San Fernando Valley Area 1, North Hollywood Operable Unit

U.S. Environmental Protection Agency $ Region 9 $ San Francisco, CA $ July 2009

Proposed Plan for Enhanced Groundwater Remedy

The United States Environmental Protection Agency (EPA) is requesting public comments on this **Proposed Plan** to improve the existing groundwater remedy for the North Hollywood Operable Unit (NHOU) of the San Fernando Valley (SFV) Area 1 **Superfund** Site (words in **bold** are defined in the Glossary at the end of this fact sheet). The purpose of this Plan is to describe and obtain public input on the cleanup options being considered. EPA is issuing this Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Plan identifies the Preferred Alternative for improving the existing NHOU groundwater remedy and provides the rationale for this preference. In addition, this Plan includes summaries of other alternatives evaluated for the site. EPA will select an updated remedy for the site after reviewing and considering all information submitted during the public comment period.

The public is invited to attend an availability session and public meeting on July 21, 2009. The availability session is an informal chance for the public to talk with EPA about SFV groundwater contamination issues and the proposed cleanup. During the public meeting, EPA will make a formal presentation of the Proposed Plan and the public will have an opportunity to ask questions and provide oral comments about this Plan as part of the public record. You may also submit written comments at any time during the 30-day comment period which begins on July 13, 2009, and ends on August 10, 2009. In the box to the right, you will find the time and place for the public meeting, as well as information on how the public can submit comments in writing.

This Plan highlights key information about the existing NHOU groundwater remedy, the contamination that is still present, and the cleanup options evaluated, including EPA's Preferred Alternative. It is based on the NHOU Focused Feasibility Study (FFS) prepared by EPA. The FFS and other supporting information are available to the public as part of the **Administrative Record** file at the **Information Repositories** or online (see Page 15 for locations, hours and web site). The EPA prepared this Plan in consultation with the Department of Toxic Substances Control (DTSC) and the Regional Water Quality Control Board (RWQCB). EPA may modify the Preferred Alternative or select another response action presented in this Plan based on new information or public comments.

How You Can Comment

The EPA encourages the public to comment on this proposed groundwater cleanup action at the North Hollywood Operable Unit. The comment period is July 13 through August 10, 2009. You can comment in person at the public meeting or in writing to the remedial project manager. Please send comments, postmarked no later than August 10, 2009, by mail, fax, or email to:

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Public Meeting

Tuesday
July 21, 2009
6-7pm Availability Session
7-9pm Public Meeting

Burbank Airport Marriott
Hotel & Convention Center
2500 Hollywood Way
Burbank, California 91505 USA

The EPA is proposing to address groundwater contamination in the NHOU by expanding the existing groundwater remedy (First Interim Remedy) to treat a higher volume of groundwater, to improve containment of contaminated groundwater, and to add treatment for new contaminants (primarily chromium). The improved groundwater remedy will be the Second **Interim Remedy** for the NHOU.

Site Background

EPA and the Los Angeles Department of Water and Power (LADWP) have been involved in addressing groundwater contamination in the NHOU since 1981, when LADWP and the Southern California Association of Governments, funded by EPA, performed a study titled *Groundwater Management Plan—San Fernando Valley Basin,* to investigate widespread groundwater contamination in the SFV. The primary groundwater **contaminants of concern** in the SFV at that time were trichloroethylene (TCE) and tetrachloroethylene (also referred to as perchloroethylene, or PCE). These are **volatile organic compounds** (VOCs) commonly used as industrial solvents. TCE concentrations in shallow groundwater of the eastern SFV are shown on Figure 1, which illustrates the extent of VOC contamination.

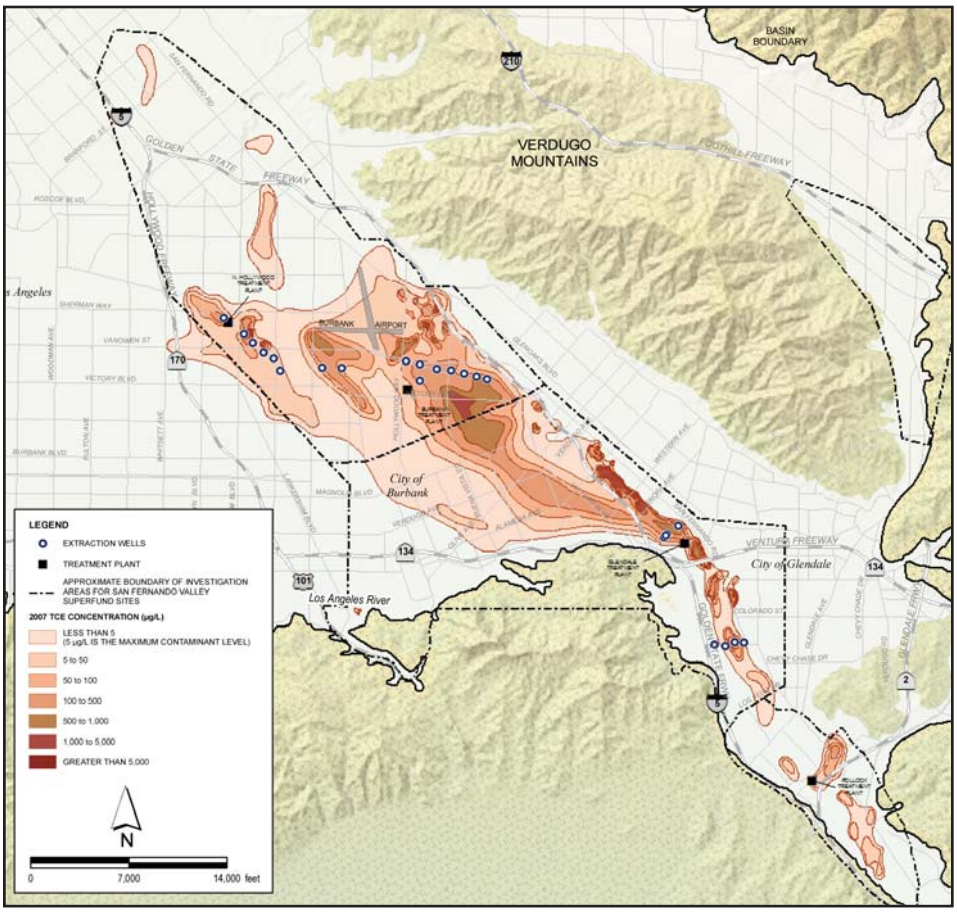

Figure 1. TCE Concentrations in Shallow Groundwater of the Eastern San Fernando Valley

To address the widespread groundwater contamination in the San Fernando Valley, EPA placed four SFV sites (or Areas) on the **National Priorities List** in 1986. These four Superfund sites are referred to as: SFV Area 1 - North Hollywood, which includes the North Hollywood and Burbank Operable Units (OUs); SFV Area 2 - Crystal Springs, which includes the Glendale North and South OUs; SFV Area 3 - Verdugo; and SFV Area 4 - Pollock. EPA has focused its resources on addressing the regional groundwater contamination, while the State (primarily through the RWQCB) has had the primary role for soil cleanup work at the numerous VOC sources that caused the groundwater contamination.

