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GLENDALE NORTH OPERABLE UNIT

RECORD OF DECISION

PART I: DECLARATION

PART II: DECISION SUMMARY

PART III: RESPONSIVENESS SUMMARY

SAN FERNANDO VALLEY AREA 2 SUPERFUND SITE

LOS ANGELES COUNTY, CALIFORNIA

United States Environmental Protection Agency
Region 9 - San Francisco, California

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RECORD OF DECISION

GLENDALE NORTH OPERABLE UNIT INTERIM REMEDY

PART I. DECLARATION

SITE NAME AND LOCATION

San Fernando Valley Area 2
Glendale North Operable Unit
Los Angeles County, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Glendale North Operable Unit, San Fernando Valley Area 2 Superfund site, chosen in accordance with CERCLA as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the Administrative Record for this operable unit.

In a letter to EPA dated March 29, 1993, the State of California agreed with the selected remedy for the Glendale North OU.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare or the environment.

DESCRIPTION OF THE REMEDY

EPA has selected an interim remedy for the North plume of groundwater contamination in the Glendale Study Area. This interim remedy is referred to as the Glendale North Operable Unit (OU). An OU is a discrete action that comprises an incremental step toward comprehensively addressing Superfund site problems. The remedy and all of the alternatives presented in the feasibility study were developed to meet the following specific cleanup objectives for the Glendale North OU:

- To inhibit vertical and horizontal migration of groundwater contamination in the North Plume of the Glendale Study Area; and

- To begin to remove contaminant mass from the upper zone of the aquifer in the North Plume of the Glendale Study Area.

The remedy involves groundwater extraction and treatment for the shallow aquifer system in the Glendale area of the San Fernando Valley. Under this remedy, contaminated groundwater would be extracted at a rate of 3,000 gallons per minute (gpm) for 12 years from new wells to be installed in the Glendale Study Area. The extracted contaminated groundwater will be filtered to remove any suspended solids, if necessary, and then treated by air stripping (single or dual-stage) and/or liquid phase granular activated carbon (GAC) to remove volatile organic compounds (VOCs). After treatment, the water shall meet drinking water standards (maximum contaminant levels or MCLs) for VOCs. If air stripping treatment is selected, air emissions will be treated using vapor phase GAC to ensure that all air emissions meet applicable or relevant and appropriate requirements. The exact number, location and other design specifics of these new extraction wells and air stripping/liquid phase GAC units will be determined during the remedial design phase of the project. After treatment to remove VOCs, to meet the nitrate MCL, the water will be blended with an alternative water of a quality such that the resulting water treated, blended water will meet all drinking water MCLs. All or part of the extracted treated water will then be conveyed to the City of Glendale or another San Fernando Valley water purveyor for distribution through its public water supply system.

As a result of comments by the City of Glendale on the Glendale North OU Proposed Plan (July 1992) and Glendale South OU Proposed Plan (September 1992) which indicated that the City had sufficient water credits to accept the treated water from both the Glendale North and Glendale South OUs, and in order to decrease overall costs associated with the OUs, EPA has determined that the treatment plants for the Glendale North and Glendale South OUs will be combined. The total 5,000 gpm of treated water will be conveyed to the City of Glendale for distribution to its public water supply system. The exact configuration of the combined treatment plant will be determined during the remedial design phase of the project. The Glendale South OU Record of Decision will also reflect this decision to combine the treatment plants.

However, if the City of Glendale does not agree to accept the treated water from both OUs or if EPA determines that combining the treatment plants will significantly delay or hinder the implementation of the Glendale North OU, the treatment plants will not be combined. Furthermore, if the City of Glendale does not accept any or all of the treated water (possibly due to water supply needs), any remaining portion of the water will be 1) offered to another San Fernando Valley water purveyor or 2) reinjected into the aquifer.

The total duration of the Glendale North OU interim remedy will be 12 years. EPA will determine the need for and scope of any further actions every five years throughout this interim remedy period and again at the conclusion of this period.

The remedial action for the Glendale North OU represents a discrete element in the overall long-term remediation of groundwater in the eastern portion of the San Fernando Valley. The objectives of this interim action; inhibition of migration and restoration of groundwater quality to meet drinking water standards for VOCs to the extent practicable, would not be inconsistent with nor preclude implementation of any final, overall remedial action or actions selected by EPA in the future for the San Fernando Valley Areas 1, 2, 3 and 4.

EPA is the lead agency for this project and the Department of Toxic Substances Control of the State of California Environmental Protection Agency Department of Toxic Substances Control (DTSC) is the support agency.

DECLARATION

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements directly associated with this action and is cost effective. This action utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, given the limited scope of the action. Because this action does not constitute the final remedy for the site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed at the time of the final response action. Subsequent actions are planned to fully address the principal threats at these sites.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, EPA shall conduct a review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, at least once every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

John C. Wise

John C. Wise
Acting Regional Administrator

6.18.93

Date

PART II. DECISION SUMMARY

This Decision Summary provides an overview of the Glendale North OU interim remedy, including the nature and extent of contamination to be addressed, a description of the remedial alternatives, the comparative analysis of the remedial alternatives, a description of the selected remedy and the rationale for remedy selection

1.0 SITE LOCATION AND DESCRIPTION

The Glendale Study Area is located within the San Fernando Basin. The following sections present a basin description, regulatory history, and a summary of the Remedial Investigation and Feasibility Study (RI/FS) activities within the San Fernando Valley and the Glendale Study Area.

1.1 Description of the San Fernando Basin

The San Fernando Basin is located within the Upper Los Angeles River Area (ULARA), which consists of the entire watershed of the Los Angeles River and its various tributaries. The San Fernando Basin covers approximately 122,800 acres and comprises 91.2 percent of the ULARA alluvial fill. It is bounded on the north and northwest by the Santa Susana Mountains, on the northeast by the San Gabriel Mountains, on the west by the Simi Hills, and on the south by the Santa Monica Mountains.

The San Fernando Basin is a significant source of drinking water, with an estimated total volume of 3 million acre-feet of groundwater stored in aquifers within the alluvial fill of the basin. The groundwater of the San Fernando Basin has been used as a source of drinking water for more than 800,000 residents within the cities of Los Angeles, Burbank, Glendale, and San Fernando. Groundwater extractions within the San Fernando Basin typically provide 15 percent of Los Angeles' annual average water supply and historically have accounted for between 50 and 100 percent of the water needs of the other cities.

1.2 Description and Background of the Glendale Study Area

The Glendale Study Area is in the vicinity of the Crystal Springs National Priorities List (NPL) Site, one of the four San Fernando Valley Superfund NPL sites, and is adjacent to the Los Angeles River (Figure 1). The Glendale Study Area includes two portions of the aquifer where high concentrations of contaminants have been identified: the North Plume and the South Plume (Figure 2). Although contamination has been detected throughout the Glendale Study Area in an apparently contiguous plume, differences exist between the North Plume and South Plume, including the types of contaminants detected and the concentrations of the

SAN FERNANDO VALLEY SUPERFUND SITE

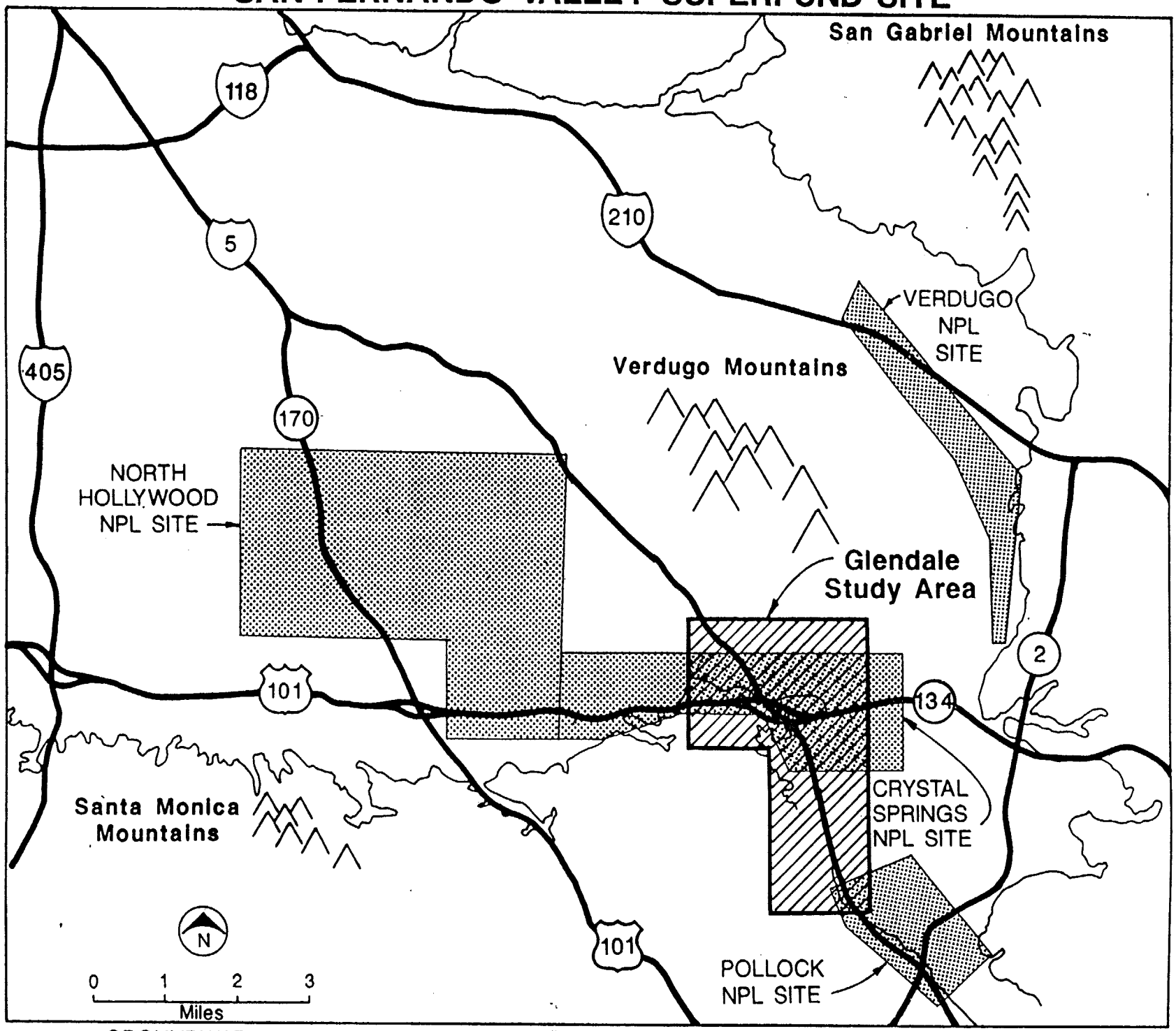


FIGURE 1

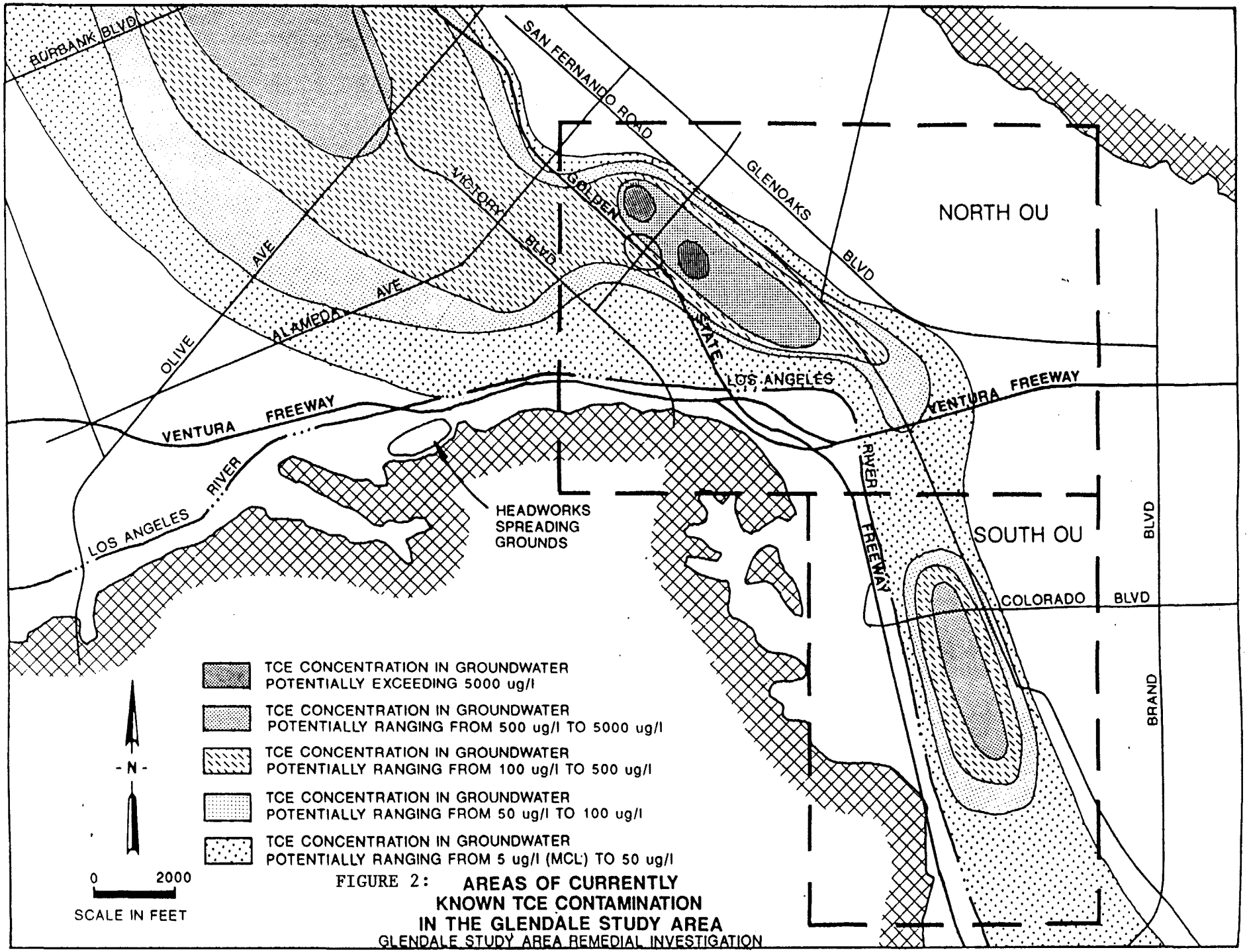


FIGURE 2: **AREAS OF CURRENTLY KNOWN TCE CONTAMINATION IN THE GLENDALE STUDY AREA**

GLENDALE STUDY AREA REMEDIAL INVESTIGATION

contaminants. The Glendale North and South Plumes are separated by an area of lower-level groundwater contamination. The Glendale North OU includes the North Plume of VOC contamination and adjacent areas where contamination is known or believed to have migrated.

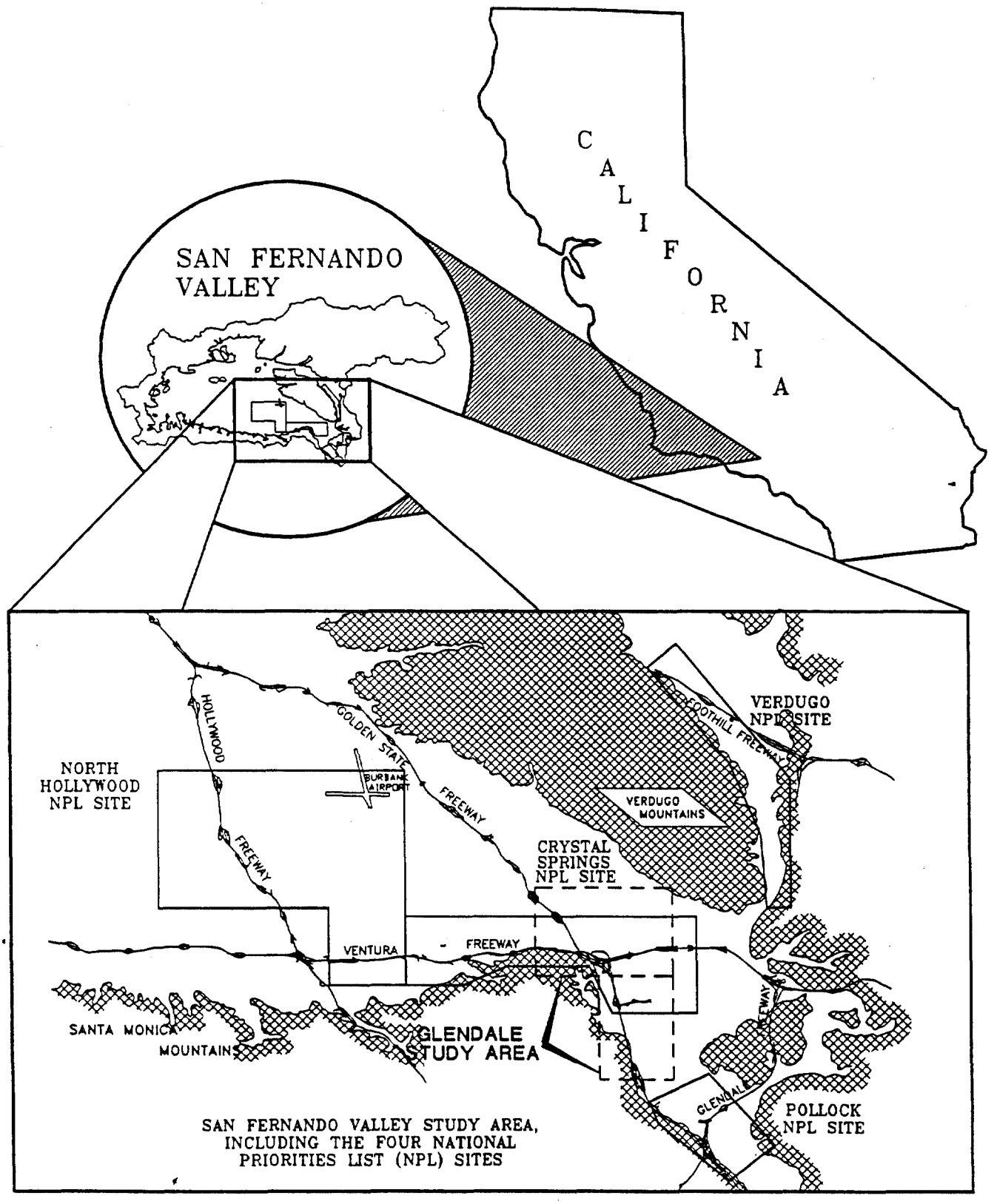
In 1990, an analysis was performed to evaluate the need for an OU within the Crystal Springs NPL site (CH2M Hill, 1990). This analysis included a qualitative comparison based on known groundwater contamination, potential downgradient impacts and water supply. This analysis concluded that there was a need for an OU within the Crystal Springs NPL site because: 1) high concentrations of TCE and PCE were present in groundwater, 2) the critical loss of groundwater production in the Glendale area and 3) the potential for contaminating groundwater downgradient from the Crystal Springs NPL site. Additional data collection was recommended to more adequately characterize the horizontal and vertical distribution of contamination in the aquifer, and also to improve the definition of the hydrogeology of the area.

