitoring of sites Groundwater will be remediated and monitored according to Title 27/23 regulations	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards
Safe Drinking Water Act (40 U S C 300 et seq)	National Primary Drinking Water Standards (40 CFR Part 141)	Chemical-specific drinking water standard MCLs have been promulgated under the SDWA Drinking-water MCL standards have also been promulgated under the SDWA MCLGs above zero are considered chemical-specific ARARs under the National Contingency Plan (40 CFR 300,430(e)(2)(1)(B)) When the MCLGs are equal to zero (which is generally the case for a chemical considered to be a carcinogen), the MCL is considered to be a chemical-specific ARAR, instead of the MCLG (40 CFR 300 430(e)(2)(I)(C)) It has been determined that the MCL of 5 µg/L for TCE and State Action Level of 4 µg/L for PCE is the appropriate cleanup level for the San Fernando Valley Ground Water Basin	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards
RWQCB Water Quality Control Plan (Basin Plan)	Water Quality Control Plan for the Los Angeles Region Chapter 3	The Basin Plan establishes water quality objectives designed to protect beneficial uses of surface and groundwater within the Los Angeles Region	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards
San Fernando Basin Water Management Plan	Policy Guidance for Direct Domestic Use of Extremely Impaired Sources Policy Memo 97-005	This policy contains provision to assure that all Californians are, to the extent possible, provide a reliable supply of safe drinking water	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards
Unregulated Contaminant Monitoring Regulation for Public Water Systems	40 CFR §141	This policy contains provision for unregulated contaminant monitoring regulation for public water systems Including the maximum contaminant levels (MCLs) for disinfecting byproducts and the MCLs for residual disinfectants 40CFR §141 64 and 65	This policy is a TBC, since all treated water from the air-stripping facility in the North Hollywood Operable Unit, shall be continuously and reliably chlorinated and residues should be monitored daily
State of California, Domestic Water Quality and Monitoring Regulations	California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64444	This policy contains provision for the domestic water quality regulations for the State of California It establishes Maximum Contaminant Levels for primary drinking water chemicals	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards

TABLE 6-8
Action-specific Potential ARARs
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
Clean Air Act SCAQMD	Air Pollution Control Equipment Permit 144890 Granted August 29, 1986	In California, the authority for enforcing the standards established under the Clean Air Act has been delegated to the State. The program is administered by the SCAQMD in Los Angeles. DWP's permit with SCAQMD requires a 90-percent removal efficiency for TCE and PCE air emissions.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Disposal of Spent Carbon Availability of Hazardous Waste Facility	42 CFR (C)(3)(B)	Pursuant to CERCLA section 104(C)(3)(B), the State is required to assure the availability of hazardous waste facility.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Disposal of Spent Carbon Landfill Requirements	40 CFR 761.75 (c)(4)	Toxic Substances Control Act provides the EPA with the ability to grant a waiver when one or more of the technical requirements under 40 CFR 761.75 (b) are not met, as long as it can be demonstrated that the landfill will not present an unreasonable risk to health and the environment.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Groundwater monitoring standards	27 CCR 20415 23 CCR 2550.7.	Requires general soil, surface water, and groundwater monitoring.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
RCRA Hazardous Waste Determination	Title 22 CCR, 66261.21, 66261.22(a)(1), 66261.22(a)(2), 66261.23, and 66261.24(a)(1) or Article 4, Chapter 11	A hazardous waste is considered a RCRA hazardous waste if it exhibits any of the characteristics of ignitability, corrosivity, reactivity, or toxicity, or if it is listed as a hazardous waste. Most waste determinations will focus on whether the generated waste (e.g., contaminated soil, treatment residuals) could be classified as toxicity characteristic waste as defined by the contaminant concentrations.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
California hazardous waste determination	Title 22CCR 66261.24(a)(2)	Wastes can be classified as non-RCRA, State-only hazardous wastes if they exceed the Soluble Threshold Limit Concentration (STLC) or Total Threshold Limit Concentration (TTLC) values.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards

TABLE 6-8
Action-specific Potential ARARs
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
Spent Carbon Waste Characterization and Disposal	27 CCR 20200(a)(2)	Requires that wastes identified as hazardous, designated nonhazardous, or inert solid waste (Sections 23 CCR 2521; 27 CCR 20210, 20220, 20230) be allowed only at waste management units that have been approved and classified.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Dewater Waste Disposal Waste Characterization and Disposal	27 CCR 20210 (2) (c)	Dewatered sludge may be discharged at a Class III landfill, provided the landfill meets the criteria stipulated under CCR 20210, unless the Department of Toxic Substances Control determines that the waste must be managed as hazardous waste.	This regulation should be considered if groundwater monitoring contents exceed MCLs for COC.
Dewater Waste Disposal and Spent Carbon Disposal Waste characterization	40 CFR §261	This RCRA section identifies the types of solid wastes that are subject to regulation as hazardous waste.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Spent Carbon Disposal	40 CFR 268.40	Attain land disposal treatment standards before putting waste into landfill in order to comply with land disposal restriction.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
EPA's Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (December 1988)		Remedial action shall be in accordance with, but not limited to, the National Contingency Plan and EPA Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (Dec 1988) or any superceding final version of such guidance.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Spent Carbon Disposal Treatment standards for hazardous wastes	22 CCR 66268	Compliance with Land Disposal Regulations treatment standards is required if hazardous waste (e.g., contaminated soil) is placed on land. Soil treatability variance may be invoked according to 40 CFR 268.44 (h)(3) and (4).	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Permit for generation and transportation of hazardous waste	22 CCR 4.5 Chapter 20	These articles establish the requirements for permits needed in order to generate or transport hazardous solids, liquids, or sludges. The North Hollywood Operable Unit facility site is technically considered a "generator" because it is the source of hazardous waste materials that may be transported off site for disposal.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.

TABLE 6-8
Action-specific Potential ARARs
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Source	Citation	Description	Significant Changes in Regulation
USDOT and DHS Hazardous Material Transportation Rules	49 CFR Subpart 172 and 177	Offsite transportation of hazardous materials will be governed by the Federal USDOT and State Department of Transportation (DOT) regulations. These requirements are incorporated by reference into RCRA regulations and the CCR.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.
Permit for generation and transportation of hazardous waste	40 CFR Subpart 262, and 263	A permit would be needed to generate or transport hazardous solids, liquids, or slugs. The North Hollywood Operable Unit facility site is technically considered a "generator" because it is the source of hazardous waste materials that may be transported off site for disposal.	There have been no changes to these requirements that would significantly impact the current remedial actions or cleanup standards.

In summary, the ARARs established in the 1987 ROD and the five-year review report dated July 1998 do not require revision to ensure the protectiveness of current remedial actions or to comply with State or Federal requirements.

6.5 Site Inspection

Representatives of EPA, LADWP, and CH2M HILL performed a Site inspection on June 30, 2003. The inspection included well 8, the treatment system, and a drive-by inspection of wells 6 and 7. Wells 2, 3, and 4 were inaccessible at the time of the Site visit. A summary of the inspection findings is presented below. The Site inspection checklist and photos are provided in Appendices B and C, respectively.

Conditions during the inspection were favorable, with high temperatures and no precipitation. All inspected areas were secured with adequate fencing.

Well 8 is located on a vacant lot owned by LADWP in a residential area. The flow meter on well 8 was broken at the time of the inspection and LADWP personnel stated that the flow meter was also inoperable for wells 4 and 6. The history logbook was readily available on site. The sample port was in working order. There is an abandoned production well adjacent to well 8.

The treatment plant was operating at the time of the Site visit. Photographs were restricted due to security; therefore, photos of the treatment system from the previous five-year review are included in Appendix B. The chlorine storage building, blower room, GAC units, and associated piping were visually inspected.

The chlorine storage building contained four chlorine tanks—one is in use, one is for backup, and two are for replacement. According to the operator (Don Stone, LADWP), approximately 8 pounds of chlorine are used each day; however, the scale for the chlorine tanks is not accurate once there are low levels of chlorine remaining in the tank. A backup

chlorination system is present. The Emergency Response Plan, LADWP phone list, air-stripping tower maintenance log book, and SCAQMD emissions permit are readily available in the chlorination room. There is a vent at the top of the wall adjacent to the chlorination system, approximately 8 feet above ground surface. The operator expressed concern over the location of the vent; he noted that most chlorine storage facilities have vents low to the ground due to the chemical nature of chlorine gas, i.e. heavier than air.

The sodium hexametaphosphate aboveground storage tank appeared in good condition and had a concrete berm as secondary containment. The control room, or blower room, was securely locked. Upon inspection, it was noted that the room was full of particulate and the filter/screen on the outdoor vent was clogged with particulate. The particulate was a fine white dust. The operator expressed concern that the particulates were released from the industrial operations at the adjacent property.

Overall, the mechanical parts of the treatment system appeared to be in good condition. All piping appeared free of leaks and cracks. The GAC units were also in good condition and all sampling ports were accessible. Light cracking of the concrete pad on which the entire treatment system is located was evident. When exiting the Site, it was apparent that the business operating on the adjacent property (S-Aziz 11821 Vose Street) was emitting a powdery substance.

6.6 Interviews

Interviews were conducted with LADWP staff, the Assistant Watermaster, and DHS. Repeated attempts were made to interview the RWQCB; however, no one was available.

During the June 30, 2003 Site visit, Virginia Murdoch (LADWP Operator), and Don Stone (LADWP Operations) were interviewed. During the visit to well 8, Virginia Murdoch noted that the flow meters on wells 4, 6, and 8 were broken, and that a work order was submitted sometime ago, but they were still not repaired. During the treatment plant inspection, Don Stone expressed concern over the lack of lower ventilation in the chlorine storage room and the white particulate dust emitted from the adjacent property.

On July 1, 2003, the following LADWP staff were interviewed:

- Nancy Wigner, Operations and Maintenance Manager of the NHOU treatment system
- Ernest Wong, P.E., Senior Engineer/Modeler
- Sergio Veloz, Mechanical Engineer responsible for the NHOU extraction wells
- Hadi Jonny, P.E., Groundwater Hydrogeologist/Modeler
- Patricia Kiechler, Administration
- Lucik Melikian, Quality Assurance Manager
- Gloria Williams, Water Quality Engineer

All LADWP staff expressed concern over chromium contamination and the shutdown of well 2 during 2002.

Nancy Wigner noted that management of the treatment system has improved during the past 2 years, e.g., pre-approval for GAC vendors to decrease downtime while awaiting the requisition process; optimizing O&M activities to minimize downtime, as planned in the 2003-2004 work plan; anticipating equipment replacement and ordering the spare parts where practical. Likewise, Sergio Veloz noted that there have been improvements in terms of prioritizing work orders for maintenance of the treatment system. Inquiries were made

to Mr. Veloz regarding the status of the reported inoperable flow meters at wells 4, 6, and 8. In a follow-up email, Mr. Veloz provided work order records for the repairs that had not been completed at the time of this report.

Mr. Wong voiced concern over the chromium contamination and indicated that the treatment system is not used to full capacity. Hadi Jonny reiterated the concern over chromium concentrations and the future problem of low recharge in the SFV. Patricia Kiechler expressed concern over the inability of the treatment system to treat groundwater for other contaminants, such as chromium, and the resulting loss of efficiency.

Lucik Melikian accounted for the air discharge exceedences, as discussed in Section 6.3. Lucik also noted that there have been improvements in reducing water quality monitoring costs by decreasing sampling frequency at NHOU wellheads from monthly to quarterly. DHS has approved the monitoring reduction, given that the contaminant levels at the wells are relatively stable and the historical highs are within the capabilities of the treatment plant. Ms. Williams commented that there is no central manager for the OU, causing decreased communications and efficiency.

On July 28, 2003, Stefan Cajina of the DHS was interviewed via telephone. Mr. Cajina expressed concern over chromium concentrations, any unknown emerging constituents, and emphasized the inability of the remedy to treat groundwater impacted with constituents other than VOCs. Mr. Cajina noted that DHS Policy 97005—a new permitting process for the installation of extraction wells in areas of known or suspected contamination—is necessary prior to the installation of any new extraction wells associated with the treatment system. The new permitting process is extensive in terms of required studies, sometimes taking 1 to 2 years to complete.

On July 22, 2003, Gary Mackey, LADWP Operations, was interviewed via telephone. Mr. Mackey expressed the need for a central coordinator. Due to frequently-changing roles, the flow of information is often delayed.

On August 4, 2003, Mark Mackowski, Assistant Watermaster, was interviewed. Mr. Mackowski recommended increasing production and expressed concern over chromium concentration in groundwater, the lack of an MCL for hexavalent chromium and any impact a low MCL will have on the future of the treatment system's ability to operate, and the delay in installing additional extraction wells.

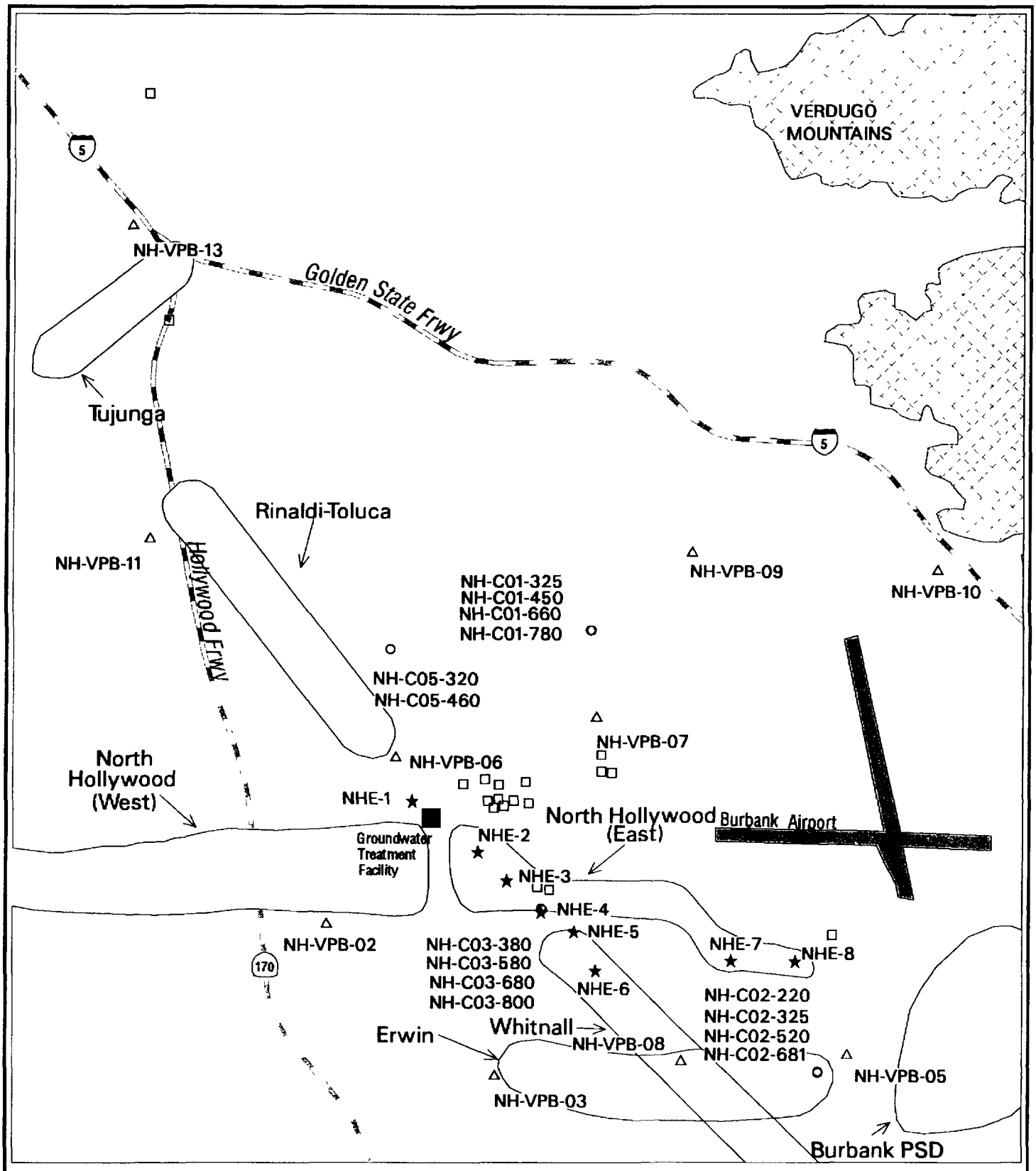

Figure 6-1
Location Map of NHOU Extraction, Remedial Investigation Monitoring Wells, Facility Monitoring Wells, Production Well Fields, and Groundwater Treatment Facility
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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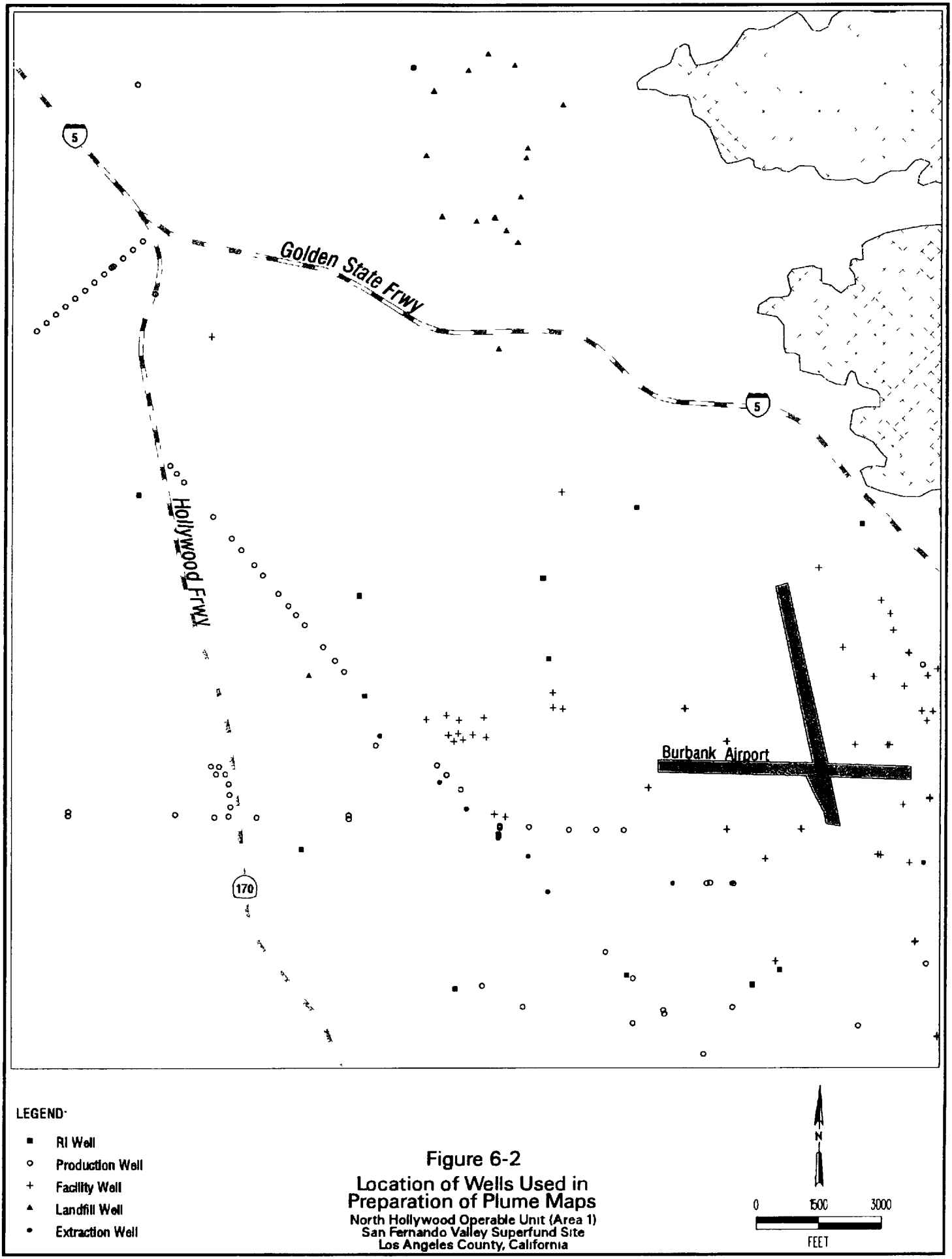