To expedite cleanups at large sites such as the four SFV Superfund sites, EPA often separates the cleanup actions into smaller parts called **operable units** (OUs). An OU is a focused study area that is established by EPA to take action on a distinct area or type of contamination, as part of an overall site cleanup. The OUs and Superfund Areas in the eastern SFV are shown on Figure 2. The proposed cleanup action discussed in this fact sheet is for the North Hollywood OU of the SFV Area 1 site. The original **Record of Decision** (ROD) for the NHOU was signed in September 1987. The selected interim remedy addressed VOC-contaminated groundwater in the North Hollywood area. The objective of the selected remedy was to "slow down or arrest" the migration of the contamination plume at the North Hollywood-Burbank well field. The 1987 ROD selected groundwater extraction and treatment by air stripping (referred to as "aeration" in historical documents).

Under the First Interim Remedy, contaminated groundwater is withdrawn from the **aquifer** using a series of extraction wells; seven of the eight original wells are currently functional. The NHOU treatment plant removes VOCs from the extracted groundwater using air stripping, with granular activated carbon filters used to remove VOCs from the process air before it is discharged to the atmosphere. The treated water meets drinking water standards and is delivered via pipeline to the LADWP water supply system, where it is blended with water from other sources and distributed through the water supply system for the City of Los Angeles.

The existing groundwater remedy has limited contaminant migration and removed approximately 6,000 pounds of VOCs from groundwater in the NHOU. In doing so, the groundwater remedy has extracted and treated approximately 8 billion gallons of VOCs contaminated groundwater to levels that are below state and federal **maximum contaminant levels** (MCLs) for drinking water. However, changing groundwater conditions in the aquifer and the discovery of VOC contamination in new areas of the aquifer beneath North Hollywood limit the ability of the existing remedy to fully contain the VOC plume in the NHOU.

In addition, EPA has detected **emerging contaminants**, including **hexavalent chromium** and **1,4-dioxane,** in excess of the state MCL for total **chromium** and the California Department of Public Health (CDPH) **notification level** (NL) for 1,4-dioxane at one of the NHOU extraction

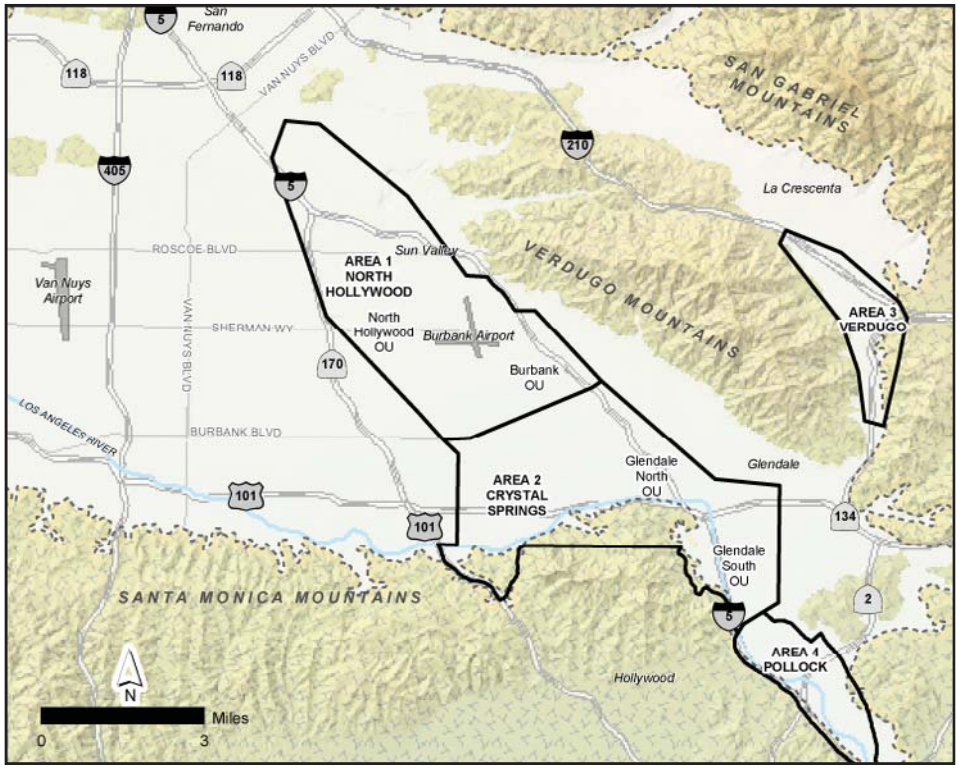

Figure 2. Superfund Areas and Operable Units in the Eastern San Fernando Valley

wells, NHE-2. The existing NHOU treatment system is incapable of removing these contaminants, and a sharp increase in NHE-2 chromium concentrations in 2007 caused the well to be shut down for 18 months. This well is located near the former Allied-Signal facility (now owned by Honeywell) and serves an important plume containment function for the high levels of contamination in that area. In September 2008, well NHE-2 was returned to service with the extracted groundwater discharging to the sanitary sewer. Although well NHE-2 is operational again, its shut down demonstrates the need for improvements in the remedy so that it can treat additional contaminants in the aquifer that would otherwise interfere with the end use of the water.

In response to the continued migration of VOC-contaminated groundwater and the presence of chromium and other emerging contaminants in the NHOU, EPA conducted a Focused Feasibility Study (FFS) to evaluate alternatives for improving the groundwater remedy. The FFS developed and evaluated a range of alternatives for addressing the contaminants in groundwater. The results of the FFS, including the comparative analysis of alternatives and identification of a preferred alternative, are summarized in this Proposed Plan.

Site Characteristics

The SFV is an important source of drinking water for the Los Angeles metropolitan area. On average, groundwater in the vicinity of the NHOU accounts for approximately 11 percent of the City of Los Angeles' drinking water supply, with the North Hollywood treatment system contributing between 1-2 percent of this amount.

The primary contaminants of concern (COCs) at the NHOU have historically been TCE and PCE. TCE and PCE are solvents that have been widely used as industrial cleaning and degreasing agents. Carbon tetrachloride, 1,1,1-trichloroethane (TCA), and several other chlorinated VOCs have also been detected in NHOU extraction wells, typically at lower concentrations than TCE and PCE. These VOCs are effectively removed by the existing NHOU treatment system to below MCLs, and often to non-detectable levels.

Two emerging contaminants of concern, hexavalent chromium and 1,4-dioxane, have been detected recently in one of the NHOU extraction wells at concentrations that exceed the MCL for chromium and the notification level for 1,4-dioxane. Chromium's industrial uses include metal plating operations and aviation and aerospace parts manufacturing. Hexavalent chromium was also used to inhibit corrosion in industrial cooling towers. Honeywell is currently implementing in-situ chromium treatment to reduce chromium concentrations in soil and groundwater directly under the former Allied-Signal facility. However, it is expected that elevated hexavalent chromium concentrations will persist in groundwater outside of Honeywell's treatment area. 1,4-Dioxane is a stabilizing agent that was added to chlorinated solvents such as TCE and TCA, and is often associated with VOC contamination in groundwater. 1,4-Dioxane is also commonly found in some paint strippers, dyes, greases, varnishes, waxes, antifreeze, and aircraft deicing fluids.