EPA conducted a remedial investigation (RI) that characterized the nature and extent of contamination in the Glendale Study Area. Upon completion of the Remedial Investigation Report for the Glendale Study Area (January 1992), a feasibility study (FS) was undertaken for the Glendale North OU which evaluated a range of cleanup alternatives for addressing the contaminated groundwater. The FS report entitled Feasibility Study for the Glendale Study Area North Plume Operable Unit was completed in April 1992.

2.0 SITE HISTORY

In 1980, after finding organic chemical contamination in the groundwater of the San Gabriel Valley, the California Department of Health Services (DHS) requested that all major water purveyors in the San Fernando Valley using groundwater conduct tests for the presence of certain industrial chemicals in the water they were serving. The results of initial tests and of subsequent testing revealed the presence of volatile organic compound (VOC) contamination in the groundwater of the San Fernando Valley. These findings resulted in a number of municipal supply wells for the cities of Los Angeles, Burbank, and Glendale being taken out of service. The primary contaminants of concern were and are the solvents trichloroethylene (TCE) and perchloroethylene (PCE), widely used in a variety of industries including metal plating, machinery degreasing and dry cleaning.

In 1984, EPA proposed four sites within the San Fernando Valley for inclusion on the NPL and in 1986 the sites were added to the list (Figure 3). Each site boundary encompasses an area in which production wells produced groundwater containing concentrations of TCE and PCE above State and Federal standards in 1984. The four NPL sites in the San Fernando Valley are the North



GLENDALE STUDY AREA

FIGURE 3
SITE LOCATION MAP

Hollywood, Crystal Springs, Verdugo, and Pollock sites, also referred to as San Fernando Valley Areas 1, 2, 3, and 4, respectively. EPA is managing the four sites as one large site. The San Fernando Valley Study Area includes the four sites as listed on the NPL and adjacent areas where contamination has or may have migrated. A basinwide groundwater RI report for the San Fernando Valley Study Area was completed in December 1992. Groundwater wells installed by EPA as part of the basinwide groundwater RI are routinely sampled to continue to monitor the nature and extent of the groundwater contamination in the San Fernando Valley.

EPA has previously signed Record of Decision (ROD) documents for two OUs in the San Fernando Valley: the North Hollywood OU (1987) and the Burbank OU (1989). The North Hollywood OU interim remedy is currently operating and the Burbank OU is in the remedial design phase. In the Glendale Study Area, EPA has identified two OUs: the Glendale North Plume OU and the Glendale South Plume OU. In addition, EPA has recently initiated an RI/FS for an OU in the Pollock area of the San Fernando Valley. All of these OUs represent interim cleanups currently in progress throughout the eastern portion of the San Fernando Valley. All remedial actions established by EPA thus far in the Record of Decision for each OU have been interim measures. EPA has not yet selected a final remedy for the entire San Fernando Valley.

TCE and PCE have been detected in the majority of the City of Glendale's wells at levels that are above the Federal Maximum Contaminant Level (MCL), which is 5 parts per billion (ppb) for each of these VOCs. The State of California MCL is also 5 ppb for both TCE and PCE. Other VOC contaminants have been detected above State and/or Federal MCLs in the Glendale area. As a result of the groundwater contamination, the majority of the City of Glendale's wells have been taken out of service. The most prevalent contaminants are TCE and PCE. In 1992, the highest concentrations of TCE and PCE detected in EPA monitoring wells in the San Fernando Valley were 7100 ppb and 160 ppb, respectively. Groundwater samples from wells installed at industrial facilities in the San Fernando Valley near potential sources of contamination have shown concentrations greater than 30,000 ppb for TCE and over 15,000 ppb for PCE. The maximum of 30,000 ppb for TCE was detected in a facility well located in the north plume portion of the Glendale Study Area.

Nitrate, an inorganic contaminant, has been detected consistently at levels in excess of the MCL (45 mg/l as nitrate or 10 mg/l nitrate as nitrogen) in the groundwater of the Glendale Study Area. The nitrate contamination is likely to be the result of past agricultural practices and/or septic systems in the San Fernando Valley.

It should be noted that the City of Glendale closely monitors the quality of drinking water delivered to residents. The water the City serves to its residents must meet all Federal and State drinking water requirements. Currently, nearly all of the water delivered by the City of Glendale is purchased from the Metropolitan Water District (MWD) of Southern California. The City uses a limited amount of groundwater from a small percentage of its nine production wells in the San Fernando Valley. If the levels of VOCs and other contaminants detected in the groundwater of production wells are equal to or less than 10 times MCLs, the State of California Department of Health Services, Office of Drinking Water permits the City to extract the water, blend it with MWD water to meet all drinking water standards, and convey the extracted, blended water to its public distribution system.

As described briefly in Section 1 above, the Glendale Study Area includes two portions of the aquifer where high concentrations of contaminants have been identified: the north plume and the south plume. A remedial investigation (RI) that characterized the nature and extent of contamination in the Glendale Study Area was completed in (January 1992). The Glendale Study Area RI included a characterization of the nature and extent of contamination, baseline risk assessments, and other RI data for both the north and south plumes. However, separate FS reports evaluating a range of cleanup alternatives for the contaminated groundwater were prepared for each plume. The Glendale North OU FS report and subsequent Proposed Plan were finalized in April 1992 and July 1992, respectively. The Glendale South OU FS report was completed in August 1992 and the Proposed Plan was completed in September 1992.

EPA's preferred alternatives as described in the Proposed Plans were: extraction of 3000 gallons per minute (gpm) of contaminated groundwater for Glendale North and 2000 gpm for Glendale South, treatment of VOCs by air stripping or liquid phase GAC, and conveyance of the treated water to a water purveyor, where it would be blended with water of a quality such that the treated, blended water would meet all drinking water standards, for eventual distribution through a public water system. As a contingency, if all or part of the treated water was not accepted by the purveyors (possibly due to water supply needs), the treated water from Glendale North would be reinjected and for Glendale South would be recharged at the Headworks Spreading Grounds (see Figure 1-2).

In response to comments by the City of Glendale on the Glendale North and South OU Proposed Plans and in order to decrease overall costs associated with the OUs, EPA has determined that the treatment plants for the Glendale North and Glendale South OUs will be combined and the total 5,000 gpm of treated water will be conveyed to the City of Glendale for distribution to its public water supply system. The exact configuration of the combined treatment plant will be determined during the remedial design phase

of the project. The Glendale South OU Record of Decision also reflects this decision to combine the treatment plants.

However, if the City of Glendale does not agree to accept the treated water from both OUs or if EPA determines that combining the treatment plants will significantly delay or hinder the implementation of the Glendale North OU, the treatment plants will not be combined and only the extracted treated water from the Glendale North OU will be conveyed to the City of Glendale for distribution to its public water supply system. As a further contingency, if the City of Glendale does not accept any or all of the treated water (possibly due to water supply needs), any remaining portion of water will be 1) offered to another San Fernando Valley water purveyor or 2) reinjected/recharged into the aquifer.

3.0 ENFORCEMENT ACTIVITIES

In September 1989, EPA signed a cooperative agreement with the State Water Resources Control Board (SWRCB) providing funds for the Regional Water Quality Control Board, Los Angeles Region (RWQCB) to expand its capability to conduct source reduction, identification, and enforcement activities at individual facilities in the San Fernando Valley. Activities include conducting surveys and inspections, and overseeing investigations and remedial activities. The cooperative agreement has been renewed annually since 1989. If RWQCB investigations confirm soil or groundwater contamination at a specific facility, then that facility is referred to EPA. EPA is using the RWQCB's facility specific information in conjunction with RI data, groundwater and vadose zone modeling results and information gathered from other sources including California Environmental Protection Agency (CAL-EPA) investigations, South Coast Air Quality Management District (SCAQMD) investigations and responses to information request letters, to build enforcement cases.

EPA is and will be using its investigatory resources, enforcement resources and authority under CERCLA in conjunction with the work of the Los Angeles Region (Region 4) of the RWQCB to:

- Identify individuals and companies who are responsible for the historic and current contamination.

- Compel responsible parties to design, construct and operate treatment facilities and reimburse EPA for prior and any future expenditures at the site.

EPA issued preliminary notices of potential liability (General Notice) for the Glendale North OU to 35 parties on August 27, 1992 and to two additional parties on August 31, 1992. The list of General Notice parties was updated in February 1993 when one owner was deleted and three others added. These parties have

been preliminarily identified as owners and operators of 22 facilities located in the vicinity of the north plume portion of groundwater contamination in the Glendale Study Area of the San Fernando Valley. EPA anticipates that additional parties will be notified of potential liability. Special notice pursuant to CERCLA §122 has not yet been issued for the Glendale North OU.

4.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA's preferred alternative, as well as six other alternatives were described in EPA's Proposed Plan for the Glendale North OU (July 1992). The Proposed Plan was in the form of a fact sheet and was distributed to all parties on EPA's mailing list for the San Fernando Valley Superfund sites. The original 30 day public comment period was extended an additional 30 days after EPA received requests for extensions from members of the public. The public comment period closed on September 8, 1992. EPA received over 150 comments. These comments and EPA's responses to these comments are summarized in Part III (the Responsiveness Summary) of this ROD.

A public meeting was held in the City of Glendale on July 23, 1992, to discuss EPA's preferred alternative and the other alternatives. At this meeting EPA gave a brief presentation regarding the Proposed Plan, answered questions, and accepted comments from members of the public.

At the public meeting and in a subsequent letter, the City of Glendale emphasized that it would like to receive greater than 3,000 gpm of extracted, treated groundwater. The City also indicated that it had stored water credits and water rights sufficient to accept greater than 5,000 gpm of extracted, treated groundwater from the San Fernando Valley. As a result of the City's oral and written comments on the Glendale North OU, EPA has determined that the treatment plants for the Glendale North and South OUs will be combined and the total 5,000 gpm of treated water will be conveyed to the City of Glendale.

Notice of the public meeting as well as the availability of the Proposed Plan was published in the Los Angeles Daily News on July 8, 1992. In addition, several newspaper articles were written about the remedial investigation, the feasibility study and the Proposed Plan for the Glendale North OU including: Los Angeles Times - June 19, 1992; Los Angeles Daily News - June 19, 1992; Los Angeles Times - July 23, 1992; Los Angeles Daily News - July 24, 1992 and the Glendale News Press - July 24, 1992. A map of the Glendale North OU was provided in the Proposed Plan and the various newspaper articles described the area that would be impacted by the Glendale North OU.

Prior to mailing out the Proposed Plan fact sheet and conducting the public meeting for the Glendale North OU, EPA

conducted an outreach program specifically aimed at the Glendale community. EPA placed inserts describing the proposed interim cleanup of groundwater in the Glendale area in utility bills delivered to over 127,000 community members. The insert not only explained the project but offered an opportunity to be added to EPA's mailing list for the San Fernando Valley project by filling out and returning an attached coupon. As a result of this utility bill insert project, EPA was able to double its mailing list for the San Fernando Valley project and to educate community members likely to be impacted by the Glendale North OU project.

In general, the purpose of EPA's community relations program for the San Fernando Valley project is to inform community members and other interested parties about the Federal process for addressing contamination at hazardous waste sites, as well as to encourage two way communication between the concerned public and EPA and/or other local agencies.

From March 1987 through December 1991, EPA and LADWP attended quarterly meetings of the Community Work Group (CWG) to discuss technical issues and management strategies involving the San Fernando Valley Superfund project including the interim groundwater cleanup for the Glendale area. The CWG consisted of interested San Fernando Valley community residents, elected officials, agency representatives, and environmental and business leaders. The CWG provided input to EPA on the various components of the Superfund project, including the interim groundwater cleanup of the Glendale area.

The community relations plan for the San Fernando Valley Superfund sites was most recently updated and issued in April 1990. The plan will be revised again in 1993 to address community relations during the remedial design phase of the Glendale North OU interim action and other changes in the community relations program.

5.0 SCOPE AND ROLE OF THE OPERABLE UNIT

The interim remedial action for the Glendale North OU represents a discrete element in the overall long-term remediation of groundwater in the eastern portion of the San Fernando Valley. While the final overall plan for the remediation of the San Fernando Valley Sites has not yet been determined, the objectives of the Glendale North OU are:

- To inhibit vertical and horizontal migration of groundwater contamination in the North Plume of the Glendale Study Area

- To begin to remove contaminant mass from the upper zone of the aquifer in the North Plume of the Glendale Study Area.

EPA does not expect these objectives to be inconsistent with, nor preclude, any final action for San Fernando Valley Areas 1, 2, 3, and 4.

The Glendale North OU interim remedy is intended to address the immediate and significant groundwater contamination problem in and beyond a portion of San Fernando Valley Area 2 (also known as the Crystal Springs NPL site) and includes a large section of the City of Glendale. A more complete investigation of the overall groundwater problem in the San Fernando Valley is being conducted through the basinwide remedial investigation and feasibility study process.

The basinwide groundwater RI Report for the San Fernando Valley Study Area was completed in December 1992. Groundwater wells installed by EPA as part of the basinwide RI are routinely sampled to continue to monitor the nature and extent of the groundwater contamination in the San Fernando Valley.

EPA is currently using the results of the remedial investigation in basinwide feasibility studies to address VOC contamination in both the groundwater and vadose zone of the eastern portion of the San Fernando Valley.

As part of the basinwide groundwater FS, EPA is revising and recalibrating the basinwide groundwater flow model to incorporate the most recent data. The updated version of the model will be complete in early 1993. EPA will then review and evaluate various groundwater remediation options for the basin including: regional pump and treat, well-head treatment, use of innovative technologies and no-action alternatives.

During 1993, EPA will also initiate work on a vadose zone FS to examine ways to protect the groundwater from contaminants that could reach the groundwater in the future. This FS will review and evaluate options for cleanup of VOC contamination in the vadose zone of the San Fernando Valley.

EPA will continue to gather and analyze information important to the project. EPA has been working with the San Fernando Valley water purveyors and the Upper Los Angeles River Area (ULARA) Watermaster to summarize past and future groundwater management in the San Fernando Valley, including an overall water balance for the San Fernando Valley. EPA's interim actions to remove contaminants and inhibit migration from the most contaminated areas in North Hollywood, Burbank, Glendale North, Glendale South and Pollock OUs will also provide information useful for the basinwide FS.

6.0 SUMMARY OF GLENDALE NORTH OU SITE CHARACTERISTICS

Results of LADWP's groundwater monitoring programs conducted from 1981 through 1987 revealed that TCE and PCE had contaminated

approximately 50 percent of the water supply wells in the eastern portion of the San Fernando Valley groundwater basin at concentrations exceeding State and Federal drinking water standards.

The results of recent (1989-1992) EPA sampling of groundwater monitoring wells installed by EPA throughout the San Fernando Valley indicate that TCE and PCE continue to be the principal contaminants of concern. TCE and PCE are industrial solvents commonly used in the metal degreasing and dry-cleaning industries. Both are known animal carcinogens and probable human carcinogens. The Federal MCL for both TCE and PCE is 5 ug/l (ppb). The State MCLs for TCE and PCE are also 5 ug/l (ppb).

There are ten EPA monitoring wells located in the north plume portion of the Glendale Study Area. In these ten wells, nine VOCs have been detected above Federal and/or State MCLs: benzene; carbon tetrachloride; 1,1-dichloroethane (1,1-DCA); 1,2-DCA; 1,1-dichloroethene (1,1-DCE); total 1,2-DCE; 1,1,2,2-tetrachloroethane; PCE; and TCE (See Tables 6-1 and 6-2). As reported in the RI Report for the Glendale Study Area, TCE was detected in eight of ten EPA monitoring wells in the north plume at a maximum concentration of 12,000 ppb. PCE was detected in seven of the ten wells at a maximum of 120 ppb. Groundwater samples from wells installed at industry facilities in the Glendale north plume portion of the Glendale Study Area, near potential sources of contamination, have shown concentrations greater than 30,000 ppb for TCE and greater than 500 ppb for PCE (See Figures 6-1 and 6-2).