Figure 6-2
Location of Wells Used in Preparation of Plume Maps
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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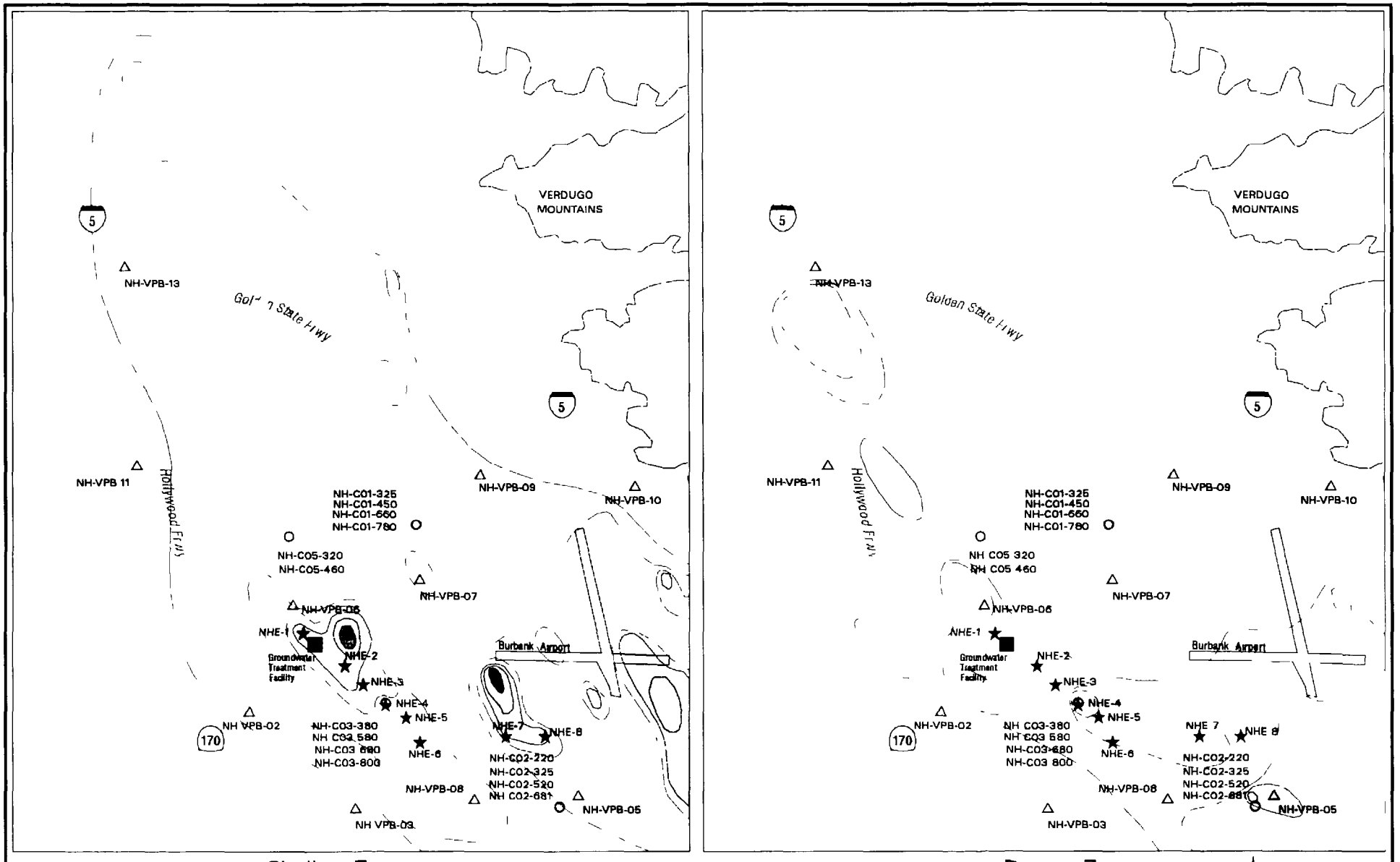

Shallow Zone

Deeper Zone

LEGEND

- > DL - 5 µg/L (MCL)
- 5.01 - 50 µg/L
- 50.01 - 100 µg/L
- 100.01 - 500 µg/L
- 500.01 - 1000 µg/L
- 1000.01 - 5000 µg/L
- Above 5000 µg/L

- SFVRI Cluster Well
- SFVRI Vertical Profile Boring
- NHOU Extraction Well

N

0 2400 4800

FEET

Figure 6-3

TCE Concentration in Groundwater (µg/L), 1998

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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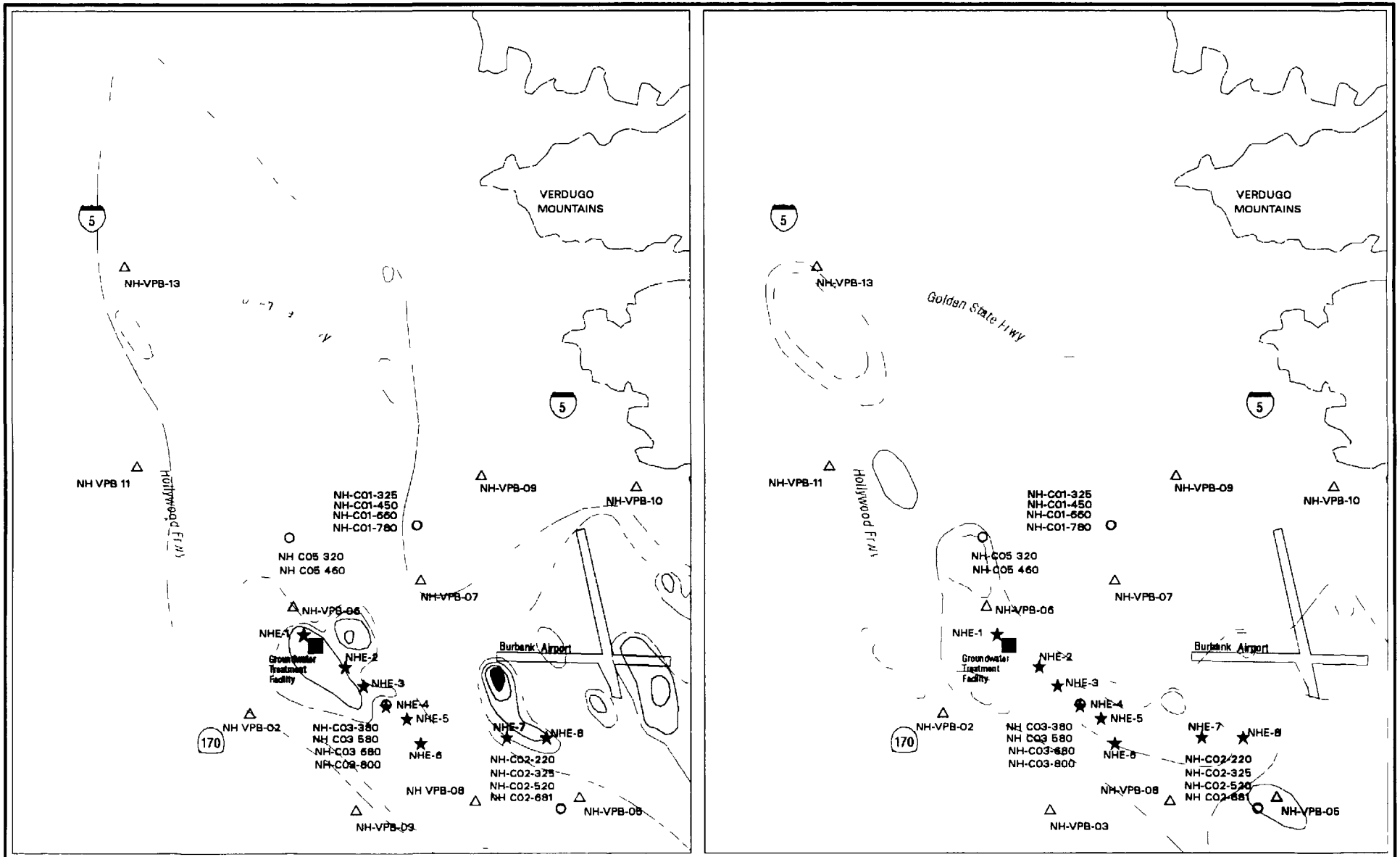

Figure 6-4

TCE Concentration in Groundwater (µg/L), 1999

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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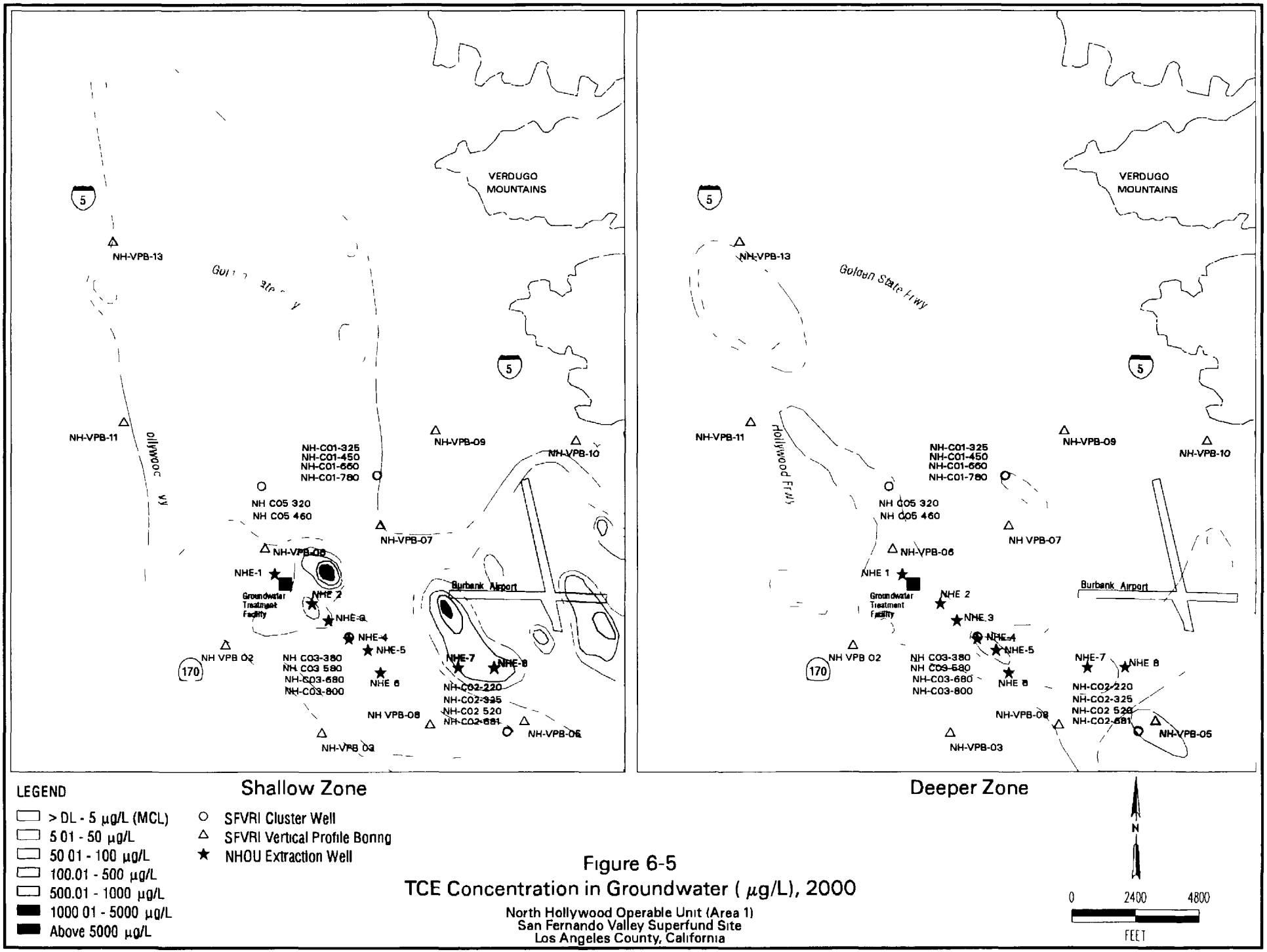

Figure 6-5
TCE Concentration in Groundwater (µg/L), 2000
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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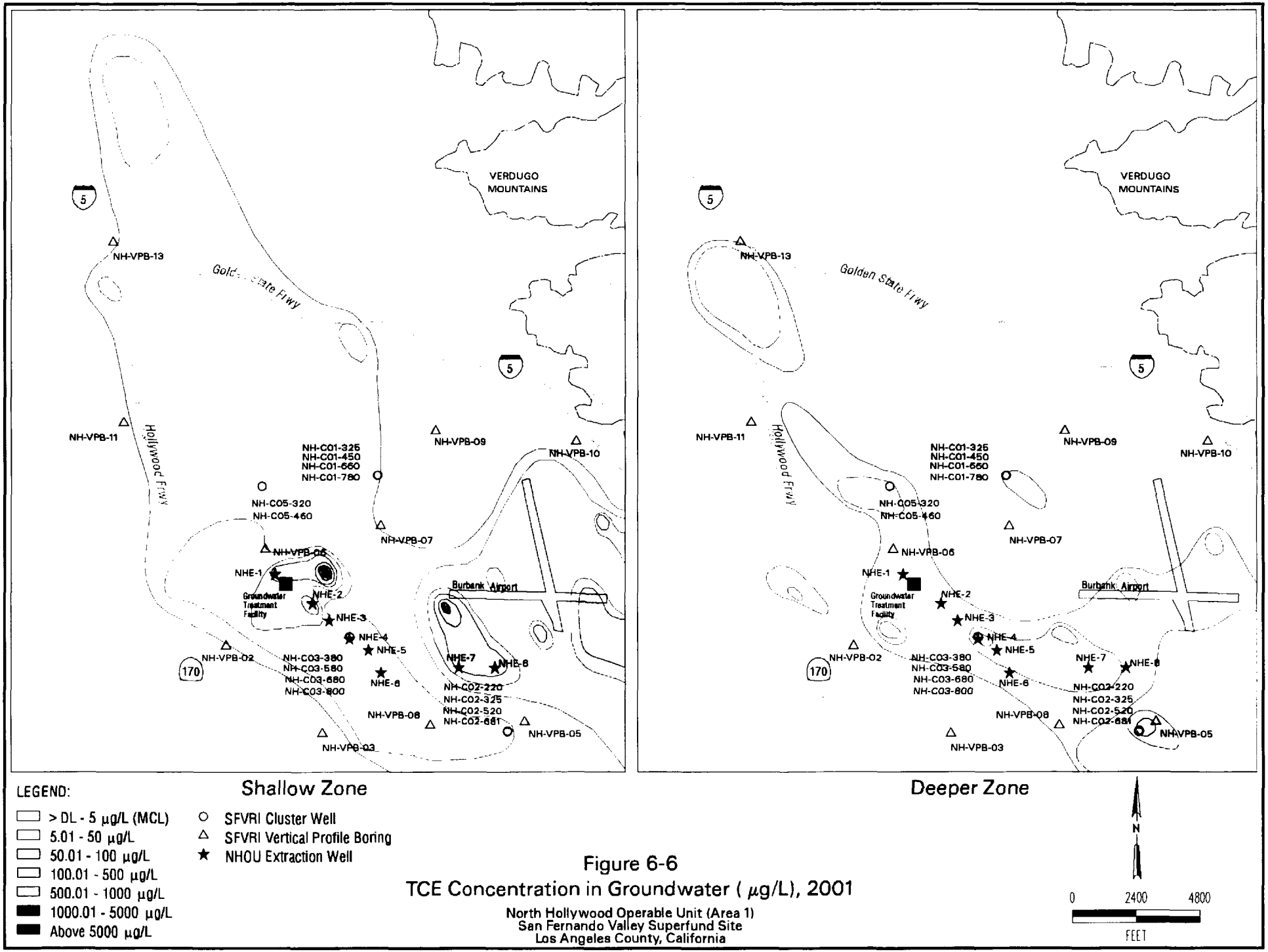

Figure 6-6
TCE Concentration in Groundwater (µg/L), 2001
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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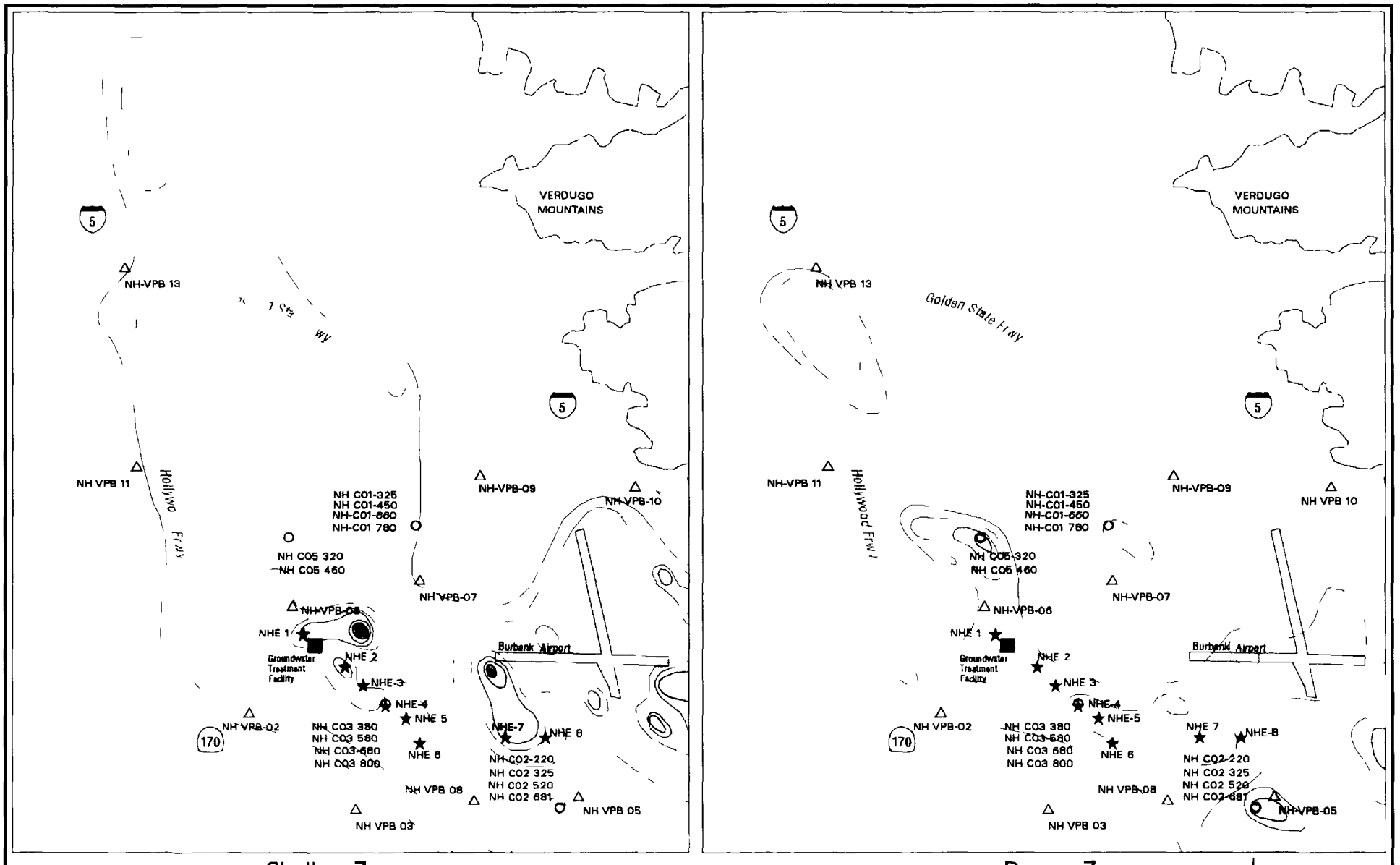