Summary of Risks from Contaminated Groundwater

A **Remedial Investigation** (RI) was conducted for the SFV Superfund sites in 1992. As part of the RI, a baseline **human health risk assessment** was conducted and reported in the original Remedial Investigation (RI) report for the SFV in 1992, in accordance with EPA's Risk Assessment Guidance for Superfund. The major transport pathway considered in the risk assessment was use of contaminated groundwater. Residential use of groundwater for potable supply was identified as the most significant exposure pathway (via ingestion and inhalation) because the SFV groundwater is used by LADWP for municipal drinking water supply.

The baseline risk assessment identified VOCs, in particular TCE and PCE, as the primary risk drivers for the SFV Superfund sites, which includes the NHOU. TCE and PCE are classified as probable human carcinogens based on laboratory studies performed on animals. Among the metals considered in the RI risk assessment, chromium had the highest **hazard index** (5.8).

Because the VOCs in groundwater were significantly greater than the MCLs at the time of the original NHOU FS, the original NHOU risk evaluation consisted of a comparison of the VOCs concentrations in groundwater with the groundwater MCLs. Since then, Region 9 has periodically compared the VOC concentrations in groundwater with the Superfund Regional Screening Levels (RSLs) (formerly known as the Preliminary Remediation Goals) and has determined that the original approach and evaluation of risk remains valid.

Since the 1992 RI, much higher concentrations of total and hexavalent chromium, TCE, PCE, and other VOCs have been detected in the NHOU, particularly at the Honeywell facility. Recent concentrations of TCE detected in the NHOU have been up to 500 times greater than the MCL, and recent peak concentrations of total chromium have exceeded the California MCL by a factor of nearly 1,000.

Because groundwater is the primary contaminated medium at the site, and groundwater/surface water interactions do not occur within the NHOU, the ecological risk posed by contaminants in groundwater is negligible.

It is EPA's judgment that implementation of the Preferred Alternative, or one of the other remedial alternatives considered in this Proposed Plan (except for the no-further-action alternative), is necessary to protect public health or welfare, or the environment from actual or threatened releases of hazardous substances into the environment.

Remedial Action Objectives and Cleanup Levels

This Proposed Plan presents EPA's Preferred Alternative for the next phase of groundwater cleanup for the NHOU. The interim action recommended in this Proposed Plan is intended to achieve the following **Remedial Action Objectives** (RAOs):

- Contain areas of contaminated groundwater that exceed the MCLs and notification levels to the maximum extent practicable.
- Prevent further degradation of water quality at the Rinaldi-Toluca and North Hollywood West production wells by preventing the migration toward these well fields of the more highly contaminated areas of the VOC plume located to the east/southeast.
- Achieve improved hydraulic containment to inhibit horizontal and vertical contaminant migration in groundwater from the more highly contaminated areas and depths of the aquifer to the less contaminated areas and depths of the aquifer, including the southeast portion of the NHOU in the vicinity of the Erwin and Whitnall production well fields.
- Remove contaminant mass from the aquifer.

The improved containment of the contaminant plume called for in these RAOs can be achieved by increasing the number of extraction wells and the volume of contaminated groundwater that is extracted by the NHOU remedy. However, in some areas of the NHOU, high volume LADWP production wells currently capture part of the VOC plume (i.e., groundwater with VOC concentrations of 5 µg/L or greater)(see Figure 3). LADWP relies on these wells (particularly those in the Rinaldi-Toluca and North Hollywood West well fields) to meet its water supply needs and manages their use so as to ensure that drinking water standards are always met. Because these wells will continue to be used, it is not possible for the NHOU system to capture and contain all of the contaminated groundwater. Consequently, one of EPA's objectives is to improve containment of the high concentration areas of the plume to ensure that no further degradation of groundwater quality occurs in the vicinity of the Rinaldi-Toluca and North Hollywood West well fields.

In addition, some areas of low to moderate VOC contamination within the NHOU are not yet adequately defined for development of a remedy to address them. At present, the low-to moderate-concentration plumes that escape containment by the existing NHOU extraction wells are ultimately captured and treated by the Burbank OU or Glendale OU extraction and treatment systems, or are captured by LADWP production wells and mitigated via blending with other water sources.

The FFS evaluated two end use options for the groundwater extracted and treated by the various alternatives: 1) delivery to LADWP for use in its municipal water supply system, or 2) reinjection of the treated water back into the aquifer.

Cleanup Levels For Drinking Water End Use

For the drinking water end use option, EPA proposes to use the federal and state drinking water MCLs as the cleanup levels for the treated groundwater. For the emerging chemicals (other than hexavalent chromium) for which MCLs have not been established (i.e., 1,4-dioxane), EPA proposes to use the CDPH notification levels as the cleanup levels for the treated groundwater.

An MCL for hexavalent chromium does not currently exist, but the State has initiated development of a public health goal and may promulgate an MCL within the next several years. Based on discussions with LADWP, it is EPA's understanding that LADWP will continue to use a voluntary cleanup level of 5 µg/L for hexavalent chromium for water it will accept for use in its water supply system. Consequently, under the drinking water end use option, chromium treatment at the NHOU will be needed so that LADWP's voluntary cleanup level of 5 µg/L can be met. Therefore, the EPA cleanup level for hexavalent chromium in treated water is 5 µg/L.

These cleanup levels, along with data from the expanded groundwater monitoring well network, will serve as a trigger for initiating further response actions to address the contaminant in question so as to ensure that drinking water standards are not exceeded in the treated water from the NHOU treatment system.

Cleanup Levels for Reinjection End Use

For the reinjection end use option, removal of hexavalent and total chromium will also be needed to comply with the State of California's anti-degradation policy, which establishes cleanup levels for reinjection into the aquifer. The anti-degradation policy allows for injection of treated groundwater at concentrations less than or equal to the groundwater quality at the injection location(s). Accordingly, the treated groundwater cleanup levels for the reinjection end use option will be established during remedial design based on the COC concentrations in the groundwater at the injection well location(s).

Table 1 lists the cleanup levels for the contaminants of concern (COCs) that pose the primary health risks in groundwater in the NHOU and for the two most significant emerging contaminants, chromium (both total and hexavalent) and 1,4-dioxane for the drinking water end use option.

Table 1. Cleanup Levels for the Contaminants of Concern

Contaminant of Concern	Cleanup Levels [a, b] (µg/L)	Basis for Cleanup Level
Trichloroethylene (TCE)	5	Federal and California MCL
Tetrachloroethylene (PCE)	5	Federal and California MCL
Total Chromium	50 [c]	California MCL
Hexavalent Chromium	5	See discussion in text
1,4-Dioxane	3	CDPH Notification Level

[a] The California Department of Public Health permitting process may require lower concentrations in the treated effluent.

[b] Cleanup levels for the reinjection end use option will be determined during remedial design based on the injection locations.

[c] The planned treatment process for hexavalent chromium will also reduce total chromium concentrations to 5 µg/L.