Nitrate has been detected consistently at levels in excess of the MCL in the groundwater of the Glendale Study Area. The highest level detected in groundwater from a shallow monitoring well in the Glendale Study Area is 16 mg/l as nitrogen (See Figure 6-3). The Federal MCL is 10 mg/l for nitrate as nitrogen. The nitrate contamination is likely the result of past agricultural practices and/or septic systems in the San Fernando Valley. Nitrate is not a CERCLA hazardous substance. However, the interim OU remedies in the San Fernando Valley involve the distribution of treated water to public water supply systems and therefore, EPA has been compelled to address the nitrate contamination in developing remedial alternatives.

Some metals have been detected at levels above the Federal and/or State MCLs in groundwater monitoring wells located in the Glendale Study Area. These metals include: arsenic, cadmium, chromium, lead and mercury. MCL exceedances occurred in early (1989) sampling rounds when field filtering of samples was not performed. Subsequent sampling and current sampling protocol require field filtering. As a result, only chromium and mercury have been found to exceed their MCLs since the initial sampling and only in a small number of wells. An analysis of these data to examine the likelihood that the metals are waterborne contaminants

TABLE 6-1

MAXIMUM VALUES OF VOLATILE AND SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN GROUNDWATER FROM THE CRYSTAL SPRINGS CLUSTER WELLS WITHIN THE NORTH PLUME OU

		Shallow Cluster Wells[b]			Lower Cluster Wells[b]		
Constituent	MCL[a] (μg/l)	Maximum Concentration (μg/l)	Number of Wells With Detects out of 9	Number of Wells Which Exceed MCL	Maximum Concentration (μg/l)	Number of Wells With Detects out of 12	Number of Wells Which Exceed MCL
Volatile Organics (μg/l)							
Acetone	---[c]	6[e]	4	---	22	5	---
Benzene	1.0	0.8	1	0	ND	0	0
2-Butanone (MEK)	---[c]	22	1	---	ND	---	---
Carbon Tetrachloride	0.5	42	4	4	1.0	2	2
Chloroform	100[d]	23	4	0	2.0	1	0
1,1-Dichloroethane	5.0	39	3	2	ND	0	0
1,2-Dichloroethane	0.5	2	1	1	ND	0	0
1,1-Dichloroethene	6.0	100	3	2	ND	0	0
1,2-Dichloroethene (total)	6.0[f]	17	3	1	ND	---	---
Ethylbenzene	680	ND	0	0	0.2	1	0
Methylene Chloride	---[c]	0.5[e]	2	0	5.0[e]	7	0
1,1,2,2-Tetrachloroethane	1.0	8.0	2	2	2.0	1	1
Tetrachloroethene (PCE)	5.0	120	8	6	130	9	6
Toluene	1,000	0.4[e]	1	0	3[e]	3	0
1,1,1-Trichloroethane (TCA)	200	26	3	0	ND	0	0
Trichloroethene (TCE)	5.0	3,100	9	8	220	8	6
Xylene (total)	1,750	ND	0	0	1	2	0
Semivolatile Organics (μg/l)							
Bis(2-ethylhexyl)phthalate	4	ND	---	---	140	1	---
Di-n-octylphthalate	---[c]	ND	---	---	11[e]	1	---

Note: Samples collected May 1990 and October 1990

ND = Not Detected

[a] Promulgated federal or state MCL, whichever is more stringent.

[b] Shallow cluster wells include CS-CO1-105, CS-CO2-62, CS-CO2-180, CS-CO3-100, CS-VPB-04, CS-VPB-05, CS-VPB-06, CS-CO5-160 and CS-C06-185. Lower cluster wells include all remaining cluster wells.

[c] No state or federal MCL promulgated.

[d] MCL is for the sum of trihalomethanes.

[e] Detected in laboratory blanks; may be considered a lab contaminant.

[f] For sum of cis- and trans-isomers, use the MCL for cis-; this isomer is more prevalent and its MCL is lower.

Source: Remedial Investigation for the Glendale Study Area (January 1992)

TABLE 6-2

MAXIMUM VALUES OF VOLATILE AND SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN GROUNDWATER FROM THE CRYSTAL SPRINGS VERTICAL PROFILE BORINGS WITHIN THE NORTH PLUME OU

		Initial Sampling - September 1989[b]			Resampling - September 1990[b]		
Constituent	MCL[a] (µg/l)	Maximum Concentration (µg/l)	Number of VPBs With Detects out of 10	Number of VPBs which are at or Exceed MCL	Maximum Concentration (µg/l)	Number of VPBs With Detects out of 11	Number of VPBs Which are at or Exceed MCL
Volatile Organics (µg/l)							
Acetone	—[c]	51[e]	3	—	690[e]	5	—
Benzene	1.0	1	1	1	2	1	1
Bromoform	100	8	1	0	ND	0	0
2-Butanone (MEK)	—[c]	5,400	2	—	ND	0	—
Carbon Tetrachloride	0.5	100	5	5	69	2	2
Chloroform	100[d]	32	5	0	30	4	0
Dibromochloromethane	100[d]	2	1	0	ND	0	0
1,1-Dichloroethane	5.0	49	2	2	46	2	2
1,2-Dichloroethane	0.5	3	1	1	2	1	1
1,1-Dichloroethene	6.0	620	4	3	440	3	3
1,2-Dichloroethene (total)	6.0[f]	25	3	2[f]	23	3	1[f]
2-Hexanone	—[c]	19	1	---	ND	0	—
4-Methyl-2-pentanone (MIK)	—[c]	30	1	---	ND	0	---
Methylene Chloride	—[c]	1	1	0	ND	0	0
Styrene	5.0	2	1	0	ND	0	0
1,1,2,2-Tetrachloroethane	1.0	24	4	4	3	1	1
Tetrachloroethene (PCE)	5.0	77	7	5	120	6	5
1,1,2-Trichloroethane	32	8	3	0	ND	0	0
1,1,1-Trichloroethane (TCA)	200	27	2	0	26	2	0
Trichloroethene (TCE)	5.0	12,000	8	8	5,700	9	7
Vinyl Acetate	—[c]	22	1	—	ND	0	—
Semivolatile Organics (µg/l)							
Bis(2-ethylhexyl)phthalate	4	—	—	—	38	1	1

NA = Not Analyzed
ND = Not Detected
[a] Promulgated federal or state MCL, whichever is more stringent.
[b] Initially sampled wells include CS-VPB-01, CS-VPB-02, and CS-VPB-04 through CS-VPB-11; Resampled wells include CS-VPB-01 through CS-VPB-11.
[c] No state or federal MCL promulgated.
[d] MCL is for the sum of trihalomethanes.
[e] Detected in laboratory blanks; considered a lab contaminant.
[f] For sum of cis- and trans-isomers, use the MCL for cis-; this isomer is more prevalent and its MCL is lower.

Source: Remedial Investigation for the Glendale Study Area (January 1992)

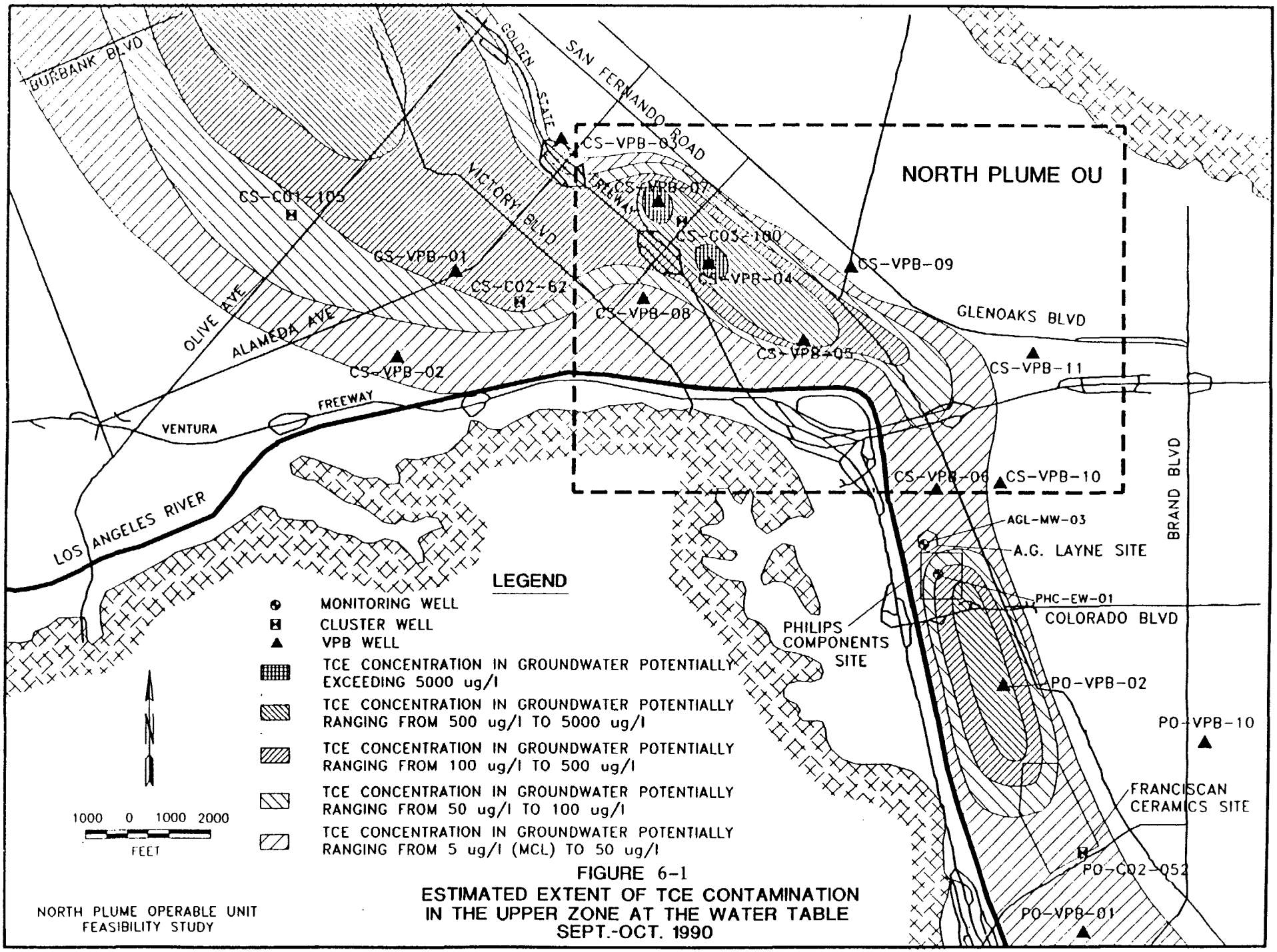


FIGURE 6-1
ESTIMATED EXTENT OF TCE CONTAMINATION IN THE UPPER ZONE AT THE WATER TABLE SEPT.-OCT. 1990

NORTH PLUME OPERABLE UNIT FEASIBILITY STUDY

REV. 10/17/91

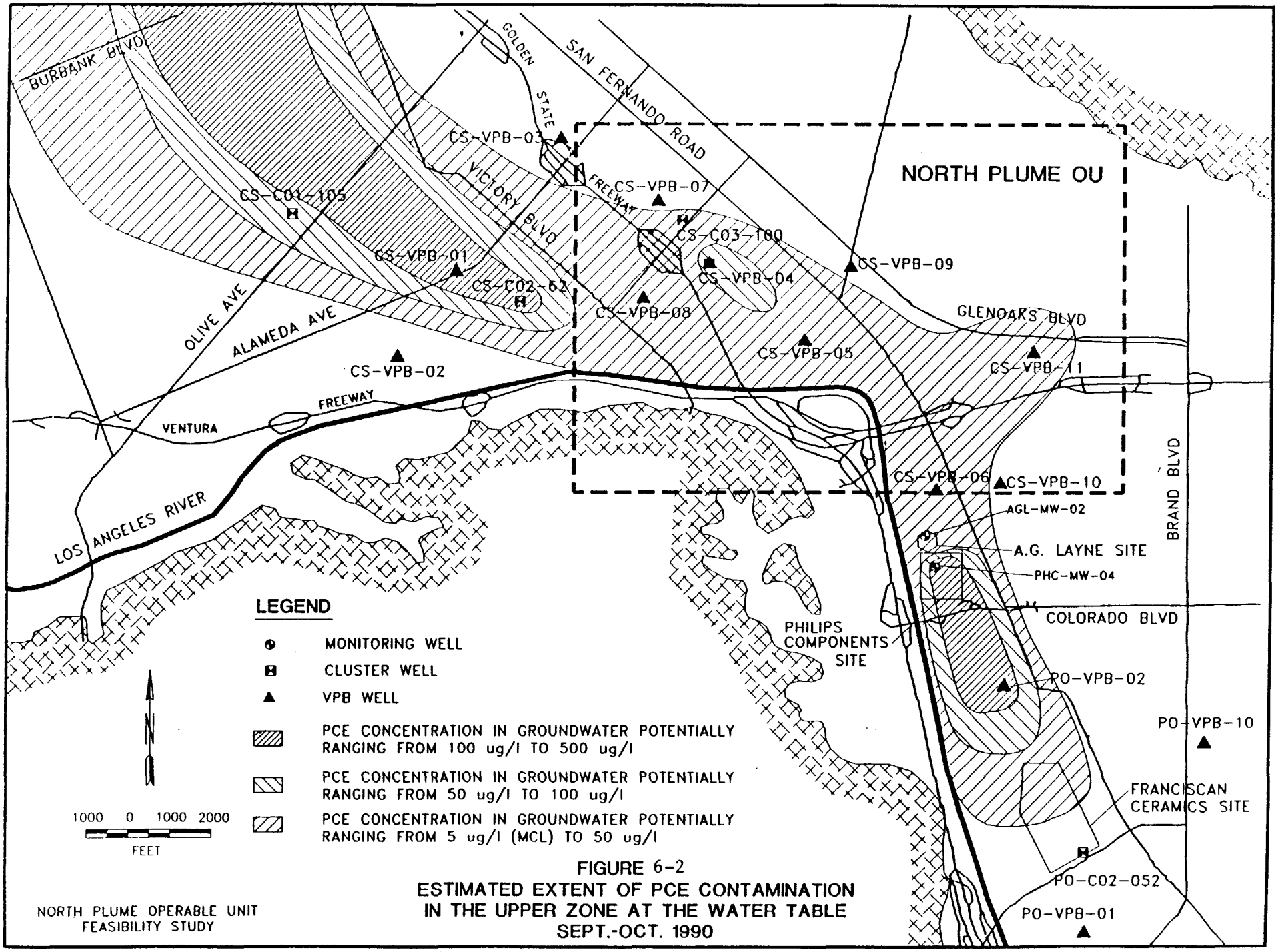


FIGURE 6-2
ESTIMATED EXTENT OF PCE CONTAMINATION
IN THE UPPER ZONE AT THE WATER TABLE
SEPT.-OCT. 1990

NORTH PLUME OPERABLE UNIT
FEASIBILITY STUDY

SCJPIS4AA FIG12-4 REV 10/18/91

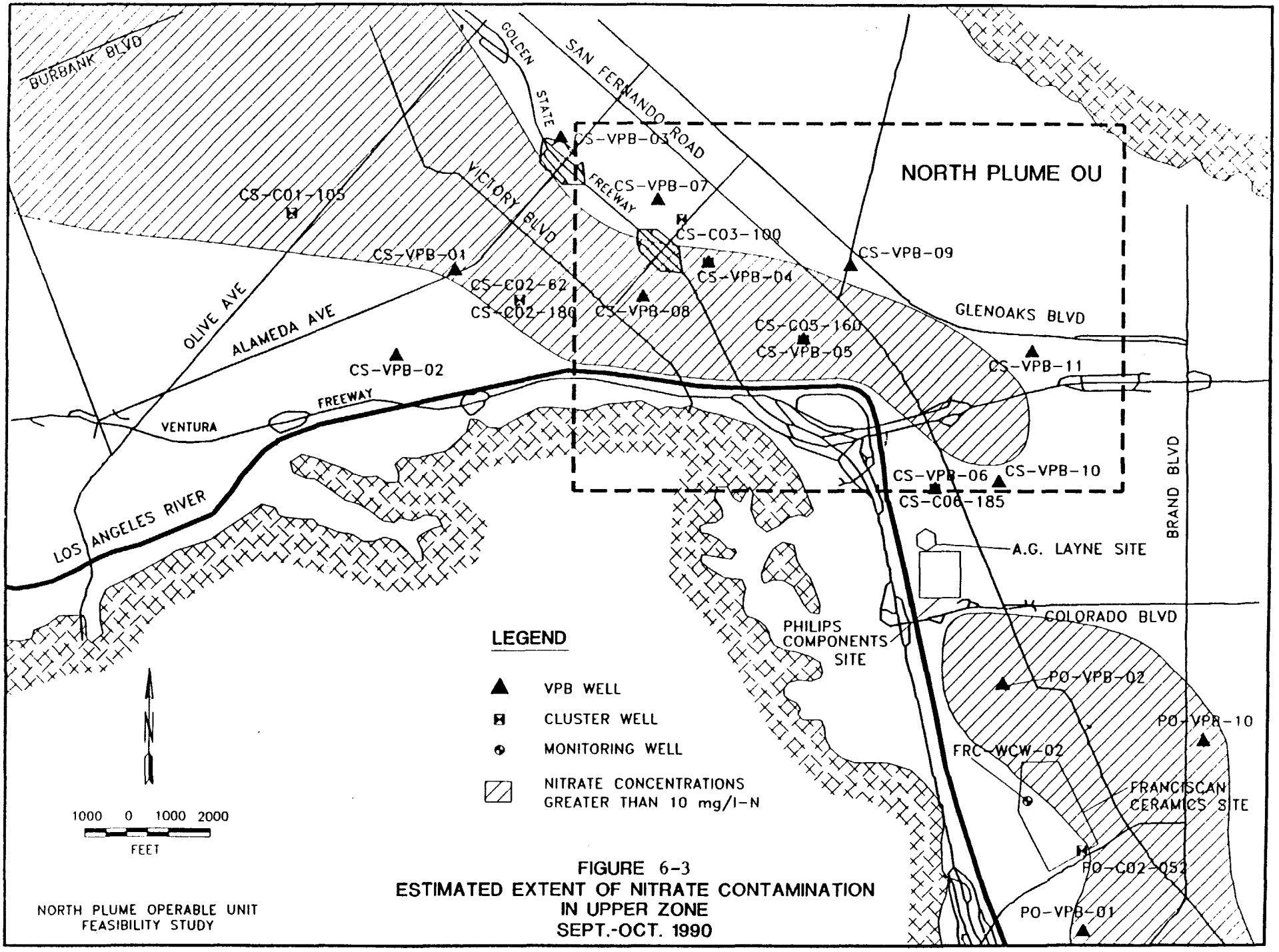


FIGURE 6-3
ESTIMATED EXTENT OF NITRATE CONTAMINATION
IN UPPER ZONE
SEPT.-OCT. 1990

NORTH PLUME OPERABLE UNIT
FEASIBILITY STUDY

GOLP5444 FIG12-2 REV 10/17/91

rather than sampling artifacts (i.e., residual particulates from well construction and development) was conducted by EPA's contractor and presented in a technical memorandum entitled: Review of Metals Data from Monitoring Wells located in the Glendale Study Area, North Operable Unit (June 16, 1992). This memorandum, available for review in the Administrative Record for the Glendale North OU, concluded that the metals exceedances were most likely the result of sampling artifacts. EPA continues to analyze groundwater samples collected under the quarterly monitoring program for priority pollutant metals.