Figure 6-7
TCE Concentration in Groundwater (µg/L), 2002
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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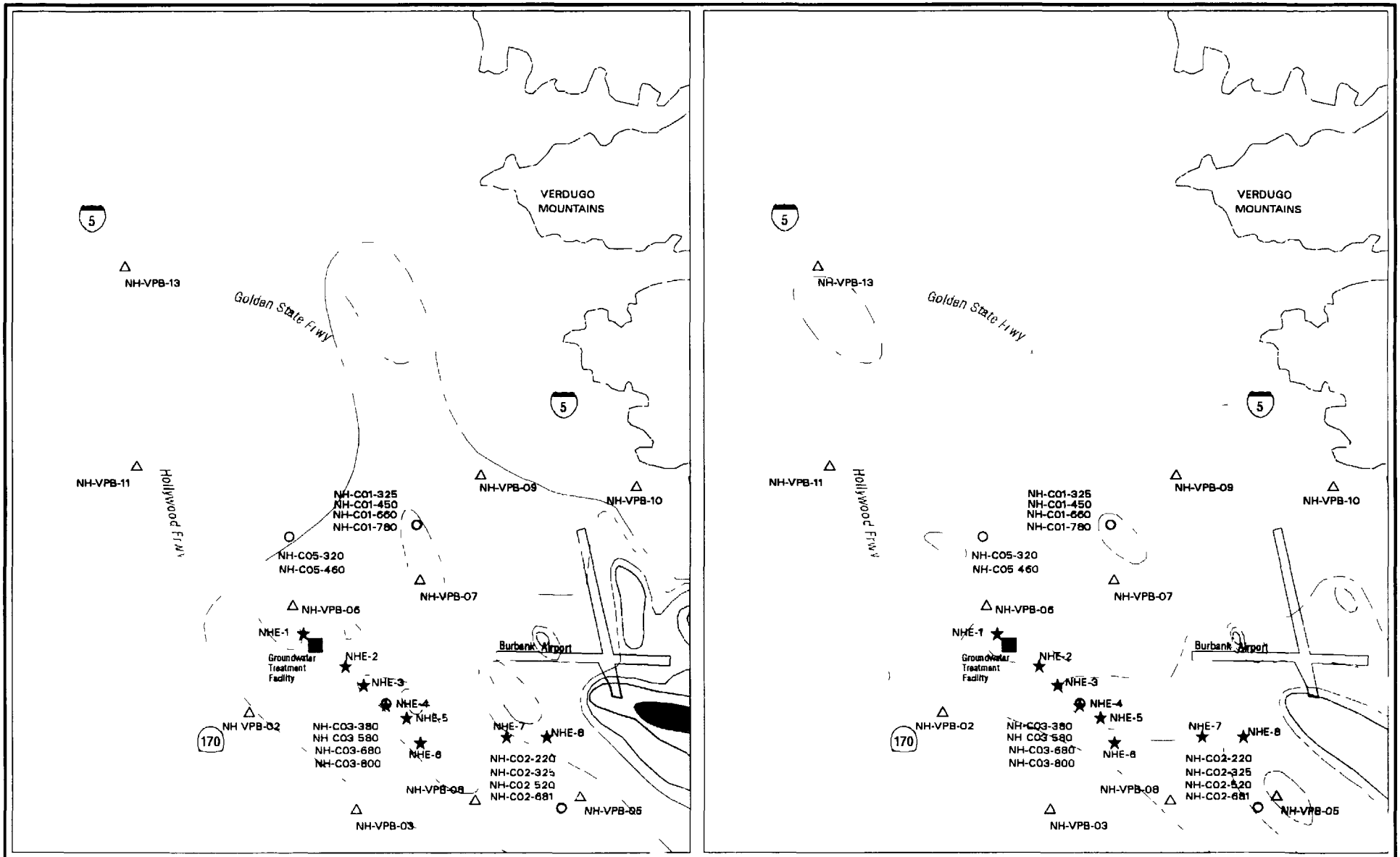

Figure 6-8
PCE Concentration in Groundwater (µg/L), 1998
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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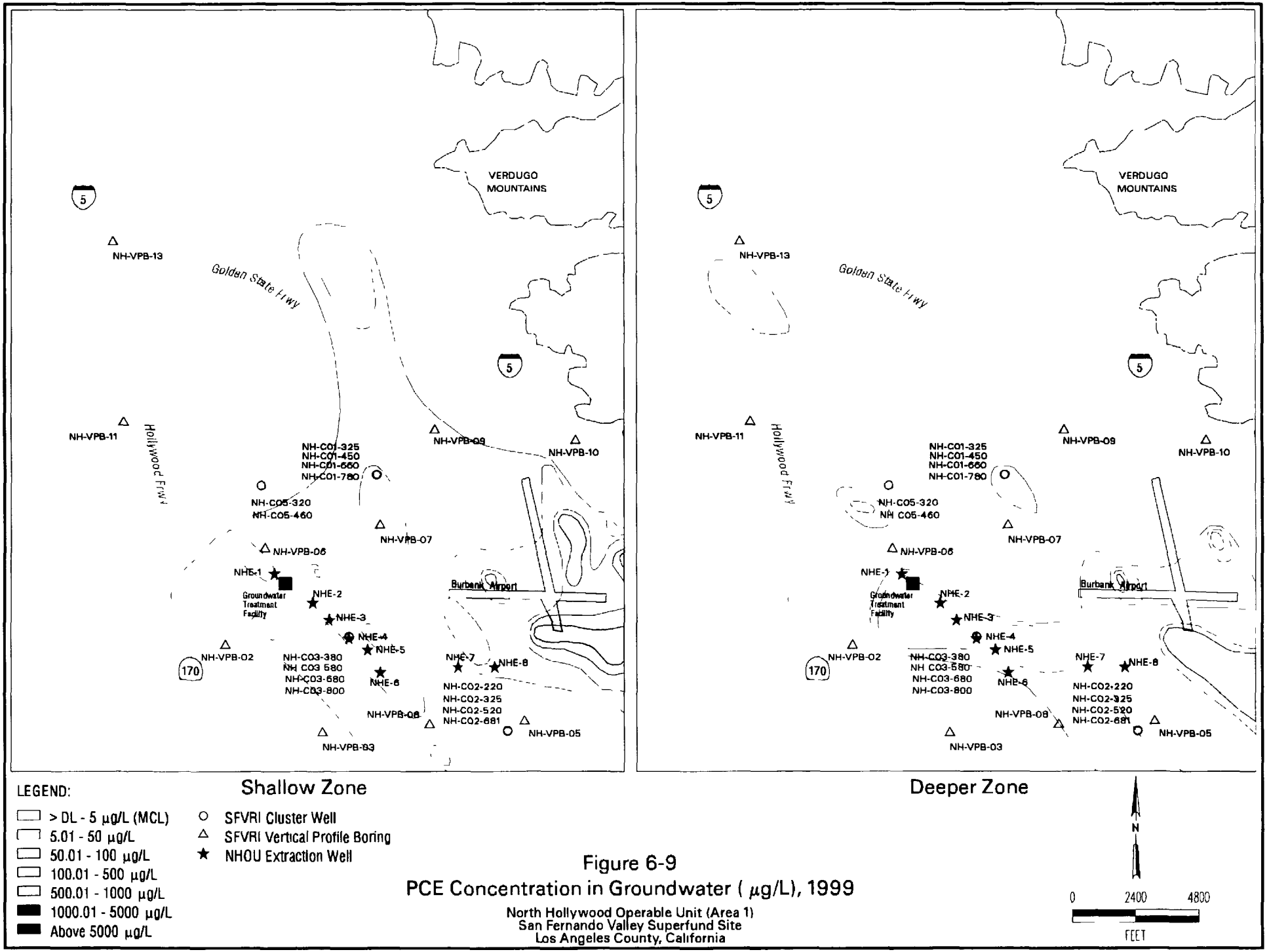

Figure 6-9
PCE Concentration in Groundwater (µg/L), 1999
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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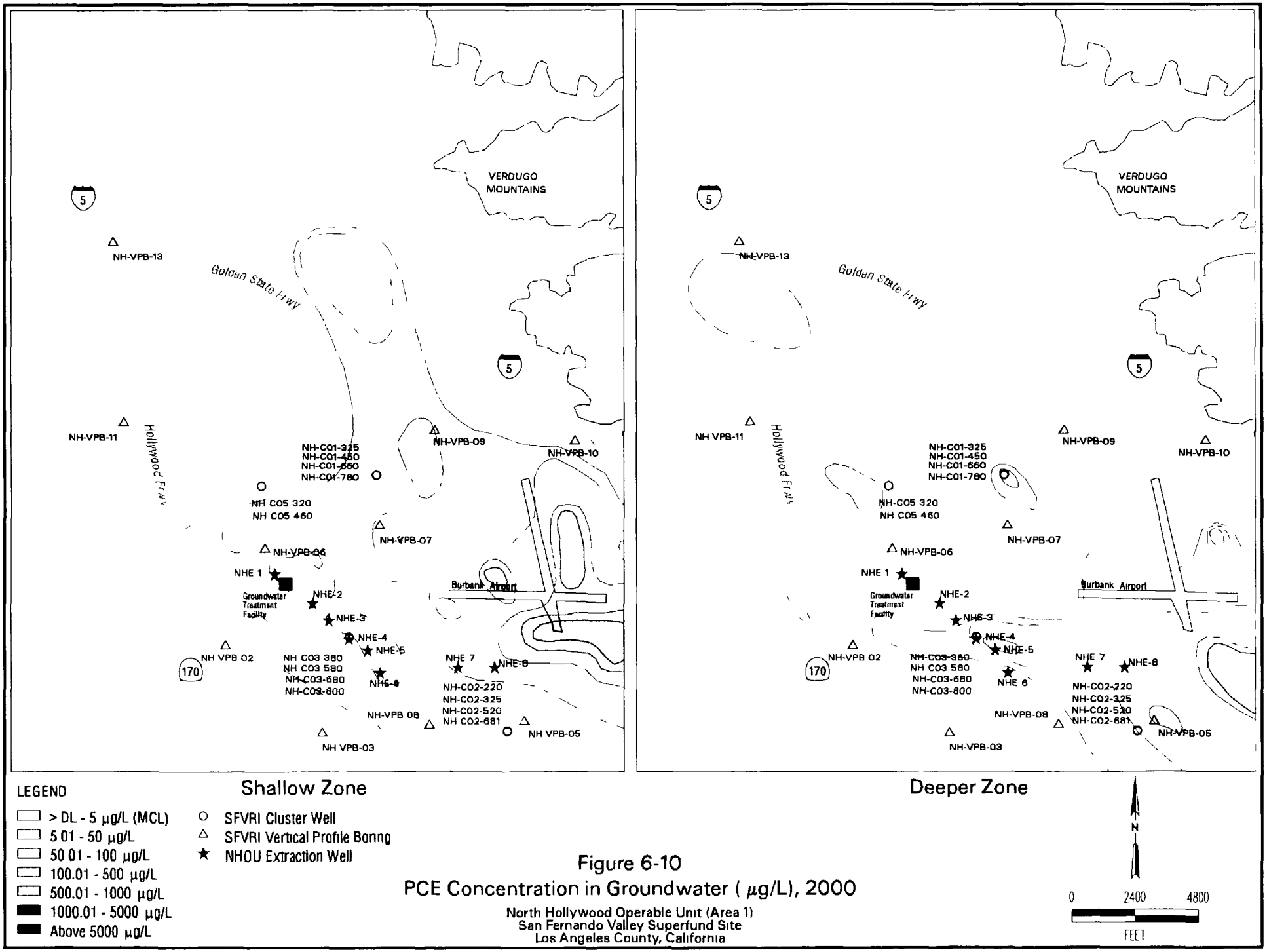

Shallow Zone

Deeper Zone

LEGEND

- > DL - 5 µg/L (MCL)
- 5.01 - 50 µg/L
- 50.01 - 100 µg/L
- 100.01 - 500 µg/L
- 500.01 - 1000 µg/L
- 1000.01 - 5000 µg/L
- Above 5000 µg/L

- SFVRI Cluster Well
- SFVRI Vertical Profile Boring
- NHOU Extraction Well

N

0 2400 4800

FEET

Figure 6-10

PCE Concentration in Groundwater (µg/L), 2000

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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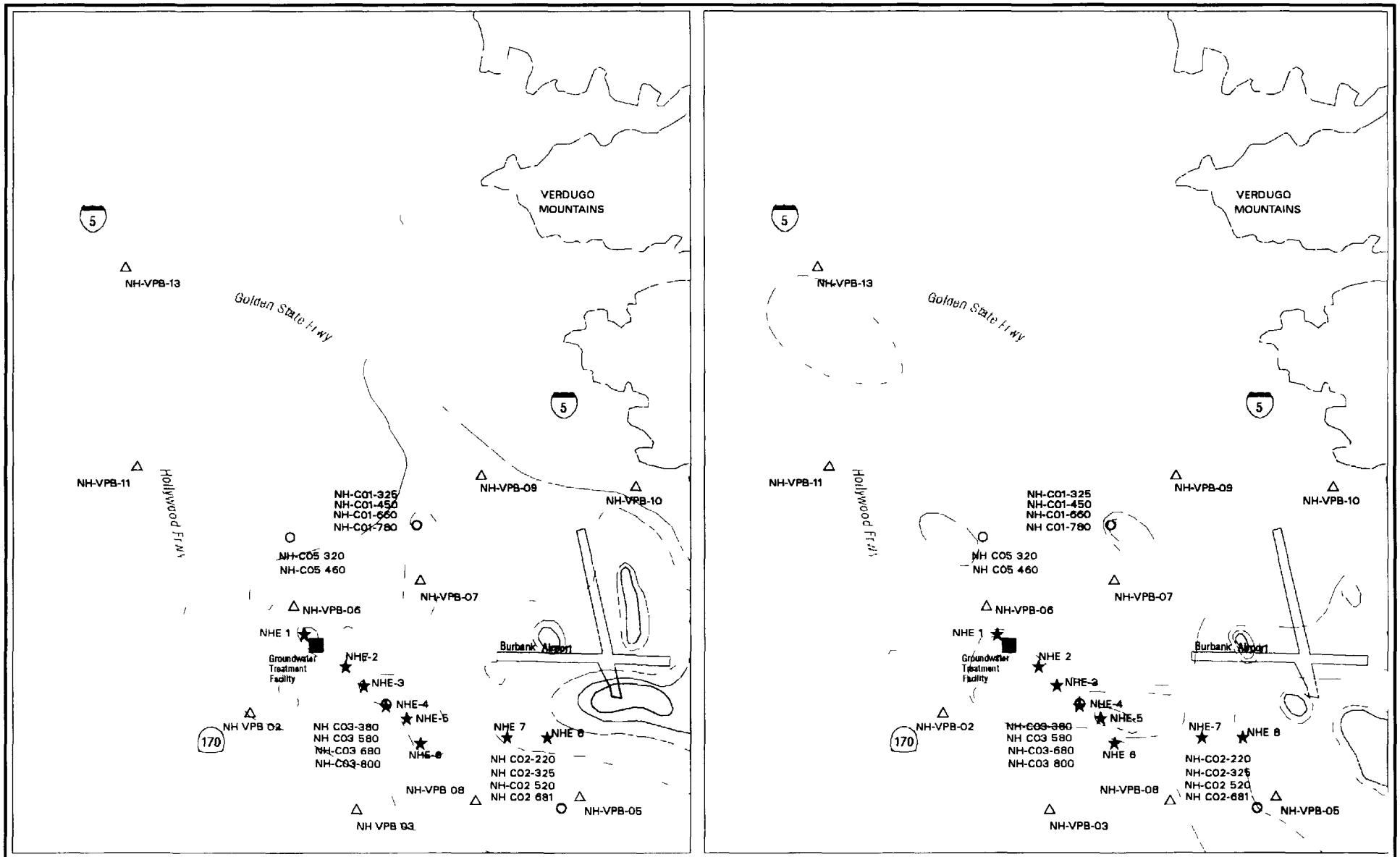

Figure 6-11
PCE Concentration in Groundwater (µg/L), 2001
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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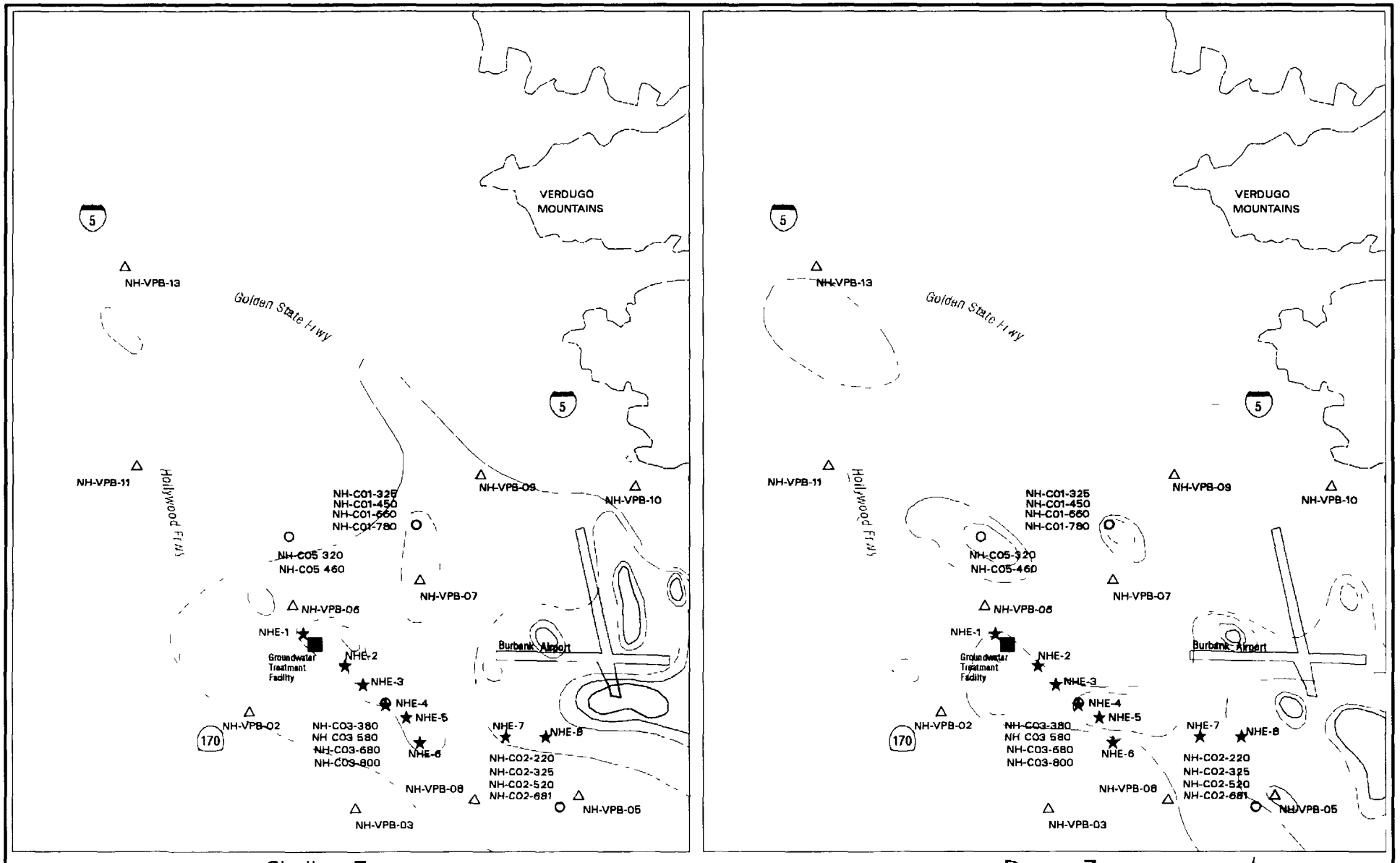

Figure 6-12
PCE Concentration in Groundwater (µg/L), 2002
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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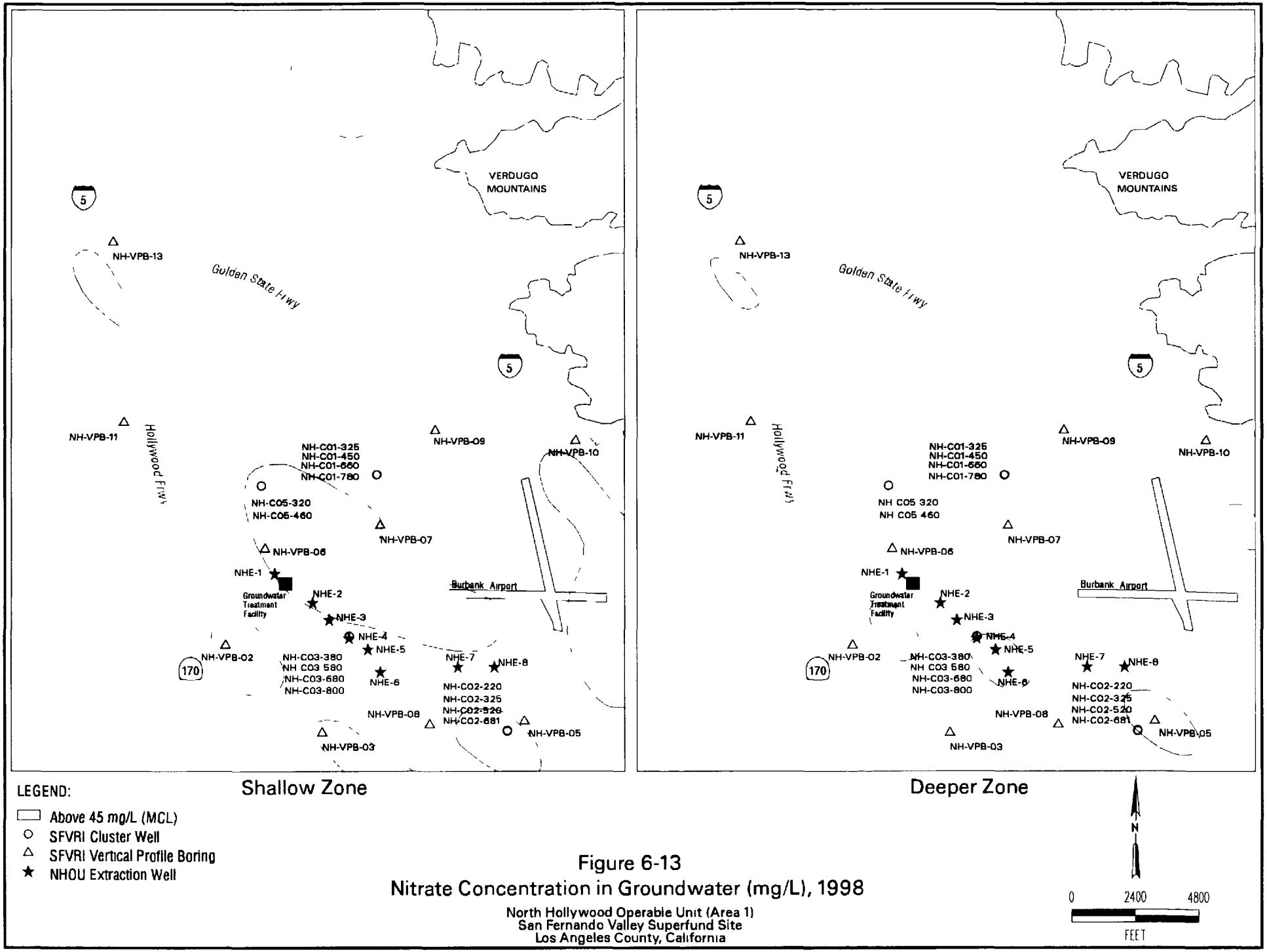

