

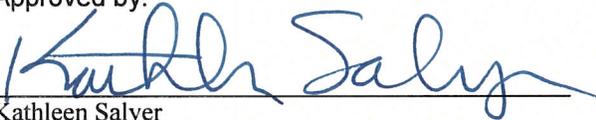
Five-Year Review Report



Second Five-Year Review Report for San Fernando Valley – Area 2 Superfund Site Glendale, Los Angeles County, California

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Date:



U.S. Environmental Protection Agency Region IX

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Executive Summary

This is the second Five-Year Review of the San Fernando Valley (SFV) – Area 2 Superfund Site (Site) located in Glendale, California. The purpose of this Five-Year Review is to review information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this Five-Year Review (FYR) was the signing of the previous FYR on September 30, 2008.

The Area 2 Site is about 6 miles long from east to west and about 3 miles wide from north to south. The SFV – Area 2 Site is adjacent to the Los Angeles River. The Site consists of three operable units (OUs), including the Glendale North Operable Unit (GNOU), Glendale South Operable Unit (GSOU), and the Glendale Chromium Operable Unit (GCOU). The GNOU is located at the north end of the Los Angeles River Narrows (where the Los Angeles River turns from an easterly course to run southerly between the Verdugo Mountains to the northeast and the Hollywood Hills to the southwest). The GSOU is located within the Narrows itself (see Figure 1 and Figure 2). The GCOU was established in 2007 to study the distribution of chromium (including hexavalent chromium), metals contamination in groundwater, and to evaluate the risks these contaminants posed to human health and the environment. The GCOU is still in the remedial investigation (RI) phase of the Superfund process.

In 1979, the California Department of Public Health (CDPH), formerly the Department of Health Services (DHS), requested that all major water providers sample and analyze groundwater for contamination as part of a statewide groundwater quality surveillance effort. Trichloroethylene (TCE) was consistently detected in a large number of production wells in the SFV at concentrations greater than the maximum contaminant level (MCL) of 5 parts per billion (ppb). Chlorinated solvents including TCE and perchloroethylene (PCE) were widely used from 1940 to 1967 for dry cleaning and degreasing machinery, and disposal of these solvents was not well-regulated. The SFV Area 2 Site was listed on the National Priorities List in 1986.

The State of California's Los Angeles Regional Water Quality Control Board (LA RWQCB) and, the U.S. Environmental Protection Agency (EPA) split remedial oversight activities in Area 2 with RWQCB responsible for source/facility remediation and the EPA responsible for overseeing groundwater clean-up. EPA supports the RWQCB efforts to identify new sources through a cooperative grant. RWQCB source control investigations include conducting assessments of facilities to determine the extent of VOC solvent usage, past and current chemical handling, storage, and disposal practices. Facilities identified as sources are often ordered to remediate. While most SFV source activities are under the lead of the LA RWQCB, the California Department of Toxic Substances Control (DTSC) also participates in the investigation and oversight of SFV source areas.

The 1993 Records of Decision (RODs) for the GNOU and GSOU select an interim containment remedy to address the volatile organic compound (VOC)-contaminated groundwater plume in the Glendale area. The remedial action objectives for the remedy include:

- Inhibition of vertical and horizontal migration of groundwater contaminants in the North and South Plumes of the Glendale Study Area;
- Removal of contaminant mass from the shallow zone of the aquifer in the North and South Plumes of the Glendale Study Area.

EPA interprets the phrase “inhibition” to mean full hydraulic control of contaminated groundwater. The remedy consists of the following features: 1) four groundwater extraction wells in the GNOU and four groundwater extraction wells in the GSOU; 2) treatment of contaminated groundwater in a 5,000 gallon per minute (gpm) VOC treatment plant located between the two extraction well fields; 3) primary removal of contaminants from the liquid phase using air stripping and polishing by liquid phase granular activated carbon (LPGAC); 4) treatment of the air stream by vapor phase granular activated carbon (VPGAC); and 5) final use of treated water as drinking water. The treatment plant is operated by the Glendale Respondents Group contractor CDM, Smith in cooperation with the City of Glendale (via its contractor). The groundwater treatment system began operations in November 2000.

The extraction and treatment systems are operationally functional and provide clean drinking water to the City of Glendale. The remedial action provides drinking water to the City of Glendale that meets all water quality requirements. There have been no changes in ARARs that would affect the protectiveness of the remedy.

Groundwater model particle tracking and downgradient VOC and metals concentrations, indicate that groundwater contaminants in the North and South Plumes are not completely captured, so contaminant migration is not inhibited. The installation of additional extraction well(s) is needed to fully achieve plume capture and containment.

The California Department of Public Health (CDPH) released a draft MCL for hexavalent chromium of 10 ppb in August 2013. A new MCL for hexavalent chromium may affect the duration and effectiveness of the current remedy and/or the treatment technology being used if the system cannot treat hexavalent chromium to the required level.

This FYR, in contrast to previous FYRs, undertook an evaluation of the potential for regional groundwater vapor intrusion to impact protectiveness at the site. The potential for occurrences of vapor intrusion was determined using EPA’s Vapor Intrusion Screening Level Calculator with groundwater depth and volatile organic compound (VOC) concentrations as inputs. Calculator results showed there is the potential for a vapor intrusion exposure pathway in Area 2. Field data needed to make a determination on the existence of such pathways has yet to be gathered; therefore an overall protectiveness determination for this FYR cannot be made at this time and is thus deferred.

A protectiveness determination of the remedy for Area 2 cannot be made at this time until further information is obtained on regional groundwater vapor intrusion pathways. It is expected that a vapor intrusion investigation will be completed within a five year period. Following the completion of the investigation of regional groundwater vapor intrusion pathways, a protectiveness determination will be made. In addition, to be protective in the long term, complete hydraulic capture of the plume must be established.

Five-Year Review Summary Form

| SITE IDENTIFICATION | | |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------|
| Site Name: San Fernando Valley (Area 2) Superfund Site | | |
| EPA ID: CAD980894901 | | |
| Region: 9 | State: CA | City/County: Glendale, Burbank, Los Angeles/Los Angeles County |
| SITE STATUS | | |
| NPL Status: Final | | |
| Multiple OUs? Yes | Has the site achieved construction completion? No | |
| REVIEW STATUS | | |
| Lead agency: EPA If "Other Federal Agency" was selected above, enter Agency name: | | |
| Author name (Federal or State Project Manager): ZiZi Searles | | |
| Author affiliation: EPA | | |
| Review period: January 2013 – September 2013 | | |
| Date of site inspection: 28 February 2013 | | |
| Type of review: Statutory | | |
| Review number: 2 | | |
| Triggering action date: 09/30/2008 | | |
| Due date (five years after triggering action date): 09/30/2013 | | |

Five-Year Review Summary Form (continued)

| Issues/Recommendations | | | | |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------|----------------|
| OU(s) without Issues/Recommendations Identified in the Five-Year Review: | | | | |
| None | | | | |
| Issues and Recommendations Identified in the Five-Year Review: | | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| Yes* | Yes | EPA | EPA | 09/2018 |
| OU(s): GNOU, GSOU | Issue Category: Monitoring | | | |
| | Issue: The vapor intrusion pathway of the regional groundwater has not been evaluated for the Area 2 Site. | | | |
| | Recommendation: Complete a regional groundwater evaluation of the potential for vapor intrusion at the San Fernando Valley Area 2 Superfund Site. | | | |

* The CERCLIS database only accepts “Yes” or “No” entries regarding whether an issue affects current or future protectiveness. However, this protectiveness determination has been deferred because there is not enough information to make the determination. For the purposes of the CERCLIS database, a “defer” determination is equivalent to “yes” entry.

| Issues/Recommendations | | | | |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------|-----------------|----------------|
| Issues and Recommendations Identified in the Five-Year Review: | | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| No | Yes | EPA | EPA | 9/2016 |
| OU(s): GNOU, GSOU | Issue Category: Remedy Performance | | | |
| | Issue: The remedy is not fully capturing and containing groundwater contamination. | | | |
| | Recommendation: Evaluate installation and operation of new wells to achieve plume capture and containment. | | | |

Protectiveness Statement(s)

| |
|--|
| |
|--|

| | | |
|-------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Operable Unit: Glendale North Operable Unit | Protectiveness Determination: Protectiveness Deferred | Addendum Due Date (if applicable): Click here to enter date. |
|-------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------|

Protectiveness Statement:

A protectiveness determination of the remedy for the GNOU cannot be made at this time until further information is obtained. Further information will be obtained by evaluating the regional groundwater vapor intrusion pathway in Area 2. It is expected that a vapor intrusion investigation will take approximately five years, at which time a protectiveness determination will be made. In addition, to be protective in the long term, complete hydraulic capture of the plume must be established.

Operable Unit:

Protectiveness Determination:

***Addendum Due Date
(if applicable):***

**Glendale South Operable
Unit**

Protectiveness Deferred

[Click here to enter date.](#)

Protectiveness Statement:

A protectiveness determination of the remedy for the GSOU cannot be made at this time until further information is obtained. Further information will be obtained by evaluating the regional groundwater vapor intrusion pathway in Area 2. It is expected that a vapor intrusion investigation will take approximately five years, at which time a protectiveness determination will be made. In addition, to be protective in the long term, complete hydraulic capture of the plume must be established.