Thirty-one wells in the Glendale Study Area were sampled for naturally-occurring radionuclides as part of EPA's quarterly monitoring program. The samples were taken during the period of July 31 to August 7, 1992. The results of this third quarter 1992 groundwater sampling for radionuclides indicate that all EPA groundwater monitoring wells in the Glendale Study Area are in compliance with current MCLs for radionuclides (gross alpha, gross beta, gross radium, radium-226, strontium-89, strontium-90, gross uranium, tritium, and radon). In addition, the samples were also in compliance with all proposed radionuclide MCLs, except radon. The proposed MCL for Radon is 300 pCi/l. Most of the groundwater samples from the 31 monitoring wells exceeded the proposed MCL for radon. If necessary, this factor will be taken into account for remedial design. Radionuclides in the groundwater of the Glendale Study Area and their potential impacts on the design of the Glendale North OU are discussed in greater detail in: Technical Memorandum San Fernando Valley Superfund Site, Radionuclides in the Glendale Study Area, dated March 2, 1993. This memorandum is available for review in EPA's Administrative Record Supplement 1 for the Glendale North OU.

In addition, during the RI for the Glendale Study Area, EPA confirmed through modeling that the groundwater in the area is a source of recharge for the Los Angeles River.

7.0 SUMMARY OF SITE RISKS

Data regarding contaminants in the north plume of groundwater contamination in the Glendale Study Area obtained by EPA during the remedial investigation was used to estimate the health risks associated with exposure to the groundwater. This estimate, called a risk assessment, was then used to identify which contaminants pose risks to human health. The data used for the Glendale North OU risk assessment is presented in the Remedial Investigation Report for the Glendale Study Area (January 1992) and in other documents include in the Glendale North OU Administrative Record file.

Baseline risk assessments are conducted at Superfund sites to fulfill one of the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP (40 CFR Part

300) requires development of a baseline risk assessment at sites listed on the National Priorities List (NPL) under CERCLA. The CERCLA process for baseline risk assessments is intended to address both human health and the environment. However, due to the highly urbanized setting of the Glendale Study Area, the focus of the baseline risk assessment for the Glendale North OU was focused on human health issues, rather than environmental issues.

The objective of the baseline risk assessment for the Glendale North OU was to evaluate the human health and environmental risks posed by the contaminated groundwater beneath the north plume portion of the Glendale Study Area if it were to be used as a source of drinking water without treatment. The baseline risk assessment incorporated the water quality information generated during the basinwide groundwater RI field investigation and sampling program to estimate current and future human health and environmental risks. The groundwater data used for the Glendale North OU risk assessment included sampling results from the 1990 Crystal Springs initial cluster well sampling, and the 1991 resampling of the Crystal Springs Vertical Profile Borings/shallow monitoring wells (VPBs). In cases where more than one sample event was recorded for a single well, the most recent data were used. If a compound was not detected in a particular well, half the value of the lowest detection limit was used from the most recent sampling event. The current public health risk calculations were based on estimates of concentrations at points of exposure from these sampling efforts.

The risk assessment for the Glendale North OU was conducted in accordance with EPA guidance including: Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA (USEPA, 1988), Risk Assessment Guidance for Superfund, Vol. I Health Evaluation Manual (Part A) and Vol. 2 Ecological Assessment (USEPA, 1989), The Exposure Factors Handbook (USEPA, 1989), and Risk Assessment Guidance for Superfund Human Health Risk Assessment, USEPA Region IX Recommendations (USEPA, 1989).

A risk assessment involves the qualitative or quantitative characterization of potential health effects of specific chemicals on individuals or populations. The risk assessment process comprises four basic steps: 1) hazard identification, 2) dose-response assessment, 3) exposure assessment, and 4) risk characterization. The purpose of each element is as follows:

- Hazard identification characterizes the potential threat to human health and the environment posed by the detected constituents.

- Dose response assessment critically examines the toxicological data used to determine the relationship between the experimentally administered animal dose and

the predicted response (e.g., cancer incidence) in a receptor.

- Exposure assessment estimates the magnitude, frequency, and duration of human exposures to chemicals.

- Risk characterization estimates the incidence of or potential for an adverse health or environmental effect under the conditions of exposure defined in the exposure assessment.

Human Health Risk Assessment

Risk assessments estimate the possibility that one additional occurrence of cancer will result from exposure to contamination. A risk of 1 in 1,000,000 (one million) means that one person in one million exposed could develop cancer as a result of the exposure. EPA considers risks greater than one in ten thousand (10^{-4}) "unacceptable."

In preparing risk assessments, EPA uses very conservative assumptions that weigh in favor of protecting public health. For example, EPA may assume that individuals consume two liters of drinking water per day from wells situated within a contaminant plume, over a 70-year lifetime or that a person is exposed to a chemical, 24 hours a day, 365 days a year, for a 30-year period, even though typical exposure to the chemical would be far less.

The baseline risk assessment for the Glendale North OU is presented in Section 7.0 of the Remedial Investigation Report for the Glendale Study Area (January 1992). The risk assessment estimated the potential risks to public health under current situations and potential future situations. The risk assessment examined the potential health effects if individuals were exposed to contaminated groundwater from the upper and lower zones of the aquifer for the Glendale north plume groundwater contamination in the Glendale Study Area.

Chemicals of potential concern for the Glendale North OU used in the risk assessment calculations included: TCE; PCE; carbon tetrachloride; 1,1-DCA; 1,2-DCA; total 1,1-DCE; 1,2-DCE; nitrate and others including some metals. A list of all potential compounds of concern for both the upper and lower aquifer zones included in the quantitative risk assessment for the Glendale North OU are presented in Table 7-1. Due to the potential for adverse health effects to infants from consumption of water with high nitrate levels, a quantitative evaluation of this compound for chronic non-carcinogenic risks was calculated. The maximum value and an average value were used for exposure point concentrations in the calculations.

TABLE 7-1

COMPOUNDS OF POTENTIAL CONCERN INCLUDED IN THE QUANTITATIVE RISK ASSESSMENT FOR THE GLENDALE NORTH PLUME OU

Constituent	Upper Zone (Yes/No)	Lower Zone (Yes/No)
VOCs		
Benzene	Y	N
Carbon Tetrachloride	Y	Y
1,1-Dichloroethane	Y	N
1,2-Dichloroethane	Y	N
Tetrachloroethene	Y	Y
Trichloroethene	Y	Y
1,1-Dichloroethene	Y	N
1,1,2,2-Tetrachloroethene	Y	Y
2-Butanone (MEK)	Y	N
1,2-Dichloroethene (total)	Y	N
BNAs		
Bis(2-ethylhexyl)phthalate	N	Y
Inorganics		
Arsenic	Y	N
Nickel	Y	N
Lead	N	Y
Mercury	Y	Y
Zinc	Y	Y
Nitrate	Y	Y

As indicated by the table, fewer compounds of potential concern were identified in samples from wells installed in the deep aquifer. Therefore, a separate characterization of risk was performed for the upper and lower groundwater zones.

An exposure assessment was conducted to identify potential transport pathways (e.g., groundwater, surface water, air); routes of exposures (e.g., ingestion, inhalation, dermal contact); and potential on-site and off-site receptor populations. Exposure assessment involves the consideration of particular transport pathways and routes of exposure to potential receptors which may include current users of the site as well as adjacent populations that may be exposed to chemicals that have been transported off site. Receptors may also include aquatic and terrestrial biota.

A critical step in assessing the potential risk to public health is to identify the pathways through which exposure could occur. The major transport pathway considered in the Glendale North OU baseline risk assessment was the use of contaminated groundwater. The point of potential contact with the contaminated groundwater is through water use from the upper or lower zone.

EPA evaluated four potential methods of exposure to water from the upper and lower zones of the aquifer: (1) exposure during residential use, (2) worker exposure during operations at the Glendale Grayson Steam Plant (3) exposure from discharge into the Los Angeles River, or (4) exposure in various other commercial uses. Other commercial users of groundwater in the Glendale Study Area include Walt Disney; Sears, Roebuck & Co.; and the Los Angeles City Zoo. The residential use of the contaminated groundwater as well as exposure from Glendale Grayson Steam Plant operations were carried into the quantitative risk assessment.

EPA included three potential exposure routes in the Glendale North OU risk assessment: (1) drinking the groundwater during residential use, (2) inhaling the chemicals in groundwater vapors during showering, and (3) inhaling groundwater vapors during steam plant operations. Dermal contact was also considered but was found by EPA not to pose a significant risk.

In accordance with current scientific opinion concerning carcinogens, it is assumed that any dose, no matter how small, has some associated response. This is called a nonthreshold effect. In the risk assessment for the Glendale North OU, the non-threshold effect was applied to all probable carcinogens. EPA has classified carcinogens with regard to the epidemiologic and toxicologic data available. The assessment of noncarcinogenic effects is complex. There is a broad interaction of time scales (acute, subchronic, and chronic) with varying kinds of effects. In addition, there are various levels of "severity" of effect. The Hazard Index is used to determine the potential for adverse health effects resulting from exposure to non-carcinogenic chemicals.

The Hazard Quotient is defined as the ratio of a single exposure level over a specified time period to a reference dose for that substance derived from a similar exposure period. A reference dose (RfD) is EPA's preferred toxicity value for evaluating non-carcinogenic effects resulting from exposures at Superfund sites. The Hazard Index is the sum of more than one Hazard Quotient for multiple substances or multiple pathways. The Hazard Index is calculated separately for chronic, sub-chronic and shorter-duration exposures. A Hazard Index greater than 1.0 indicates the potential for adverse health effects. However, it should be noted that a Hazard Index value of 1.0 or greater does not mean that an adverse health effect is certain. It is a benchmark value indicating a greater probability for a possible adverse effect.

The results of the baseline risk characterization for the upper and lower zones of the aquifer are summarized in Tables 7-2 and 7-3. A detailed discussion of the data presented in these tables is included in Section 7.0 of the Remedial Investigation Report for the Glendale Study Area (January 1992).

The risk associated with ingestion of groundwater from the upper zone found that TCE, 1,1-DCE and arsenic were the primary contributors to the carcinogenic risk in the ingestion scenario. PCE and carbon tetrachloride were secondary contributors. Concentration levels of TCE and 1,1-DCE were several orders of magnitude above their respective MCLs, but concentrations of arsenic were detected below its MCL. For shower inhalation risks, TCE and 1,1-DCE were major contributors to risk for groundwater in the upper and lower zones.

The uncertainties associated with the Glendale North OU risk assessment are discussed in detail in Section 7.6 (page 7-24) of the Remedial Investigation Report for the Glendale Study Area (January 1992).

In summary, the results of the human health portion of the Glendale North OU risk assessment indicated that contaminant levels in the upper zone of the aquifer of the Glendale Study Area would pose an unacceptable (2×10^{-3}) risk to human health if this water were to be delivered directly to local residents, without being treated. This means that an estimated 1 in 500 persons would be more likely to develop cancer during their lifetimes.

Environmental Risk Assessment

An ecological risk assessment was also performed for the Glendale North OU to address the potential ecological risks to flora and fauna in the area. This assessment provided a qualitative evaluation of potential current and future risks represented by the present site conditions, assuming no remedial action is taken in the Glendale Study Area.

TABLE 7-2

SUMMARY OF RISK CHARACTERIZATION FOR THE UPPER ZONE AQUIFER FOR THE GLENDALE NORTH PLUME OU

Exposure Scenario	Arithmetic Mean[1]	RME[2]	Maximum[3]	Type of Risk
Adult Ingestion	8E-04	2E-03	5E-03	Cancer Risk
	4E+00	8E+00	2E+01	Hazard Index
Shower Inhalation	1E-03	2E-03	8E-03	Cancer Risk
	4E+00	8E+00	2E+01	Hazard Index
Steam Plant Inhalation	2E-05	---	5E-05	Cancer Risk
	4E-02	---	7E-02	Hazard Index

[1] Average Value

[2] Reasonable Maximum Exposure. The highest exposure that is reasonably expected to occur at a site (95% upper confidence limit of observed concentrations).

[3] The exposure scenario using the highest observed concentration in any monitoring well in the north plume of groundwater contamination in the Glendale Study Area. EPA considers this scenario to be unreasonably high.

TABLE 7-3

SUMMARY OF RISK CHARACTERIZATION FOR THE LOWER ZONE AQUIFER FOR THE GLENDALE NORTH PLUME OU

Exposure Scenario	Arithmetic Mean[1]	RME[2]	Maximum[3]	Type of Risk
Adult Ingestion	2E-05	5E-05	1E-04	Cancer Risk
	3E-01	7E-01	2E+00	Hazard Index
Shower Inhalation	1E-05	2E-05	6E-05	Cancer Risk
	2E-01	4E-01	1E+00	Hazard Index
Steam Plant Inhalation	---	---	1E-07	Cancer Risk
	---	---	2E-03	Hazard Index

[1] Average Value

[2] Reasonable Maximum Exposure. The highest exposure that is reasonably expected to occur at a site (95% upper confidence limit of observed concentrations).

[3] The exposure scenario using the highest observed concentration in any monitoring well in the north plume of groundwater contamination of the Glendale Study Area.

The Glendale Study Area is zoned for commercial and industrial establishments. The surrounding area is a mixture of residential and commercial zoning. Although an extensive ecological survey was not performed for the area, the presence of a significant wildlife population was not indicated. In addition, the developed condition of the site excludes the potential for significant natural vegetative cover.

The release pathway of primary concern at this site is contaminated groundwater. There is no information, at present, to indicate that this groundwater reaches the surface or that significant concentrations are discharged to a surface water source (i.e., canal, river, etc.). Discharges to the Los Angeles River are likely to occur but are not expected to be significant enough, in volume or frequency, to impact aquatic biota.

Given the present developed condition of the site and the major exposure pathway consideration of contaminated groundwater, there was no expectation for significant impact to potential environmental receptors. Urbanization has already replaced habitat potential; therefore, no significant number of receptors appeared to be present. There appeared to be no apparent mechanism for exposure to environmental receptors from contaminated groundwater. Also, there was no indication that future site plans would reinstate habitat and thereby recreate a potential for environmental receptors in the future.

8.0 DESCRIPTION OF ALTERNATIVES

Based on the results of the RI, EPA identified several cleanup alternatives for addressing groundwater contamination in the Glendale North Plume. The alternatives were developed to meet the following specific cleanup objectives for the Glendale North OU:

- To inhibit vertical and horizontal migration of groundwater contamination in the North Plume of the Glendale Study Area; and

- to begin to remove contaminant mass from the upper zone of the aquifer in the North Plume of the Glendale Study Area.

All of the alternatives, with the exception of the "no action" alternative (Alternative 1), involve groundwater extraction and treatment for the shallow aquifer system in the Glendale area of the San Fernando Valley. The upper zone or shallow-most portion of the aquifer is where the majority of the VOC contamination has been identified. Detailed descriptions of the various alternatives are presented in the Feasibility Study for the Glendale Study Area North Plume Operable Unit (April 1992).