Figure 6-13
Nitrate Concentration in Groundwater (mg/L), 1998
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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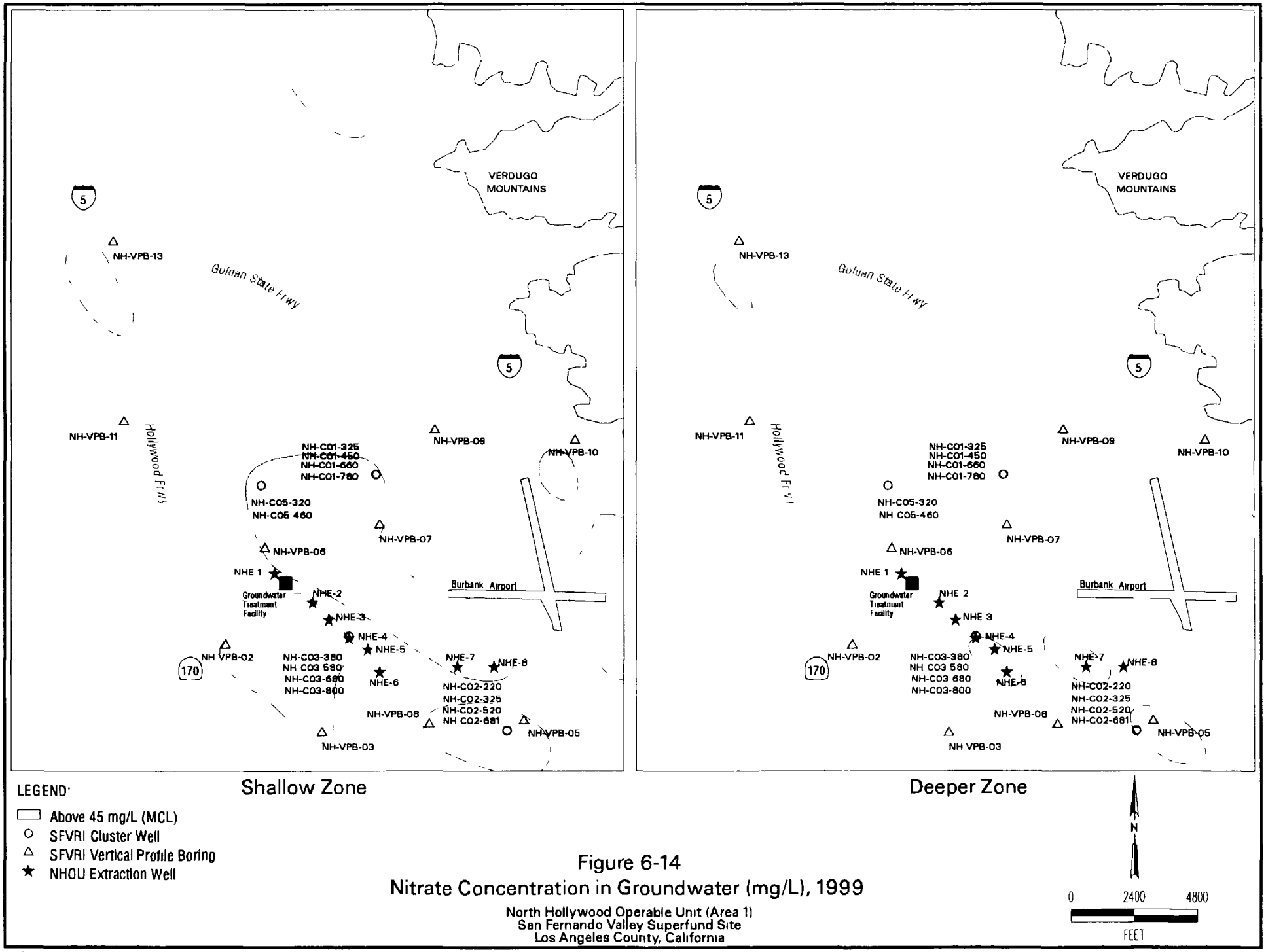

Figure 6-14
Nitrate Concentration in Groundwater (mg/L), 1999
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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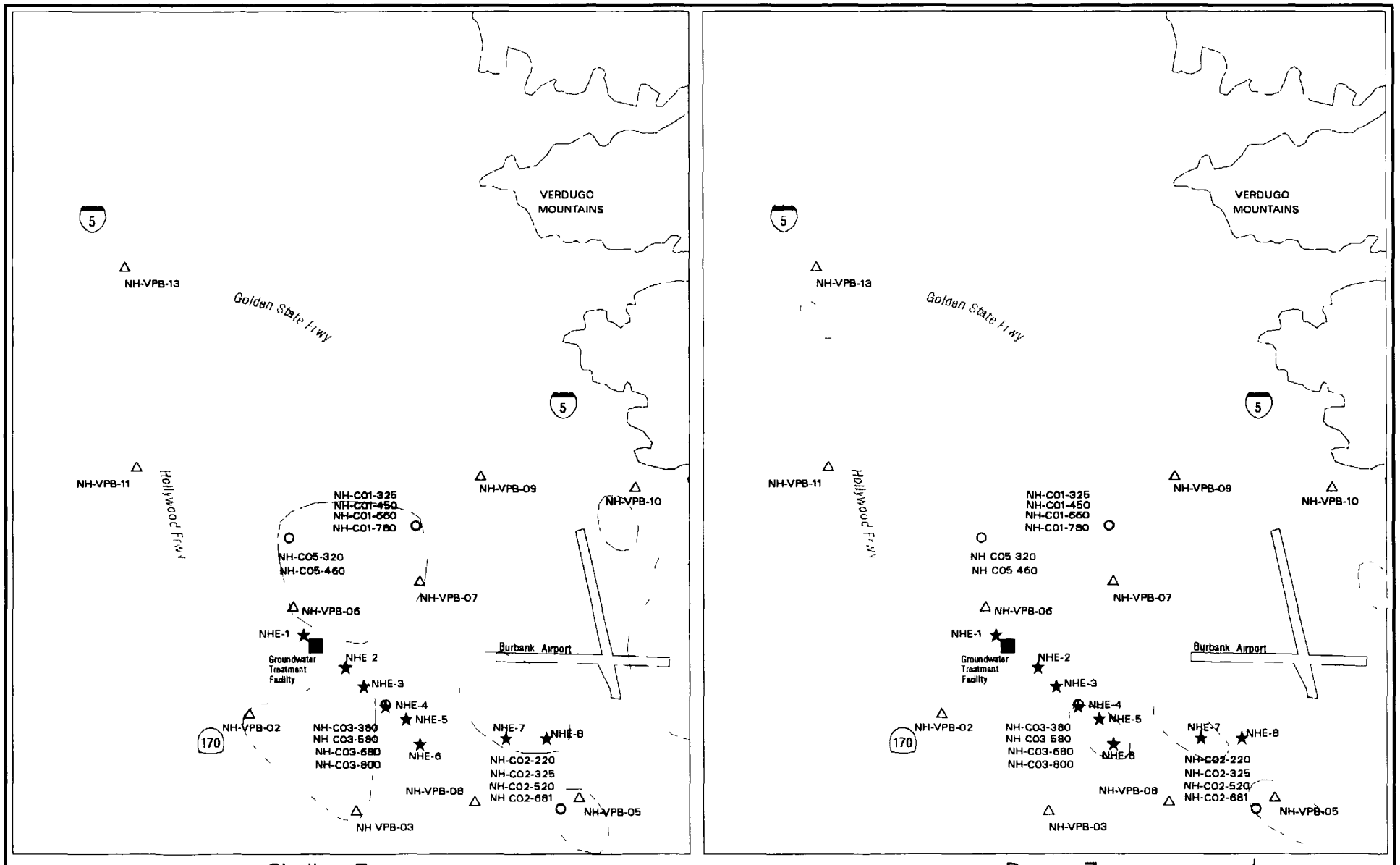

Figure 6-15
Nitrate Concentration in Groundwater (mg/L), 2000

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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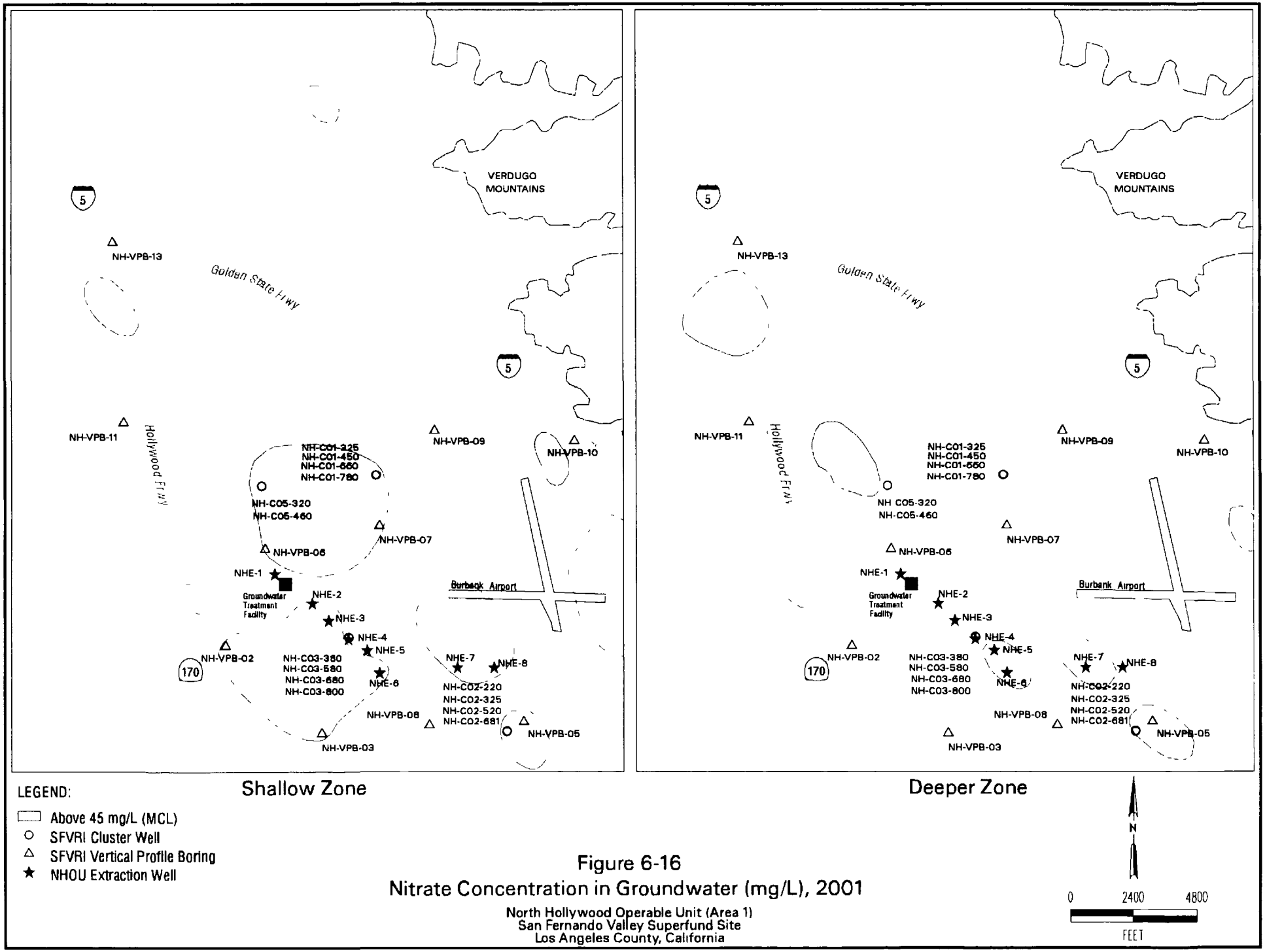

Figure 6-16
Nitrate Concentration in Groundwater (mg/L), 2001

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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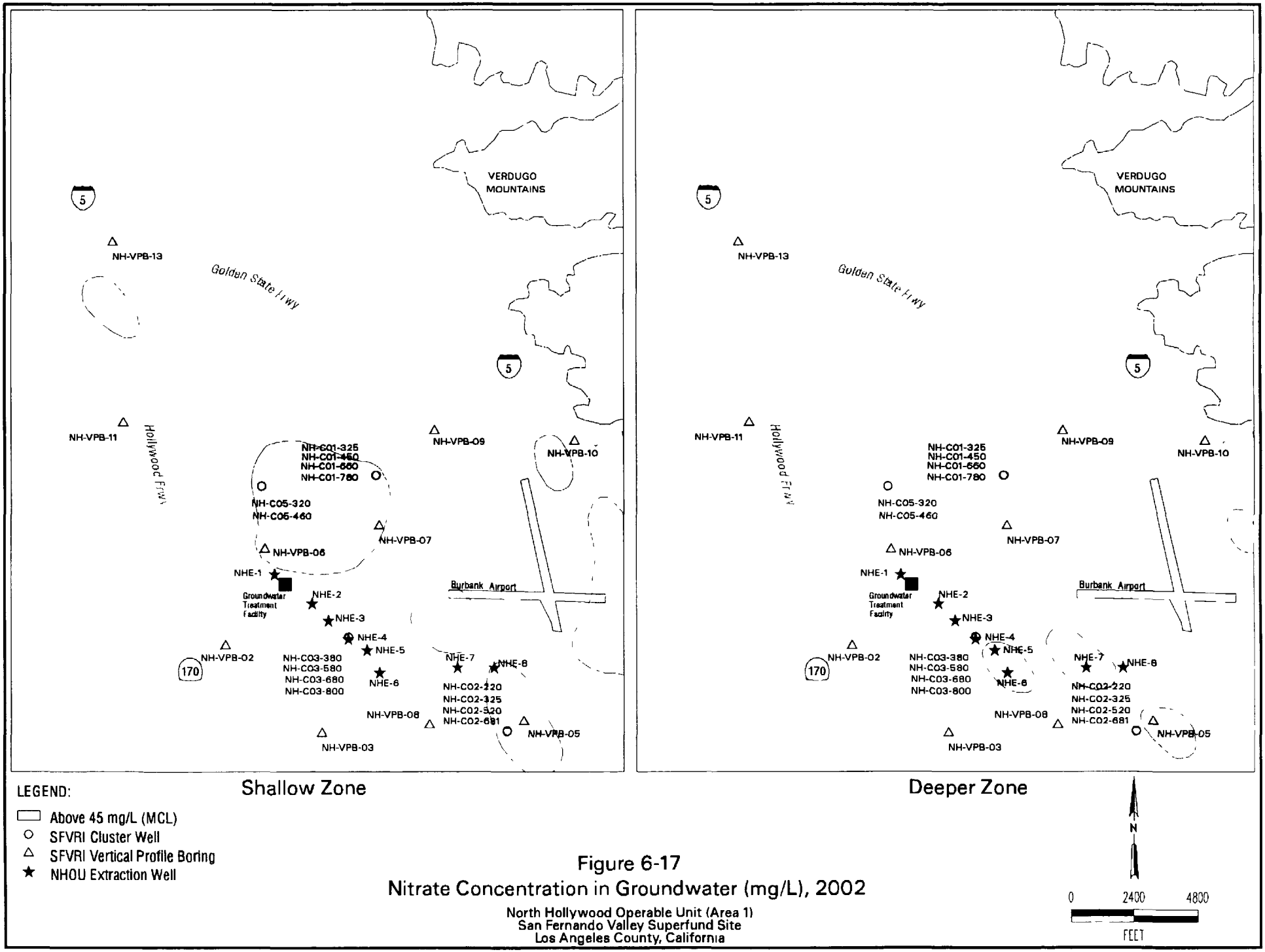

Figure 6-17
Nitrate Concentration in Groundwater (mg/L), 2002
North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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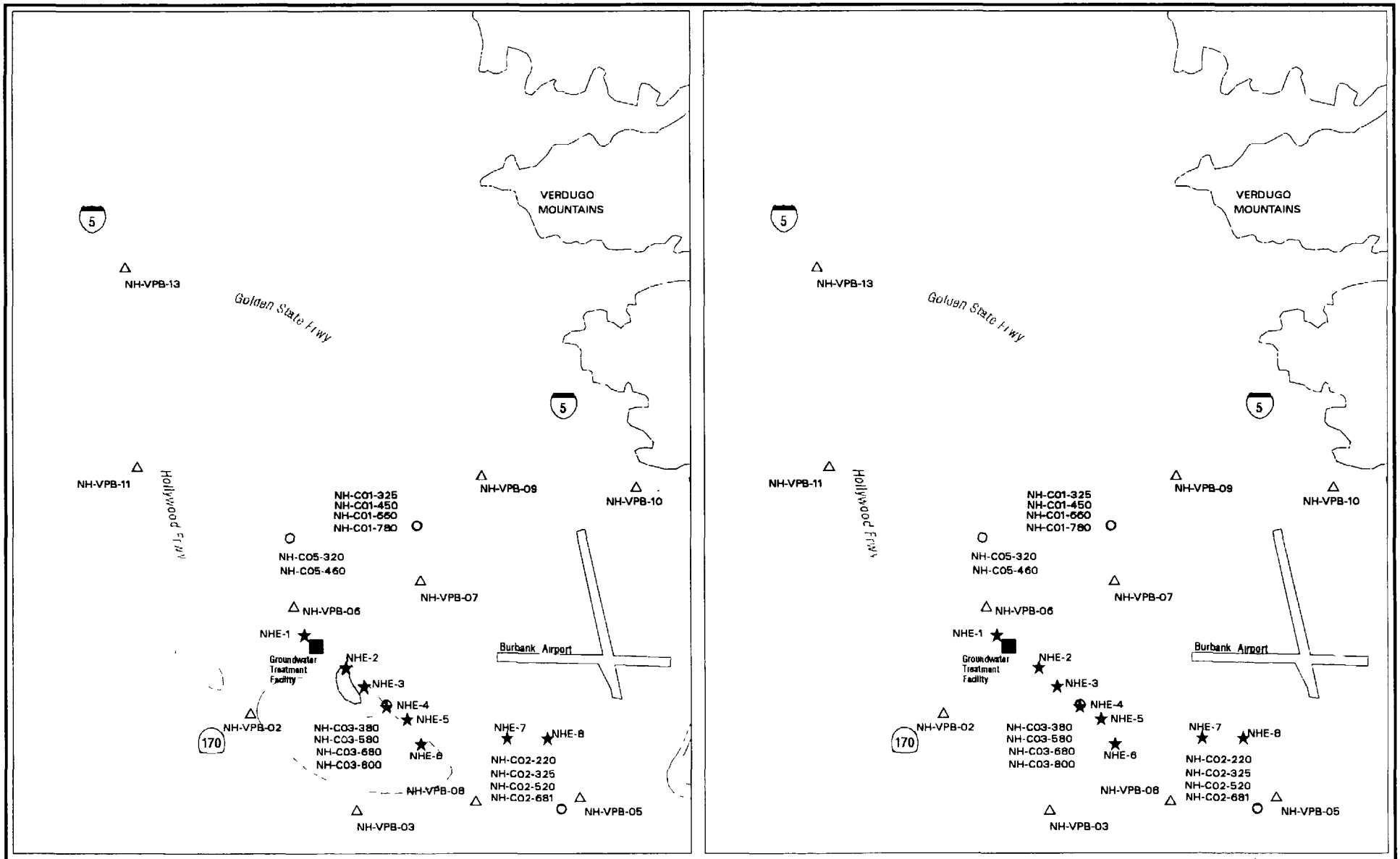