Remedial Alternatives

Based on the available information about the current nature and extent of groundwater contamination in the NHOU, the past performance of the existing remedy, and projections for future water withdrawals and recharge by LADWP, EPA developed a range of remedial action alternatives for achieving the RAOs described above. Nine remedial alternatives (Alternatives 1 through 5b) that incorporate different combinations of technologies and process options (described in detail in the FFS) have been developed. The exact number, location, and pumping rates for the groundwater extraction wells are estimated and will be finalized during remedial design.

As a baseline against which to compare other alternatives, Alternative 1 assumes continued operation of the existing NHOU extraction and treatment system and delivery of treated groundwater to LADWP, with few modifications. Alternatives 2a through 5b include significant improvements to the NHOU extraction and treatment system, as well as two options for reuse of treated groundwater: delivery to LADWP (defined in the FFS as option "a") or reinjection to the aquifer (option "b"). EPA's Preferred Alternative is Alternative 4a.

The remedial alternatives have several common components that are described below.

Common Components for all Remedial Alternatives

All of the remedial alternatives considered in the FFS include the following common components:

- **Institutional controls** in the form of a groundwater management plan (i.e., a written agreement between EPA and LADWP regarding extraction rates for the NHOU Second Interim Remedy and the production well fields) to mitigate the potential negative impacts to the NHOU system performance that could result from unexpected groundwater withdrawal by water purveyors (e.g., LADWP) in and near the NHOU.
- Groundwater and treatment system monitoring, including approximately 37 new groundwater monitoring wells.
- Wellhead treatment at extraction well NHE-2 using an advanced oxidation process (AOP) to remove 1,4-dioxane and a secondary treatment process to remove byproducts resulting from AOP.

- Chromium treatment for groundwater extracted by well NHE-2.

Alternatives 2a through 5b include the following additional common components:

- Repair and/or modify (deepen) existing extraction wells NHE-1 through NHE-8 to improve capture of the VOC plume.
- Construct new extraction wells and associated pipelines to improve hydraulic containment of highly contaminated groundwater south of LADWP's southern Rinaldi-Toluca wells and east of LADWP's North Hollywood West Well Field.
- Refurbish the existing air stripper and add a second air stripper to provide sufficient primary VOC treatment capacity to handle the increased volume of groundwater from the extraction wells.
- Chromium treatment for groundwater extraction wells (in addition to NHE-2) where chromium concentrations are expected to be highest. The primary difference between Alternatives 2a through 5b is the number of extraction wells treated for chromium.

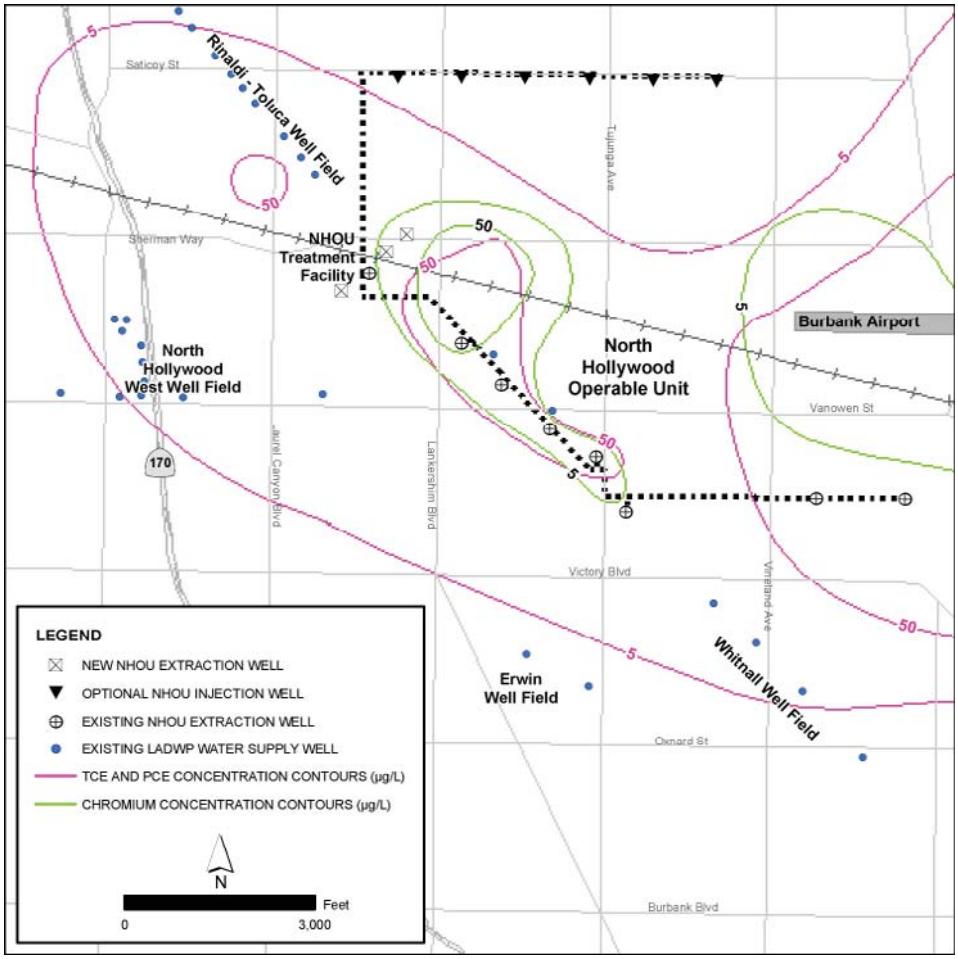

Figure 3. Potential Remedy Components for Remedial Alternatives

Figure 3 is a map showing locations of the existing and potential remedy components described above relative to the VOC and chromium plumes.

Alternatives 2a, 3a, 4a and 5a include the following to allow for delivery of treated water to LADWP's water supply system: liquid phase granular activated carbon (LPGAC) treatment system installed downstream from the air strippers to provide double barrier VOC treatment as required by CDPH.

Alternatives 2b, 3b, 4b and 5b include the following to allow for reinjection of treated water to the aquifer: six injection wells and associated pipeline, and nine additional monitoring wells.

End Use Options for Treated Water

Alternatives 1, 2a, 3a, 4a, and 5a assume that the groundwater treated by the NHOU treatment plant would continue to be blended with water from other sources, delivered to the City of Los Angeles, and used as part of the drinking water system of the LADWP. As noted above, redundant VOC treatment (air stripping followed by LPGAC) would be implemented under Alternatives 2a, 3a, 4a, and 5a to meet CDPH requirements for drinking water from severely impaired sources. In addition, chromium treatment would be implemented under Alternatives 2 through 5 (both "a" and "b" options) to reduce total and hexavalent chromium concentrations in the combined effluent from the NHOU treatment system. The approach and number of wells selected for chromium treatment varies between alternatives, as discussed below.

Reinjection of treated groundwater into the aquifer using injection wells is assumed under Alternatives 2b, 3b, 4b, and 5b. Redundant VOC treatment would not be required under the reinjection option. Reinjection of the treated water would supplement recharge to the aquifer, making the water available for future pumping and use by LADWP. The configuration of the injection wells, treatment system components, and ancillary equipment are discussed in the FFS. The six injection wells would be located north (upgradient) of the NHOU extraction wells. In this configuration, the treated groundwater would be reinjected into the aquifer at the northern boundary of the VOC and chromium plumes, and supplement the hydraulic gradient driving contaminated groundwater toward the extraction wells.