Initially, all of the alternatives were screened for: 1) effectiveness at protecting public health and the environment, 2) technical feasibility (implementability), and 3) cost. As a result of this initial screening, seven alternatives were evaluated using nine specific criteria: 1) Overall Protection of Human Health and the Environment, 2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs), 3) Long-term Effectiveness and Permanence, 4) Reduction of Toxicity, Mobility or Volume through Treatment, 5) Short-term Effectiveness, 6) Implementability, 7) Cost, 8) State Acceptance, and 9) Community Acceptance. Each of EPA's nine evaluation criteria is summarized below.

Overall Protection of Human Health and the Environment: This criterion assesses whether each alternative provides for both short term and long term overall protection of human health and the environment from unacceptable risks posed by the hazardous substances, pollutants, or contaminants present in the North Plume. The assessment draws upon the evaluation of short-term effectiveness, long-term effectiveness, implementability, reduction of toxicity, mobility and/or volume through treatment, and compliance with ARARs.

Compliance with ARARs: This criterion is used to determine whether the alternative meets all of the chemical-, action- and location-specific ARARs identified in Section 10 of this ROD. Since the remedial action established by the Glendale North OU ROD is an interim action, chemical-specific requirements to be attained in the aquifer at the end of the final remedy are not ARARs for this action. Action-specific ARARs address the groundwater response actions that may be taken as part of this interim action for the Glendale North OU. All of the alternatives, except no action, include groundwater extraction followed by treatment and disposal or use as potable supply. Therefore, specific levels for treatment of the contaminated water prior to disposal or to delivery to the drinking water purveyor are chemical-specific and action-specific ARARs for the Glendale North OU.

Long-Term Effectiveness and Permanence: Long-term effectiveness refers to the period after the remedial action is complete. Each alternative is assessed for its long-term effectiveness and permanence in reducing the risk to human health and the environment at the end of the 12-year period. The long-term effectiveness evaluation focuses on how much total contaminant mass has been removed and contaminant concentrations remaining in the aquifer at the end of the 12-year period.

Reduction of Toxicity, Mobility, and/or Volume through Treatment: This criterion addresses how well the remediation technologies permanently and significantly reduce the toxicity, mobility and/or volume of the hazardous substances. The evaluation based on this criterion focuses on the quantity of hazardous materials destroyed or treated, the degree to which the remedial action is

irreversible, the type and quantity of residuals that are remaining after the remedial action is complete, and whether the alternative satisfies the statutory preference for treatment as a principal element of the remedy.

Short-Term Effectiveness: Each alternative is evaluated based on its effectiveness in protecting human health and the environment during the construction and implementation period. The short-term effectiveness evaluation for each alternative focuses on how well the alternative removes contaminant mass, inhibits the movement of the contaminant plume, and how well the treatment system meets the cleanup levels in the extracted and treated groundwater during the 12-year period. Short-term effectiveness also addresses the effectiveness of the alternative in reducing potential risks to people living in the vicinity of the Glendale North Plume and to workers' health and safety during construction of the proposed facilities and implementation of the interim remedy.

Implementability: The implementability criterion includes both the technical and administrative feasibility of implementing an alternative. The technical feasibility refers to the ability to construct, reliably operate and maintain, and meet cleanup levels for process options. Administrative feasibility refers to the ability to obtain approvals from other offices and agencies, the availability and capacity of treatment, storage, and disposal services, and the availability of specific equipment and technical specialists.

Cost: The NCP requires that the following types of costs be evaluated: 1) Capital costs, including both direct and indirect costs, 2) Annual operation and maintenance costs and 3) Net present value of capital and operations and maintenance (O&M) costs. Capital and O&M costs presented in the Glendale North OU FS report have an accuracy of +50 percent to -30 percent, as specified by the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988). Capital costs include a contingency of 20 percent of total field cost (TFC) and a contractor's overhead and profit (OH&P) at 30 percent of the sum of TFC and contingency. Evaluating present worth costs assumes an interest rate of 10 percent and operating period of 12 years. The O&M cost evaluation assumes an operating load factor of 90 percent.

State Acceptance: This criterion considers the concerns of the State (technical and administrative) regarding the alternatives.

Public Acceptance: This criterion assesses the components of alternatives that interested persons in the community support, have reservations about or oppose.

EPA's preferred alternative, as well as the other six alternatives were described in EPA's Proposed Plan for the Glendale North OU (July 1992).

The Glendale North OU is an interim action and is not the final remedy for cleanup of contaminated groundwater in the Glendale area. With the exception of the no action alternative, all of the alternatives involve the extraction of 3,000 gpm of groundwater for a period of 12 years. The total duration of the remedy is 15 years, but during the first three years the remedy will be in the remedial design and construction phases and no extraction or treatment of groundwater will be taking place. A computer model called a solute transport model was developed and used to determine that the extraction rate of 3,000 gpm over a 12 year period would result in the most effective inhibition of plume migration and effective contamination removal for this interim action. With the exception of Alternative 1 - No Action, all of the alternatives would involve the construction and operation of a VOC treatment system.

With the exception of Alternative 1 - No Action, the seven alternatives analyzed and compared during the FS and presented in the Glendale North OU FS report include three major elements: 1) extraction of contaminated groundwater at the rate of 3000 gpm, 2) treatment of the VOCs, and 3) one of four options for final use - distribution to a public water supply system, reinjection into the aquifer, spreading at an existing spreading grounds, or discharge to the Los Angeles River (See Table 8-1). The major elements of each of seven alternatives are listed below.

Alternative 1	No Action
Alternatives 2	Extract/Treat VOCs(air stripping or liquid phase GAC)/Public Water Supply
Alternative 3	Extract/Treat VOCs(perozone)/Public Water Supply and/or Reinject
Alternative 4	Extract/Treat VOCs/River
Alternative 5	Extract/Treat VOCs plus ion exchange for nitrate/Reinject
Alternative 6	Extract/Treat VOCs/Spreading Grounds
Alternative 7	Extract/Treat VOCs/Reinject

The highlights of the seven alternatives are summarized briefly below. More detailed descriptions of the alternatives are presented in the Feasibility Study for the Glendale Study Area North Plume Operable Unit (April 1992).

Table 8-1: Summary of Alternatives—Glendale North OU

Components	Alternative 1	Alternative 2	Alternative 3
Groundwater Extraction	• None	• Extract 3000 gpm groundwater from 12 wells	• Same as Alternative 2
Treatment	• None	• Treat VOCs with dual-stage air stripping and vapor-phase GAC • Meet nitrate MCL by blending	• Treat VOCs with perozone oxidation, airstripping, and vapor-phase GAC • Same as Alternative 2
Final Use	• Monitor groundwater quality	• Convey treated, blended water to City of Glendale's Public Distribution System	• Same as Alternative 2
CRITERIA	**EVALUATION**		
Effectiveness and Permanence	• Not effective in the short or long-term	• Inhibit vertical and lateral migration of contaminant plume • No contaminated groundwater discharged to Los Angeles River • Remove contaminant mass from aquifer • Treated groundwater would meet drinking water standards	• Same as Alternative 2 • Same as Alternative 2 • Same as Alternative 2 • Same as Alternative 2
Reduction of Toxicity, Mobility, Volume, and Treatment	• No reduction of toxicity, mobility, or volume	• Estimated to reduce TCE concentrations in the aquifer from 600 ppb to less than 100 ppb after 12 years • Removes 82% of the initial mass of TCE in the aquifer	• Same as Alternative 2 • Same as Alternative 2
Compliance with ARARs	• Will not meet ARARs	• Will meet ARARs	• Same as Alternative 2
Overall Protection of Human Health and Environment			
(Human Health)	• Assuming no institutional controls, increased lifetime cancer risk of ingesting contaminated groundwater is estimated to be 1 in 500	• Protective of human health	• Same as Alternative 2
(Environment)	• Not protective of environment	• Environmental degradation will be reduced because migration of groundwater containing TCE concentrations inhibited and TCE mass removed	• Same as Alternative 2
Implementability (Technical)	• Monitoring wells easy to construct. Spread of groundwater plume could make future remediation difficult	• Can be implemented	• Same as Alternative 2, except perozone oxidation treatment proven at pilot scale only
ESTIMATED COSTS			
Total Capital Cost Annual O&M Total Present Worth	$230,000 $110,000 $791,000	$19,800,000 $3,240,000 $36,400,000	$17,800,000 $2,610,000 $31,200,000

☐ EPA's Preferred alternatives.

* Alternative #5 presented here in this Proposed Plan was formerly Alternative #8 in the Feasibility Study for the Glendale Study Area: North Plume Operable Unit (April 1992).

** Alternative #7 presented here in this Proposed Plan was formerly Alternative #10 in the Feasibility Study for the Glendale Study Area: North Plume Operable Unit (April 1992).

Table 8-1 (cont.): Summary of Alternatives—Glendale North OU

Alternative 4	Alternative 5*	Alternative 6	Alternative7**
• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2
• Same as Alternative 2	• Same as Alternative 2, plus treatment of nitrate with ion exchange	• Same as Alternative 2	• Same as Alternative 2
• Discharge treated water to Los Angeles River	• Inject 3,000 gpm treated water into 12 wells	• Discharge treated water to Headworks Spreading Ground	• Same as Alternative 5
EVALUATION			
• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2
• Same as Alternative 2	• Groundwater discharge to Los Angeles River may be greater than Alternative 2 (but TCE concentrations lower)	• Same as Alternative 2	• Same as Alternative 5
• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 5
• Treated groundwater would meet drinking water standards for VOCs and surface water discharge standards for nitrates	• Same as Alternative 2	• Treated groundwater would meet drinking water standards for VOCs and groundwater recharge standards for nitrates	• Same as Alternative 5
• Same as Alternative 2	• Estimated to reduce TCE concentrations from 800 ppb to less than 100 ppb after 12 years	• Same as Alternative 2	• Same as Alternative 5
• Same as Alternative 2	• Removes 89% of initial mass of TCE in the plume	• Removes 86% of the initial mass of TCE in the plume	• Same as Alternative 5
• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2
• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2	• Same as Alternative 2
• Same as Alternative 2	• Same as Alternative 6, except greater mass of TCE removed	• Same as Alternative 2, except greater mass of TCE removed	• Same as Alternative 5
• Same as Alternative 2	• Same as Alternative 2; issues associated with waste brine disposal (from ion exchange) and with injection (e.g., potential for clogging) will have to be addressed	• Same as Alternative 2; one administrative issue may be the availability of the Headworks Spreading Grounds for recharge	• Same as Alternative 2, except issues associated with injection (e.g., clogging), which will have to be pilot-tested prior to full-scale implementation
$17,700,000 $3,050,000 $33,300,000	$37,000,000 $4,760,000 $61,400,000	$19,600,000 $3,300,000 $36,500,000	$21,800,000 $3,300,000 $38,700,000

Alternative 1: No Action

The No Action alternative serves as a "baseline" against which other alternatives are compared. This alternative is evaluated to determine the risks that would be posed to public health and the environment if no action were taken to treat or contain the contamination. The no action alternative would involve only groundwater monitoring; no additional cleanup activities would be conducted.

Alternative 2: EPA's Preferred Alternative
Extract/Treat(Air Stripping or Liquid Phase GAC)/Public Water System

Alternative 2 involves the extraction of 3,000 gpm of contaminated groundwater for 12 years. The extraction wells would be located to inhibit most effectively the migration of the contaminant plume. Various locations and scenarios for extraction wells and rates of extraction are proposed in the feasibility study report for the Glendale North OU. However, all design decisions for this interim remedy will be made during the remedial design phase. At that time, one of the locations proposed for extraction wells and scenarios for rates of extraction at individual wells may be selected or new ones may be selected.

The extracted groundwater will be filtered to remove any suspended solids, if necessary, and then treated for VOCs using dual-stage or single-stage air stripping with vapor-phase GAC adsorption for emissions control or liquid phase GAC. Whether air-stripping (dual versus single) or liquid phase GAC will be used will be determined during remedial design as will the exact location for the treatment plant (note that four possible locations were proposed in the Glendale North OU FS report). The treated water will be blended with water which does not contain nitrate in excess of the nitrate MCL to reduce nitrate levels to meet the nitrate MCL. The treated water shall meet all ARARs identified in Section 10 of this ROD and will be conveyed to the City of Glendale and/or another San Fernando Valley water purveyor for blending and distribution through the public supply system. The treated, blended water will have to meet all applicable drinking water requirements for drinking water in existence at the time that the water is served prior to distribution through the public drinking water supply system.

In response to comments by the City of Glendale on the Glendale North and South OU Proposed Plans and in order to decrease overall costs associated with the OUs, EPA has determined that the treatment plants for the Glendale North and Glendale South OUs will be combined and the total 5,000 gpm of treated water will be conveyed to the City of Glendale for distribution to its public water supply system. The exact location of the combined treatment plant will be determined during the remedial design phase of the

project. The Glendale South OU Record of Decision will also reflect this decision to combine the treatment plants.

However, if the City of Glendale does not agree to accept the treated water from both OUs (possibly due to water supply needs) or if EPA determines that combining the treatment plants will significantly delay or hinder the implementation of the Glendale North OU, the treatment plants will not be combined. Furthermore, if the City of Glendale does not accept any or all of the treated water, any remaining portion of water will be 1) offered to another San Fernando Valley water purveyor or 2) reinjected into the aquifer, per Alternative 7 (see description below).

Existing production wells that may provide pathways for vertical migration of contamination will be abandoned or rehabilitated, if required. Final determinations regarding which production wells will be abandoned and/or rehabilitated will be made during remedial design. Groundwater monitoring wells will be installed to evaluate the effectiveness of the remedial action. More specifically, groundwater monitoring shall be conducted no less frequently than quarterly to: 1) evaluate influent and effluent water quality, 2) determine and evaluate the capture zone of the extraction wells, 3) evaluate the vertical and lateral (including downgradient) migration of contaminants, 4) evaluate the effectiveness of the reinjection well system, if necessary and 5) monitor any other factors associated with the effectiveness of the interim remedy determined to be necessary during remedial design.

Alternative 3: Extract/Treat(Perozone Oxidation)/Public Water System

Alternative 3 also requires the extraction of 3,000 gpm of contaminated groundwater for 12 years, and the same final use of the treated water and the same groundwater monitoring requirements as Alternative 2. Alternative 3 only differs from Alternative 2 in that the extracted groundwater would be treated for VOCs using perozone oxidation, followed by air stripping with vapor-phase GAC adsorption for emissions control. Air stripping would be required to remove any carbon tetrachloride in the extracted groundwater because the perozone oxidation process alone does not effectively treat this VOC.

Alternative 4: Extract/Treat/River

Alternative 4 also involves the extraction of 3,000 gpm of contaminated groundwater for 12 years, and the same treatment methodology and the same groundwater monitoring requirements as Alternative 2. However, rather than providing the treated water to a public water purveyor, the treated water would be discharged to the Los Angeles River.

Alternative 5[1]: Extract/Treat plus Ion Exchange/Reinject

Alternative 5 also involves the extraction of 3,000 gpm of contaminated groundwater for 12 years, and the same monitoring requirements as Alternative 2. Alternative 5 differs from Alternative 2 in that the extracted groundwater would be treated for VOCs using dual-stage air stripping with vapor-phase GAC adsorption for emissions control and then would be treated using ion exchange to reduce the nitrate levels in the water to meet the nitrate MCL. The treated water would then be reinjected.

Alternative 6: Extract/Treat/Spreading Grounds

Alternative 6 also involves the extraction of 3,000 gpm of contaminated groundwater for 12 years, the same treatment approach as described in Alternative 2 and the same ground water monitoring requirements as Alternative 2. However, unlike Alternative 2, the treated water would be recharged to the aquifer at the Headworks Spreading Grounds.

Alternative 7[2]: Extract/Treat/Reinject

Alternative 7 also involves the extraction of 3,000 gpm of contaminated groundwater for 12 years, the same treatment system, the same groundwater monitoring requirements and provides for abandonment or rehabilitation of production wells as required for Alternative 2. However, the treated water would be reinjected. The reinjection shall occur where nitrate levels in the aquifer are equal to or greater than the nitrate levels in the water to be reinjected.

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A comparative analysis of the alternatives against the nine evaluation criteria is presented in this section.

No Action versus the Nine Criteria. Clearly, Alternative 1 would not be effective in the short- and long-term in protecting human health and the environment as it does not provide for removing any contaminants from the upper zone of the aquifer, for inhibiting further downgradient and vertical contaminant plume migration, or for reducing the toxicity, mobility and volume of contaminants through treatment. Implementing the no-action alternative would be

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[1] Note: Alternative #5 presented here in this ROD was formerly Alternative #8 in the Feasibility Study for the Glendale Study Area: North Plume Operable Unit (April 1992).

[2] Note: Alternative #7 presented here in this ROD was formerly Alternative #10 in the Feasibility Study for the Glendale Study Area: North Plume Operable Unit (April 1992).

simple and inexpensive since it involves only groundwater monitoring. As indicated by the baseline risk assessment for the Glendale North OU presented in the RI Report for the Glendale Study Area (January 1992), Alternative 1 could pose both carcinogenic and non-carcinogenic risk if a person were exposed to the groundwater from the upper zone of the aquifer. Loss of a valuable water resource from continued degradation of the aquifer and discharge of valuable water to the river is a major concern.