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List of Abbreviations

| | |
|---------|--------------------------------------------------------------------------------------|
| µg/L | micrograms per liter |
| acre-ft | acre foot/feet |
| AOC | Administrative Order on Consent |
| ARAR | Applicable or Relevant and Appropriate Requirements |
| BACT | Best available control technology |
| bgs | below ground surface |
| CAO | Cleanup and Abatement Order |
| CCR | California Code of Regulations |
| CDPH | California Department of Public Health |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| CFR | Code of Federal Regulations |
| COC | Contaminant of Concern |
| DCA | Dichloroethane |
| DCE | Dichloroethylene |
| DHS | California Department of Health Services |
| DTSC | California Department of Toxic Substances Control |
| EPA | Environmental Protection Agency |
| EWEP | Extraction Well Evaluation Program |
| EWER | Extraction Well Evaluation Results |
| FFS | Focused Feasibility Study |
| FYR | Five-year review |
| GAC | Granular activated carbon |
| GCOU | Glendale Chromium Operable Unit |
| GNOU | Glendale North Operable Unit |
| GOU | Glendale Operable Unit |
| gpm | gallons per minute |
| GRG | Glendale Respondents Group |
| GSOU | Glendale South Operable Unit |
| GWTP | Glendale Water Treatment Plant |
| IRIS | Integrated Risk Information System |
| LADWP | Los Angeles Department of Water and Power |
| LAGWRP | Los Angeles-Glendale Water Reclamation Plant |
| LPGAC | Liquid-phase granular activated carbon |
| MCL | Maximum contaminant level |
| msl | mean sea level |
| MWD | Metropolitan Water District |
| NCP | National Contingency Plan |
| NDMA | N-Nitrosodimethylamine |
| NPL | National Priorities List |
| OU | Operable Unit |
| PCE | Perchloroethylene |
| ppb | parts per billion |
| RA | Remedial Action |
| RAO | Remedial Action Objectives |
| RCF | Reduction/Coagulation/Filtration |
| RCRA | Resource Conservation and Recovery Act |

| | |
|--------|--------------------------------------------------|
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RWQCB | Los Angeles Regional Water Quality Control Board |
| SAL | State Action Level |
| SCAQMD | South Coast Air Quality Management District |
| SFV | San Fernando Valley |
| SOW | Statement of Work |
| TBC | To-Be-Considered |
| TCA | Trichloroethane |
| TCE | Trichloroethylene |
| TCP | Trichloropropane |
| TM | Technical memorandum |
| ULARA | Upper Los Angeles River Area |
| USACE | United States Army Corps of Engineers |
| VOC | Volatile organic compound |
| VPGAC | Vapor-phase granular activated carbon |
| WBA | Weak-base anion exchange |

Second Five-Year Review Report for San Fernando Valley – Area 2 Superfund Site

1. Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of FYRs are documented in five-year review reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Contingency Plan (NCP). CERCLA 121 states:

“If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.”

EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

“If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action.”

The United States Army Corps of Engineers (USACE) conducted the FYR and prepared this report regarding the remedy implemented at the San Fernando Valley (SFV) Area 2 Superfund Site (SFV Area 2 Site or Site) in Los Angeles County, California. EPA is the lead agency for developing and implementing the remedy for the Site. The California Department of Toxic Substances Control and the Los Angeles Regional Water Quality Control Board (RWQCB), as the support agencies representing the State of California, have reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the second FYR for the SFV Area 2 Site. The triggering action for this statutory review is the previous FYR. The FYR is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site at levels above those that would allow for unlimited use and unrestricted exposure.

The SFV Area 2 Site (Figure 1) consists of three groundwater Operable Units (OUs): Glendale North Operable Unit (GNOU), Glendale South Operable Unit (GSOU), and Glendale Chromium Operable Unit (GCOU). Collectively, the three OUs are referred to as the Glendale Operable Unit (GOU).

The GNOU is located adjacent to and north of the Los Angeles River. The GSOU is located in the Los Angeles Narrows itself (see Figure 1 and Figure 2). Each of these two OUs has an extraction system consisting of four wells for eight total extraction wells. Water from the extraction wells is pumped to the Glendale Water Treatment Plant (GWTP), which is located between the GNOU and GSOU well fields. The GWTP utilizes air stripping, liquid-phase granular activated carbon (LPGAC), and vapor-phase GAC (VPGAC) for VOC treatment. In 2007, EPA established the GCOU to study the distribution of chromium (including hexavalent chromium) and metals contamination in groundwater in Area 2 and to evaluate potential associated unacceptable risks to human health and the environment.

This FYR primarily addresses the GNOU and the GSOU, and partly addresses the GCOU. The GCOU is in the remedial investigation (RI) stage; hence, this OU has no implemented remedy available for review at this time.

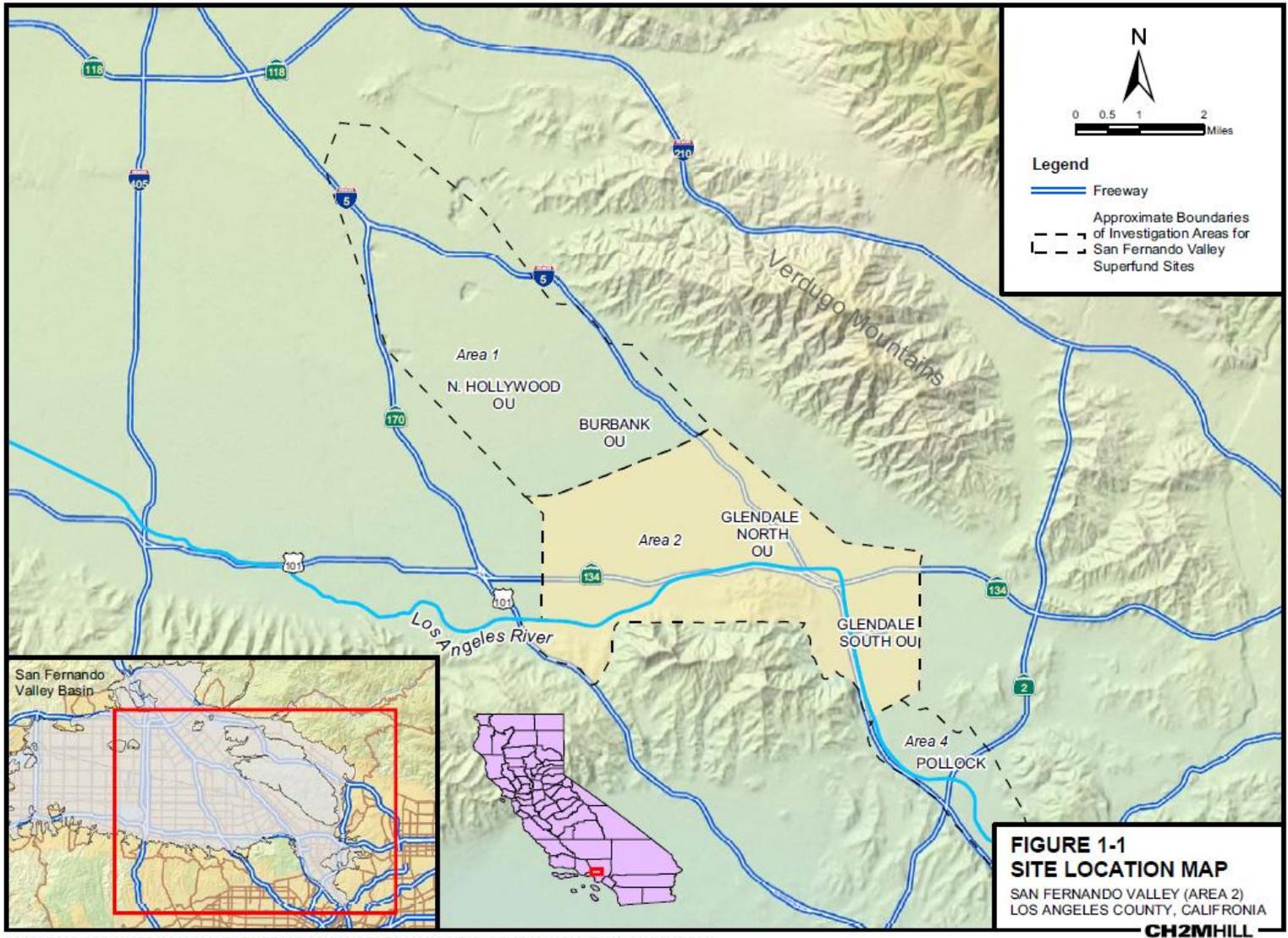


Figure 1. Location Map for the SFV Area 2 Superfund Site

2. Site Chronology

Table 1 lists the dates of important events for the SFV Area 2 Superfund Site.