Figure 6-18

Total Dissolved Chromium Concentration in Groundwater (µg/L), 2001

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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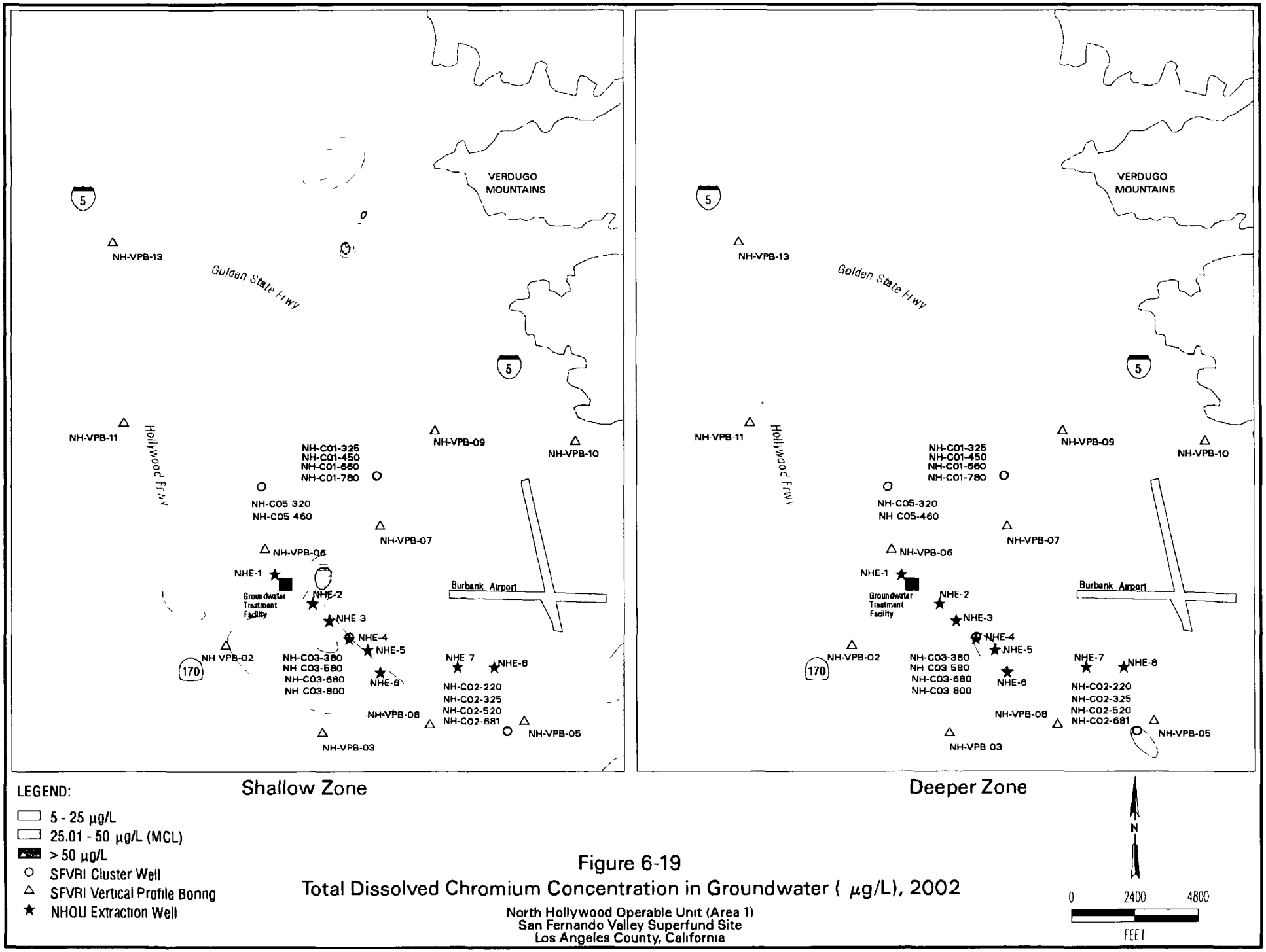

Figure 6-19

Total Dissolved Chromium Concentration in Groundwater (µg/L), 2002

North Hollywood Operable Unit (Area 1)
San Fernando Valley Superfund Site
Los Angeles County, California

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7.0 Technical Assessment

7.0 Technical Assessment

7.1 Functioning of the Remedy as Intended by Decision Documents

Since the beginning of operations in 1989 to present, the NHOU groundwater treatment facility has met all the requirements stipulated in the DHS permit and has achieved the treated water quality requirements specified in the ROD. However, the treatment system has never operated at the 2,000-gpm design capacity and the groundwater data indicates plume migration. The maximum capacity at which the system operated during the past five years was 1,700 gpm during 1998. Additionally, there was excessive downtime of the treatment system during 1999, 2000, and 2001. The NHOU groundwater treatment facility has generally met all requirements of the SCAQMD permit to operate with the exception of the two exceedences noted in Section 6.3.2.

Lower than expected extracted volume is attributed to extraction wells yielding less than the original rated capacity of 300 gpm. Factors influencing this include:

1. NHOU extraction wells are shallow and were installed to capture groundwater from the Region 1 (200 to 280 feet bgs) and Region 2 (270 to 420 feet bgs) - an area sensitive to groundwater elevation changes and an area where groundwater elevations have been declining.
2. NHOU extraction wells were designed to a 300-gpm capacity, based on limited geologic and hydrogeologic data available in the 1980s.
3. The pumps in some of the NHOU extraction wells are set to extract less than 300 gpm to ensure capture from Region 1, as well as manageable, sustainable drawdown (LADWP, 2002a).
4. Well 1 is inactive.
5. Shutdown of wells due to the management of new potential COCs.
6. Shutdown of wells due to maintenance issues.

As a result of decreasing water levels and the design of NHOU extraction wells, well 1 could not produce sufficient groundwater for treatment and was removed from service during the first year of operation.

Wells have been consistently removed from service due to new COC concentrations, particularly total chromium. Well 2 was shutdown from September 2000 to December 2002 because total chromium concentrations exceeded LADWP's internal standard of 20 µg/L, and occasionally exceeded the MCL of 50 µg/L. Additionally, well 4 was shutdown from September 2000 to June 2001 for total chromium concentrations less than the MCL but greater than 20 µg/L. Nitrate contamination also threatens the operation of extraction wells; however, shutdowns specific to presence of this contaminant have not occurred.

Shutdown of wells due to maintenance issues affected the continuous operation of wells 3 through 5 from 2000 to 2001. LADWP management has addressed excessive maintenance delays through better planning and communication during the past 2 years. Submittal of annual work plans since 2001 has provided schedules and goals necessary to maintain treatment system operation, providing the schedules and goals are met.

During the Site visit and interviews, it was revealed that the flow meters have been inoperable on wells 4, 6, and 8 since October 2002, April 2003, and April 2003, respectively. Despite inclusion in the preventive maintenance schedule (Table 4-2), personnel scheduling constraints were cited as the reason for excessive repair time. Flow readings are input into the LADWP groundwater model, where the LADWP's basin-wide groundwater management is evaluated. While actual readings are unavailable, estimates of flow are provided. Priority maintenance issues need to improve, given that the purpose of the remedy is to effectively contain and treat VOC-contaminated groundwater, and that the modeling assists with evaluating attainment of this goal.

Shutdown of the treatment system as a whole for an excessive amount of time inhibits the ability of the treatment system to meet the ROD objective of 2,000-gpm for VOC plume capture and treatment. From 1998 to 2003, the following maintenance activities caused downtime greater than 2 months: GAC change-out, mechanical problems with the influent valve during 1999, repair of the air heater during 2002, and a vacuum line break during 2002. The work plan identifies concurrent work, preventive maintenance, and items requiring attention. The work plan appears to have decreased maintenance issues during the past 2 years. Improvements have been made, such as the method for GAC change-outs; however, response time to unexpected O&M problems and acquisition of parts is still a lengthy process. The previous five-year review noted lengthy downtime due to maintenance and repairs from 1989 to 1995. This issue is identified again in this review for the period of 1999, 2001, and 2002.

Well 2 was shutdown due to chromium concentrations from September 2000 to December 2002. During this time, a five-year maximum concentration of 610 µg/L of TCE in well 2 was recorded in July 2002. Well 3 was shutdown for extended periods due to maintenance issues during 2001, operating at less than 75 percent of operational time. Additionally, well 4 was shutdown during 1998, 2000, and 2001, resulting in less than 75 percent operational efficiency during operation due to maintenance issues. Wells 3 and 4 are located in the vicinity of high TCE plume concentrations.

Operating the treatment system at less than 2,000 gpm and extraction wells at less than the rated capacity due to the aforementioned issues may be responsible for the TCE plume growth discussed in Section 6.3.1. The North Hollywood (west) pumping field is located directly west of the treatment system and may be impacted in the future, should TCE plume migration continue westward.

7.2 Current Validity of Assumptions Used During Remedy Selection

The assumptions made at the time of remedy selection are generally unchanged. However, in 1991, the EPA established national primary drinking water regulations, setting a MCL of

5 µg/L for PCE and a MCLG of zero. The new standard is higher than the 4 µg/L SAL cleanup goal set in the 1987 ROD; therefore, does not compromise the protectiveness of the remedy. During this five-year review, the assumptions concerning COC exposure and toxicity data and changes in remedial action objectives were evaluated. No current or potential changes have been identified during this five-year review process.

7.3 Recent Information Affecting the Remedy

The presence of new contaminants and expansion of the VOC plume may affect the protectiveness of the remedy in the future. New contaminants present in NHOU extraction wells at concentrations greater than MCLs or SALs include nitrate and total chromium. Perchlorate and hexavalent chromium are present in the NHOU groundwater, however, there are no MCLs nor SALs associated with these potential COCs.

Nitrate contamination originated from historical agricultural practices and private sewage disposal (ULARA, 2003b). To reduce the source of nitrates, a sanitary sewer construction program for 18 areas within the SFV was established and, as of 1999, six of the 18 areas still required upgrade (ULARA, 2003b). Nitrate is a possible COC due to the potential ingestion risk to infants that could result in methemoglobinemia (cyanosis or blue-baby syndrome). The remedy is not capable of remediating nitrate-contaminated groundwater. Currently, extracted and treated groundwater is blended to decrease nitrate concentrations to less than the MCL. If the concentration of nitrates increases in the NHOU area, the remedial action integrity may be compromised due to blending requirements to reduce nitrate concentrations below the MCL.

In 1999, the EPA provided federal funding for the RWQCB to investigate chromium sources in the SFV. A former industrial source was identified directly upgradient of the NHOU where the maximum total chromium concentration is greater than 5,000 µg/L and hexavalent chromium is greater than 4,000 µg/L. A RWQCB Cleanup and Abatement Order was issued for this site. The current EPA MCL for total chromium is 100 µg/L. The current DHS MCL for total chromium is 50 µg/L. A revised DHS MCL for total chromium and a new DHS MCL for hexavalent chromium is due January 2004; however, a delay is anticipated (personal communication, Stefan Cajina/DHS, July 28, 2003). The treatment system was not designed to treat chromium-impacted groundwater. If the new DHS MCLs are low, the remedy may not be able to continue operating using the current facility. Measures should be taken to improve plume containment, and efforts should continue to address sources to avoid potential impacts to additional production wells.

There is no MCL for perchlorate, and the treatment system was not designed for remediation of perchlorate-impacted groundwater. Perchlorate has only been detected in remedial investigation monitoring wells; however, if extraction wells are impacted in the future above any established MCL or SAL, the protectiveness of the remedial action may be compromised.

As discussed in Section 6.3.1., the VOC plume has increased in size in the North Hollywood area since 1998. During 2002, LADWP prepared *Evaluation of the North Hollywood Operable Unit and Options to Enhance its Effectiveness, DRAFT* (2002a). This report recommended the installation of additional wells in the vicinity of extraction wells 1 and 2 to improve plume

capture within the NHOU area by increasing operation to the treatment system's 2,000-gpm design capacity. The draft final version of this report, expected to be completed September 2003, will contain descriptions of modeling procedures and rationale used to make the conclusions; therefore, the conclusion presented in the draft document cannot be effectively evaluated given the data presented. However, based on the groundwater monitoring plume maps presented in Section 6.0, the recommendation for additional wells appears to be warranted. In addition to the locations proposed by LADWP, the southeast migration of the VOC plume beyond well 6 should also be addressed. When planning the location of additional extraction wells, DHS Policy 97-005 must be considered due to the extensive timeframe necessary to complete all required evaluations necessary for a drinking water permit prior to well construction. When well construction and operation is anticipated, modeling should be used to evaluate plume location and well placement.

8.0 Issues and Recommendations

8.0 Issues and Recommendations

Issues identified during the five-year review process relate to groundwater containment concerns, management of the treatment system, and health and safety issues for Site workers. This section discusses the issues in detail and provides recommendations for improvement.

Issue

The treatment system has never operated at the 2,000 gpm capacity. Complete containment of the TCE groundwater plume is in question based on recent plume maps and preliminary modeling results from the first draft of the NHOU enhancement study. It appears that there may be some westward movement of the upper northeast portion and some southern movement of the TCE contaminant plume in the NHOU area. The draft final enhancement study is due at the end of September 2003.

Recommendation

1. Evaluate TCE plume capture based on the final NHOU enhancement study.

2. If plume growth or migration is confirmed, design and implement actions to increase capture. These recommendations should be presented in the Burbank OU 5-year review which will be completed as an addendum to this report during 2004.

Issue

NHOU treatment system operations and maintenance issues are complex. Management of reporting requirements for various agencies involves multiple departments within LADWP, which further complicates the project as a whole. The five-year review process conducted for this Site has revealed that there is not a central project manager to track all of the activities and personnel involved with this project. There is a project manager at LADWP who is knowledgeable of all activities associated with EPA reporting and has made many improvements to the management of the treatment system and the priority of maintenance issues during downtime. However, all preventive maintenance and mechanical problems which do not result in system downtime are managed under different departments with no central coordination. For example, three NHOU extraction well flow meters have been inoperable for more than two months, and scheduled preventive maintenance on these flow meters was cancelled due to staffing issues. An appointed project manager of the treatment system should be aware of all issues and ensure that the treatment system is managed with the objective of VOC plume containment and treatment.

Recommendation

Within the next three months, expand the responsibilities of the current LADWP project manager to include all aspects of the treatment system, specifically, but not restricted to:

1. Managing any and all O&M problems.

2. Ensuring the preventive maintenance schedule is followed and completed.
3. Managing all sampling (air and water) activities related to the Site.
4. Managing all reporting for the treatment system (EPA and DHS).
5. Managing evaluation of hydraulic containment.
6. Effectively communicating redefined roles and responsibilities within LADWP (refers to tasks 1 through 5 above).
7. Arranging and attending regularly scheduled meetings to discuss the NHOU remedy.

Issue

The material presented in EPA quarterly reports from LADWP is not comprehensive in terms of remedy performance. Air quality data, chemical data pertaining to potential new COCs, and preventive maintenance updates are not presented. The performance of the treatment system is not evaluated on a regular basis.

Recommendation

In the fourth quarter 2003 quarterly report and all subsequent quarterly reports, the following information should be included:

1. Add a column that provides a status report to the preventive maintenance table of the annual work plan, presented in this report as Table 4-2.
2. Present and evaluate all air monitoring data collected while using the current GAC filters. Discuss the plan for future sampling events and anticipated GAC change-out.
3. Present and summarize all water monitoring data collected during the previous quarter, particularly data for new potential COCs such as nitrate, total chromium, hexavalent chromium, and perchlorate (if monitored).
4. Summarize hydraulic evaluation (groundwater elevation and modeling efforts) performed during the previous quarter and any expected issues for the following quarter. This is particularly important given the influence that pumping at the North Hollywood well field (west of the NHOU treatment system) has on TCE plume migration.

Issue

GAC change-out is a necessary component of the remedy to ensure that VOCs are not emitted to the air above SCAQMD permit limits. The current project manager has made many improvements to the procurement of GAC, which has decreased system downtime due to GAC change-out. However, GAC change-out occurred after air quality exceeded SCAQMD limits during 1998 and 1999. The purpose of monitoring is to plan GAC change-out prior to exceedences. Quarterly monitoring cannot effectively achieve this goal, due to the time lapse between sampling events.

Recommendation

The following recommendations should be implemented within the next six months.

1. Initiate procedures to obtain a new agreement with a GAC contractor in October 2004.
2. Increase air quality sampling frequency once the GAC has been in use for six months and two rounds of quarterly data have been obtained.
3. Provide summaries of air quality data for the current GAC unit in the quarterly report, as stated previously.
4. Ensure that GAC change-out occurs prior to exceeding SCAQMD air quality limits.
5. If TCE concentrations increase during initial months of use following GAC change-out, investigate this issue further and perform additional sampling as needed.

Issue

There is no vent low to the ground in the chlorine storage building, which is a health and safety issue in the event of a chlorine gas leak. Additionally, the Site operator reported that the chlorine scale is not accurate when tanks are at low levels.

Recommendation

The following recommendations should be implemented as soon as possible to ensure the safety of Site workers, but no later than the next six months:

1. Install a vent low to the ground in the chlorine storage building, in accordance with health and safety regulations for chlorine storage facilities.
2. Replace or repair the chlorine tank scale.

Issue

During the Site visit it was observed that there was excessive white particulate dust in the blower room of the NHOU treatment system. There is a metals and plastics grinding facility located adjacent to the Site. The Site operator reported that particulate often is emitted from the adjacent property and is blown by wind towards the Site. This particulate could be a health and safety issue for Site workers, cause additional maintenance issues for the treatment system, and/or introduce foreign materials to the blower room where air enters to aerate groundwater. A preliminary investigation found that the facility operating adjacent to the Site has a RCRA permit and a SCAQMD permit.

Recommendation

1. Submit a Public Records Request to SCAQMD to find out the type of permit under which the adjacent property operates, what constituents are emitted, and if there is any monitoring requirements associated with the permit (within the next six months).
2. Request that Site operators note when particulate is seen being emitted from the adjacent property (immediately).

3. If necessary, plan and conduct particulate air monitoring at the Site at a time scheduled in accordance with observations made during task 2. Analyze air particulate samples if warranted (within the next 12 months).

4. The packing material within the aeration (air-stripping) tower should be inspected to see if the particulate within the blower room is entering the tower (within the next six months).

Issue

During the Site visit, it was noted that the flow meters for wells 4, 6, and 8 were broken. Work orders were submitted for maintenance October 2002 and April 2003, respectively.

Recommendation

1. Repair the flow meters by October 31, 2003.

9.0 Protectiveness Statement

9.0 Protectiveness Statement

The interim remedy at the NHOU currently protects human health and the environment because the concentration of TCE and PCE in treated groundwater is less than ROD selected clean-up goals and no other potential COCs currently exceed health-based standards. However, in order for the remedy to be protective of human health and the environment in the long-term, VOC plume containment should be addressed to control potential exposure pathways to ensure continued protectiveness. In addition, there should be ongoing reporting of extraction well concentrations of total chromium, hexavalent chromium, and perchlorate, COCs not previously identified in the ROD. Additional sampling and reporting is recommended. In order to provide continued protectiveness in the long-term, periodic review of emergent chemical concentrations and their associated MCLs or risk-based treatment standards should be made.

A protectiveness determination for Area 1 as a whole cannot be made at this time until the five-year review report is complete for the Burbank OU. It is expected that at this will be completed during 2004. This site-wide review will address the long-term protectiveness issues noted above.

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10.0 References

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Appendix A
Documents Reviewed

APPENDIX A

Documents Reviewed

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Appendix B
Five-year Review Site Inspection Checklist, Memo, and Interview Summary Forms

APPENDIX B

Five-year Review Site Inspection Checklist, Memo, and Interview Summary Forms

TABLE B-1
Site Inspection Team Roster
Site Inspection- June 30, 2003
North Hollywood Operable Unit
San Fernando Valley (Area 1) Superfund Site
Los Angeles County, California

Name	Title	Affiliation
Bob Fitzgerald	Remedial Project Manager	US Environmental Protection Agency Region IX
Nancy Wigner	Project Manager / Engineer	Los Angeles Department of Water and Power
Virginia Murdoch	Well Fields Operator	Los Angeles Department of Water and Power
Don Stone	Treatment System Operator	Los Angeles Department of Water and Power
Tina Girard	Task Manager	CH2M HILL Oakland Office

Five-Year Review Site Inspection Checklist
San Fernando Valley Superfund Site
North Hollywood OU

I. SITE INFORMATION	
Site name: San Fernando Valley Superfund Site – North Hollywood OU	**Date of inspection:** June 30, 2003
Location and Region: North Hollywood, CA, Region IX	**EPA ID:** CAD980894893
Agency, office, or company leading the five-year review: EPA Region IX	**Weather/temperature:** Approximately 85°, Sunny

Remedy Includes: (Check all that apply)

_ Landfill cover/containment
_ Access controls
_ Institutional controls
X Groundwater pump and treatment
_ Surface water collection and treatment
_ Other

Attachments X Inspection team roster attached X Site map attached [in report]

II. INTERVIEWS (Check all that apply)

1 **O&M Site Manager**
Name Nancy Wigner Title PE - LADWP Date 7/30/03

Interviewed X Phone No (213) 367-1151

Problems, suggestions
See Attached Interview Summary Form

NOTE All referenced attachments can be found in Five Year Review Report

2 **O&M staff**
Name Virginia Murdock Title Operations LADWP Date 6/30/03

Interviewed X Phone No

Problems, suggestions
Interviewed at site She discussed the delay in repairs to the equipment, see site visit memo

3. **Local regulatory authorities and responsible agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency California Department of Health

Contact: Stefan Cajina
Name Title Date Phone No.