Overall Protection of Human Health and the Environment, Short Term Effectiveness and Long Term Effectiveness. Alternatives 2 through 7 are effective in the short-term and long-term in reducing the risk to human health and the environment by removing contaminants from the upper zone of the aquifer, by inhibiting further downgradient and vertical contaminant plume migration, and by reducing the toxicity, mobility, and volume of contaminants in the aquifer. Alternatives 2 through 4 have the same effectiveness in inhibiting downward and downgradient migration of the contaminant plumes, in removing contaminant mass from the Upper Zone of the aquifer, and in reducing the discharge of contaminated groundwater to the Los Angeles River. During the first 12 years of operation, Alternatives 2 through 4 are estimated to remove approximately 82 percent of the total estimated initial TCE mass, and may reduce the maximum TCE concentration remaining in the upper zone of the aquifer by as much as 88 percent.

Alternative 6 is effective in inhibiting downward and downgradient migration of the contaminant plumes, in removing contaminant mass from the upper zone of the aquifer, and in reducing the discharge of contaminated groundwater to the Los Angeles River. Because Alternatives 6 involves recharge at the Headworks Spreading Grounds which would push a portion of the contaminant plume located upgradient of the extraction sites towards the extraction wells, this alternative may remove slightly more mass (86 percent of the estimated initial TCE mass) than Alternatives 2 through 4 (82 percent of the estimated initial TCE mass). Alternative 6 also reduces the maximum TCE concentration remaining in the Upper Zone of the aquifer by as much as 88 percent.

Alternatives 5 and 7 have the same effectiveness in inhibiting downward and downgradient migration of the contaminant plumes and in removing contaminant mass from the Upper Zone of the aquifer. The extraction well configuration proposed in the FS report for Alternative 5 is different from those proposed for Alternatives 2 through 6, in that three extraction sites are used instead of four, to accommodate injection downgradient of extraction. Reinjecting the treated groundwater may increase the discharge of contaminated groundwater to the river near the injection wells in excess of the discharge estimated in the no-action alternative. However, the injection of 3,000 gpm of treated water would dilute the contamination in the groundwater and decrease the contaminant

concentration levels in the groundwater discharged to the Los Angeles River. Other injection sites could be investigated during the remedial design phase. The model estimates that approximately 89 percent of the initial estimated mass of TCE in the groundwater would be removed during the first 12 years of operation.

Alternatives 5 and 7 reduce the maximum TCE concentration remaining in the Upper Zone of the aquifer by as much as 86 percent. Although slightly more contaminant mass (89 percent versus 82 and 86 percent for Extraction Scenarios 4 and 8, respectively) is removed in this scenario due to the effects of aquifer recharge, the TCE concentration remaining in the Upper Zone is slightly higher. The higher TCE concentration is due to the downgradient reinjection of the treated groundwater, which may tend to restrict the remaining contaminant mass to a slightly smaller area.

Reduction of Toxicity, Mobility and Volume through Treatment. The VOC treatment technologies used in Alternatives 2, 4, 5, 6, and 7 (dual-stage air stripping with vapor-phase GAC adsorption and/or liquid phase GAC adsorption) and used in Alternative 3 (perozone oxidation followed by air stripping with vapor-phase GAC adsorption) are technically feasible and effective in meeting ARARs for VOCs in the extracted and treated groundwater. Treatment of the extracted contaminated groundwater via dual-stage air stripping with vapor-phase GAC adsorption and/or liquid phase GAC adsorption would reduce substantially the toxicity and mobility of contaminants in the aqueous phase. The adsorption of contaminants onto the GAC would reduce the volume of contaminated media. However, a substantially larger quantity of contaminated GAC media would be generated with the dual-stage air stripping system compared to perozone oxidation (which is a destructive technology) followed by air stripping with vapor-phase GAC adsorption. This contaminated GAC would require disposal or regeneration.

Treatment of the extracted contaminated groundwater via perozone oxidation followed by air stripping with vapor-phase GAC adsorption would destroy greater than 90 percent of the VOCs, and generate a smaller quantity of contaminated GAC media compared to dual-stage air stripping. VOC treatment using perozone oxidation has only been tested and applied in pilot-scale/limited applications, and limited O&M data are available; however, a demonstration-scale (2,000-gpm) facility has begun operation in North Hollywood for treating TCE- and PCE-contaminated groundwater. This prototype facility should provide useful information regarding the long-term performance and O&M costs.

As a result of comments received during the public comment period, EPA further evaluated the use of perozone oxidation for the Glendale North OU. Additional research on perozone use and revised cost estimates based on a bench scale treatability study can be found in the following technical memorandum: Applicability of

Perozone Treatment Process for the Glendale North Operable Unit Groundwater Remediation (March 12, 1993) included in Supplement 1 of the Administrative Record for the Glendale North OU available at all five information repositories for the San Fernando Valley Superfund sites. Carbon tetrachloride, which is one of the contaminants found in the groundwater of the Glendale North plume, is not as readily treated using the perozone process and must be treated using air-stripping or liquid phase GAC to ensure that the treated water will meet all drinking water standards for VOCs. In addition, incomplete oxidation can lead to the formation of by-products such as formaldehyde which would also need to addressed. The bench scale treatability study found that the total present worth cost estimated in the FS report is underestimated and $500,000 or more could be added to the estimated $31,200,000. These factors coupled with the uncertainties associated with design, capital and operational costs and reliability, and finally the fact that a municipality will be receiving this water, all combine to make Alternative 3 less preferable than Alternatives 2 and 4 through 7 which propose using air stripping or liquid phase GAC for VOC treatment.

Compliance with ARARs. As discussed in the ARARs section (Section 10) of this ROD, since this remedial action is an interim action, there are no chemical-specific ARARs for aquifer cleanup for any of the alternatives. For Alternatives 2-7, the chemical-specific ARARs for the treated water from the VOC treatment plant at this site are Federal MCLs and more stringent State MCLs for VOCs. Alternatives 2, 4, 5, 6 and 7 are expected to meet these ARARs for the treated water. There is some uncertainty regarding the ability of Alternative 3 to meet these ARARs because perozone has not been used to treat such high concentrations of VOCs at such high flow rates. Therefore, there could be problems unless the air stripping unit proposed to follow the perozone system is a redundant treatment system which would add substantially to the cost.

For the Alternatives that involve distribution of the treated water to a public water supply system (Alternatives 2 and 3), secondary drinking water standards are ARARs and will be met prior to blending of the water for nitrate. For water that will be served at the tap, all applicable requirements will have to be met after blending, including the nitrate MCL. For Alternatives 6 and 7, the nitrate levels in the treated groundwater will meet ARARs by ensuring that recharge of the treated groundwater (Alternative 6) and reinjection of the treated water (Alternatives 5 and 7) occurs where levels of these substances in the receiving aquifer are similar to those in the treated water to be discharged, recharged or reinjected. EPA has confirmed that nitrate levels in the groundwater beneath the Headworks Spreading Grounds are similar to the nitrate levels observed in the vicinity of proposed extraction well sites. In Alternative 4, the treated water will meet MCLs for VOCs prior to discharge to the Los Angeles River (which is on-site).

For a more detailed discussion of ARARs please review Section 10 of this ROD .

Implementability. Technically and administratively, Alternatives 2, 3, 4 and 6 could be implemented. The technologies considered for groundwater monitoring, extraction, and conveyance are proven and have been applied extensively. For Alternative 6, the availability of the Headworks Spreading Grounds for discharge of extracted and treated groundwater would need to be addressed. Technically, Alternatives 5 and 7 could probably be implemented, but using ion exchange for nitrate treatment (Alternative 5) and reinjection for treated groundwater disposal may pose some technical and administrative feasibility issues. In particular, disposing of the waste brine generated from backwashing the ion exchange system may restrict the technical and administrative feasibility of using ion exchange for nitrate treatment. Several technical feasibility issues may arise when injecting treated groundwater. At the location of the proposed reinjection sites, the groundwater is approximately 30 feet below the ground surface; thus, only a limited hydraulic head could be applied to induce injection. Groundwater-injection pilot studies may be required prior to full-scale application. In addition, other possible locations for reinjection well placement can be proposed and reviewed during the design phase.

EPA has determined that the treatment plants for the Glendale North and Glendale South OUs will be combined. The total 5,000 gpm of treated water will be conveyed to the City of Glendale for distribution to its public water supply system. The exact configuration of the combined treatment plant will be determined during the remedial design phase of the project. The City of Glendale has indicated that it has sufficient water credits and capacity in their existing water system to accept this amount of extracted treated water. Therefore, combining the treatment plants for the Glendale North and South OUs would be implementable.

State and Public Acceptance. Based on comments received during the public comment period, the State and the public generally expressed support for Alternatives 2 through 7. In a letter dated June 16, 1992, the State (DTSC) expressed its concurrence with EPA's preferred alternative presented in the Proposed Plan for the Glendale North OU which is now EPA's selected remedy for the Glendale North OU. In a letter dated March 29, 1993, after reviewing the Draft ROD for the Glendale North OU, DTSC stated that it agreed with EPA's selected remedy for the Glendale North OU. EPA received several comments from other State agencies, the City of Glendale and members of the Glendale community specifically in support of Alternatives 2 and 7. In a letter dated September 8, 1992, the Los Angeles Region of the Regional Water Quality Control Board offered support for EPA's preferred alternative presented in

the Proposed Plan for the Glendale North OU but requested to go "on record" as favoring the direct use of the treated water as opposed to reinjecting it.

One member of the public commented that he did not like Alternative 2 and asked that EPA not include distribution to a public water supply as a final use of the treated water. The State Water Resources Control Board, City of Glendale, and many other commenters did not support Alternative 4, involving discharge to the Los Angeles River. A few commenters including the City of Glendale had a preference for Alternative 3, which proposes perozone for VOC treatment. Comments received during the public comment period along with EPA responses are presented in Part III of this ROD, the Responsiveness Summary.

A public meeting was held in the City of Glendale on July 23, 1992, to discuss EPA's preferred alternative and the other alternatives. At this meeting EPA gave a brief presentation regarding the Proposed Plan, answered questions, and accepted comments from members of the public.

At the public meeting and in a subsequent letter, the City of Glendale emphasized that it would like to receive greater than 3,000 gpm of extracted, treated groundwater. The City also indicated that it had stored water credits and water rights sufficient to accept greater than 5,000 gpm of extracted, treated groundwater from the San Fernando Valley. As a result of the City's oral and written comments on the Glendale North OU, EPA has determined that the treatment plants for the Glendale North and South OUs shall be combined and the total 5,000 gpm of treated water will be conveyed to the City of Glendale.

Cost. The estimated total present worth of Alternatives 2, 3, 4, 6, and 7 ranges from $28,200,000 to $38,700,000. The total present worth costs for Alternative 2 fall within the middle of this range at $36,400,000. The total present worth for Alternative 5 which includes nitrate treatment using ion exchange is $61,400,000. Using ion exchange for nitrate treatment adds significantly to the cost of the alternatives.

EPA has determined that the treatment plants for the Glendale North and Glendale South OUs will be combined. The total 5,000 gpm of treated water will be conveyed to the City of Glendale for distribution to its public water supply system. The exact configuration of the combined treatment plant will be determined during the remedial design phase of the project. The costs of the two separate OU projects is estimated to be $36,400,000 for Glendale North and $25,020,000 for Glendale South. Therefore, these two separate OU projects total $61,420,000. Recent EPA cost estimates (included in Supplement 1 to the Glendale North OU Administrative Record) indicate that combining the Glendale North and South OUs could result in a cost savings of $13,888,000.

Although the cost estimate for Alternative 2 is slightly higher than some of the other alternatives, the estimated costs presented here and in the FS do not take into account the value of utilizing the groundwater resource as opposed to disposing of the water in the Los Angeles River (Alternative 4) or reinjecting the water back into the aquifer (Alternative 7).

10.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This section discusses Applicable or Relevant and Appropriate requirements (ARARs) for the Glendale North OU. Under Section 121(d)(1) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 (collectively, CERCLA), 42 U.S.C. § 9621(d) remedial actions must attain a level or standard of control of hazardous substances which complies with ARARs of Federal environmental laws and more stringent state environmental and facility siting laws. Only state requirements that are more stringent than Federal ARARs, and are legally enforceable and consistently enforced statewide may be ARARs.

Pursuant to Section 121(d) of CERCLA, the on-site portion of a remedial action selected for a Superfund site must comply with all ARARs. Any portion of a remedial action which takes place off-site must comply with all laws legally applicable at the time of the off-site activity occurs, both administrative and substantive.

An ARAR may be either "applicable", or "relevant and appropriate", but not both. According to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300), "applicable" and "relevant and appropriate" are defined as follows:

- Applicable requirements are those cleanup standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. "Applicability" implies that the remedial action or the circumstances at the site satisfy all of the jurisdictional prerequisites of a requirement.

- Relevant and appropriate requirements are those cleanup standards, standard of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal environmental or state environmental or facility siting laws that, while

not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

Chemical-Specific ARARs. Chemical-specific ARARs are health- or risk-based concentration limits, numerical values, or methodologies for various environmental media (i.e., groundwater, surface water, air, and soil) that are established for a specific chemical that may be present in a specific media at the site, or that may be discharged to the site during remedial activities. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards.

Location-Specific ARARs. Location-specific requirements set restrictions on certain types of activities based on site characteristics. Federal and state location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. Examples of special locations possibly requiring ARARs may include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

Action-Specific ARARs. Action-specific requirements are technology- or activity-based requirements which are triggered by the type of remedial activities under consideration. Examples are Resource, Conservation and Recovery Act (RCRA) regulations for waste treatment, storage or disposal.

Neither CERCLA nor the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (400 C.F.R. Part 300) provides across-the-board standards for determining whether a particular remedy will result in an adequate cleanup at a particular site. Rather, the process recognizes that each site will have unique characteristics that must be evaluated and compared to those requirements that apply under the given circumstances. Therefore, ARARs are identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as remedies.

The following section outlines the Applicable or Relevant and Appropriate Requirements (ARARs) that apply to this site.

10.1 Chemical-Specific ARARs

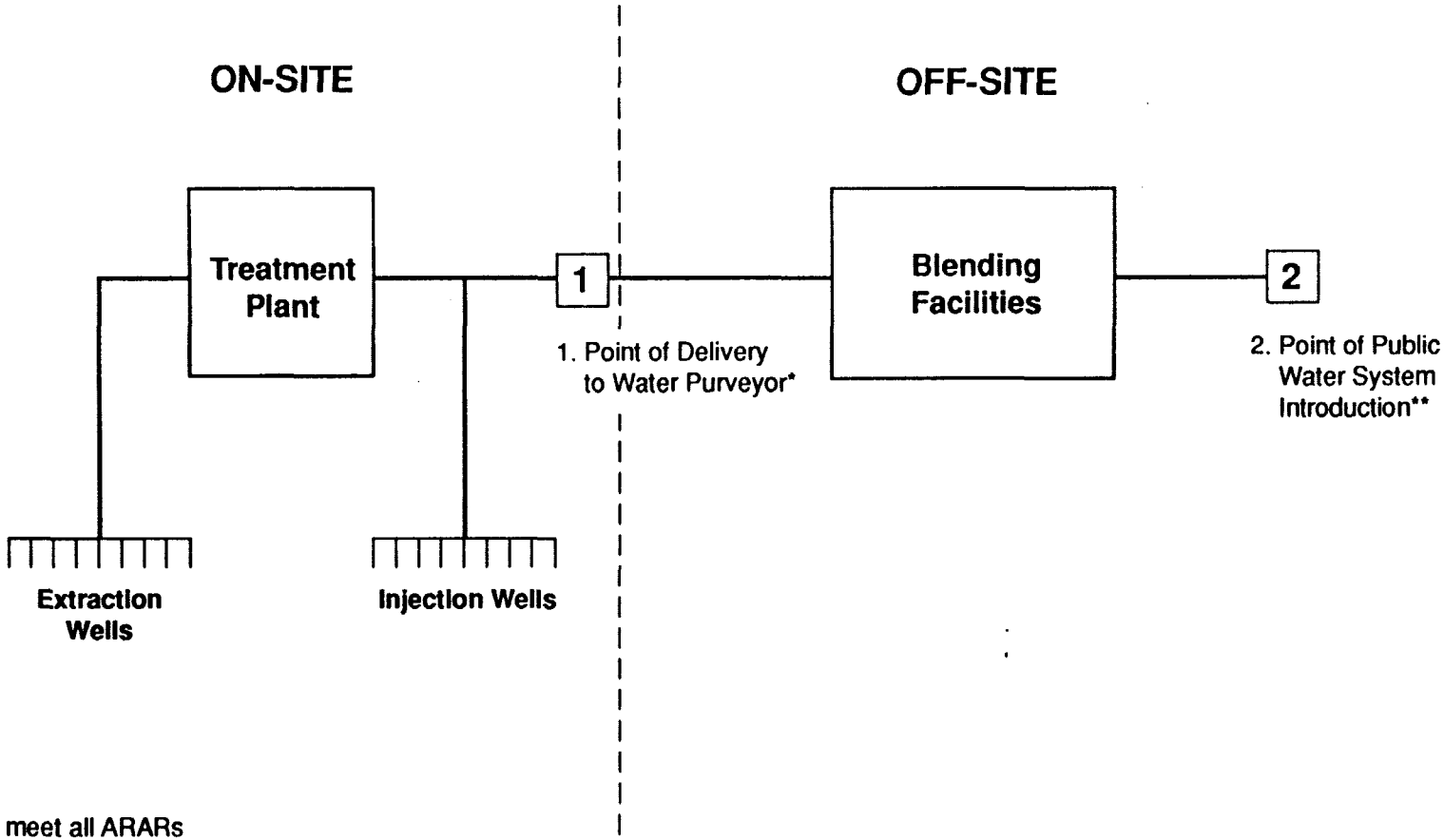
10.1.1 Federal Drinking Water Standards

Section 1412 of the Safe Drinking Water Act (SDWA), 42 U.S.C. S300g-1, "National Water Regulations"; National Primary Drinking Water Regulations, 40 CFR Part 141.