Table 1. Chronology of Site Events

| Event | Date |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| The California Department of Health Services (DHS; now the California Department of Public Health) detected trichloroethylene (TCE), perchloroethylene (PCE), and other volatile organic compounds (VOCs) in a large number of production wells at levels exceeding their respective maximum contaminant levels (MCLs) and/or State Action Levels (SALs); those wells were removed from service. Alternative water supply was obtained from the Metropolitan Water District (MWD) where needed. | 1979-1980 |
| The Los Angeles Department of Water and Power (LADWP) completed the Groundwater Management Plan – San Fernando Valley Basin. The study detected widespread VOC contamination in the eastern San Fernando Valley and also located a contaminant plume migrating to the southeast at 300 feet per year. | July 1983 |
| San Fernando Valley Areas 1, 2, 3, and 4 were listed on the National Priorities List (NPL). | 1986 |
| A basin-wide remedial investigation/feasibility study (RI/FS) was initiated under LADWP lead. | 1987 |
| The RWQCB issued Cleanup and Abatement Order No. 87-161 directing Lockheed to implement specific assessment and remediation tasks at its B1 Plant near Building 175 in Burbank, CA. | December 1987 |
| The RI for the entire San Fernando Valley was completed (including Area 2). | April 1992 |
| Records of Decision (RODs) were signed for Glendale North and South Operable Units (OUs). | June 1993 |
| Well construction was started. | November 1997 |
| Glendale water treatment plant (GWTP) construction was started. | July 1998 |
| The City of Glendale (City) initiated the application process pursuant to DHS Policy 97-005 for the Glendale Treatment Plant. | November 1998 |
| EPA initiated a chromium source investigation by providing funds to RWQCB to investigate 4,040 potential chromium users in the SFV. | January 1999 |
| The Offices of Environmental Health Hazard Assessment of California EPA formally adopted a public health goal for total chromium of 2.5 µg/L, with 0.2 µg/L for hexavalent chromium assumed as part of the goal. | February 1999 |
| The GWTP began Operation in “start-up” mode (except for well GS-1; the DHS permit did not allow operation of GS-1; thus, full operation was not achieved). | August 1, 2000 |
| Glendale Respondents Group and EPA sign GSOU and GCOU CDs | November 2000 |
| The City of Glendale has been responsible for day-to-day operations of the GOU treatment facility since they assumed responsibility as the operator in March 2001. | March 2001 |
| Well GS-1 began operation after DHS approved City of Glendale’s focused 97-005 application. Full operation was achieved. | June 6, 2002 |
| The City proposed new pumping rates for GS-3 and other extraction wells (“alternative pumping scheme”) to moderate chromium concentrations. | August 2002 |
| The City initiates bench-scale study of chromium treatment technologies. | Late 2002 |
| The City performed capture analysis to demonstrate their alternative pumping scheme could provide equal containment to treatment plant operation at design flows. EPA approved the alternate pumping scheme. | May 2003 |
| EPA assigned contractor support staff to the Los Angeles Regional Water Quality Control Board (RWQCB) for investigation of chromium-related sites. | June 2003 |

| Event | Date |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| EPA performed a modeling study for chromium fate and transport. | April 2004 |
| RWQCB completed the Chromium Investigation: San Fernando Valley Phase 1- Inspections Final Report. Further assessment was recommended for 105 sites. RWQCB issued seven Cleanup and Abatement Orders. | August 2004 |
| The well screen in well GN-3 failed; the well was offline for about 21 months. | March 2005 |
| City conducted batch pilot tests on various chromium treatment technologies. | Early 2006 |
| EPA established the GCOU to study the distribution of hexavalent chromium contamination in groundwater and to evaluate potential associated unacceptable risks to human health and the environment. | 2007 |
| RWQCB revised the general permit, thereby lowering the limit for hexavalent chromium to 8 ppb for discharge to the river | June 2007 |
| EPA approved alternate pumping of wells GS-3 and GN-3 (the two highest chromium wells) to aid compliance with the new hexavalent chromium limit for river discharge. | June 2007 |
| The City conducted a pilot test (continuous flow) of a Reduction/Coagulation/Filtration (RCF) process. | February 2008 |
| EPA approved a modification to the Statement of Work of the Consent Decree to allow construction of demonstration projects for hexavalent chromium treatment at the Glendale OU (GOU). | August 2008 |
| EPA approved the final design/build proposal for two demonstration projects for chromium treatment: a) RCF, and b) weak-base anion exchange (WBA). | September 2008 |
| The first FYR for the SFV Area 2 Superfund Site was completed. | September 2008 |
| The City prepared an extraction well evaluation plan to evaluate and maintain the wells to avoid unplanned outages similar to the outage of well GN-3 for screen failure. | 2009 |
| RCF demonstration project was implemented at well GN-3. | April 2010 |
| WBA demonstration project was implemented at well GS-3. | May 2010 |
| Glendale Respondents Group agrees perform a FFS as additional work under the 2000 CDs in order to update and revise the groundwater remedy at the San Fernando Valley ("SFV") Area 2 Superfund Site, Glendale North and South Operable Units (collectively, the "GOU") | August 2010 |
| EPA initiated a remedial investigation (RI) of chromium in groundwater in the GCOU. | 2011 |
| The EPA entered into an Administrative Order on Consent with GCOU Respondents to perform part of the RI work. | 2011 |
| CH2M Hill submitted the final RI Work Plan for the GCOU to EPA. | April 2012 |
| RCF operation ceased. | July 2012 |
| A splitter pipe was installed to allow splitting of plant influent to allow for the GWTP to operate during well rehabilitation. | February 2013 |

3. Background

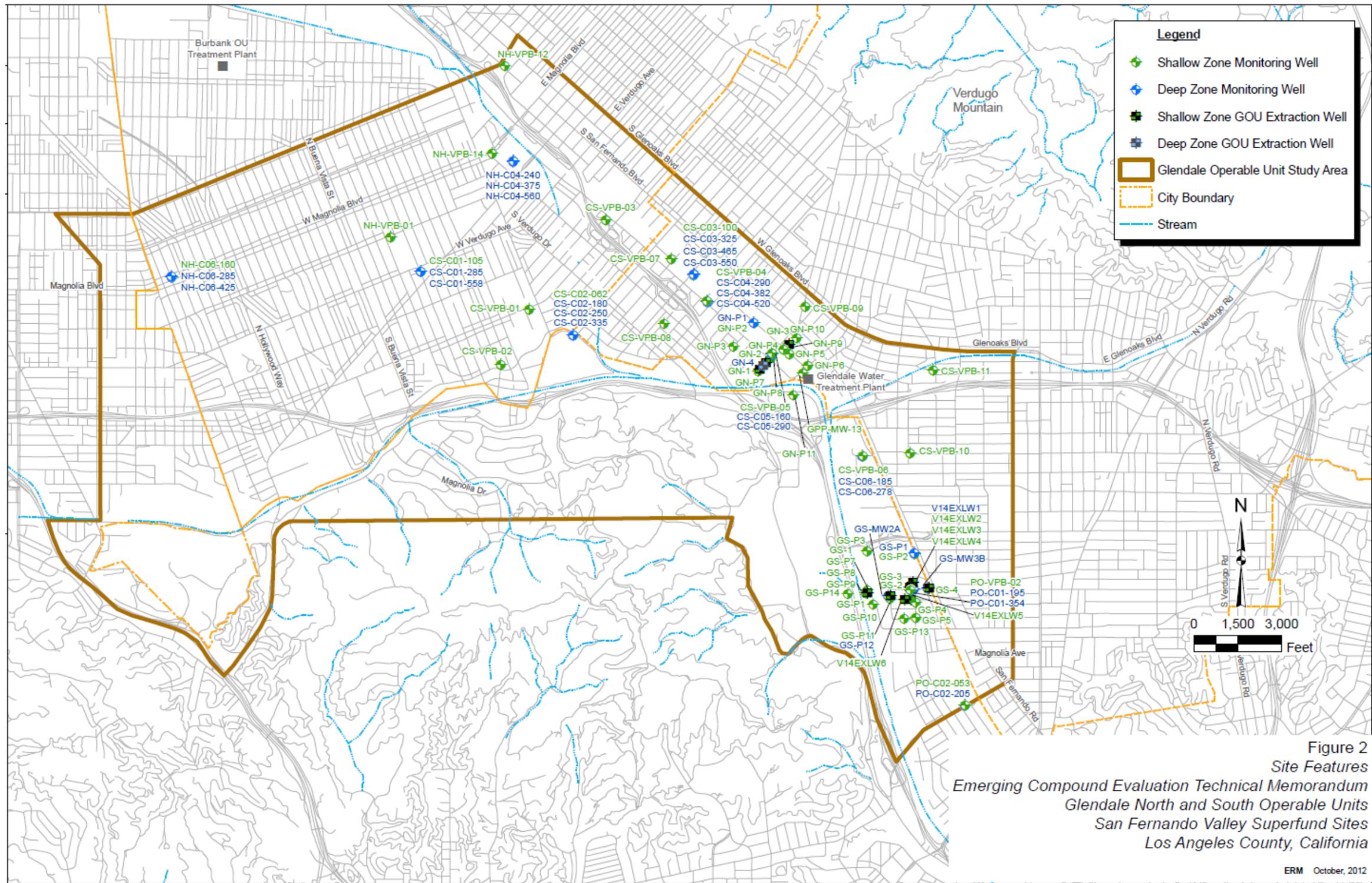
3.1. Physical Characteristics

The SFV Area 2 Site is located within the San Fernando Basin. This area includes the western portion of the City of Glendale and portions of the City of Los Angeles and Burbank. Glendale North and South Operable Units (OUs), the primary focus of this FYR, are located within Area 2 (Figure 1). The Glendale Chromium OU (GCOU), also within Area 2, is discussed separately in this FYR.