For the reinjection scenarios, because the treated groundwater would no longer be delivered to LADWP, it is assumed that the existing NHOU extraction and treatment system would have to be replaced, including the extraction wells (NHE-1 through NHE-8), the pipeline from the extraction wells to the treatment plant site, and existing VOC treatment unit (air stripper). In addition, land would have to be purchased to site a new treatment system, extraction wells, and injection wells.

Summary of Remedial Alternatives

Alternative 1 – Existing NHOU Extraction and Treatment System

Alternative 1 is included to provide a baseline for comparison purposes only. Typically, a "no-action" alternative is considered in a feasibility study to provide a baseline for comparison to other alternatives. However, a no-action alternative was already considered and rejected for the NHOU (in 1987), and an existing interim remedy is currently in place. Therefore, rather than reconsidering the no-action alternative, Alternative 1 consists of continued use of the existing NHOU Extraction and Treatment System, with minor modification and increased monitoring. It is assumed that wellhead treatment for chromium and 1,4-dioxane at extraction well NHE-2 will be implemented in 2009/2010 so that groundwater extracted by this well can be pumped to the NHOU treatment system.

Alternatives 2a and 2b – Expand Extraction Well System and Operate Chromium Wellhead Treatment Systems at NHE-1 and NHE-2

The primary objective of Alternatives 2a, 2b, and the other alternatives (except for Alternative 1) considered in the FFS is to improve hydraulic containment, particularly for highly contaminated groundwater in the NHOU. To achieve this objective, Alternatives 2a and 2b include expansion and improvement of the Existing NHOU Groundwater Extraction and Treatment System. Under Alternatives 2a and 2b, wellhead chromium treatment systems would be installed at NHE-1 and NHE-2.

Alternative 2a includes the following specific actions:

- **Delivery of treated groundwater to LADWP as the end use.** This will require construction of an LPGAC system downstream from each of the air strippers to provide double barrier treatment for VOCs.
- **Wellhead chromium treatment at well NHE-1.** Initiation of pumping at the modified extraction well NHE-1 is expected to result in extraction of chromium-contaminated groundwater at concentrations similar to those detected at well NHE-2. Ex situ wellhead treatment of chromium would be implemented at well NHE-1 (using one of the two specific treatment technologies described in the FFS).
- **Wellhead chromium treatment at well NHE-2.** The ex situ treatment system for chromium currently planned by Honeywell is designed for a pumping rate of 140 gpm, which is approximately half of the target pumping rate for NHE-2 after it is deepened under Alternative 2a. Therefore, the chromium treatment system planned by Honeywell will be replaced or enlarged to accommodate a peak flow rate of 300 gpm, and an average flow rate of 250 gpm.
- **Wellhead 1,4-dioxane treatment at well NHE-2.** The ex situ treatment system for 1,4-dioxane treatment currently planned by Honeywell is designed for a pumping rate of 140 gpm, which is approximately half of the target pumping rate for NHE-2 after it is deepened under Alternative 2a. Therefore, the 1,4-dioxane treatment system planned by Honeywell will be replaced or enlarged to accommodate a peak flow rate of 300 gpm, and an average flow rate of 250 gpm.

Alternative 2b is nearly identical to Alternative 2a, but assumes reinjection of the treated groundwater into the aquifer rather than delivery to LADWP, resulting in the following differences:

1. Construction of six new injection wells, a pipeline from the NHOU treatment plant to the injection wells, and nine new monitoring wells in the vicinity of the injection wells.
2. No LPGAC system downstream from each of the air strippers, as there would be no need to provide double barrier treatment for VOCs.

Alternatives 3a and 3b – Expand Extraction Well System and Operate Chromium Treatment System for Combined Effluent from Extraction Wells NHE-1 and NHE-2

Alternatives 3a and 3b were developed to evaluate the cost-effectiveness of operating a single chromium treatment system for the combined flow from wells NHE-1 and NHE-2, compared with operation of two individual wellhead chromium treatment systems at these wells (as assumed under Alternatives 2a and 2b). Other components of Alternatives 3a and 3b are identical to those of Alternatives 2a and 2b, respectively.

Alternatives 4a and 4b – Expand Extraction Well System and Operate Ex Situ Chromium Treatment System for Multiple Extraction Wells

These alternatives incorporate chromium treatment for the combined influent from extraction well NHE-1 and two of the three new extraction wells (NEW-2 and NEW-3), along with wellhead chromium treatment for NHE-2. Groundwater modeling results indicate that under expected future SFV well field pumping scenarios, new extraction wells NEW-2 and NEW-3 would intercept groundwater containing high concentrations of chromium. Alternatives 4a and 4b include chromium treatment for both of these new extraction wells.

Other components of Alternatives 4a and 4b are identical to those of Alternatives 2a and 2b, respectively.

Figure 4. EPA's nine evaluation criteria

Alternatives 5a and 5b – Expand Extraction Well System and Operate Ex Situ Chromium Treatment System for All Extraction Wells

Alternatives 5a and 5b incorporate chromium treatment of influent from all the extraction wells. Other components of Alternatives 5a and 5b are identical to those of Alternatives 2a and 2b, respectively.

Cleanup Evaluation Criteria

The remedial alternatives must be evaluated against EPA's nine evaluation criteria (see Figure 4). The first two are considered "threshold criteria" because any alternative selected as the remedy must meet these criteria. The next five are the primary balancing criteria, which are used to weigh major trade-offs among alternatives. The last two criteria, state agency and community acceptance, will be evaluated based on comments EPA receives during the public comment period for the Proposed Plan.

Comparative Analysis of Alternatives

Table 2 summarizes the comparative analysis of alternatives. Each alternative is compared to the others and rated "Meets Criteria Best," "Meets Criteria Moderately" or "Meets Criteria Least" with respect to the evaluation criteria previously discussed. A "Meets Criteria Best" rating is most favorable and a "Meets Criteria Least" rating is least favorable. The estimated costs for each alternative are also presented in Table 2. The comparative evaluation using the nine criteria is discussed below. A more detailed analysis of the alternatives can be found in Section 5 of the FFS.

Overall Protection of Human Health and the Environment

Alternative 1 does not provide adequate hydraulic containment of the most highly contaminated groundwater in the NHOU. Furthermore, although it is able to remove contaminants in extracted groundwater to acceptable levels, Alternative 1 does not provide double barrier protection for drinking water (the current beneficial use). Therefore, Alternative 1 is considered to provide a relatively low level of protection of human health and the environment compared to Alternatives 2a through 5b.

Alternatives 2a through 5b would each achieve improved hydraulic containment of the most highly contaminated groundwater in the NHOU and thus the same level of improvement in this regard compared to Alternative 1. Under Alternatives 2a, 3a, 4a, and 5a (LADWP delivery for end use of treated groundwater), double barrier treatment for VOCs provides an added level of safety towards ensuring that treated water meets all drinking water standards and requirements.