Problems; suggestions: See attached interview summary form

Agency Regional Water Quality Control Board

Contact Art Heath / Dixon Oriola
Name Title Date Phone No.

Problems; suggestions: Repeated attempts to interview, no one was available during the five year review process.

4. **Other interviews** (optional): See Attached Interview Summary Forms

III. ONSITE DOCUMENTS AND RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

X O&M manual - 1988 1 copy only	X Readily available	_ Up to date – no
X As-built drawings	X Readily available	_ Up to date
X Maintenance logs	X Readily available	X Up to date – yes

Remarks: O&M Manual is out of date; well details (i.e. pumps) out of date. Maintenance logs are electronically stored in database.

2. **Site-Specific Health and Safety Plan** X Readily available _ Up to date

X Contingency plan/emergency response plan X Readily available X Up to date

Remarks: Emergency Response Plan was readily available at the treatment plant; dated December 12, 2002.

3. **O&M and OSHA Training Records** _ Readily available _ Up to date _ N/A

Remarks: O&M records are maintained the database. Status of OSHA training records is unknown after two inquiries to Nancy Wigner.

4. **Permits and Service Agreements**

X Air discharge permit	X Readily available	_ Up to date	X N/A
_ Effluent discharge	_ Readily available	_ Up to date	_ N/A
_ Waste disposal, POTW	_ Readily available	_ Up to date	_ N/A
_ Other permits _____	_ Readily available	_ Up to date	_ N/A

Remarks: Air permit does not require renewal, issued in 1986.

5. **Gas Generation Records** X Readily available X Up to date _ N/A

Remarks: Post 2002 records available from Lucik Melikian ; from 1999 to date Gary Macke maintains records..

6.	**Settlement Monument Records**	_ Readily available	_ Up to date	X N/A
	Remarks:			
7.	**Groundwater Monitoring Records**	X Readily available	X Up to date	_ N/A
	Remarks: CH2M HILL.			
8.	**Leachate Extraction Records**	_ Readily available	_ Up to date	X N/A
	Remarks:			
9.	**Discharge Compliance Records**			
	X Air	X Readily available	X Up to date	_ N/A
	X Water (effluent)	X Readily available	X Up to date	
	Remarks:			
10.	**Daily Access/Security Logs**	_ Readily available	_ Up to date	X N/A
	Remarks: N/A. Site fenced and unattended.			

IV. O&M COSTS

1. **O&M Organization**

_ State in-house
_ PRP in-house
_ Other
_ Contractor for State
_ Contractor for PRP
X Contractor for USEPA

2. **O&M Cost Records**

X Readily available
X Up to date
X Funding mechanism/agreement in place
_ Original O&M cost estimate N/A: ROD signed 1987
_ Breakdown attached

Total annual cost by year for review period if available - see Report.

	Date		Date	Total cost	
From	_____	To	_____	_____	_ Breakdown attached
	Date		Date	Total cost	
From	_____	To	_____	_____	_ Breakdown attached
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons:

_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS

A. Fencing

1. **Fencing** X Location shown on site map X Gates secured _ N/A

Remarks: All wells and the treatment system are located in fenced areas.

B. Other Access Restrictions

1. **Signs and other security measures** X Signs Displayed

Remarks:

C. Institutional Controls N/A

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented _ Yes _ No _ N/A
Site conditions imply ICs not being fully enforced _ Yes _ No _ N/A

Type of monitoring (e.g., self-reporting, drive by)
Frequency_____
Responsible party/agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Reporting is up to date _ Yes _ No _ N/A
Reports are verified by the lead agency _ Yes _ No _ N/A

Specific requirements in deed or decision documents have been met _ Yes _ No _ N/A
Violations have been reported _ Yes _ No _ N/A
Other problems or suggestions: Report attached

2. **Adequacy:** _ ICs are adequate _ ICs are inadequate _ N/A

Remarks _____
_____
_____

D. General

1. **Vandalism/trespassing** _ Location shown on site map X No vandalism evident

Remarks:

2. **Land use changes onsite** X Yes

Remarks: Wells 2, 3, 4 used as plant Nursery area for movies.

3. **Land use changes offsite** X N/A

Remarks: Not evaluated; current land use surrounding site is industrial and residential.

VI. GENERAL SITE CONDITIONS

A. Roads	X Applicable		
1	**Roads**	X Location shown on site map	X Roads adequate _ N/A
	Remarks Residential public streets join wells, treatment system roadway is in good condition		
B. Other Site Conditions			
	Remarks		

VII. LANDFILL COVERS Not Applicable X

A. Landfill Surface			
1	**Settlement** (Low spots)	_ Location shown on site map	_ Settlement not evident
	Areal extent_____	Depth_____	
	Remarks		
2	**Cracks**	_ Location shown on site map	_ Cracking not evident
	Lengths _____	Widths_____	Depth_____
	Remarks		
3	**Erosion**	_ Location shown on site map	_ Erosion not evident
	Areal extent_____	Depth_____	
	Remarks		
4	**Holes**	_ Location shown on site map	_ Holes not evident
	Areal extent_____	Depth_____	
	Remarks		
5	**Vegetative Cover** Grass	_ Cover properly established	_ No signs of stress
	Trees/Shrubs (indicate size and locations on a diagram)		
	Remarks		
6	**Alternative Cover** (armored rock, concrete, etc) _ N/A		
	Remarks		
7	**Bulges**	_ Location shown on site map	_ Bulges not evident
	Areal extent_____	Height_____	
	Remarks		

8.	**Wet Area/Water Damage**	_ Wet areas/water damage not evident	
	Wet areas	Location shown on site map	Areal extent_____
	Ponding	Location shown on site map	Areal extent_____
	Seeps	Location shown on site map	Areal extent_____
	Soft subgrade	Location shown on site map	Areal extent_____
	Remarks:		
9.	**Slope Instability**	Slides _ Location shown on site map	_ No evidence of slope instability
	Areal extent_____		
	Remarks:		
B. Benches		_ Applicable	_ N/A
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	_ Location shown on site map	_ N/A or okay
	Remarks:		
2.	**Bench Breached**	_ Location shown on site map	_ N/A or okay
	Remarks:		
3.	Bench Overtopped	_ Location shown on site map	_ N/A or okay
	Remarks:		
C. Letdown Channels		_ Applicable	_ N/A
	(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement**	_ Location shown on site map	_ No evidence of settlement
	Areal extent_____	Depth_____	
	Remarks:		
2.	**Material Degradation**	_ Location shown on site map	_ No evidence of degradation
	Material type_____	Areal extent_____	
	Remarks:		
3.	**Erosion**	_ Location shown on site map	_ No evidence of erosion
	Areal extent_____	Depth_____	
	Remarks:		
4.	**Undercutting**	_ Location shown on site map	_ No evidence of undercutting
	Areal extent_____	Depth_____	
	Remarks:		

5.	**Obstruction**	Type_____	_ No obstruction	
	Location shown on site map Size_____	Areal extent_____		
	Remarks:			
6.	**Excessive Vegetative Growth**	Type _____		
	No evidence of excessive growth Vegetation in channels does not obstruct flow Location shown on site map	Areal extent_____		
	Remarks:			
D. Cover Penetrations		_ Applicable	X N/A	
1.	**Gas Vents**	_ Active	_ Passive	
	Properly secured/located Evidence of leakage at penetration	_ Functioning	_ Routinely sampled	_ Good condition
	Remarks:			
2.	**Gas Monitoring Probes**			
	Properly secured/located Evidence of leakage at penetration	_ Functioning	_ Routinely sampled	_ Good condition
	Remarks:			
3.	**Monitoring Wells** (within surface area of landfill)			
	Properly secured/located Evidence of leakage at penetration	_ Functioning	_ Routinely sampled	_ Good condition
	Remarks:			
4.	**Leachate Extraction Wells**			
	Properly secured/located Evidence of leakage at penetration	_ Functioning	_ Routinely sampled _ Needs O&M	_ Good condition _ N/A
	Remarks:			
5.	**Settlement Monuments**	_ Located	_ Routinely surveyed	_ N/A
	Remarks:			
E. Gas Collection and Treatment (effluent from groundwater treatment system)		X Applicable	_ N/A	

1.	**Gas Treatment Facilities** _ Flaring _ Thermal destruction _ Collection for reuse X Good condition _ Needs O&M Remarks: VOC Contaminated Groundwater is treated via volatilization with 2 vapor GAC units.
2.	**Gas Collection Wells, Manifolds and Piping** X Good condition _ Needs O&M Remarks: The piping leading from the aeration tower to the GAC vapor filters appeared to be in good condition.
3.	**Gas Treatment Facilities** (e.g., gas monitoring of adjacent homes or buildings) X Good condition _ Needs O&M _ N/A Remarks: Discharge (sampling) records indicate the system is operating in compliance.
F. Cover Drainage Layer	_ Applicable X N/A
1.	**Outlet Pipes Inspected** _ Functioning _ N/A Remarks:
2.	**Outlet Rock Inspected** _ Functioning _ N/A Remarks:
G. Detention/Sedimentation Ponds	_ Applicable _ N/A
1.	**Siltation** Areal extent_____ Depth_____ _ N/A Siltation not evident Remarks:
2.	**Erosion** Areal extent_____ Depth_____ Erosion not evident Remarks:
3.	**Outlet Works** _ Functioning _ N/A Remarks:
4.	**Dam** _ Functioning _ N/A Remarks:
H. Retaining Walls	_ Applicable X N/A
1.	**Deformations** _ Location shown on site map _ Deformation not evident Horizontal displacement_____ Vertical displacement_____ Rotational displacement_____ Remarks:
2.	Degradation _ Location shown on site map _ Degradation not evident Remarks:

I. Perimeter Ditches/Off-Site Discharge _ Applicable X N/A

1. **Siltation** _ Location shown on site map X Siltation not evident

   Areal extent_____ Depth_____

   Remarks:

2. **Vegetative Growth** _ Location shown on site map X N/A

   Vegetation does not impede flow
   Areal extent_____ Type_____

   Remarks:

3. **Erosion** _ Location shown on site map _ Erosion not evident

   Areal extent_____ Depth_____

   Remarks:

4. **Discharge Structure** _ Functioning X N/A

   Remarks:

VIII. VERTICAL BARRIER WALLS X Not Applicable

1. **Settlement** Location shown on site map Settlement not evident

   Areal extent_____ Depth_____

   Remarks:

2 **Performance Monitoring** Type of monitoring_____

   Performance not monitored
   Frequency_____ _ Evidence of breaching
   Head differential_____

   Remarks:

IX. GROUNDWATER/SURFACE WATER REMEDIES X Applicable

A. Groundwater Extraction Wells, Pumps, and Pipelines X Applicable

1. **Pumps, Wellhead Plumbing, and Electrical**

   _ Good condition _ All required wells located X Needs O&M _ N/A

   Remarks: Flow meters broken at Well # 6, # 8 and maybe # 4

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

   _ Good condition X Needs O&M

   Remarks: See above.

3. **Spare Parts and Equipment**

   _ Readily available _ Good condition _ Requires upgrade _ Needs to be provided

   Remarks: Some spare parts available, some wells are scheduled for upgrade this fiscal year

B. Surface Water Collection Structures, Pumps, and Pipelines X N/A

1. **Collection Structures, Pumps, and Electrical**

_ Good condition _ Needs O&M

Remarks:

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

_ Good condition _ Needs O&M _ N/A

Remarks:

3. **Spare Parts and Equipment**

_ Readily available _ Good condition _ Requires upgrade _ Needs to be provided _ N/A

Remarks:

C. Treatment System X Applicable

1. **Treatment Train** (Check components that apply)

_ Metals removal _ Oil/water separation _ Bioremediation
X Air stripping X Carbon adsorbers
Filters: GAC – setup 3-year contract so that filters are obtained easily when needed.
X Additive (e.g., chelation agent, flocculent) Sodium Hexametaphosphate
X Good condition _ Needs O&M
X Sampling ports properly marked and functional
X Sampling/maintenance log displayed and up to date
X Equipment properly identified
_ Quantity of groundwater treated annually
_ Quantity of surface water treated annually N/A

Remarks: Blower Room filled with thick coating of particulate dust.

2. **Electrical Enclosures and Panels** (properly rated and functional)

_ N/A X Good condition _ Needs O&M

Remarks: Electric panels for 5 wells will be replaced this year (June 2003 to June 2004) were replaced last year for 2 wells.

3. **Tanks, Vaults, Storage Vessels**

Sodium Hexametaphosphate aboveground storage tank

Remarks: Tank appeared in good condition.

4. **Discharge Structure and Appurtenances**

X Good condition _ Needs O&M

Remarks:

5. **Treatment Building(s) – support building**

_ N/A _ Good condition (especially roof and doorways) _ Needs repair

Chemicals and equipment properly stored – See below

Remarks: In Chlorine Storage Building, there is an elevated vent (~ 8 ft aboveground) but no vents low to ground.

6. Monitoring Wells (pump and treatment remedy)

X Properly secured/locked _ Functioning - See Report _ Routinely sampled - yes

_ Good condition - See Report _ All required wells located - no _ Needs O&M - yes _ N/A

Remarks: See above with regards to flow meters on extraction wells.

D. Monitored Natural Attenuation N/A

1. **Monitoring Wells** (natural attenuation remedy)

_ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition

_ All required wells located _ Needs O&M

Remarks:

X. OTHER REMEDIES N/A

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e , to contain contaminant plume, minimize infiltration and gas emission, etc.).

The interim remedial action at the North Hollywood OU is groundwater extraction and treatment by vapor GAC. Currently, the unit is extracting from 7 wells; however, due to additional contaminants (chromium) – extraction from well # 2 has been intermittently shut down. As a result, it is possible that due to the extensive pumping in the well field to the west the VOC plume has migrated to the west, and the unit is no longer capturing all contamination See "5-year Review Report" for a full technical evaluation.

Issues identified during site visit are:

1. Broken flow meters.
2. Accessibility to wells 2, 3, and 4.
3. Particulate dust in the Blower Room associated with the treatment system.
4. Lack of low vent in chlorine storage room.

B.	Adequacy of O&M
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. There appears to be difficulty with communication and coordination of efforts - see interviews for details. This has resulted in unnecessary long-term shutdown of the system.
C.	**Early Indicators of Potential Remedy Failure**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. As stated above, a more cooperative approach should be implemented. The Annual Work Plan, the first submitted in 2001, will provide an organized, efficient way of coordinating O&M efforts to decrease downtime and overall costs.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Assign one Task Manager for the entire project. Currently, Nancy Wigner is the project manager, with a limited role focused on EPA reporting; her duties should be expanded for a cooperative, organized approach to the project as a whole.

Site Visit - N. Hollywood OU

ATTENDEES: Bob Fitzgerld - USEPA
Nancy Wigner - LADWP
Tina Girard - CH2M HILL
Virginia Murdock – LADWP
Don Stone – LADWP

MEETING DATE: June 30, 2003

LOCATION: LADWP / Well 8, Treatment System

SUBJECT: Site Visit - N. Hollywood OU

FROM: Tina Girard

Well 8: Virginia Murdoch present at well 8

- The area enclosing Well 8 is fenced; this is a residential area; the surface is of low permeability (gravel & concrete); there are no leaks in piping apparent, nor the 4 inch well line; a park and residential areas boarder the location of well 8.

Inquired as to pumping rate, responses were:

Viginia Murdoch ~ 0.7cfs

Nancy Wigner ~ 0.2cfs

- The flow meter is broken on well 8.
- There is an abandoned production well adjacent to well 8; the depth of the production well is approximately 1,000 feet below ground surface (ft bgs); The depth of well 8 is approximately 300 ft bgs.
- The sample spicket is in working order
- There are overhead power lines at site

  Instrument Readings: Lifetime hours = 64257.4 (Virginia reported that this instrument is sometimes not in working order)

  Motor: 3 phase, 480 Volts, 65 Amps
- There is a primer on all pumps except well 4; the primer adds to life of pump.
- History logbook available onsite; first entry was 1996.
- Wells 2, 3, 4 are located on leased land which is used as a plant nursery for movie sets; sometimes the wells cannot be located. Nancy said that wells 2-4 were inaccessible during visit.
- Drove by well 7, appeared in good condition; residential area.
- Well 6 apperared in good condition from a distance; the well is located underneath high voltage power lines.

Treatment Plant

Met with Don Stone - Operations (818) 771-6010

- No photos due to post 9/11 security
- Chlorine storage building/office
  - Total of 4 chlorine tanks; 2 for replacement; 1 in use; 1 for backup.
  - Use approximately 8 pounds/day of chlorine.
  - Machine records total chlorination.
  - The scale for the chlorine tanks is not accurate once low levels of chlorine are left (remaining) in the tank.
  - There is backup chlorination system and tank.
  - Emergency response plan (ERP) and LAAFP phone list readily available (ERP dated 12-12-02).
  - Aeration tower log book is readily available and up to date all data is input into 'Maxima' database.
  - Air Quality Management District Permit was visibly posted but out of date.
  - Don expressed concern that the outdoor our vent was at the top of the building. He stated that in all other chlorine storage facilities the vent was at the bottom of the building due to the nature of chlorine gas in the event of a leak.
  - Air sampling occurs once a month to ensure viability of GAC units.
- The sodium hexametaphosphate (corrosion inhibitor) AST had a secondary containment system (concrete berm).
- Current Meter Readings:

  Blower D/P Inches of Water = 0.15

  Hood D/P Inches of Water = 2.8

  Mist Eliminator Inches of Water = 0.01

  Packing Inches of Water = 1.1
- A new probe for emissions control was installed in the past year - the heating element was malfunctioning and causing shutdown.
- Blower - Control room is locked; the room was full of particulates and the filter/screen on the outdoor vent was full/clogged with particulate. Fine white dust; possibly from the industry adjacent to the treatment system. Don expressed concern over the particulates released from adjacent operations.
- Main control panels - all switches on except 'pump 1 and 2' off.
- Totalizer: Main blower = 7.550 SCFM

  Water Flow = 1,324 gpm

- Relative Humidity = 10.2 % once treated with emissions heater 49.8% effluent.
- Shutdown occurs when the blower is down, there is a power failure, or alarms are activated.
- GAC # 1 differential = 2.1 PSIG (normal accoriding to Don).
- Air Sampling Outlets are accessible.
- Light cracking in concrete pad which the OU is located.
- The water effluent sampling point is approximately 350 feet from the treatment facility.
- Well 1 is decommissioned but not obandoned; too shallow for extraction.
- The business adjacent to site emitting powdry substance:

  S - AZIZ
  Dress Grindin Co Inc
  Double Disc Inc
  11821 Vose Street
  observed many bags on pallet, one labelled Redcolite

Five-Year Review Interview Record			**Interviewee:** Stefan Cajina California Department of Health Drinking Water Field Operations	
Site Name		**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit		EPA ID# CAD980894893	7/28/03	Phone X Fax/email ☐ In person ☐
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Stefan Cajina	CA Dept. of Health Drinking Water Field Operations	(213) 580-3127		1449 West Temple Street, Suite 202, Los Angeles, CA 90026
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. **What is your overall impression of the work conducted at the site? (general sentiment)**

Response: The remedy is working as expected but pumping may be low. The main concern is outflow in terms of water quality and flow. The effluent is meeting all concentration goals. Chromium is major concern and the possibility of any unknown contaminants of concern (COCs).

2. **Are you aware of any changes in State laws and regulations that may impact protectiveness?**

Response: Hexavalent chromium – DOH can only enforce the MCL of 50ug/L for total chromium, hexavalent chromium is regulated by requiring monitoring as a COC only.
Chromium may be big issue at the site in the future, it is uncertain as to whether hexavalent chromium will be regulated. There was a deadline for an MCL for hexavalent chromium in 2004 but this appears like it will be delayed, there is not an MCL not yet in place. DOH is using all required monitoring data for hexavalent chromium to build a comprehensive database.