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. The basin is approximately 23 miles long in an east-west direction and up to approximately 12 miles wide in a north-south direction. The elevation of the Los Angeles River valley floor slopes from 1,100 feet above mean sea level (msl) in the northwestern portion of the valley to approximately 350 feet above msl near the southern portion of the Los Angeles Narrows. The valley is bounded on the northeast by the San Gabriel Mountains with the Verdugo Mountains to the southeast, on the north and northwest by the Santa Susana Mountains, on the west by the Simi Hills, and on the south by the Santa Monica Mountains.

The GOU is located south and down-gradient of the SFV Area 1 Superfund Site in the southeastern portion of the San Fernando Basin and north of the Pollock Area. Within Area 2, the Los Angeles River turns southward from its west to east course. The GOU is about 6 miles long from east to west and about 3 miles wide from north to south. The SFV Area 2 Site is adjacent to the Los Angeles River. The GNOU is located at the north end of the Los Angeles River Narrows, and the GSOU is located within the Narrows, to the east of the river, and north of Los Angeles.

A single treatment facility for both the GNOU and GSOU is located in Glendale. There are eight extraction wells associated with the Glendale Water Treatment Plant (Figure 2).



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3.2. Hydrology

The uplands surrounding the SFV are comprised of crystalline and sedimentary rocks. Quaternary alluvium up to 2,000 feet thick was derived by erosion of the surrounding uplands (RWQCB 2002). Lateral zonation is present due to the changes in the pattern of deposition of the Tujunga fan at the northeast corner of the SFV.

Groundwater in the eastern SFV occurs primarily in alluvial valley-fill deposits of Quaternary age, eroded from the adjacent San Gabriel and Verdugo Mountains. The valley fill is estimated to be at least 1,200 feet thick in places, and is bounded to the east and at depth by granitic and metamorphic bedrock of low permeability. The valley-fill deposits of the eastern SFV are relatively permeable and have been subdivided into four distinct lithologic/aquifer zones as follows (James M. Montgomery, Inc. 1992):

- Upper Zone (0-250 ft bgs) – The Upper Zone consists of layers and lenses of silt, sand, and gravel from land (ground) surface to a depth of approximately 250 feet below land surface (below ground surface, or bgs). According to aquifer tests conducted during the SFV RI in the North Hollywood and Crystal Springs Study Areas, hydraulic conductivities in the Upper Zone range from about 30 to 360 feet per day (ft/day).
- Middle Zone (250-300 ft bgs) – The Middle Zone is approximately 50 feet thick and contains increased proportions of fine-grained sand and silt compared to the other zones. Because of its fine-grained nature and anticipated poor yield characteristics, few production wells have been completed in this zone. The Middle Zone appears to grade to coarser-grained deposits in the GSOU, where the Upper and Middle Zones become difficult to distinguish lithologically.
- Lower Zone (300-550 ft bgs)– The Lower Zone consists of interbedded sand, silt, and gravel, with cobbles in the upper portion. Thickness of this zone is estimated to be 200 to 250 feet, and hydraulic conductivity ranges from 130 to 900 ft/day. Most of the groundwater pumped from the eastern SFV is pumped from this highly productive zone.
- Deep Zone (550+ ft bgs) – Where encountered during drilling, the Deep Zone consists mainly of fine-grained, relatively low-permeability sediments, including silt and clay. Few wells have penetrated this zone; therefore, thickness and hydraulic characteristics of this zone are poorly understood.

Depths to groundwater measured at monitoring wells in the eastern SFV range from approximately 30 to 200 feet bgs (CH2M Hill 2003). Therefore, groundwater is typically first encountered in the Upper Zone; the Middle, Lower, and Deep zones are believed to be fully saturated through most of the study area. The water table or potentiometric surface typically occurs within the Upper or Middle zone of the regional aquifer. Groundwater levels at these monitoring wells have commonly declined approximately 30 feet since the mid-1990s, resulting from several factors, including: (1) large-scale groundwater withdrawals, (2) less-than-average precipitation during the past decade, and (3) an approximate 70 percent reduction in the amount of groundwater recharged through spreading.

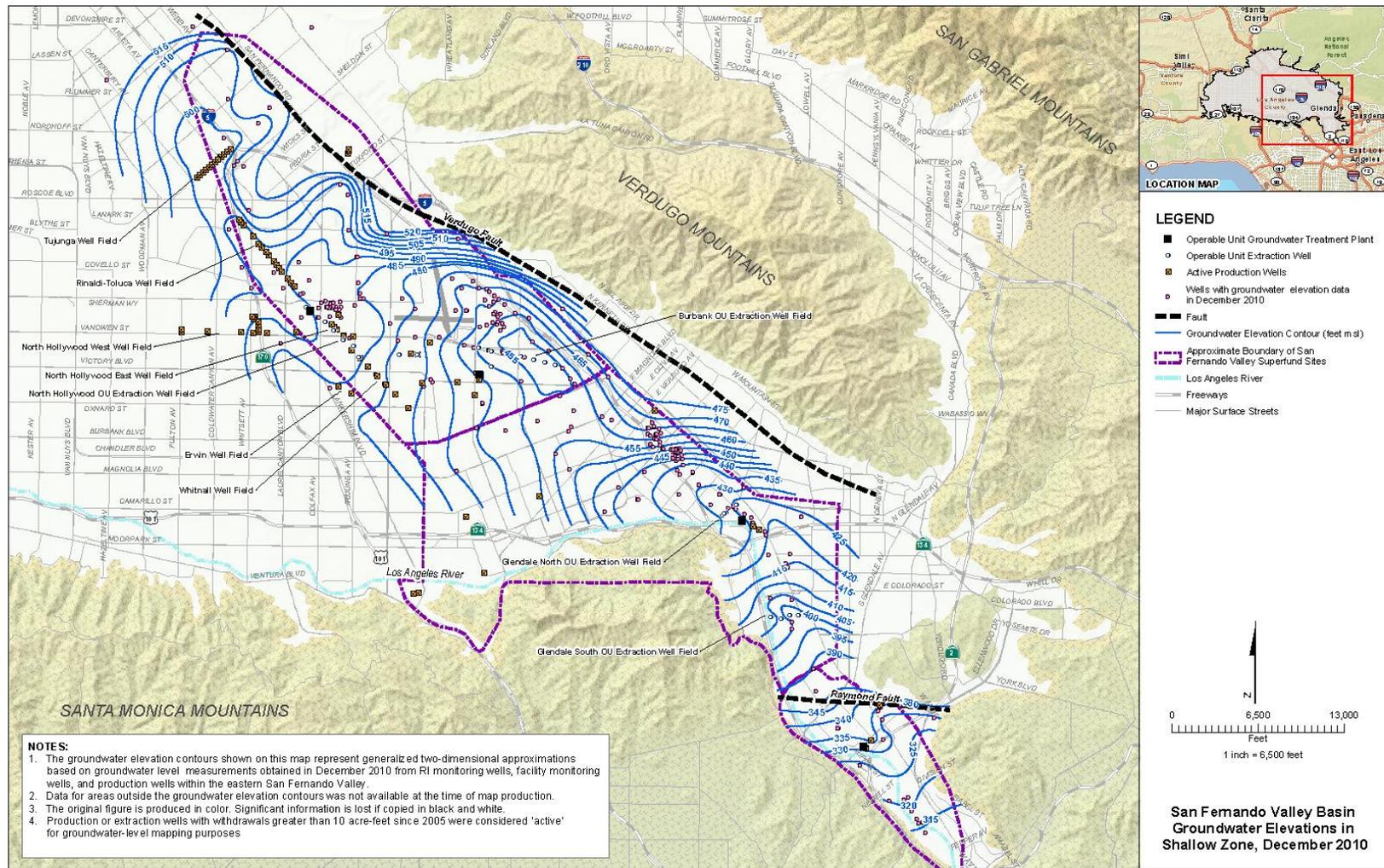
For the purposes of differentiating groundwater elevations and the distribution of chemicals of concern (COC) with respect to depth, USEPA designated wells screened within 50 feet of the water table as

“Shallow Zone” wells, and wells screened greater than 50 feet of the water table as “Deep Zone” wells. These hydrological designations should not be confused with the lithological designations of the Upper, Middle, Lower, and Deep Regional Zones (ERM 2011).

Horizontal hydraulic gradients in the GOU are generally southeast toward the Los Angeles River Narrows, where essentially all groundwater and surface water outflow from the SFV occurs (Figure 3). Localized deviations to this pattern occur in the vicinity of pumping wells at several locations in the study area, and a large cone of depression is present in the Burbank OU to the northwest.