Alternatives 2a through 3b provide for chromium treatment only from extraction wells NHE-1 and NHE-2. Under expected future production pumping scenarios, new extraction wells NEW-2 and NEW-3 are forecasted to intercept groundwater contaminated with high levels of chromium. Only Alternatives 4a through 5b include chromium treatment for groundwater extracted by these two extraction wells.

Alternatives 5a and 5b expand chromium treatment to include all of the existing and new NHOU extraction wells. However, chromium treatment is not expected to be required at all wells in order to meet the cleanup levels for either end use, and a larger quantity of treatment residuals would be produced by the chromium treatment system under Alternatives 5a and 5b than the other alternatives.

Compliance with ARARs

Alternatives 1, 2a, 3a, 4a, and 5a (i.e., those alternatives where treated water is delivered to the LADWP water supply system) are expected to comply with the current MCLs and with all other ARARs for those alternatives. In the event that reinjection is selected as the end use for treated groundwater, Alternatives 2b, 3b, 4b, and 5b (for which reinjection is the end use of treated water) are expected to comply with ARARs, including the State's anti-degradation policy, under a wide range of pumping scenarios. However, Alternatives 2b and 3b may result in chromium concentrations exceeding the cleanup level in the NHOU treated effluent and thus fail to comply with the State's anti-degradation policy ARAR under the expected pumping scenario, or if the current Honeywell effort to remediate hexavalent chromium in the vadose zone and aquifer in situ is less effective than expected.

Table 2: How Do the Alternatives Compare to EPA's Cleanup Criteria?

	Alternatives				
Evaluation Criteria	**1a** Existing Remedy	**2a and 2b** Expand Extraction Well System plus Chromium Wellhead Treatment at Wells NHE-1 & NHE-2	**3a and 3b** Expand Extraction Well System plus Chromium Treatment for Combined Flow from Wells NHE-1 and NHE-2	**4a and 4b** Expand Extraction Well System plus Ex Situ Chromium Treatment for Wells NHE-1 & 2 and NEW-2 & 3	**5a and 5b** Expand Extraction Well System plus Ex Situ Chromium Treatment for All Extraction Wells
Protection of Human Health & the Environment	○	⊙	⊙	●	●
Compliance with Applicable or Relevant and Appropriate Requirements	●	●	●	●	●
Long-term Effectiveness & Permanence	○	⊙	⊙	●	●
Reduction of Toxicity, Mobility, or Volume through Treatment	○	⊙	⊙	●	●
Short-term Effectiveness	●	●	●	●	●
Implementability	○	⊙	⊙	●	⊙
Cost*:					
Option "a": Provide Treated Water to LADWP	$40,100,000	$91,700,000	$82,600,000	$107,800,000	$119,900,000
Option "b": Reinject Treated Water	Not applicable	$118,100,000	$109,000,000	$134,200,000	$146,300,000
State Agency Acceptance	DTSC and LARWQCB concur with EPA's preferred alternative.				
Community Acceptance	Community acceptance for the recommended alternative will be evaluated after the public comment period.				

● Meets Criteria Best ⊙ Meets Criteria Moderately ○ Meets Criteria Least

* Costs are given as net present value of construction and operation and maintenance costs, assuming 30 years operation and 7% discount rate.

Long-term Effectiveness and Permanence

Each alternative provides some degree of long-term protection. Alternative 1 would be effective in removing contaminants from the water that it captures and treats, but its limited extraction system would allow areas of high VOC and chromium contamination to migrate towards LADWP well fields, and the existing extraction system will not prevent hexavalent chromium from migrating to other NHOU extraction wells that lack chromium treatment.

Under Alternatives 2a through 5b, the improvements to the extraction and treatment system will result in containment of the high concentration plumes and prevent further degradation of water quality in the vicinity of the LADWP well fields. These alternatives will thus have a much higher degree of long-term protection than Alternative 1. However, implementation of the reinjection option for discharge of treated water (Alternatives 2b, 3b, 4b, and 5b) would likely result in treated water becoming contaminated again following reinjection.

Alternatives 4a and 4b would provide an increased level of effectiveness and permanence as compared to Alternatives 2a through 3b, as they provide for chromium removal from new NHOU extraction wells NEW-2 and NEW-3. Alternatives 5a and 5b expand chromium treatment to include all of the existing and new NHOU extraction wells. However, chromium treatment is not presently required at all existing extraction wells, nor is it predicted to be needed in the future unless an MCL for hexavalent chromium is set at a level below 5 µg/L. Treatment of the combined discharge from all of the extraction wells under Alternatives 5a and 5b would require significantly more energy and result in production of greater volumes of treatment residuals than would be produced under Alternatives 2a through 4b, which focus chromium treatment on those wells requiring it.

Reduction of Toxicity, Mobility, or Volume through Treatment

All alternatives provide for reduction of toxicity, mobility, or volume through extraction of contaminated groundwater and treatment of VOCs at the NHOU treatment plant. TCE, PCE, and other VOCs in groundwater extracted from the NHOU will be removed with a treatment system that traps VOCs in granular activated carbon, and then permanently destroys them at an off-site carbon regeneration facility. The overall rate of groundwater extraction for Alternative 1 is significantly less than the flow rates for Alternatives 2a through 5b, and thus Alternative 1 will provide a lower degree of reduction of toxicity, mobility, and volume through treatment. In addition, Alternative 1 also provides less treatment for chromium in groundwater.

Under Alternatives 2a through 3b, chromium will be removed by wellhead treatment at extraction wells NHE-1 and NHE-2. The combined chromium treatment system for additional extraction wells included in Alternatives 4a through 5b would provide a greater degree of chromium mass removal from the extracted groundwater than Alternatives 2a through 3b.

Short-term Effectiveness

The modifications to the Existing NHOU Extraction and Treatment System included in Alternative 1 are minor, and do not pose substantial risks to the community or construction workers during implementation. No adverse environmental impacts are anticipated in the areas where facilities would be constructed.

Similar to Alternative 1, no special worker protection issues or environmental impacts are anticipated under Alternatives 2a through 5b. Construction of pipelines from the new extraction wells to the NHOU treatment plant may create a temporary nuisance to residents but should not pose any significant risks. Similarly, under Alternatives 2b, 3b, 4b, and 5b, construction of the injection wells, additional pipelines, and additional monitoring wells may create an additional nuisance to residents but do not pose any substantial risks to the community or construction workers.

Alternatives 2a through 5b would take longer to implement (approximately 3 years) than Alternative 1, which is largely in place already. During that time, the existing NHOU treatment system would continue to be operated in such a manner that the contaminant concentrations in

the treatment plant effluent remain below the MCLs and notification levels. Therefore, Alternatives 2a through 5b are expected to be equally protective of human health in the short term as Alternative 1.

Implementability

All alternatives are considered to be technically feasible to implement, although implementation of Alternatives 2a through 5b will require substantially more effort than Alternative 1. Alternatives 5a and 5b are expected to be significantly more difficult to implement from a technical standpoint than Alternatives 2a through 4b, due to the relatively large chromium treatment system required. As noted in the discussion of Compliance with ARARs, the ability of Alternatives 1 through 3b to achieve cleanup levels for chromium in the combined effluent from the NHOU treatment system under the expected pumping scenarios is uncertain. Because of this uncertainty, LADWP and/or State agencies may not accept either of the planned end use options for the treated water under these alternatives. Therefore, implementation of Alternatives 1 through 3b is expected to be more difficult than Alternatives 4a and 4b from an administrative standpoint.