At nearby sites, other COCs, particularly 1,2,3 trichloropropane are an issue, this may impact the NHOU in the future.

3. **Do you feel well informed about the site's activities and progress?**

Response: Yes. Quarterly meetings are held with the Water Master and there are regular Committee Meetings.

4. Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details..

Response: The challenge will be to increase production at the NHOU which requires the installation of new extraction wells. Permit action from DOH involves Policy 97005 which is a new guidance for DOH to evaluate permits for wells with contamination or potential contamination. This is a very involved process which requires evaluating all sources & potential sources of contamination. LADWP must be able to treat all COCs identified in the process which may involve upgrading the treatment facility. The timeline for the permitting process is approximately 1-2 years.

5. Other Questions/Comments:

- **Are you aware of any exceedences influencing protectiveness?**
  No.
- **Do the reports contain all information necessary?**
  Yes, LADWP is revising the blending plan, therefore the output/format of the blending reports will change.
- **Why isn't hexavalent chromium or perchlorate tested for & reported in monthly reports?**
  The monthly reports are only evaluated in terms of VOCs. Chromium and data pertaining to other COCs is reviewed regularly separately. As results of analyses are available they are transmitted to DOH electronically. COCs are addressed in blending (new plan that will come out soon). Other COCs (i.e. hexavalent chromium, percholate, etc..) are sampled for quarterly or monthly at sources (wells) and monthly or weekly at the blending point.
- **The Source Assessment Report was recently completed, are you aware of any issues that were identified in this report?**
  This report is similar to the watermaster reports which summarize known contamination and evaluate this in terms of potential threats. Mr. Cajina has not reviewed the assessment report yet. A summary of this report is available online.
- **At the blending point concentrations of VOCs are sometimes greater than effluent concentrations, what is your comment on this?**
  The NH pumping station blends water from multiple well fields with wells in basin feeding into facility and treated surface water from LA aqueduct treatment plant. It is not unusual to see this at blending point.
- **What is your opinion on the issue of Well # 2 affected by hexavalent chromium and total chromium?**
  The LADWP decision for the standard of 20 ppb is an internal value, not an MCL (the MCL for total chromium is 50 ppb). This value is a more conservative value. There are also blending issues for nitrate; if nitrate concentrations are greater than 60% of the MCL then there cannot be blending.
- **Are there any others reports submitted?** No, only the monthly DOH reports.

- Overall there may be a long-term threat due to chromium and hexavalent chromium, this issue must be addressed.
- DOH inspects the facility periodically.

Five-Year Review Interview Record	Interviewee: Hadi Jonny Groundwater Hydrogeologist / Modeler Los Angeles Department of Water and Power

Site Name	EPA ID No.	Date of Interview	Interview Method via
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit	EPA ID# CAD980894893	07/01/2003	Phone ☐ Fax/email ☐ In person ☒

Interview Contacts	Organization	Phone	Email	Address
Hadi Jonny	LA Department of Water and Power	(213) 367-0905	Hadi.jonny@water.ladwp.com	111 North Hope Street Los Angeles, CA 90051
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. What is your overall impression of the work conducted at the site? (general sentiment)

Response:
The job is being completed well but the chromium issue needs to be addressed to save the viability of the well field. Ultimately, the goal is not to change the configuration of the plume, but to contain it by continued pumping.

2. Is the remedy functioning as expected? How well is the remedy performing?

Response:
See enhancement study report for full evaluation of plume containment and hexavalent chromium issue. (Hadi Jonny is a co-author of this report)

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?

Response:
See the enhancement study in terms of the hexavalent chromium issue. Perchlorate is not much of an issue at the OU.

4. Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.

Response:
There are monthly internal meetings regarding the entire groundwater basin where O&M issue specific to the North Hollywood OU are discussed.

5. *Do you have any comments, suggestions, or recommendations regarding the site?*

Response:
Suggestion: A backup GAC system would reduce the down-time of the system at as a whole. For example once an air quality sensor read and exceedence therefore the entire system shut-down. Additionally, the system is shut-down during GAC change-out.

The responsibility and associated financial responsibility of the hexavalent chromium contamination issue needs to be addressed promptly.

6. Other Comments regarding groundwater modeling and the Hydrogeology

-The original groundwater model was developed by Montgomery Watson under CH2M HILL supervision.
-The challenge now is recharge of the groundwater basin because output is greater than input.
-There are no problems with land subsidence because it is an unconfined aquifer
-Burbank is the location of the deepest aquifer.
-Drawdowns are monitored on a monthly basis to ensure that downward vertical gradients are not enhanced by pumping.
-Rely on data forms from field personnel in water control group to monitor drawdown.
-Blending plays a large role in the management of groundwater in the basin.
-Groundwater is served to the public at <60% of the MCL.

Five-Year Review Interview Record	**Interviewee:** Patricia Kiechler, ULARA Watermaster Administration Los Angeles Department of Water and Power

Site Name	**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit	EPA ID# CAD980894893	7/1/2003	Phone ☐ Fax/email ☐ In person ☒

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Patricia Kiechler	LA Department of Water and Power	(213) 367-0921	Patricia.kiechler@water.ladwp.com	111 North Hope Street Los Angeles, CA 90012
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. **Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details..**

Response:
No unexpected costs during the past 5 years, like cement lining to seal up leaking pipes that occurred many years ago. But there have been costs due to lost opportunities and longer than anticipated cleanup periods. There have been opportunity losses due to lost productivity that reduces maximum use of the treatment facility. There will be costs as cleanup time lengthens due to inefficiencies in pumping. There will be loss of capital expenditures if the system is inoperable in less than the planned life of the system due to lack of control over new contaminants.

2. **Are you aware of any ongoing community concerns regarding the site or its administration?**

Response:
Now there are no community concerns in terms of the OU; during the initial planning there were community concerns. There are ongoing community concerns not just pertaining to the OU, but all over the San Fernando Valley regarding chromium +6 contamination.

3. **Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?**

Response:
Not aware of any

4. Do you have any comments, suggestions, or recommendations regarding the site?
Response:
The VOC contaminants are being addressed as is the downtime in maintenance through tighter controls and better planning, but there are still major problems. In order to maximize treatment, production must be increased; and in order to preserve the entire operable unit, Chrome 6 and other emerging contaminants being recognized as hazardous to drinking water that threaten closure of the facility need to be addressed.

Five-Year Review Interview Record			**Interviewee:** Gary Mackey Contract Administrator Los Angeles Department of Water and Power	
Site Name		**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit		EPA ID# CAD980894893	7/22/2003	Phone ☒ Fax/email ☐ In person ☐
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Gary Mackey	LA Department of Water and Power	(818) 771-6009	Gary.mackey@water.ladwp.com	111 North Hope Street Los Angeles, CA 90012
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. What is your overall impression of the work conducted at the site? (general sentiment)

Response:
There is a need for a central coordinator. Management roles change frequently and often the flow of information is very delayed, overall there are too many people involved in the project and roles are not clearly defined. Gary resides in the operations group; he is responsible for: maintenance on the chlorination facility, sodium hexametaphosphate, and carbon change-out.

2. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response:

Almost daily (5-6 days per week)checks are performed of the sodium hexametaphosphate system Chlorination system maintenance is scheduled semi-annually and annually.

3. Blower maintenance was scheduled for May according to the workplan, was this performed?

Response:

Speak to Albert Gostelum (213) 367-1056 or Sergio regarding this, Gary is not responsible for this.

4. Are you aware of any reporting requirements regarding the air discharge permit?

Response:

No, confirm with Lucik.

5. Other Information / Comments:

-The last carbon change-out occurred approximately 1 year ago.
-The problem discussed by Nancy in terms of obtaining an approved vendor in a timely manner for carbon change-out is specifically the tough insurance requirements. Now, a 2-year contract is setup with the current vendor.
-The packing materials in the tower were last inspected 5 years ago under the direction of Lucik.
-Gary stated that he was not responsible for many duties that others within LADWP directed me to him regarding. He provided contacts which may be able to assist.
Contacts:
Jim Higam and Russ Knox, run Maxima – the maintenance database (213) 367-1164
George Pince, Instrument Technician (818) 772-6015
Chris Troutman, Mechanic, Maintenance (818) 771-6023
Dan Ulin, Electrician Supervisor (818) 771-6030
Jim Yanotta, day-to-day Operations Manager (213) 367-1001

Five-Year Review Interview Record	**Interviewee:** Mr. Mark Mackowski Assistant to the Water Master Upper Los Angeles River Area

Site Name	**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit	EPA ID# CAD980894893	8/4/03	Phone X Fax/email ☐ In person ☐

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Mark Mackowski	Assistant Water Master - ULARA	213-367-0896		Los Angeles, CA
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. **What is your overall impression of the work conducted at the site? (general sentiment)**

Response: Favorable, however the production should be increased.

2. **Is the remedy functioning as expected? How well is the remedy performing?**

Response: Migration is controlled; however expected production is 2,000 gpm - yet actual production is 1,200 - 1,600 gpm.

3. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?**

Response: Not knowledgeable about monitoring data. Hexavalent chromium could adversely impact operation as continued pumping of the upper unit may increase migration towards NHOU. In general, water levels are declining all over the basin.

4. **Are you aware of any changes in laws and regulations that may impact protectiveness?**

Response: DHS should set MCL for hexavalent chromium. If it is substantially low, the operation (of the NHOU) may be impacted. There is currently no MCL for perchlorate and there have been a few wells upgradient of the NHOU with low-level detections. Likewise, if a low MCL is set then system operation could be affected. The NHOU is not capable of treating the hexavalent chromium nor perchlorate.
State Regulation 97.005 (DOH) was recently created which states that when proposing a new

production well, a comprehensive study of sources and potential sources of contamination must be performed in areas of known or suspected contaminants. This must be considered when planning additional wells. The process is very extensive.

5. Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details..

Response: Occasions of shut-down; not too familiar with specifics.

6. Do you feel well informed about the site's activities and progress?

Response: Yes, there are regular meetings held (Annual Reporting and a Quarterly Administration meeting).

7. Are you aware of any ongoing community concerns regarding the site or its administration?

Response: No

8. Are you aware of any institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed or unusual activities at the site? - in terms of ULARA water rights

Response: There are no plans to change water rights.

9. Do you have any comments, suggestions, or recommendations regarding the site?

Response: Increase production capacity. This must start now due to the extensive permitting process. Overall pleased with plume containment. I would like to see increased enforcement of hexavalent chromium sources to stop additional contamination and ultimately improve planning of future wells.

10. Other Questions:

Did the "Watermaster special report concerning the history and occurrence of hexavalent chromium contamination in the SFV and related watermaster conclusions and recommendations" January 2003 identify any potential sources other than the Allied Signal upgradient or in the vicinity of the NHOU?

Response: There are other potential sites in the area. It is possible that in the future other sites will be issued Cleanup & Abatement Orders.

NHOU and associated NH pumping field wells are sampled for full Title 22 analyses every 3 years, yet the results were not presented in the pumping and spreading plan. Do you have access to these results? Are there any other COCs present that have not been mentioned?

Response: Pumping & Spreading Plan - Appendix A Pg. 9 = TCE and PCE, concentrations.
Entire Title 22 studies are provided by LADWP in Quarterly Reports to the EPA. DHS also receives all required water quality results, and probably posts them on their database.

Five-Year Review Interview Record				Interviewee: Lucik Melikian Process Research Engineering / Water Quality Los Angeles Department of Water and Power
Site Name		**EPA ID No.**		**Date of Interview** / **Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit		EPA ID# CAD980894893		7/1/2003 — Phone ☐ Fax/email ☐ In person ☒
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Lucik Melikian	LA Department of Water and Power	(213) 367-3195	Lucik.melikian@water.ladwp.com	111 North Hope Street Los Angeles, CA 90012
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. What is your overall impression of the work conducted at the site? (general sentiment)

Response:
The QAPP is comprehensive and is followed in terms of water quality monitoring for water supply wells and treated water as well as GAC filters effluent.

2. Is the remedy functioning as expected? How well is the remedy performing?

Response:
Currently the maximum groundwater extracted is 1,300 gpm; the system is designed to treat 2,000 gpm. The system is functioning better than expected and operating above design specifications (higher air to water ratio) with over 99% VOC removal efficiency.

3. Have there been unexpected difficulties or costs at the site in the last five years? If so, please give details..

Response:
As QA Manger for the Project I was not involved or aware of any operational costs or difficulties. A copy of the QAPP Rev No 4, describing responsibilities was submitted.
There was one air quality exceedence 3/7/2003 due to heater maintenance. The system was not shut-down during maintenance therefore the discharge during this time exceeded limits.

There was another air quality exceedence in 1999 which appears to be related to erroneous data. There are 3 sampling ports and if there was a 'typical' exceedence' you would expect a gradual increase in numbers (i.e. sampling port 1 (lower) >2 (medium), 2<3 (upper)). This trend is not evident therefore

erroneous data is suspected.

4. Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.

Response:

Yes

DWP applied to DHS to decrease the VOC monitoring frequency at wellheads from monthly to quarterly because the treatment system is proven to be effective. At the historical high contaminant levels, the product water VOC levels were consistently well below 60% of the MCL. DHS approved this recommendation.

Since no EDB/DBCP were detected in the aeration tower influent and effluent water and any of the water supply wells during the last three years, quarterly monitoring. DWP has applied for a reduction of monitoring frequency for EDB/DBCP. Reduced monitoring frequency for some other constituents is being evaluated. Overall these improvements will decrease costs while maintaining public health safety and protection.

5. Do you have any comments, suggestions, or recommendations regarding the site?

Response:

-The Water quality QA Program was fully implemented and all the generated data are in compliance with the procedures described in the QAPP. Relative percent difference (%RPD) for VOCs duplicate analysis results were always much lower than 20% (Precision acceptance limit). A copy of WQLab QC data for NHOU samples analyzed during 2002 was submitted.
-Since 1999 I have not been involved in the Air Quality monitoring at the facility. The Environmental Lab as instructed by the Treatment Operations Group collects the air samples. I (Lucik) would review the copies of any analytical report provided to her. She would notify the Operations when shutdown is needed or GAC adsorption capacity is exhausted and carbon change-out is required.
Q: Do you know if there are any reporting requirements to AQMD?
A: Not aware of any, but to my knowledge Treatment Operations Group (Gary Macke) was contacted by AQMD for several occasions.
Recommendations:
-To ensure efficient performance of the GAC filters influent air humidity should be maintained at 40-50% Relative Humidity and the facility should never be operated when the emissions control heater is not functioning.
-The quality of GAC placed in the scrubber filters should be evaluated to make sure the product delivered meets the specifications criteria indicated in the service contract.

Five-Year Review Interview Record		**Interviewee:** Nancy Wigner, P. E. Operations and Maintenance Manger – North Hollywood Operable Unit Los Angeles Department of Water and Power		
Site Name		**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit		EPA ID# CAD980894893	7/1/2003	Phone ☐ Fax/email ☐ In person ☒
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Nancy Wigner	LA Department of Water and Power	(213) 367-1151	Nancy.wigner@ladwp.com	111 North Hope Street Los Angeles, CA 90012
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. What is your overall impression of the work conducted at the site? (general sentiment)

Response:
Excellent

2. Is the remedy functioning as expected? How well is the remedy performing?

Response:
In the last 2 years (since Nancy began working on the project) the remedy is performing well.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?

Response:
Additional COCs such as chromium and perchlorate are a concern. In particular, chromium concentrations have caused the shut-down of pumping from well #2.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response:
There is a daily inspection of the treatment system performed by operations staff to ensure the system is functioning. In terms of the well fields, inspections are performed daily, every-other-day, or as needed.

5. Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details..

Response:

Obtaining change-out GAC for the facility was a challenge when Nancy initially was assigned to the project due to the purchasing / requisition process in place at LADWP. This caused extended shut-down of the system. Nancy organized a 3-year contract for GAC vendors to ensure that the delay would not happen again, providing the contract is renewed every 3 years.

Also during the last 5 years a valve needed replacing. The ordering and requisition process took a very long time causing extended (months) downtime of the treatment system. Normally during this replacement process the actuator and valve are replaced. The actuator was not replaced during the valve replacement, therefore Nancy ordered another the part and it is stored onsite and is scheduled to be replaced during the 03/04 plan year. Additionally, change-out is now planned for 15-20 years and will reevaluated as equipment reliability changes; whereas the usual life-expectancy of the part is approximately 50 years.

6. Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.

Response:

Yes. Maintenance is scheduled when the unit is still running if possible; if shut-down is necessary multiple maintenance items are scheduled. This approach was incorporated into the 2003-2004 Work Plan. Additionally, all maintenance scheduled is entered into the MAXIMA database for optimization.

7. Are you aware of any ongoing community concerns regarding the site or its administration?

Response:

No

8. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?

Response:

Occasional vandalism and dumping of trash and unwanted furniture and fixtures at the well locations but nothing out of the ordinary given the location of the wells (within transmission right-of-ways and vacant lots). The treatment system and tower are very secure with triple fencing, there are no known events that have occurred at this site. Once, an inner gate was found open and the system was shut-down while the investigation occurred; there were no obstructions or violations discovered.

9. Do you have any comments, suggestions, or recommendations regarding the site?
Response:
There is a lot of paperwork associated with the site; the quarterly reports – planning and progress seem redundant. Additionally, the monthly reports to DHS are now included in the EPA quarterly reports; however EPA would still like the reports submitted quarterly and monthly (EPA receives the monthly report in 2 forms).
The chromium contamination is a major issue for LADWP, would like to see more response from the EPA regarding chromium.

There have been many improvements made to the management of the treatment system recently including quick response time to maintenance issues, and increased communication of the purpose of the treatment system so that the site is no longer managed in terms of production potential.

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10. Other Questions and Comments:

Q. Where is the flow data coming from if the flow meters are broken at wells 6 and 8 (and possibly well #4)?
A. It is probably estimated

Q. Is the totalizer at the tower a 'collective' totalizer or is it possible to obtain information for each well?
A. The totalizer measures total flow, it is not possible to obtain flow information for each well from the totalizer at the tower.

Q. What is the status of the control/starter replacement?
A. Two were replaced last fiscal year (ending in June) and the remaining five are scheduled for this year.

Q. Responsibility clarification (see preventative maintenance table in Work Plan)
A: Aeration wells – Operators; Aeration wells – overhaul flowmeters – Mechanics; Aeration Tower – Gary Macke and Water treatment Operators; North Hollywood Sump – Reservoir Maintenance.

Five-Year Review Interview Record	**Interviewee:** Gloria Williams Water Quality Engineer (produces monthly DHS reports) Los Angeles Department of Water and Power

Site Name	**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit	EPA ID# CAD980894893	7/1/2003	Phone ☐ Fax/email ☐ In person ☒

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Gloria Williams	LA Department of Water and Power	(213) 367-3277	Gloria.williams@water.ladwp.com	111 North Hope Street Los Angeles, CA 90012
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. **What is your overall impression of the work conducted at the site? (general sentiment)**

Response:
There are no contaminant exceedences once the water is blended and if there are exceedences the system is shut-down; therefore overall the system is protective. Monitoring is effective to ensure protection and blending is crucial to reduce concentrations.

2. **What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?**

Response:
Nitrate and hexavalent chromium concentrations are the major concern; perchlorate may be an issue in the future.

3. **Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

Response:
In terms of Gloria's role, there is monthly influent/effluent sampling at the tower. At the blendpoint samples are obtained daily.

4. *Do you have any comments, suggestions, or recommendations regarding the site?*

Response:
There does not appear to be one central manager for the entire OU, which causes decreased communications and increased efforts.
To maintain the operation of the well field the potential for other contaminants to be present should be evaluated since this is an industrial area. A source water assessment for each well head is currently being performed.

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5. Other Comments
-Gloria is responsible for producing monthly DHS reports, and coordinating data for the monthly reports. Gloria uses the water treatment logs but the original logs are generated by Water Treatment Operators who visit the facility.
-Nitrate and hexavalent chromium exceedences are the primary issue; however the concentration of these contaminants are 60% of the MCL at the blendpoint.
-Full Title 22 analyses is performed once every 3 years (VOCs, Perchlorate and some others are analyzed once a year.)

Five-Year Review Interview Record		**Interviewee:** Sergio Veloz Well Fields Engineer Los Angeles Department of Water and Power		
Site Name		**EPA ID No.**	**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit		EPA ID# CAD980894893	7/1/2003	Phone ☐ Fax/email ☐ In person ☒
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Sergio Veloz	LA Department of Water and Power	(213) 367-1278	Sergio.veloz@water.ladwp.com	111 North hope Street Los Angeles, CA 90012
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612

Interview Questions (Please address period since the last 5-year review in 1998)

1. **What is your overall impression of the work conducted at the site? (general sentiment) Is the remedy functioning as expected? How well is the remedy performing?**

Response:
There is very low flow from well #5, this should be evaluated in the future. In general, the wells are low producers.
The maintenance group and the engineering support group do their best to keep the wells and aeration facility in service. Down time for out of service equipment is considerably short. We try to address problems and get the equipment back in service as soon as possible. The wells are not designed to pump large quantities of water, but they are important for water quality control.