Groundwater flow velocities in the eastern SFV are estimated by the ULARA Watermaster to range from approximately 300 to 1,300 feet per year (ft/yr), depending on location (Upper Los Angeles River Area Watermaster 2012). Groundwater flow velocities are highest in the in the Glendale South OU and Los Angeles River Narrows area.

Vertical hydraulic gradients in the eastern SFV generally are much smaller than horizontal gradients, but can be strongly influenced in the vicinity of well fields by groundwater withdrawals (James M. Montgomery, Inc. 1992). Extraction wells in the Glendale and Burbank OUs are mostly screened in the lower portion of the Upper Zone, and for this reason, upward gradients from the Middle and Lower zones are assumed to occur near these well fields. However, the SFV RI concluded that the relatively fine-grained, low-permeability nature of the Middle Zone impedes movement of groundwater between the Upper and Lower zones in much of the eastern SFV. Deposits that comprise the Middle Zone become coarser in the GSOU and in the Los Angeles River Narrows, making the Middle Zone less distinct hydraulically from the Upper and Lower zones. In this area, the Middle Zone probably does not substantially impede vertical groundwater movement.



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Figure 3. Groundwater Elevation Contours December 2010 (CH2M Hill 2010).

3.3. Land and Resource Use

The Site and its vicinity encompass an area of urban mixed land use. The area supports industrial, light industrial, low-high density residences, recreational, retail, and commercial land use. The Site consists of parts of the Cities of Glendale, Burbank, and Los Angeles.

The San Fernando Basin is a significant source of drinking water, with an estimated volume of 3 million acre-feet of groundwater stored in the aquifer within the alluvial fill of the basin. Groundwater as a source of drinking water is utilized by the Cities of Burbank, Glendale and Los Angeles and historically have accounted for between 15 and 50 percent of the water needs. Groundwater extractions from the San Fernando Basin typically provide up to 25 percent of the annual average water supply for Glendale's 191,000 residents..

3.4. History of Contamination

In 1979, the California Department of Public Health (CDPH), formerly the Department of Health Services (DHS), requested that all major water providers sample and analyze groundwater for contamination as part of a statewide groundwater quality surveillance effort. TCE was consistently detected in a large number of production wells in the SFV at concentrations greater than the MCL. Chlorinated solvents including TCE and PCE were widely used from 1940 to 1967 for dry cleaning and degreasing machinery, and disposal of these solvents was not well-regulated.

The SFV Area 2 Site includes two portions of the aquifer where high concentrations of contaminants have been identified: the North Plume and the South Plume. Although contamination has been detected throughout the Site 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 contaminants. An area of lower-level groundwater contamination separates the Glendale North and South Plumes. Plume maps and well data charts in section 6.4.1 (Figure 4 through Figure 15) show the known extent of contaminants of concern (COCs) in the SFV in the area of the GOU. The SFV Area 2 Site was listed on the NPL in 1986 (along with Areas 1, 3, and 4).

3.5. Initial Responses

In 1980, the Los Angeles Department of Water and Power (LADWP) commenced a two-year study to define the extent of groundwater contamination in the SFV. The results of the study, published in 1983, revealed widespread VOC-contaminated groundwater in the SFV, specifically a contaminant plume migrating to the southeast at a rate of 300 ft/yr. These findings resulted in a number of municipal supply wells for the cities of Los Angeles, Burbank, and Glendale being taken out of service. Water for the City of Glendale was purchased as needed from the Metropolitan Water District (MWD) of Southern California.

As part of the GCOU RI and GOU FFS 40 additional monitoring wells have been installed and pump-tests have been performed on existing extraction wells further refining the nature and extent of contamination and the conceptual site model.

The original COCs for the SFV Area 2 Site were TCE and PCE. The presence of TCE, PCE, in groundwater at concentrations greater than the MCL provided the original basis for taking action under CERCLA. In the past 15 years EPA is also concerned with preventing exposure to other groundwater COCs such as perchlorate, chromium (especially hexavalent chromium), 1,4 dioxane, and Trichloropropane (TCP). Possible routes of exposure to COCs include ingestion, inhalation, and dermal contact.

The most prevalent groundwater contaminants in the SFV were found to be TCE and PCE. In 1992, the highest concentrations of TCE and PCE detected in EPA monitoring wells in the SFV were 1,700 micrograms per liter ($\mu\text{g/L}$) and 160 $\mu\text{g/L}$, respectively. A basin-wide RI was completed in 1992, and 87 groundwater monitoring wells were installed throughout the eastern SFV. The 1992 Basinwide RI provided the baseline assessment for the extent of contamination in all Areas of the SFV. Since the 1992 RI, additional monitoring and characterization have taken place in Area 2, especially in the past 10 years. As part of the GCOU RI and GOU FFS 40 additional monitoring wells have been installed and pump-tests have been performed on existing extraction wells further refining the nature and extent of contamination and the conceptual site model.

Due to the large area and complexity of the site EPA shares oversight responsibilities with the State of California. Pursuant to cooperative Agreement, EPA oversees the remediation of groundwater while the State of California oversees the remediation of sources. From the late 1980s to the present, EPA has provided a grant to the Los Angeles Regional Water Quality Control Board (RWQCB) to conduct assessments of facilities in the SFV to determine the extent of VOC solvent, and more recently metals usage at facilities to assess past and current chemical handling, storage, and disposal practices. These investigations were conducted pursuant to the RWQCB's Well Investigation Program and resulted in source remediation activities at facilities within the SFV where the release of solvents had occurred. The cooperative grant with the RWQCB remains ongoing, facilitating source investigations and remediation activities in progress. Although EPA does not have a cooperative grant with the California Department of Toxic Substances Control (DTSC), DTSC is overseeing clean-up at selected sites in the SFV.

In 1999, EPA provided funds to the RWQCB to investigate potential chromium sources in the SFV. In November 2002, the RWQCB released the findings from its investigation of more than 4,000 potential chromium sources, recommending further assessment of 105 sites. Of these 105 sites identified in the RWQCB study, 7 facilities in the SFV were given Cleanup and Abatement Orders (CAOs) from the RWQCB. In 2007, based on the RWQCB and subsequent EPA investigation results, EPA established the Glendale Chromium Operable Unit (GCOU) to study the distribution of hexavalent chromium contamination in groundwater and to evaluate potential associated unacceptable risks to human health and the environment. Other potential chromium groundwater contaminant sources in the SFV are being evaluated by RWQCB, DTSC, and EPA. EPA completed removal actions on two facilities; one in December 2007 and the other in 2010.

4. Remedy Selection

The 1993 RODs for the GNOU and GSOU selected interim remedies to address the VOC-contaminated groundwater plume in the Glendale area. The remedial action objectives (RAOs) for GNOU and GSOU were presented in the RODs as follows:

- To inhibit vertical and horizontal migration of groundwater contaminants in the North and South Plumes of the Glendale Study Area; and
- To begin to remove contaminant mass from the upper zone of the aquifer in the North and South Plumes of the Glendale Study Area.

EPA interprets the phrase “inhibition” to mean full hydraulic control of contaminated groundwater. EPA’s expectation in its first remedial action objective is that the contamination will be hydraulically contained and not migrate to areas not previously impacted.

The RODs selected groundwater extraction, treatment of VOCs by air stripping and liquid phase granular activated carbon (LPGAC), blending to meet the nitrate MCL, and conveyance to a public water distribution system. In addition, the RODs stated the air stream resulting from air stripping will be treated using vapor-phase GAC (VPGAC) to ensure that air emissions meet Federal air quality standards as regulated by the South Coast Air Quality Management District (SCAQMD). The RODs selected a combined treatment system (a single treatment plant [GWTP]) for both OUs.

4.1. *Remedy Implementation*

The GNOU and GSOU remedy construction occurred from 1997 to 2000 and included:

- Installation of eight extraction wells, (four wells each in the north and south wellfields , GN-1 through GN-4 and GS-1 through GS-4), capable of producing a total of 5,000 gallons per minute (gpm)
- Conveyance piping from extraction wells to the groundwater treatment facility
- Design and construction of the groundwater treatment facility capable of treating 5,000 gpm
- Conveyance piping of treated water from the groundwater treatment facility to the City of Glendale Grandview Reservoir
- Conveyance piping for discharge of treated water to the Los Angeles River during routine maintenance or in the event of a system malfunction

Four of the extraction wells are located in the GNOU, and four are located in the GSOU. Seven of the wells were completed in the Shallow Zone (approximately 200 feet deep) and one well (GN-4) was completed in the Deeper Zone (approximately 400 feet deep). Wellhead facilities for each extraction well consist of a pump and appurtenances to accomplish pumping to the GWTP.

The treatment facility is composed of two single-stage packed air strippers, eight 20,000-pound (lb) LPGAC units (operated in parallel), and six 10,000-lb VPGAC vessels (two trains of three VPGAC units operated in parallel; one train per air stripper). Groundwater from the transmission pipelines flows

directly into two single-stage packed air strippers for VOC removal. The water is collected at the bottom of each air stripper and pumped into LPGAC vessels where residual VOCs are adsorbed. The water pumped through the LPGAC units is disinfected and delivered to the City of Glendale for transmission to the Grandview Reservoir. The off-gases from the air strippers are treated by passing them through the VPGAC vessels. As the off-gases pass through the VPGAC vessels, VOCs are adsorbed onto the GAC, and the treated air is released through discharge stacks.