Cost

A summary of the capital, annual O&M, and net present value (NPV) costs for each alternative is presented in Table 3. These cost estimates are based on a 7% discount rate and 30-year O&M period. Details of the cost estimates for each alternative are provided in Appendix D of the FFS.

Alternative 1 is the lowest cost alternative. Alternatives 2a and 3a, which are identical except for the individual versus combined chromium treatment units for extraction wells NHE-1 and NHE-2, are the next highest cost alternatives. The difference between costs for these alternatives is within the range of uncertainty in the cost estimate, and should be considered approximately equal. Alternatives 4a and 5a are the highest cost alternatives, largely due to the larger flow volumes to be treated for chromium at the NHOU treatment plant.

Estimated costs for implementation of the reinjection option for end use of treated water (Alternatives 2b, 3b, 4b, and 5b), which includes construction of additional wells and pipelines, are substantially greater than the LADWP delivery option (Alternatives 2a, 3a, 4a, and 5a), which requires double barrier VOC treatment.

Table 3. Summary of Estimated Costs for Remedial Alternatives

Alternative	Capital Costs	Annual O&M Costs	Total Estimated NPV (30 Years of O&M)
1 (LADWP delivery)	$16,300,000	$3,772,000	$40,100,000
2a (LADWP delivery option)	$46,500,000	$8,318,000	$91,700,000
2b (reinjection option)	$89,300,000	$8,091,000	$118,100,000
3a (LADWP delivery option)	$45,300,000	$7,679,000	$82,600,000
3b (reinjection option)	$88,100,000	$6,876,000	$109,000,000
4a (LADWP delivery option)	$52,300,000	$9,148,000	$107,800,000
4b (reinjection option)	$95,000,000	$8,345,000	$134,200,000
5a (LADWP delivery)	$61,700,000	$9,370,000	$119,900,000
5b (reinjection option)	$104,400,000	$8,567,000	$146,300,000

Note: Capital costs have been rounded to the nearest $100,000. Annual O&M costs have been rounded to the nearest $1,000. Total estimated NPV has been rounded to the nearest $100,000.

State Acceptance

State agencies have indicated that Alternative 1 is not acceptable because of the continued migration of groundwater contamination and the potential for chromium contamination to migrate and further degrade the aquifer. The State has expressed its support for Alternative 4a, EPA's Preferred Alternative.

Community Acceptance

The LADWP has indicated that Alternative 1 is not acceptable because of the continued migration of groundwater contamination and the potential for chromium contamination to migrate and further degrade the aquifer. Acceptance from community members other than LADWP is currently unknown and will be assessed based on the input received during the public comment period.

Preferred Alternative

EPA's Preferred Alternative is Alternative 4a, which includes the construction of an estimated three new extraction wells, the modification/rehabilitation of several existing extraction wells, expanded VOC treatment, chromium treatment for NHE-1, NHE-2 and two of the new extraction wells, and use of the treated water in LADWP's water supply system. The exact number, location, and pumping rates for the groundwater extraction wells are estimated and will be finalized during remedial design. Figure 4 schematically illustrates the major components of Alternative 4a.

Based on the information currently available, EPA believes the Preferred Alternative meets the threshold criteria and provides the best balance of trade-offs among the other alternatives. Under Alternative 4a, the installation of additional extraction wells, the modification of existing extraction wells, and expansion of the VOC treatment system will

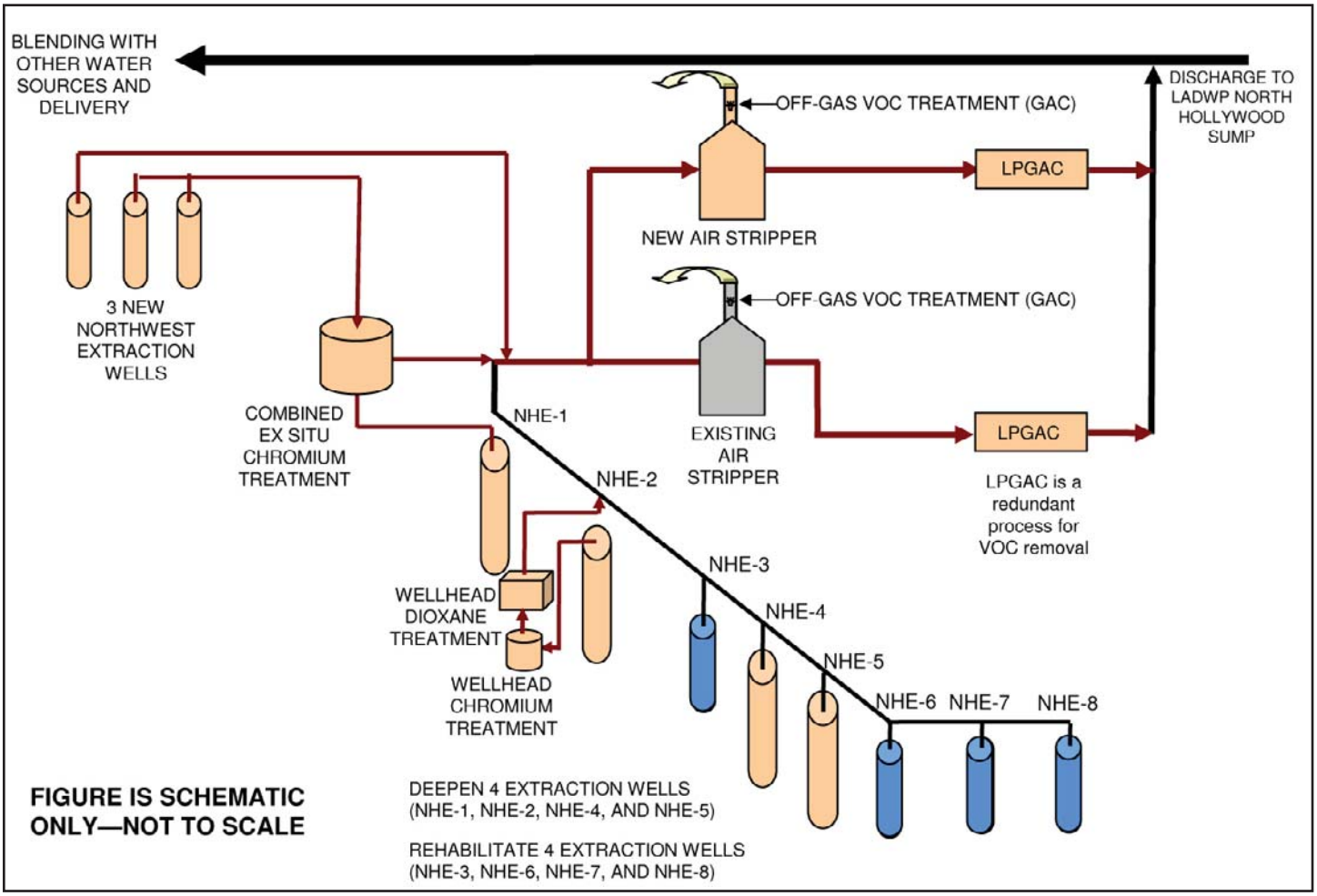

Figure 5. Schematic Layout of Alternative 4a

achieve significantly improved plume capture and prevent further degradation of water quality at the Rinaldi-Toluca and North Hollywood West well fields. This alternative will also result in permanent and significant reduction in the mobility and volume of VOCs in groundwater in the NHOU. Alternative 4a also specifically provides for chromium removal from the extraction wells where the highest chromium concentrations are expected to occur and will achieve the treated water cleanup level of 5 µg/L for hexavalent chromium under a wide range of pumping scenarios.