2. **Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

Response:
When a failure or major problem is reported by the operators, the engineering support group performs field tests to decide the next course of action. The operators visit the well field on a regular basis.

3. **Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details..**

Response:
Well controls are old and obsolete, but we are in the process of replacing them. Pumping units usually have a lifetime of 2-3 years.
Well #6 was out of service during August 2002 and the pump was replaced (usually pumps have a lifetime of 2-3 years).

4. Have O&M and/or sampling efforts been optimized? If yes, please describe changes and resultant or desired cost savings or improved efficiency.

Response:

This well field is a high priority and repairs are performed as quickly as possible.
There is some room for improvement, i.e. the broken flow meters at wells #6 & 8, overall LADWP is doing a good job.

5. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?

Response:

Not aware of any vandalism. Well controls and any other monitoring equipment are protected to prevent vandalism.

6. Do you have any comments, suggestions, or recommendations regarding the site?

Response:

From a production standpoint, a well that produces more water would be an improvement. 1,300 gpm for the entire system is not much production. Improvements can be made in terms of priority to maintenance issues. Our goal is to keep the facility in service 100 % of the time.

7. Other Comments

-Operators report problems to the area supervisors.
-Engineering support group approves work orders which are submitted by area supervisors.
-David Castillo is the area supervisor for the aeration facility.
-Monthly reports of down-time are produced by the engineering support group.
-Out of service equipment reports are produced by-weekly by the engineering support group.

Five-Year Review Interview Record				**Interviewee:** Ernest Wong, P. E. Formerly (as of July 2002) an active participant in the North Hollywood OU. Los Angeles Department of Water and Power	
Site Name		**EPA ID No.**		**Date of Interview**	**Interview Method via**
San Fernando Valley (Area 1) Superfund Site – North Hollywood Operable Unit		EPA ID# CAD980894893		6/30/2003	Phone ☐ Fax/email ☐ In person ☒
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**	
Ernest Wong	LA Department of Water and Power	(213) 367-0847	Ernest.wong@water.ladwp.com	111 North Hope Street, Room 1450 Los Angeles, CA 90051	
Tina Girard	CH2M HILL / SFO, as rep of EPA	(510) 587-7586	tgirard@ch2m.com	155 Grand Ave, Suite 1000 Oakland, CA 94612	

Interview Questions (Please address period since the last 5-year review in 1998)

1. **What is your overall impression of the work conducted at the site? (general sentiment) Is the remedy functioning as expected? How well is the remedy performing?**

The NHOU has been in operation since 1989 and was undergoing construction of the extraction wells and well collector line and design of the groundwater treatment facility when the EPA and LADWP entered into a Cooperative Agreement to provide federal funding for the project in 1986.

The groundwater treatment facility has been effective in removing TCE and other VOCs from the groundwater, but the extraction wells generally do not provide sufficient flow to meet the 2,000-gpm capacity of the groundwater treatment facility. The current extractions have been effective in containing down gradient VOC contaminant migration in the San Fernando Basin (SFB).

However, additional extraction wells would restore extraction capacity to maximize the use of the treatment facility, address upgradient migration of VOC contamination, and provide reserve capacity to compensate for extraction wells that can be lost from service due to mechanical problems or water quality problems that are not addressed by the treatment facility. Occasionally there are mechanical problems with the system.

2. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? How has the discovery of additional COCs impacted the effectiveness of the remedy?

Response:

Monitoring data shows that the capture zone is maintaining VOC containment in the SFB and that the VOC levels are persisting.

The recent increase in chromium and hexavalent chromium that has been discovered in the most upgradient extraction well (Well No. 2) has resulted in its periodic removal from service and has impacted the effectiveness of the upgradient containment of VOCs in the SFB that poses a threat to some of LADWP's production wells. Investigation has revealed a source site (Home Depot, formerly Allied-Signal) located approximately 1,300 feet upgradient of Well No. 2 with levels of chromium and hexavalent chromium at approximately 4,000 ug/l, each.

The source site poses a threat to the entire NHOU in the long term. The resolution of the source site is necessary to restore and enhance the effectiveness of the extractions of the remedy.

When pumping is halted from well #2, the VOC plume appears to have migrated westward.

3. Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details..

Response:

A few years ago, there was construction at the North Hollywood Forebay where the NHOU treated supply is blended with other water supplies and enters into LADWP's distribution system. During construction, the NHOU operation was suspended.

(NOTE: This construction may have taken place more than five years ago.)

4. Are you aware of any ongoing community concerns regarding the site or its administration?

Response:

Only during the original planning stages were there community concerns.

5. Do you have any comments, suggestions, or recommendations regarding the site?

Response:

Suggest coordinating repairs to the blending sump with the routine O&M at the tower (treatment system) to decrease down-time.

The inability to reach 2,000 gpm has not impeded capture of contaminated groundwater; except the north-west end of the well string where the well fields (production wells) have influenced capture.

Chromium and its source is the major concern at this OU. Containment was effective until chromium concentrations caused shut-down at well #2.

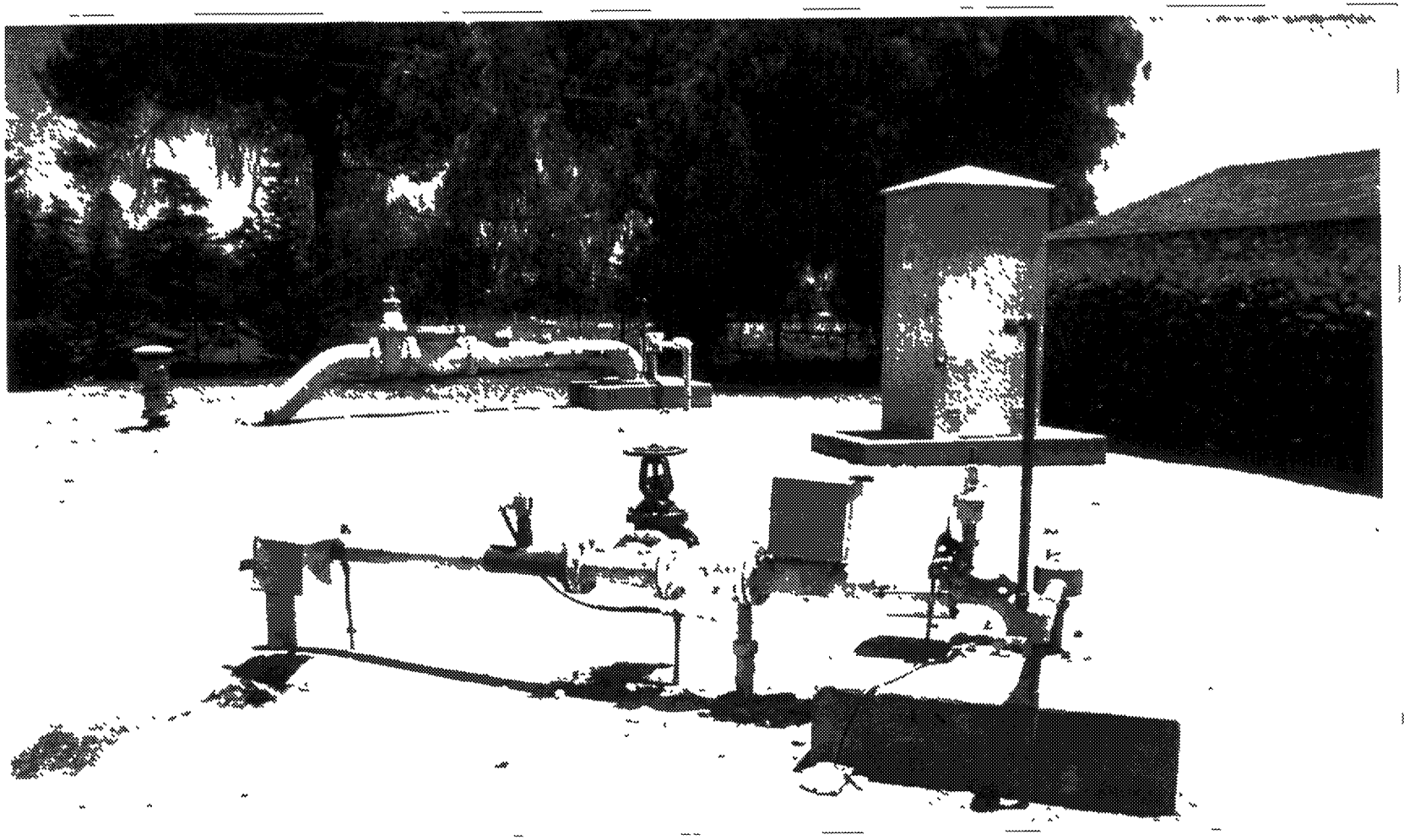
There is a need to implement the recommendation of the enhancement study, however funds for this OU are running out and money is required to address the issue in the long-term.

6. Other Questions or Comments:

Q: Is the production well adjacent to extraction (aeration) well #8 still in use?
A: No, this well is classified as inactive.

Q: Do you foresee any mechanical issues related to the treatment system in the near future due to the age of the system (15 years old)?
A: No, the NHOU undergoes a preventative maintenance program that should address the mechanical issues.

Appendix C
Site Inspection Photographs



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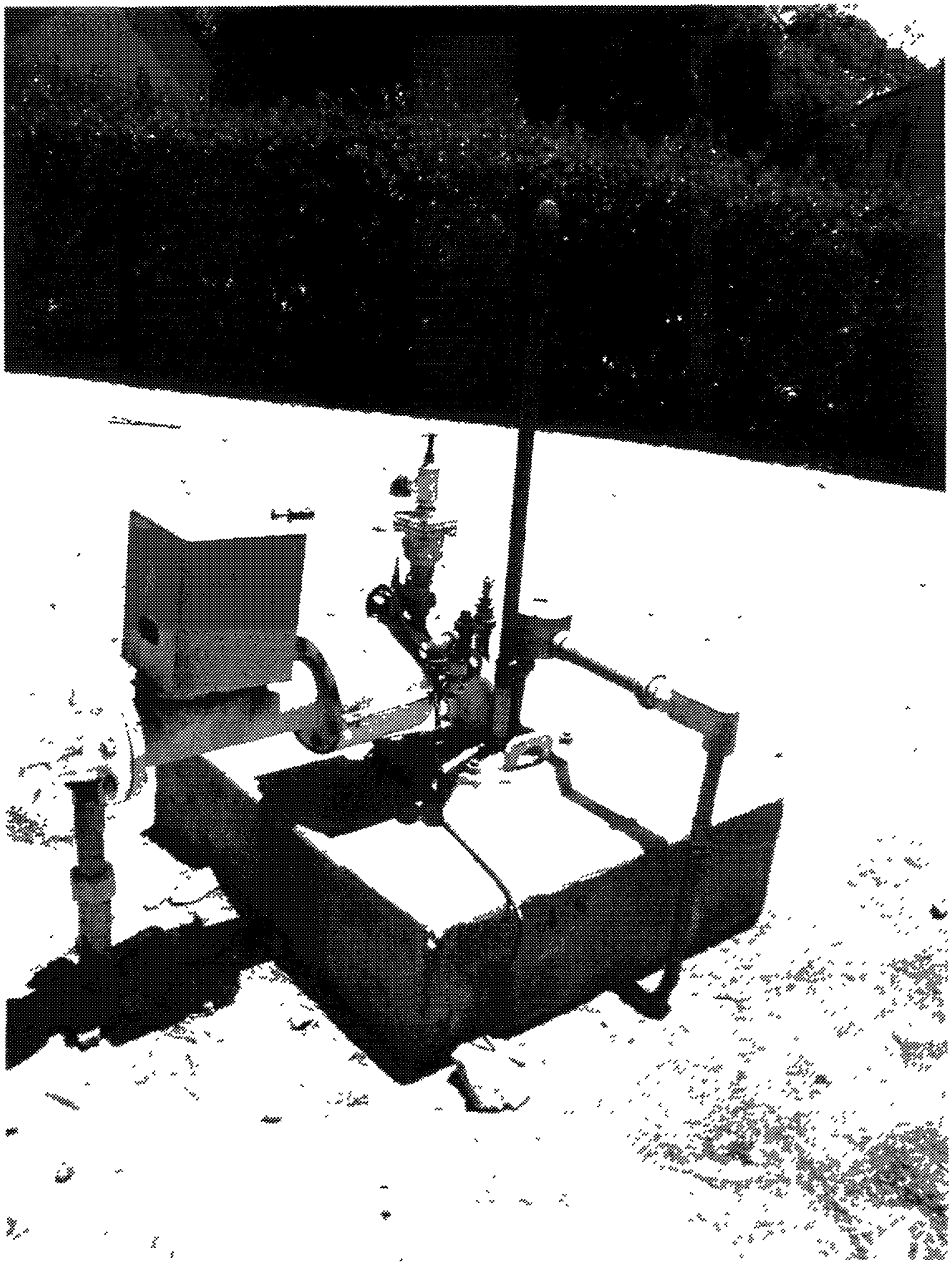

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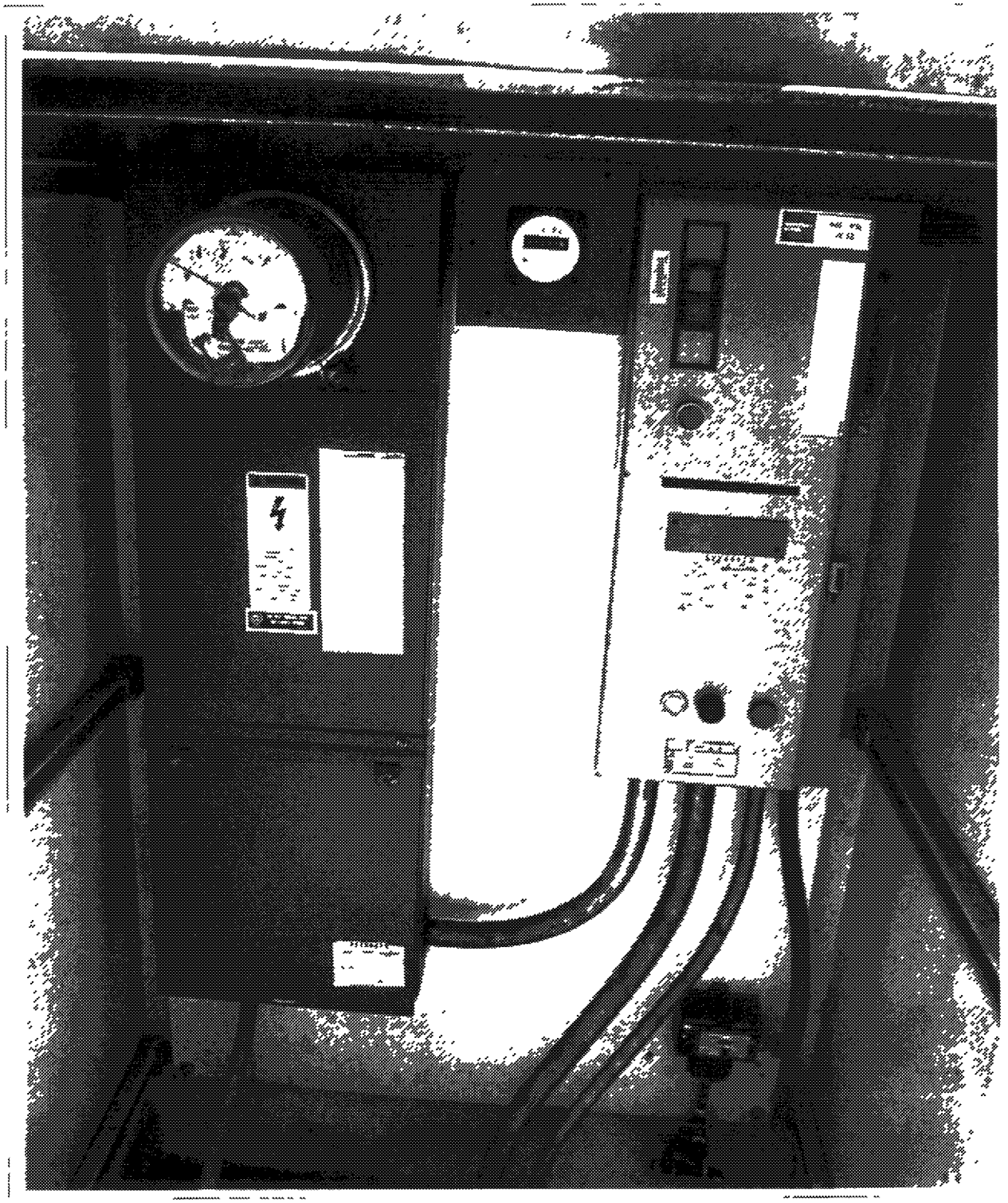

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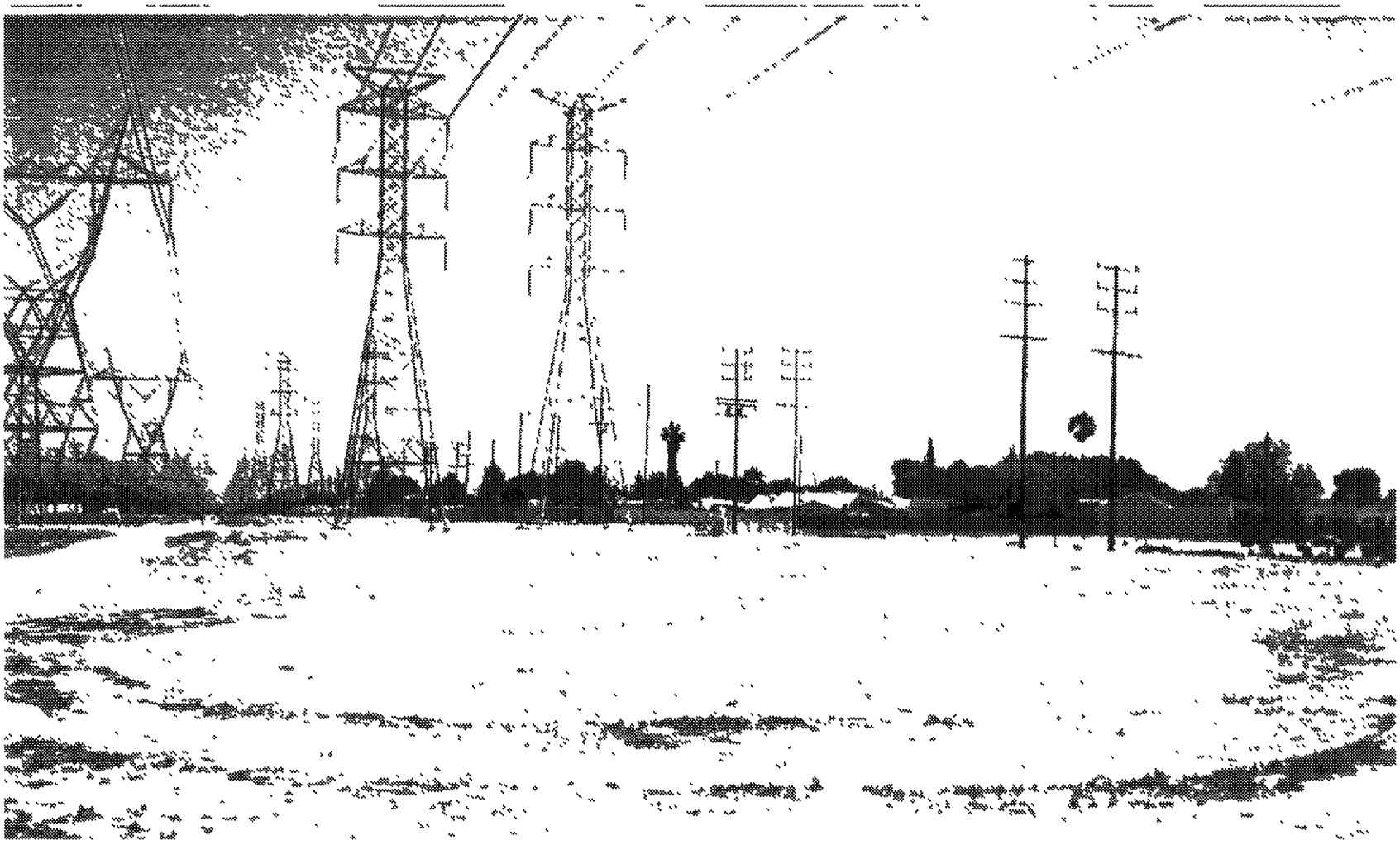

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