The interim remedy began initial operation in August 2000, and all extraction wells were operational by 2002.

4.2. Operation and Maintenance (O&M)

The City of Glendale (via its contractor CDM Smith) is conducting long-term monitoring and maintenance activities for the GOU according to the Revised O&M Manual (CDM 2003). CDM provides monthly operations reports to EPA, the City of Glendale, DTSC, RWQCB, ULARA Watermaster, and other parties detailing the scheduled and unscheduled maintenance; volumes of water extracted, treated, and discharged; contaminant concentrations in extraction wells, plant influent, and plant effluent; and estimated VOC mass removal.

From 2008-2012, frequent scheduled maintenance activities included carbon replacement, air filter replacement, carbon bed expansions, cleaning or installing disinfectant injection components, instrument calibration, flow meter replacement, pump lubrication, piezometer sampling, safety inspections, equipment inspections, and other preventative maintenance. Common occurrences that resulted in unscheduled maintenance included communication issues with extraction wells and well failure due to power conditions. Significant O&M activities over the same period included:

- Installing and testing a new sodium hypochlorite (NaOCl) storage tank (November 2008-January 2009) in response to a leak in September 2008. 2008 maintenance reports indicate a leak was detected in the NaOCl tank on 9/10/2008, with the contents being transferred to temporary totes (all leakage contained). Several scheduled maintenance activities over the months from November 2008 - January 2009 indicate the installation and testing of a new tank.
- Well rehabilitation for GN-4 (2009) and GS-2 (2011)
- Setup and testing of the demonstration scale hexavalent chromium removal treatment systems the WBA (GS-3) and RCF (GN-3) from December 2009 – April 2010; startup of WBA in March 2010 and RCF in April 2010
 - Formaldehyde was found to be associated with the resin product after the initial flushing of the W. BA system. Initial flushing water is now stored in large tanks on site for biological treatment.

Annual O&M costs for the GOU from January 2010 through December 2012 are shown in Table 2.

Table 2. Annual O&M Costs

| Date Range | Total Cost (rounded to the nearest \$1,000) |
|-------------------------|---------------------------------------------|
| January – December 2010 | \$2,917,000 |
| January – December 2011 | \$3,224,000 |
| January – December 2012 | \$3,158,000 |

5. Progress Since the Last Five-Year Review

5.1. Previous Five-Year Review Protectiveness Statement and Issues

The protectiveness statement from the 2008 FYR for the SFV Area 2 Site stated the following:

“The interim remedies at the San Fernando Valley, Area 2, Superfund Site are protective of human health and the environment because all exposure pathways are currently being controlled. To be protective in the long-term, the operational problems due to the chromium discharge limit and their effect on plume containment must be addressed.”

The 2008 FYR included one issue and recommendation. The recommendation and the current status are discussed below.

Table 3. Status of Recommendations from the 2008 FYR

| Issues from previous FYR | Recommendations | Party Responsible | Milestone Date | Action Taken and Outcome | Date of Action |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------|----------------|-----------------------------------------------------------------|----------------|
| Reduced pumping of two extraction wells due to high chromium concentrations has caused some loss of plume capture and migration of VOCs | Complete the Chromium Demonstration Project | City of Glendale | January 2009 | WBA and RCF selected for pilot- and demonstration-scale testing | Ongoing |

Weak-base anion exchange (WBA) and reduction, coagulation, and filtration (RCF) were selected as alternative treatments for pilot and demonstration scale testing. WBA was installed to treat groundwater pumped from GS-3, the extraction well with the highest hexavalent chromium concentrations in GSOU, and began operation in May 2010 (concentration data for all extraction wells can be found in section 5.4). An RCF system was also installed to treat a 100-gpm slipstream from the GOU north extraction well GN-3, the extraction well with the highest hexavalent chromium concentrations in GNOU, and began operation in April 2010. In July 2012, the RCF system was shut down because pilot testing was completed; the WBA well head system is still operating and adopted as part of operations in order to allow the plant to achieve pumping requirements for the GS-3 well.

5.2. Work Completed at the Site During this Five Year Review Period

In addition to the completion of the Chromium Demonstration Project (research project done in parallel with the operation of the hexavalent chromium demonstration facilities) and the installation of WBA and RCF, several actions have been completed during this FYR period.

In 2009, CDM Smith completed an evaluation of the extraction wells, and presented the results in a document titled Extraction Well Evaluation Results (EWER). The EWER established a priority list for wells needing rehabilitation. Well GN-4 was rated first in need and was rehabilitated in 2009. The following year well GS-2 was rehabilitated from April through June of 2011.

In 2010, EPA initiated a removal action at a former metal plating facility in Glendale. The cleanup involved the excavation of 460 tons of soil contaminated with chromium. In 2011, EPA initiated the RI for groundwater chromium contamination in Area 2 and parts of Area 1. In November 2011, EPA entered into an agreement, an Administrative Order on Consent (AOC), with the GCOU respondents to perform a portion of the RI work. In April 2012, the Final RI Work Plan for the GCOU was prepared by CH2M Hill on behalf of the EPA. The RI Work Plan identified areas where additional chromium investigation may be warranted to more completely delineate the extent of chromium contamination. The GCOU respondents have installed 12 new monitoring wells as part of the RI activities. EPA plans to install up to 17 new monitoring wells to address data needs that are not being addressed by the GCOU RI field work began in 2012.

The GCOU field work is important for the future of the GNOU and GSOU since chromium has the potential to impair the operation of the current VOC remedy. The GNOU and GSOU remedies (collectively called the GOU) are not designed to treat Chromium. At this moment Chromium influent is blended so the hexavalent chromium component does not exceed 5 ppb prior to delivery to the public water system. The 5 ppb standard is a voluntary standard that is derived from a Glendale City ordinance which states the City will not accept water designated as a drinking water source that has hexavalent Chromium concentrations above 5 ppb. The GCOU remedial investigation activities are important to future operations of the GNOU and GSOU as an upgradient chromium plume front has the potential debilitate future remedy operations as hexavalent chromium concentrations increase in more wells. In such a scenario blending to 5 ppb for hexavalent chromium will become logistically difficult with increases in influent concentration and number of wells impacted.

Several efforts have been completed in accordance with the *GOU Focused Feasibility Study (FFS) Statement of Work (SOW)* developed by EPA and the Glendale Respondents Group (GRG), the *FFS Work Plan* (ERM 2010), and the *FFS Work Plan Addendum* (ERM 2011). These efforts have been documented in technical memorandums (TMs). In their most recent forms, these documents (all produced by ERM on behalf of the GRG) include: *Draft Extraction Well GS-1 Evaluation TM* (June 2012), *Final Site Characterization TM* (October 2012), *Draft Emerging Compounds Evaluation TM* (October 2012), and *Revised Draft Hydraulic Containment Evaluation TM* (October 2012). It should be noted that most of these documents have significant comments from EPA, California Department of Public Health (CDPH), and/or the City of Glendale. The following is a summary of the findings in various technical memos:

- The purpose of the *Extraction Well GS-1 Evaluation* was to assess the impacts of surface water on extraction well GS-1. CDPH had raised concerns that groundwater extracted by GS-1 may be influenced by the adjacent Los Angeles River or upgradient wastewater treatment plant retention pond. Detections of n-nitrosodimethylamine (NDMA) in the Los Angeles River raised the possibility that there was a surface water connection to groundwater extracted by GS-1. The GS-1 Technical Memo concluded that the primary source of NDMA in GS-1 was the Los Angeles-Glendale Water Reclamation Plant (LAGWRP) retention pond. The presence of NDMA in well GS-1 suggested a surface water influence from the Los Angeles River (85% of river flow is treated wastewater) or the upgradient LAGWRP facility. During the past five years NDMA

reached a maximum concentration of 0.2 µg/L, exceeding the CDPH notification level for NDMA of 0.01 µg/l.

Historical investigations of LAGWRP operations revealed that the pond was potentially breached in 1992 when it was used as a staging area for construction equipment. Analysis of historical trends also showed that increasing concentrations of NDMA in well GS-1 coincided with a 2007 process change at the wastewater facility. The *Extraction Well GS-1 Evaluation* concluded that the LAGWRP pond was the most likely NDMA source.

In response to the conclusion that the wastewater pond was the source of well GS-1 NDMA contamination, LAGWRP changed operations so wastewater effluent bypassed the pond. Over the course of 9 months (April-December 2012) the pond was drained and VOC and NDMA concentrations were monitored monthly at well GS-1. Results showed that NDMA concentrations decreased as the pond drained. An August 2012 report shows NDMA concentrations decreasing to 0.022 µg/L. In December 2012, EPA and CDPH concurred with the GRG report that the pond was the source of NDMA and requested that the GRG continue to work with LAGWRP to ensure that the pond would not be put back into use unless the liner was repaired. As of the writing of this Five-Year Review the LAGWRP pond remains dry and GS-1 NDMA concentrations continue to decrease.