The reuse option under Alternative 4a, delivery of treated water to LADWP, provides the greatest beneficial use of the treated water and at a significantly lower cost than reinjection.

The Preferred Alternative includes the installation and sampling of new monitoring wells to evaluate performance of the remedy and to better characterize the plume in certain areas of the NHOU. EPA will use the resulting data to evaluate the need for and scope of additional remedial actions within the NHOU. The State has expressed support for EPA's Preferred Alternative.

Next Steps

The public comment period on this Proposed Plan will continue until August 10, 2009. At the end of the public comment period, EPA will review and consider all comments and make a final decision on the selected remedy for the NHOU. The EPA will document the remedy selection in a **Record of Decision** (ROD) that will include a responsiveness summary addressing comments submitted by the public. The ROD will be placed in the information repositories, and notice of its availability will be announced in the local newspaper.

After EPA issues the ROD, it will seek to negotiate an agreement with the potentially responsible parties for implementation of the cleanup.

Technical Assistance Program

A Technical Assistance Grant (TAG) is available for citizens who live near a Superfund site. The grant helps qualified citizen groups affected by a Superfund site to hire an independent technical advisor to help interpret and comment on site-related information. An initial grant of up to $50,000 is available. For further information about the grant, please call us and request an application (toll free 800-231-3075) or go to http://www.epa.gov/superfund/community/tag/resource.htm.

Information Repositories

EPA maintains site information at the following repositories. These repositories contain the Administrative Record, project documents, fact sheets, and reference materials. EPA encourages you to review these documents to gain a more complete understanding of the site.

EPA also has a site information web page at www.epa.gov/region09/SanFernandoNorthHollywood

City of Los Angeles Central Library
Science and Technical Department
630 West 5th Street
Los Angeles, CA 90071
(213) 228-7216

Hours:
Mon. – Thur. 10:00 AM – 8:00 PM
Fri. – Sat. 10:00 AM – 6:00 PM
Sun. 1:00 PM – 6:00 PM

U.S. EPA Superfund Records Center
95 Hawthorne Street, Room 403
San Francisco, CA 94105
(415) 536-2000

Hours:
Mon. – Fri. 8:30 AM – 4:00 PM

Glossary of Terms

Administrative Record: The complete collection of supporting documents that EPA relies on to select a cleanup action.

Aquifer: An underground layer of soil, sand, or gravel that can store and supply groundwater to wells and springs.

Chromium: Chromium is a steel-gray, lustrous, hard metal that takes a high polish, and has a high melting point. The most common oxidation states of chromium are +2, +3, and +6, with +3 being the most stable. The +1, +4 and +5 oxidation states are rare. Chromium compounds of oxidation state 6 (see "hexavalent chromium" below) are powerful oxidants.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law first passed in 1980 and subsequently amended that created a trust fund, known as the Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Contaminants of Concern: Site-specific chemicals that exceed regulatory levels or pose a potentially significant risk to human health and the environment.

1,4-Dioxane: 1,4-Dioxane is a clear liquid that dissolves in water at all concentrations. It is used primarily as a solvent in the manufacture of chemicals and as a laboratory reagent. 1,4-dioxane also has various other uses that take advantage of its solvent properties. It is a trace contaminant of some chemicals used in cosmetics, detergents, and shampoos.

Emerging contaminant: An "emerging contaminant" is a chemical or material that is characterized by a perceived, potential or real threat to human health or the environment or lack of published health standards. A contaminant may also be "emerging" because of the discovery of a new source or a new pathway to humans, or a new detection method or treatment technology has been developed.

Focused Feasibility Study: A study that evaluates options to clean up environmental contamination at a Superfund site.

Groundwater: The supply of water found below the ground surface, usually in an aquifer (see "Aquifer" above).

Hazard Index: For non-cancer health effects, U.S. EPA calculates a "hazard index" (HI). This index is a comparison of the concentration present at the site and the concentration below which non-cancer health effects are no longer expected.

Hexavalent chromium: Hexavalent chromium or Cr(VI) compounds are those which contain the element chromium in the +6 oxidation state. Chromium compounds are often used as pigments for photography, and in pyrotechnics, dyes, paints, inks, and plastics. Hexavalent chromium is recognized as a human carcinogen.

Human Health Risk Assessment: Qualitative and quantitative evaluation of the risk posed to human health by the specific pollutants found at the site.

Information Repository: A location accessible to community members (such as a local library) that houses documents, reports and other site-related information, general information about Superfund, newspaper notices and the Administrative Record for the site. EPA also maintains an information repository for all Superfund sites at its offices in San Francisco.

Institutional Controls (ICs): Administrative or legal mechanisms such as permits, zoning, and/or deed restrictions that protect property users and the public from existing contamination.

Glossary of Terms *(Continued)*

Interim Remedy: A remedy that is implemented to address contamination until a final remedy is implemented.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to **Maximum Contaminant Level Goals (MCLGs)** as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): A federal regulation that provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States identified for possible long-term cleanup.

Notification Level: A notification level is established by the California Department of Public Health (CDPH) (formerly the California Department of Health Services) "to provide information to public water systems, regulatory agencies, and the public about certain non-regulated chemicals in drinking water that lack MCLs. When chemicals are found at concentrations greater than these levels, certain requirements and recommendations apply." Prior to 2005, the notification levels were referred to as "action levels."

Operable Unit (OU): An OU is an area that is defined so that EPA may take action on a distinct area or type of contamination, as part of an overall site cleanup.

Proposed Plan: A document that summarizes the cleanup alternatives evaluated as part of the Feasibility Study process and identifies the preferred cleanup alternative.

Record of Decision (ROD): The document that formalizes EPA's decision to implement a specific remedial action.

Remedial Action Objectives: The cleanup levels established by EPA when implementing a remedial action.

Remedial Investigation: The study that determines the nature and extent of contamination that is present at a site.

Superfund: The common name for the process established by CERCLA to investigate and clean up abandoned or uncontrolled hazardous waste sites [see "Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)" above].

Volatile Organic Compounds: Carbon-containing chemical compounds that evaporate readily at room temperature.

San Fernando Valley Area 1, North Hollywood Operable Unit

Proposed Plan for Enhanced Groundwater Remedy

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EPA Website: **www.epa.gov/region9/SanFernandoNorthHollywood**

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