EPA has established Maximum Contaminant Levels (MCLs) (40 CFR Part 141) under the Safe Drinking Water Act (SDWA) to protect public health from contaminants that may be found in drinking water sources. These requirements are applicable at the tap for water provided directly to 25 or more people or which will be supplied to 15 or more service connections. The MCLs are applicable to any water that would be served as drinking water. Under NCP Section 300.430(f)(5), remedial actions must generally attain MCLs and non-zero Maximum Contaminant Level Goals (MCLGs) for remedial actions where the groundwater is currently or potentially a source of drinking water.

The Glendale North groundwater is a source of drinking water. However, since the Glendale North OU remedial action is an interim action, chemical-specific cleanup requirements for the aquifer such as attaining MCLs and non-zero MCLGs, which would be ARARs for a final remedy, are not ARARs for this interim action. (See 55 Fed. Reg. 8755.) Nevertheless, EPA has determined that for the treatment plant effluent from the Glendale North OU, the Federal Maximum Contaminant Levels (MCLs) for VOCs and any more stringent State of California MCLs for VOCs are relevant and appropriate and must be attained regardless of the end use or discharge method for the treated water.

For the treated and blended water which will be put into the public water supply, all applicable requirements for drinking water in existence at the time that the water is served will have to be met because EPA considers the blending facility and the serving of the water to the public (at the tap) to be off-site. Complying with all applicable requirements for drinking water at the tap will also require attainment of the MCL for nitrate prior to serving the water to the public. Since these are not ARARs, these requirements are not "frozen" as of the date of the ROD. Rather, they can change over time as new laws and regulations applicable to drinking water change. See 55 Fed. Reg. 8758 (March 8, 1990). Figure 10-1 provides a diagram of the treatment chain and blending process for the treated water prior to distribution of the treated and blended water to the public water supply for Alternatives 2 and 3.



* Must meet all ARARs

** Must meet all legal requirements including MCL for nitrate

FIGURE 10-1: ON-SITE ARARS AND OFF-SITE LEGAL REQUIREMENTS FOR THE GLENDALE NORTH OU INTERIM REMEDY

10.1.2 State Drinking Water Standards

California Safe Drinking Water Act, Health and Safety Code, Division 5, Part 1, Chapter 7, §4010 et seq., California Domestic Water Quality Monitoring regulations, CCR Title 22, Division 4, Chapter 15, §64401 et seq.

California has also established drinking water standards for sources of public drinking water, under the California Safe Drinking Water Act of 1976, Health and Safety Code Sections 4010.1(b) and 4026(c). The State of California has promulgated MCLs for primary VOCs. Several of the State MCLs are more stringent than Federal MCLs. In these cases, EPA has determined that the more stringent State MCLs for VOCs are relevant and appropriate for the treatment plant effluent from the Glendale North OU interim remedy. The VOCs for which there are more stringent State standards include: benzene; carbon tetrachloride; 1,2-Dichloroethane (1,2-DCA); 1,1-Dichloroethene (1,1-DCE); cis-1,2-DCE; trans-1,2-DCE; and Xylene. There are also some chemicals where State MCLs exist but there are no Federal MCLs. EPA has determined that these state MCLs are relevant and appropriate for the treated water prior to discharge or delivery to the water purveyor. The VOCs for which there are no Federal MCLs but for which state MCLs exist include: 1,1-DCA; 1,1,2,2-tetrachloroethane; and 1,1,2-Trichloroethane.

In a letter to EPA dated June 2, 1992, the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) stated that EPA should include a discussion regarding "future State MCLGs and the cumulative hazard index and how they will affect the use of treated groundwater as a drinking water source." Water served as drinking water is required to meet MCLs at the tap, not MCLGs. Therefore, EPA would generally not expect a future change in an MCLG to affect the use of treated groundwater as a drinking water source. The cumulative hazard index is also not an ARAR. However, EPA does retain the authority to require changes in the remedy if necessary to protect human health and the environment, including changes to previously selected ARARS. See 40 C.F.R. Sections 300.430(f)(1)(ii)(B)(1) and 300.430(f)(5)(iii)(C). If EPA receives new information indicating the remedy is not protective of public health and the environment, EPA would review the remedy and make any changes necessary to ensure protectiveness.

EPA has also determined that the monitoring requirements found in CCR Title 22 Sections 64421-64445.2 are relevant and appropriate for any treated water which will be delivered to the City of Glendale's Public Water distribution system. However, the selection of these sections as ARARs involves only the requirements that specific monitoring be performed. It would not include any administrative requirements (such as reporting requirements) and would also not include meeting substantive standards set within

these sections since no such standards have been identified by the State as being more stringent than Federal requirements. For the off-site portion of this remedy, including the treated water after blending, all applicable requirements would have to be satisfied including the monitoring requirements in CCR Title 22 Sections 64421-64445.2.

Accordingly, the chemical-specific standards for the groundwater extracted and treated under the Glendale North OU interim remedy are the current Federal or State MCLs for VOCs, whichever is more stringent.

10.2 Location-Specific ARARs

No special characteristics exist in the Glendale Study Area to warrant location-specific requirements. Therefore, EPA has determined that there are no location-specific ARARs for the Glendale North OU.

10.3 Action-Specific ARARs

10.3.1 Clean Air Act, 42 U.S.C. §7401 et seq.

Rules and Regulations of the South Coast Air Quality Management District

Glendale North OU treatment of VOCs by air stripping, whereby the volatiles are emitted to the atmosphere, triggers action-specific ARARs with respect to air quality.

The Clean Air Act regulates air emissions to protect human health and the environment, and is the enabling statute for air quality programs and standards. The substantive requirements of programs provided under the Clean Air Act are implemented primarily through Air Pollution Control Districts. The South Coast Air Quality Management District (SCAQMD) is the district regulating air quality in the San Fernando Valley.

The SCAQMD has adopted rules that limit air emissions of identified toxics and contaminants. The SCAQMD Regulation XIV, comprising Rules 1401, on new source review of carcinogenic air contaminants is applicable for the Glendale North OU. SCAQMD Rule 1401 also requires that best available control technology (T-BACT) be employed for new stationary operating equipment, so the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of ten in one million (1×10^{-5}). EPA has determined that this T-BACT rule is applicable for the Glendale North OU because compounds such as TCE and PCE are present in groundwater, and release of these compounds to the atmosphere may pose health risks exceeding SCAQMD requirements.

The substantive portions of SCAQMD Regulation XIII, comprising Rules 1301 through 1313, on new source review are also ARARs for the Glendale North OU.

The SCAQMD also has rules to limit the visible emissions from a point source (Rule 401), which prohibits discharge of material that is odorous or causes injury, nuisance or annoyance to the public (Rule 402), and limits down-wind particulate concentrations (Rule 403). EPA has determined that these rules are also ARARs for the Glendale North OU interim remedy.

10.3.2 Water Quality Standards for Reinjection and Discharges of Treated Water to Surface Waters or Land

Federal Standards

The Safe Drinking Water Act provides Federal authority over injection wells. The Federal Underground Injection Control Plan is codified in Part 144 of 40 C.F.R and prohibits injection wells such as those that would be located at the Site from (1) causing a violation of primary MCLs in the receiving waters and (2) adversely affecting the health of persons. 40 C.F.R. §144.12. Section 144.13 of the Federal Underground Injection Control Plan provides that contaminated ground water that has been treated may be reinjected into the formation from which it is withdrawn if such injection is conducted pursuant to a CERCLA cleanup and is approved by EPA. 40 C.F.R. §144.13. These regulations are applicable to any Glendale North OU treated water that is reinjected into the Glendale North groundwater.

The Resource Conservation and Recovery Act (RCRA) Section 3020 is also an action-specific ARAR. This section of RCRA provides that the ban on the disposal of hazardous waste into a formation which contains an underground source of drinking water (set forth in Section 3020(a)) shall not apply to the injection of contaminated groundwater into the aquifer if: (i) such injection is part of a response action under CERCLA; (ii) such contaminated groundwater is treated to substantially reduce hazardous constituents prior to such injection; and (iii) such response action will, upon completion, be sufficient to protect human health and the environment. RCRA Section 3020(b).

State Standards

For any reinjection to the basin, including spreading, or discharges to surface water that occur on-site, the reinjected or discharged water must meet all action-specific ARARs for such reinjection or discharge. The ARAR applicable to the recharged (Alternative 6) or reinjected (Alternative 5 or 7) water is:

- The Los Angeles Regional Water Quality Control Board's Water Quality Control Plan, which incorporates State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California." Resolution No. 68-16 requires maintenance of existing State water quality unless it is demonstrated that a change will benefit the people of California, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed by other State policies.

EPA anticipates that there may be short-term discharges of treated water to the Los Angeles River during the initial operation of the VOC treatment plant and on certain other limited occasions. The ARAR for any treated water that is discharged, on a short term basis, to the Los Angeles River is the National Pollutant Discharge Elimination System (NPDES) Program which is implemented by the LARWQCB. In establishing effluent limitations for such discharges, the LARWQCB considers the Water Quality Control Plan for the Los Angeles River Basin (the "Basin Plan"), which incorporates Resolution 68-16, and the best available technology economically achievable (BAT). See, Cal. Water Code § 13263.

Since the RWQCB did not identify specific substantive discharge requirements or technology standards for such temporary discharges, EPA has reviewed the Basin Plan and considered BAT and has made certain determinations for the short-term discharges to the Los Angeles River. In order to comply with this ARAR, any treated groundwater that will be discharged, on a short-term basis, to the Los Angeles River on-site must be treated to meet Federal MCLs or State MCLs for VOCs, whichever is more stringent.

The treated water will also contain nitrate. The Basin Plan states that the level of nitrate shall not exceed 45 mg/l in water designated for use as domestic or municipal supply. According to the Basin Plan, the Los Angeles River is not designated for municipal or domestic water supply. Therefore, the 45 mg/l is not an ARAR for the short-term discharges associated with the Glendale North OU.

EPA has also considered what BAT could be for such short-term discharges. For on-site discharges, meeting the nitrate MCL through treatment by ion exchange would result in complex technical issues, such as disposal of waste brine, and would be very costly given the temporary nature of such discharges. Therefore, EPA has not identified ion exchange as the NPDES treatment standard for such short-term discharges.

EPA also considered the Mineral Quality Objective for the Los Angeles River of 36 mg/l (8 mg/l nitrate-N) established in the Basin Plan. Because the anticipated average concentration of

nitrate in the short-term discharge is likely to be close to the MCL, and any discharge would be short-term, there should not be any significant long-term effects on the mineral quality of the Los Angeles river associated with short-term discharges of VOC-treated water from the Glendale North OU.

It should also be noted that extractions of 3,000 gpm of groundwater per the Glendale North OU will result in decreased amounts of contaminated groundwater recharging to the Los Angeles River, thereby further protecting its beneficial uses.

Again, with respect to VOCs, any on-site discharge to the Los Angeles River must meet Federal MCLs or State MCLs for VOCs, whichever is more stringent. Since short-term discharges to the Los Angeles River would occur on-site, the procedural requirements for Federal National Pollution Discharge Elimination System (NPDES) as implemented in RWQCB Waste Discharge Requirements (WDRs) issued under Section 13263 of the California Water Code would not be ARARs.

10.3.3 Secondary Drinking Water Quality Standards

The State of California's Secondary Drinking Water Standards (SDWS) are ARARs for the Glendale North OU if the final use option involves serving treated groundwater as drinking water. 22 CCR §64471. The California SDWS are selected as ARARs because they are promulgated state standards and are relevant and appropriate to the action of supplying the treated water to a public water supplier. Although California SDWS are not applicable to non-public water system suppliers, the California SDWS are relevant and appropriate since the treated water under this action would be put into the City's drinking water system action. Since the Federal SDWS are not enforceable limits and are intended as guidelines, they are not ARARs for this action. Furthermore, since the State SDWS are more stringent than the Federal SDWS, EPA has not selected the Federal SDWS as requirements for this action. In summary, if the treated water is to be served as drinking water, the treated water prior at the point of delivery must meet the California SDWS. See Figure 10-1. If the treated water is reinjected or discharged to the river, the water will not be required to meet State SDWS.

10.3.4 Resource Conservation and Recovery Act (RCRA) and Hazardous Solid Waste Amendment (HSWA) Standards, 42 U.S.C. §§6901-6987.

RCRA, passed by Congress in 1976 and amended by the Hazardous and Solid Waste Amendments of 1984, contains several provisions that are ARARs for the Glendale North OU. The State of California has been authorized to enforce its own hazardous waste regulations (California Hazardous Waste Control Act) in lieu of the Federal RCRA Program administered by the EPA. Therefore, State regulations in the California Code of Regulations (CCR), Title 22, Division 4.5, Environmental Health Standards for the management of Hazardous

Wastes (hereinafter the State HWCL Regulations), are now cited as ARARs instead of the Federal RCRA Regulations.

Since the source of the contaminants in the groundwater is unclear, the contaminated groundwater is not a listed RCRA waste. However, the contaminants are sufficiently similar to RCRA wastes that EPA has determined that portions of the State's HWCL Regulations are relevant and appropriate. Specifically, the substantive requirements of the following general hazardous waste facility standards are relevant and appropriate to the VOC treatment plant for Alternatives 2 through 7: Section 66264.14 (security requirements), Section 66264.15 (location standards) and Section 66264.25 (precipitation standards).

In addition, the air stripper would qualify as a RCRA miscellaneous unit if the contaminated water constitutes RCRA hazardous waste. EPA has determined that the substantive requirements for miscellaneous units set forth in Sections 66264.601 - .603 and related substantive closure requirements set forth in 66264.111 - .115 are relevant and appropriate for the air stripper. The miscellaneous unit and related closure requirements are relevant and appropriate because the water is similar to RCRA hazardous waste, the air stripper appears to qualify as a miscellaneous unit, and the air stripper should be designed, operated, maintained and closed in a manner that will ensure the protection of human health or the environment.

The land disposal restrictions (LDR), 22 CCR Section 66268 are relevant and appropriate to discharges of contaminated groundwater to land. The remedial alternatives presented do not include land disposal of untreated groundwater. Because of the uncertainty in the levels of contamination and volumes of water to be derived from the development, purging and/or aquifer testing of monitoring and/or extraction wells at the Glendale North OU, these waters must be treated to meet Federal and State MCLs for VOCs, whichever is more stringent, prior to discharge to land.

The container storage requirements in 22 CCR Sections 66264.170 -.178 are relevant and appropriate for the storage of contaminated groundwater over 90 days.

On-site storage or disposal of the spent carbon from the treatment system could trigger the State HWCL requirements for storage and disposal if the spent carbon contains sufficient quantities of hazardous constituents that cause the spent carbon to be classified as a characteristic hazardous waste. If the spent carbon is determined to be a hazardous waste under HWCA, the requirements for handling such waste set forth in Sections 66262 and 66268 are applicable.

Certain other portions of the State's HWCL's regulations are considered to be relevant but not appropriate to the VOC treatment

plant. EPA has determined that the substantive requirements of Section 66264.15 (general inspection requirements), Section 66264.15 (personnel training) and Sections 66264.30-66264.56 (Preparedness and Prevention and Contingency Plan and Emergency Procedures) are relevant but not appropriate requirements for this treatment system. EPA has made this determination because the treatment plant will be required to have health and safety plans and operation and maintenance plans under CERCLA that are substantively equivalent to the requirements of Sections 66264.15, 66264.30-66264.56.

10.4 Summary of ARARs for the Glendale North OU Interim Remedy

EPA has determined a number of chemical-, and action-specific ARARs for the Glendale North OU interim remedy. All of the alternatives that involve groundwater extraction and treatment could achieve the chemical-specific treatment standards for the groundwater at the point of delivery (See Figure 10-1). However, Alternative 3 which uses perozone is a less certain technology than air stripping or liquid-phase GAC adsorption for such a large volume of water and therefore is somewhat less likely to achieve the chemical-specific ARARs.

11.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, EPA has determined that Alternative 2: Extraction, Treatment of VOCs by air stripping (either single- or dual-stage) or liquid phase GAC, Blending to meet the nitrate standard and Conveyance to a public water distribution system, in combination with Alternative 7 (as a contingency): Extraction, Treatment of VOCs, and Reinjection, is the most appropriate interim remedy for the Glendale North OU.

Alternative 2 includes the extraction of 3,000 gpm of contaminated groundwater for 12 years. The extraction wells will be new and will be located to inhibit most effectively the migration of the contaminant plume while maximizing the extraction of the most contaminated groundwater. The most contaminated groundwater is located in the upper or shallowest zone of the aquifer. Various locations and scenarios for extraction wells and rates of extraction are proposed in the FS report for the Glendale North OU; however, all design decisions for this interim remedy will be made during the remedial design phase. During the remedial design phase one of the locations proposed for extraction wells and scenarios for rates of extraction per individual well may be selected or new ones may be selected.