- The purpose of the *Site Characterization* TM is to present data collected during specific field investigations and to address data gaps so that evaluations of hydraulic containment, emerging compounds, and extraction well GS-1 could be completed. The document essentially revises the conceptual site model for the site. As part of the site characterization effort 14 new monitoring wells were installed in the vicinity of the GNOU and GSOU, and pump test were performed on selected extraction wells.
- *The purpose of the Emerging Contaminants Evaluation* was to assess groundwater analytical data for emerging contaminant identification and determine potential current and future impacts to GOU remedy performance and GWTP operations for constituents identified as emerging contaminants. The evaluation identified two compounds, 1,4-dioxane and hexavalent chromium, as having the most potential to impact GOU remedy performance and GWTP operations. Chromium, especially hexavalent chromium, has the potential to impair the existing remedy since the current treatment system was not designed to treat chromium. 1, 4 dioxane could impair remedy performance if extraction well and treatment facility effluent exceed the CDPH notification level of 1ug/L. Concentrations of 1,2,3-TCP in GOU extraction wells are likely to increase because up-gradient areas (specifically the Burbank Operable Unit) have higher concentrations. Increasing 1,2,3-TCP concentrations would ultimately increase facility O&M costs as treatment of 1,2,3-TCP increases the frequency of change outs in GAC and LPGAC vessels. In summary the report details the distribution and concentrations of emerging contaminants chromium, 1,4-dioxane, 1,2,3-TCP, perchlorate, and NDMA throughout Area 2.

- The purposes of the *Hydraulic Containment Evaluation* TM was to determine whether the interim remedy, as it is operated currently, achieves the RAO of inhibition of vertical and horizontal migration and to evaluate alternatives to enhance the interim remedy and the degree of hydraulic containment. EPA interprets the phrase “inhibition” to mean full hydraulic control of contaminated groundwater. The study found hydraulic control is not being achieved. Groundwater modeling in this report indicates a loss of capture between wells GN-2 and GN-3 in the GNOU (north well field), and between all wells in the GSOU (south wellfield), is not being achieved.

Groundwater model particle tracking results showed that particles were escaping between the aforementioned wells (Figures 30 and 31). To mitigate the escape of contamination downgradient, an alternative was identified to achieve hydraulic containment in the GSOU. The chosen alternative involves the installation of a new extraction well in the GSOU between well GS-2 and GS-3, relocation of the WBA system from well GS-3 to well GN-3, and adjustment of pumping rates of existing extraction wells. The GNOU and GSOU parties have committed to moving forward with implementing the design enhancements recommended in the *Hydraulic Containment Evaluation*. EPA is working to implement the aforementioned improvements and to address areas where only partial hydraulic containment is being achieved through the installation of additional extraction wells.

6. Five-Year Review Process

6.1. Administrative Components

EPA Region 9 initiated the FYR in January 2013 and scheduled its completion for September 2013. The review team was led by ZiZi Searles of EPA, Remedial Project Manager (RPM) and contractor support was provided by USACE (David Sullivan, geologist and Aaron King, environmental engineer). On January 9, 2013, EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. A review schedule was established that consisted of the following: 1) community notification, 2) document review, 3) data collection and review, 4) site inspection; 5) local interviews; and 6) Five-Year Review Report development and review.

6.2. Community Involvement

On January 30, 2013, a public notice was published in the *Los Angeles Daily News* announcing the commencement of the Five-Year Review process for the San Fernando Valley Area 2 Site, providing contact information for EPA's San Fernando Valley Sites Community Involvement Coordinator, Jackie Lane, and inviting community participation. The press notice is available in Appendix B. The Five-Year Review report will be made available to the public once it has been finalized. Copies of this document will be placed in the designated public repositories: City of Glendale Public Library, 222 East Harvard St. Glendale, CA or call (818) 548-2021 and Los Angeles Public Library, 630 W. Fifth St., Los Angeles CA 90071 or call (213) 228-7000. Upon completion of the FYR, a public notice will be placed in the *Daily News Los Angeles* to announce the availability of the final FYR report in the Site document repositories.

6.3. Document Review

This FYR includes a review of site-related documents including the ROD, remedial action reports, and recent monitoring data. A complete list of the documents reviewed can be found in Appendix A.

6.3.1. ARARs Review

Section 121 (d)(2)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) specifies that Superfund Remedial Actions (RAs) must meet any federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). ARARs are those standards, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, RA, location, or other circumstance at a CERCLA site.

Changes (if any) in ARARs are evaluated to determine if the changes affect the protectiveness of the remedy. The 1993 GNOU ROD and the 1993 GSOU ROD identified only chemical- and action-specific ARARs for the site; no location-specific ARARs were identified for the Site. Each ARAR and any change to the applicable standard or criterion are discussed below. The selected interim remedies are expected to comply with all federal and state ARARs except for 40 CFR § 300.430(e)(2)(i)(A), which requires that the contaminant levels of the groundwater that remains in the aquifer be reduced below MCLs.

6.3.1.1 Chemical-specific ARARs

Because these were interim actions for containment of groundwater contamination, EPA has not established chemical-specific ARARs for restoration of groundwater remaining on-Site. EPA is waiving this ARAR pursuant to CERCLA Section 121(d)(4)(A), 42 U.S.C. § 9621(d)(4)(A), and 40 CFR § 300.430(f)(1)(ii)(C), which allows EPA to select a remedy that does not achieve an ARAR when the remedial alternative selected is an interim measure that will become part of a total remedial action that will attain ARARs. EPA's waiver of the aquifer cleanup standard does not apply to water extracted from the aquifer and delivered to municipalities for use as drinking water; all extracted and treated water is expected to comply with MCL ARARs

Performance standards for treated groundwater are summarized in Table 4. The current regulatory standards for TCE, PCE, and the other VOC COCs are the state and federal MCLs. The current regulatory standard for total chromium is the state MCL of 50 µg/L. Hexavalent chromium is not regulated by itself, but addressed by both federal and state MCLs for total chromium. Recently, CDPH has proposed a draft MCL specific for hexavalent chromium at a value of 10 µg/L (August 2013). US EPA is currently revising the hexavalent chromium toxicity assessment and plans to revisit the MCL upon its completion. A final MCL for hexavalent chromium is expected to be announced during the period of the next FYR.

In April 2007, the Los Angeles RWQCB changed the effluent standards for the maintenance and emergency discharges of treated water to the Los Angeles River. The effluent standard for hexavalent chromium was changed to 8 µg/L. The City of Glendale is required to keep hexavalent chromium concentrations in the combined discharge from the extraction wells below 8 µg/L in order to ensure that any emergency bypasses do not violate the current river discharge limits. The 8 µg/L limit became effective in June 2007. Also, the City of Glendale adopted a goal of 5 µg/L for hexavalent chromium prior to distribution in the City's water system. When delivering water to the distribution system, the hexavalent chromium concentration in the effluent from the GOU treatment system is not to exceed 11 µg/L; blending is performed with water from the City of Glendale G-3 turn-out prior to delivery to the distribution system, which is meant to achieve the 5 µg/L limit.

At the time of this FYR no final state or federal MCLs had been promulgated for 1,2,3-TCP, 1,4-dioxane, or NDMA. For these emerging contaminants that lack MCLs, the CDPH notification levels, which are health-based advisory levels for drinking water use, may be treated as criteria to-be-considered (TBC) in setting alternative performance standards for extracted groundwater.

Nitrate is also present in groundwater in excess of the MCL, as a result of past agricultural and sewage disposal practices in the SFV, but is not targeted for treatment as part of the GNOU or GSOU interim remedies. 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.

The State of California's Secondary Drinking Water Standards are also ARARs for the Site 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 Secondary Drinking Water Standards are not applicable to non-public water system suppliers, they are relevant and appropriate since the treated water under this action would be put into the City's drinking water system.

Table 4. Performance Standards for Treated Groundwater

| Contaminant of Concern | Federal MCL (µg/L) | California MCL (µg/L) | CDPH Notification Level (µg/L) | Basis for Performance Standard | Performance Standard (µg/L) ^a |
|--------------------------------------|--------------------|-----------------------|--------------------------------|-------------------------------------------|------------------------------------------|
| TCE | 5 | 5 | None | Federal MCL | 5 |
| PCE | 5 | 5 | None | Federal MCL | 5 |
| 1,1-DCA | None | 5 | None | California MCL | 5 |
| 1,2-DCA | 5 | 0.5 | None | California MCL | 0.5 |
| 1,1-DCE | 7 | 6 | None | California MCL | 6 |
| cis-1,2-DCE | 70 | 6 | None | California MCL | 6 |
| 1,1,1-TCA | 200 | 200 | None | Federal MCL | 200 |
| 1,1,2,2-Tetrachloroethane | None | 1 | None | California MCL | 1 |
| Vinyl chloride | 2 | 0.5 | None | California MCL | 0.5 |
| Carbon tetrachloride | 5 | 0.5 | None | California MCL | 0.5 |
| Methylene chloride | 5 | 5 | None | Federal MCL | 5 |
| Benzene | 5 | 1 | None | California MCL | 1 |
| Toluene | 1,000 | 150 | None | California MCL | 150 |
| Ethylbenzene | 700 | 300 | None | California MCL | 300 |
| Xylene, Total | 10,000 | 1,750 | None | California MCL | 1,750 |
| MTBE | None | 13 | None | California MCL | 13 |
| Nitrate (as nitrogen) | 10,000 | 10,000 ^b | None | Federal MCL | 10 |
| Total chromium ^c | 100 | 50 | None | California MCL | 50 |
| Hexavalent chromium ^{d,e,f} | None | None | None | RWQCB: See note e Glendale: See note f | 8 ^e ; 5 & 11 ^f |
| Perchlorate | None | 6 | None | California MCL | 6 |
| 1,2,3-TCP | None | None | 0.005 | CDPH Notification Level | 0.005 |
| 1,4-dioxane | None | None | 1 ^g | CDPH Notification Level | 1 |
| NDMA | None | None | 0.01 | CDPH Notification Level | 0.01 |

a. The CDPH permitting process may require lower concentrations in the treated effluent.