The extracted groundwater will be filtered to remove any suspended solids, if necessary, and then treated for VOCs using dual-stage or single-stage air stripping with vapor-phase GAC adsorption for emissions control or liquid phase GAC may also be

used. Whether air-stripping (dual versus single) or liquid phase GAC will be used will be determined during remedial design as will the exact location for the treatment plant (note that four possible locations were proposed in the FS report). If air-stripping is used for VOC treatment, the air stream will be treated using a vapor-phase GAC adsorption system to ensure that air emissions meet Federal air quality standards as regulated by the South Coast Air Quality Management District and described in the ARARs section of this ROD.

After the extracted groundwater is treated for VOCs, the treated water exiting the treatment plant shall meet all MCLs and secondary drinking water standards with the exception of nitrate. The VOC-treated water will then be blended with water which does not contain nitrate in excess of the nitrate MCL to reduce nitrate levels to meet the nitrate MCL. The treated and blended water to be delivered to a public drinking water supply shall meet all legal requirements. The water will then be conveyed to the City of Glendale and/or another municipality for distribution through the public water supply system.

As a result of comments by the City of Glendale on the Glendale North OU Proposed Plan (July 1992) and Glendale South OU Proposed Plan (September 1992) which indicated that the City had sufficient water credits to accept the treated water from both of these OUs, and in order to decrease overall costs associated with the OUs, EPA has determined that the treatment plants for the Glendale North and Glendale South OUs will be combined. The total 5,000 gpm of treated water will be conveyed to the City of Glendale for distribution to its public water supply system. The exact configuration of the combined treatment plant will be determined during the remedial design phase of the project. The Glendale South OU Record of Decision will also reflect this decision to combine the treatment plants.

However, if the City of Glendale does not agree to accept the treated water from both OUs (possibly due to water supply needs) or if EPA determines that combining the treatment plants will significantly delay or hinder the implementation of the Glendale North OU, the treatment plants will not be combined.

EPA has selected Alternative 7, reinjection of the treated water, as a contingency if the City of Glendale or another San Fernando Valley water purveyor does not accept any or all of the treated water. As a result, any remaining portion of water not accepted by the City of Glendale will be: first, offered to another San Fernando Valley water purveyor or second, reinjected into the aquifer, per Alternative 7.

With the exception of blending to meet the nitrate MCL and final use of the treated water, Alternative 7 is identical to Alternative 2 above.

After the extracted groundwater is treated for VOCs, the treated water exiting the treatment plant shall meet all MCLs for VOCs but will not need to meet secondary drinking water standards. with the exception of nitrate. The VOC-treated water will then be reinjected into the aquifer. To comply with ARARs, nitrate concentrations in the water to be reinjected will have to be similar to or lower than the levels of nitrate in the area of the aquifer where the reinjection will occur.

Reinjection wells will be new wells and will be located such that the effectiveness of inhibition of further downgradient groundwater contamination migration and contaminant mass removal from the aquifer are optimized, to the maximum extent practicable. Locations and injection rates for injection wells are proposed in the FS report for the Glendale North OU, however, all design decisions for this interim remedy will be made during the remedial design phase. During the remedial design phase one of the locations proposed for reinjection wells may be selected or new ones may be selected.

Existing production wells that may provide pathways for vertical migration of contamination will be abandoned or rehabilitated, if required. While the Glendale North OU FS report proposed several production wells be abandoned or rehabilitated, these are only proposals. Again, final determinations regarding which production wells will be abandoned and/or rehabilitated, if any, will be made during remedial design.

Alternative 7 production well abandonment and/or rehabilitation and monitoring well requirements are identical to those discussed above for Alternative 2.

Groundwater monitoring wells shall be installed to evaluate the effectiveness of the Alternative 7 interim remedial action for the Glendale North OU. More specifically, groundwater monitoring will be conducted no less frequently than quarterly to: 1) evaluate influent and effluent water quality, 2) determine and evaluate the capture zone of the extraction wells, 3) evaluate the vertical and lateral (including downgradient) migration of contaminants, 4) to evaluate the effectiveness of the reinjection well system and its impact on the remedy and 5) to monitor any other factors associated with the effectiveness of the Alternative 7 interim remedy determined to be necessary during remedial design. Once the Glendale North OU remedial action has been operating for six years, monitoring frequency may be decreased to less than quarterly if conditions warrant.

The VOC treatment plant of the Glendale North OU interim remedy (whether it be Alternative 2, Alternative 7 or a combination thereof) shall be designed and operated so as to prevent the unknowing entry, and minimize the possible effect of unauthorized entry, of persons or livestock into the active portion of the

facility. One means of preventing unauthorized entry would be to erect a perimeter fence around the VOC treatment plant. This fence should be in place prior to initiation of the remedial action and should remain in place throughout the duration of the remedy. The VOC treatment plant shall also be designed and operated so as to prevent releases of contaminated groundwater from the plant.

The selected remedy for the Glendale North OU meets all of EPA's nine evaluation criteria. The selected remedy is equally effective as the other alternatives in the short-term and long term reduction of risk to human health and the environment by removing contaminants from the upper zone of the aquifer, by inhibiting further downgradient and vertical migration of the contaminant plume, and by reducing the toxicity, mobility, and volume of contaminants in the aquifer.

The selected remedy is estimated to remove approximately 82% (Alternative 2) to 89% (Alternative 7) of the total estimated initial TCE mass after 12 years of extraction, and may reduce the maximum TCE concentration remaining in the upper zone of the aquifer by 88% or more. Thus, at the end of the 12 year interim remedy, the maximum TCE concentration remaining in the upper zone of the aquifer would be approximately 250 ug/l. The selected remedy is estimated to significantly inhibit downgradient migration of contaminated groundwater as well as vertical migration from the upper to the lower zone of the aquifer. Vertical migration will be further curtailed with the rehabilitation and/or abandonment of inactive production wells screened in both the upper and lower zones. Furthermore, the modeling conducted as part of the FS indicated that the 3000 gpm extraction rate of the selected remedy would be effective in inhibiting the discharge of contaminated groundwater to the Los Angeles River by reducing groundwater levels to below river bottom elevations.

The VOC treatment technologies selected (dual- or single-stage air stripping with vapor phase GAC or liquid phase GAC) are technically feasible and proven effective at meeting ARARs for VOCs in the treated groundwater.

Alternative 2, in combination with alternative 7, could be implemented, both technically and administratively. Other alternatives which dispose of the water by spreading at the Headworks Spreading Grounds may not be implementable because Headworks is widely used and may not be available.

In a letter dated March 29, 1993, the State expressed agreement with EPA's selected remedy. EPA received several public comments during the sixty day public comment, the majority of which expressed support for Alternative 2, primarily because this alternative provides the treated water to a drinking water purveyor. EPA's preferred alternative. These comments, along with

EPA's responses are presented in Part III of this ROD, the Responsiveness Summary.

The selected remedy is protective of human health and the environment, meets ARARs, and unlike some other alternatives such as Alternative 4 which includes discharge of the treated water to the Los Angeles River, provides beneficial uses (distribution to a public water supply and/or reinjection) for the treated water. The selected remedy is cost-effective. The estimated cost of Alternative 2 has a total present worth of $36,400,000, which is in the middle of the range for all seven alternatives and this cost would be significantly reduced by combining the treatment plants for the OUs (based on a total cost savings of up to $13.8 million for both OUs). The estimated total cost of Alternative 7 is $38,700,000, which is higher than Alternative 2 but significantly less than Alternative 5, the most expensive alternative proposed. As discussed in Section 10 (ARARs), Alternative 5 exceeds the chemical-specific ARARs because it involves treatment of nitrate by ion exchange.

12.0 STATUTORY DETERMINATIONS

As required under Section 121 of CERCLA, the selected interim remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the interim remedial action, and is cost effective. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment to reduce toxicity, mobility, and volume as a principal element.

The selected interim remedial action is protective of human health and the environment in that it removes a significant VOC contaminant mass from the upper zones of the aquifer and inhibits further downgradient and vertical migration of contaminated groundwater.

The VOC treatment technologies selected (dual- or single-stage air stripping with vapor phase GAC or liquid phase GAC) are technically feasible and proven effective at meeting ARARs for VOCs in the treated groundwater and the air.

The selected remedy permanently and significantly reduces the toxicity, mobility, and volume of hazardous substances in the aquifer as well as the extracted groundwater.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, EPA shall conduct a review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, at least once every five years after commencement of remedial action

to ensure that the remedy continues to provide adequate protection of human health and the environment.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The only significant change to the Glendale North OU interim remedy proposed in the Proposed Plan fact sheet dated July 1992 involves the volume of water to be conveyed to the City of Glendale.

As a result of oral comments at the Glendlae North OU Proposed Plan public meeting as well as written comments by the City of Glendale on the Glendale North OU Proposed Plan (July 1992) and Glendale South OU Proposed Plan (September 1992) which indicated that the City had sufficient water credits to accept the treated water from both the Glendale North and Glendale South OUs, and in order to decrease overall costs associated with the OUs, EPA has determined that the treatment plants for the Glendale North and Glendale South OUs will be combined. The total 5,000 gpm of treated water will be conveyed to the City of Glendale for distribution to its public water supply system. The exact configuration of the combined treatment plant will be determined during the remedial design phase of the project. The Glendale South OU Record of Decision will also reflect this decision to combine the treatment plants.

However, if the City of Glendale does not agree to accept the treated water from both OUs (possibly due to water supply needs) or if EPA determines that combining the treatment plants will significantly delay or hinder the implementation of the Glendale North OU, the treatment plants will not be combined and only the extracted treated water from the Glendale North OU will be conveyed to the City of Glendale for distribution to its public water supply system. As a further contingency, if the City of Glendale does not accept any or all of the treated water, any remaining portion of water will be 1) offered to another San Fernando Valley water purveyor or 2) reinjected/recharged into the aquifer.

The impact of this change is that an additional 2,000 gpm of treated water would be provided to the City. In its comments to EPA on both the Glendale North and South OU Proposed Plans, the City indicated that it would be able to accept the additional treated water. The cost of construction and operation and maintenance of the combined treatment plant is expected to be less than the cost of construction and operation and maintenance of individual treatment plants. Recent EPA cost estimates indicate that as much as $13,888,000 would be saved on the total present worth cost by combining the two treatment plants.

PART III. RESPONSIVENESS SUMMARY

For Public Comments received during the Public Comment Period for the Glendale North Operable Unit Interim Remedy at the San Fernando Valley Superfund Site Los Angeles County, California

EXECUTIVE SUMMARY

This Responsiveness Summary addresses comments received from the public, state agencies, and local agencies on EPA's proposed interim cleanup plan for the Glendale North OU. Comments from the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) on the RI report for the Glendale Study Area, the Glendale North FS Report, and the draft Proposed Plan for the Glendale North OU were received by EPA prior to issuing the Proposed Plan and initiating the public comment period. DTSC's comments and EPA's responses are available for review in the Administrative Record for the Glendale North OU and are not included in this responsiveness summary.

EPA held a sixty day public comment period on the RI and FS reports, Proposed Plan and other Glendale North OU Administrative Record documents between July 6, 1992 and September 8, 1992. A public meeting was held in Glendale on July 23, 1992. Approximately 30 representatives of the community, state and local agencies, and EPA attended the meeting. EPA staff made a presentation on the Glendale North OU alternatives, including EPA's preferred alternative, and answered questions. A transcript of the meeting is included in the Supplement 1 to the Administrative Record for the Glendale North OU.

EPA received comments orally from three members of the public during the July 23, 1992 public meeting. The first commenter was a representative of the City of Glendale. The City's comments included a request for additional water (up to 12,000 gpm) and their overall support of EPA's preferred alternative for the Glendale North OU. EPA responded to this comment by stating that the Glendale North OU remedy involves extractions of 3,000 gpm only. However, EPA has since determined that the Glendale North and South OUs will be combined and the extracted, treated water will be conveyed to the City of Glendale. If this is accomplished, an additional 2,000 gpm of extracted, treated water would be provided to the City, for a total of 5,000 gpm.

The second commenter expressed an interest in seeing EPA consider selecting Alternative 3 for the Glendale North OU interim remedy. Similar comments were also made by the City of Glendale. Alternative 3 involves treating VOC contamination using an innovative technology called perozone (hydrogen peroxide and

ozone). EPA explained that this VOC treatment is not proven at high flow rates (> 3,000 gpm), may be substantially more costly than estimated and is not effective at treating some of the Glendale North OU contaminants (e.g. carbon tetrachloride). Since the final use of the treated water is distribution to a public water supply system, EPA determined that selecting a proven technology (e.g., air stripping or liquid phase GAC) was preferable.

The third commenter expressed concern about using groundwater from the lower zone of the aquifer for blending to meet the nitrate MCL. The State also expressed this same concern to EPA in writing. EPA explained that it shares these concerns because this water is also likely to be contaminated and extracting it would likely result in vertical migration of both VOC and nitrate contamination. In addition, such extractions might interfere with the effectiveness of the Glendale North OU remedy.

EPA also received nine letters containing comments from interested community members, the City of Glendale, the California Department of Health Services Office of Drinking Water (ODW), and the Los Angeles Region of the California Regional Water Quality Control Board (RWQCB). A tenth letter was received one day after the close of the public comment period. The comments included in the tenth letter were similar to those of earlier commenters and thus EPA was able to address them. These letters are included in Supplement 1 of the Glendale North OU Administrative Record.

One member of the public was concerned that extracting 3000 gpm of groundwater over a 12-year period would result in subsidence and sink hole formation. EPA responded that subsidence is not likely to occur as a result of Glendale North OU extractions. Other commenters asked that EPA use the treated water only for reclaimed water purposes and not for drinking water. EPA explained that the treated water will be of a much higher quality than reclaimed water and will meet all drinking water standards prior to final use.

The City of Glendale's written comments were similar to those presented orally at the public meeting.

The RWQCB expressed support for EPA's preferred alternative and favors direct use of the treated water to reinjecting it. EPA also prefers direct use of the treated water but will reinject any remaining portion if a water purveyor cannot accept it. ODW stated that it considers the perozone treatment process an experimental one and that it should not be used for the Glendale North OU interim remedy. EPA agreed with this comment. ODW also stated that the City of Glendale must obtain a water supply permit. EPA responded that the City will receive the treated water at the point of delivery and thereafter the water will need to meet all offsite

legal requirements, including permits for offsite actions, before it is conveyed to the public water distribution system.

EPA also received numerous comments from ITT General Controls, Inc. on several issues relating to the RI and FS documents and the Proposed Plan for the Glendale North OU interim remedy. Most of these comments criticized EPA for not justifying its decisions including its preferred alternative selection, suggested that EPA did not provide the proper supporting documentation and stated that the interim remedy for Glendale North OU did not demonstrate consistency with a permanent remedy for the San Fernando Valley sites. EPA responded that the Glendale North OU is an interim action and not a permanent remedy, that the RI/FS and remedy selection were conducted in accordance with the NCP, applicable EPA guidance, that an entire Administrative Record with supporting documentation is available for review at the San Fernando Valley information repositories, and finally that the Glendale North OU interim remedy would not be inconsistent with nor preclude implementation of any final remedy for the San Fernando Valley sites.

The Responsiveness Summary is divided into two parts. Part I focuses on EPA's responses to the concerns and major issues raised by members of the local community including the City of Glendale. Part II includes detailed responses to the comments received that were more legal or technical in nature. Comments submitted by State agencies are included in Part II.

ATTACHMENT B

GLENDALE NORTH OPERABLE UNIT

RECORD OF DECISION

PART I: DECLARATION

PART II: DECISION SUMMARY

PART III: RESPONSIVENESS SUMMARY

SAN FERNANDO VALLEY AREA 2 SUPERFUND SITE

LOS ANGELES COUNTY, CALIFORNIA

United States Environmental Protection Agency
Region 9 - San Francisco, California

ATTACHMENT C

GLENDALE SOUTH OPERABLE UNIT

RECORD OF DECISION

PART I: DECLARATION

PART II: DECISION SUMMARY

PART III: RESPONSIVENESS SUMMARY

SAN FERNANDO VALLEY AREA 2 SUPERFUND SITE

LOS ANGELES COUNTY, CALIFORNIA

United States Environmental Protection Agency
Region 9 - San Francisco, California

ATTACHMENT D

RESPONDENTS TO
ADMINISTRATIVE ORDER ON CONSENT FOR REMEDIAL DESIGN,
IN THE MATTERS OF GLENDALE NORTH OPERABLE UNIT
AND GLENDALE SOUTH OPERABLE UNIT.

Access Controls, Inc.
Admiral Controls, Inc.
Brock Bus Lines
Burbank Steel Treating, Inc.
Courtaulds Aerospace, Inc.
Credit Managers Association of California
EEMCO/Datron Inc.
Fiber-Resin Corporation
Foto-Kem Industries, Inc.
GCG Corporation
Haskel International, Inc.
ITT Corporation
Joseph A. Thomson
Lockheed Corporation
Loral Librascope Corporation
Menasco Aerosystems Division of Coltec
Industries Inc.
Pacific Bell
Philips Components Discrete Products Division of
Philips Electronics North America Corporation
Ranchito Allegra
Southern Pacific Transportation Company
Sterer Engineering & Manufacturing Company
The Prudential Insurance Company of America dba
Prudential Realty Group
The Walt Disney Company
Vorelco, Inc., a division of
Volkswagen of America, Inc.
ZERO Corporation