b. MCL is listed as 45 mg/L nitrate as nitrate, which is equivalent to 10 mg/L nitrate as nitrogen.

c. When speciation data is unavailable the State of California uses 50 micrograms per liter, and for risk evaluation reasons, assumes all total chromium is hexavalent chromium.

d. Federal and state MCLs specific to hexavalent chromium have not been established. In August 2013 CDPH announced a draft hexavalent chromium MCL of 10 µg/L for public comment.

e. The City of Glendale is required to keep treatment plant and well effluent hexavalent chromium concentrations below 8 µg/L in order to ensure that any emergency bypasses does not violate the current RWQCB-mandated limits for discharging to the river.

f. The City of Glendale passed a city ordinance requiring drinking water to meet a standard of 5 µg/L for hexavalent chromium prior to distribution in the City's water system. To meet this requirement treatment plant effluent delivered to the distribution system is not to exceed 11 µg/L for hexavalent chromium. The City has determined effluent with hexavalent chromium above 11 µg/L may not blend with the City's other water sources to meet the 5 µg/L city requirement.

g. In 1998, CDPH established its initial notification level at 3 µg/L, based on a EPA drinking water concentration that corresponded with a 10⁻⁶ theoretical lifetime excess cancer risk. In 2010, EPA revised its 1,4-dioxane risk evaluation such that a 10⁻⁶ risk level corresponds to 0.35 µg/L. CDPH revised its notification level to 1 µg/L in November 2010

i. The CDPH Notification Level for 1, 2, 3 TCP is the same as the detection limit. The detection limit for 1,2,3 TCP in water is 0.005µg/L.

6.3.1.2 Other ARARs

Federal and state laws and regulations other than chemical-specific ARARs that have changed over the past five years are described in Table 5. These ARARs were pre-construction requirements, so it is assumed that all applicable requirements were obtained before the units went on-line. However, if the systems are modified significantly, these ARARs would still apply. There have been no other revisions to laws and regulations that affect the protectiveness of the remedy. A full summary of ARARs listed in the 1993 GNOU and GSOU RODs is given in Appendix F.

Table 5. Applicable or Relevant and Appropriate Requirements Evaluation

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|-------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Clean Air Act SCAQMD | Regulation XIII | Regulation XIII requires that stationary sources of air emissions meet best available control technology (BACT) standards. | Rules 1309 (Emission Reduction Credits and Short Term Credits), 1315 (Federal New Source Tracking System), and 1325 (Federal PM _{2.5} New Source Review Program) of Regulation XIII have been amended or adopted since the previous FYR, but none of the changes affect protectiveness. | For air strippers, SCAQMD considers vapor phase GAC (with 90-99% removal efficiency) devices to be BACT. These are pre-construction requirements, so it is assumed that all applicable requirements were obtained before treatment units went on-line. | Latest amendment was on June 3, 2011. |
| Clean Air Act SCAQMD | Rule 1401 | Rule 1401 specifies limits for individual cancer risk and excess cancer cases from new or modified stationary sources which emit carcinogenic air contaminants. The rule requires BACT for toxic air discharge for new stationary sources where a lifetime maximum individual cancer risk of one in one million or greater is estimated to occur. | The list of chronic and acute toxic air contaminants was expanded, but this does not affect protectiveness. | As Rule 1401 is a pre-construction regulation, it is assumed that all applicable requirements were attained before the treatment units went on-line. If the air stripping treatment system is modified significantly, substantive provisions of Rule 1401 will still apply. | Latest amendment was on September 10, 2010. |

6.3.2. Human Health Risk Assessment Review

A human health risk assessment was completed for the Site as part of the San Fernando Valley groundwater RI (James M. Montgomery, Inc. 1992). For this FYR, the risk assessment was reviewed to identify any changes in exposure or toxicity that would impact protectiveness.

The 1992 risk assessment identified two exposure pathways at SFV Area 2 Site: ingestion of drinking water and inhalation of vapors during showering. The dermal absorption pathway was considered, but it was determined that its potential contribution to overall risk would not be significant. There have been no

changes in exposure pathways that were listed in the RI. The vapor intrusion pathway (discussed in Section 6.3.2.1 below) was not evaluated in the 1992 RI.

In the RI, lifetime excess cancer risks and non-cancer hazard quotients were calculated for the ingestion and inhalation pathways for the shallow and deeper aquifer zones under three different exposure scenarios: average, reasonable maximum exposure (RME), and maximum. The different scenarios essentially represent exposures to different contaminant concentrations found during the RI. The average scenario represents an exposure to average contaminant concentrations, the RME scenario represents an exposure to contaminant concentrations corresponding to the upper bound 95% confidence interval, and the maximum scenario represents an exposure to the maximum observed contaminant concentrations. Table 6 shows cancer risks associated with ingestion and inhalation exposure pathways.

Table 6. Site Risks Identified in the San Fernando Valley RI/FS

| Exposure Scenario and Pathway | Non-cancer Hazard Index | Cancer Risk |
|-------------------------------------------------------|--------------------------------|--------------------|
| Shallow Zone – San Fernando Valley Groundwater | | |
| Average - Ingestion | 1.7 | 4.0E-04 |
| RME - Ingestion | 3.1 | 8.0E-04 |
| Maximum - Ingestion | 20 | 6.0E-03 |
| Average - Inhalation | 1.2 | 6.0E-04 |
| RME - Inhalation | 2.2 | 1.0E-03 |
| Maximum - Inhalation | 14 | 1.0E-02 |
| Deeper Zone – San Fernando Valley Groundwater | | |
| Average - Ingestion | 0.26 | 4.0E-05 |
| RME - Ingestion | 0.42 | 6.0E-05 |
| Maximum - Ingestion | 1.7 | 2.0E-04 |
| Average - Inhalation | 0.17 | 1.0E-05 |
| RME - Inhalation | 0.32 | 2.0E-05 |
| Maximum - Inhalation | 1.6 | 1.0E-04 |

6.3.2.1 Vapor Intrusion

EPA’s understanding of contaminant migration from soil gas and/or groundwater into buildings has evolved over the past few years leading to the conclusion that vapor intrusion may have a greater potential for posing risk to human health than assumed when the ROD was prepared. In April 2013 EPA released an external review draft version of its vapor intrusion guidance titled “*OSWER Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air*” (EPA 2013). This guidance was used to evaluate the SFV Area 2 potential for vapor intrusion discussed in following paragraphs.

In the late 1980’s and early 90’s a regional groundwater soil gas investigations were as part of OU specific and Basinwide SFV RI activities. This soil gas sampling was performed to gather information on the

extent of VOC contamination in the basin. Soil gas data collected for the purpose of assessing the potential for regional groundwater vapor intrusion was not obtained at this time.

The potential for regional groundwater vapor intrusion was evaluated in this FYR following a “multiple lines of evidence” approach. PCE, TCE (i.e.VOCs) present in regional groundwater are of such a concentration, sufficiently toxic, and volatile that certain areas of the site are potentially susceptible to vapor intrusion. Groundwater PCE and TCE concentrations over large areas of Area 2 are greater than the generic groundwater screening levels for a vapor intrusion hazard quotient equal to 1 for a residential exposure scenario (58 µg/L for PCE, 5.2 µg/L for TCE) as shown in EPA’s Vapor Intrusion Screening Level Calculator (EPA 2013). The fact that the area is heavily populated and contains numerous buildings is another condition that suggests the possibility for vapor intrusion. Finally ground water elevations are shallow enough for groundwater VOC volatilization to potentially reach the surface. This assessment also found that the areas most vulnerable to potential vapor intrusion are areas where groundwater is the shallowest. The most recent ULARA Watermaster Report (2012) shows water levels in three wells in Area 2 to be less than 50 feet bgs. Groundwater levels documented in the *Revised Draft Hydraulic Containment Technical Memorandum* (ERM 2012), show PCE and/or TCE contamination above the hazard quotient in many wells where the top of screen is less than 100 feet bgs and 50 feet bgs.

At time of the writing of this FYR the potential for regional groundwater vapor intrusion is unknown. Given the EPA’s Vapor Intrusion Screening Level Calculator results show there is potential for Area 2’s vapor intrusion, further investigation is needed to assess whether such vapor intrusion pathways exist. The uncertainty surrounding the potential for vapor intrusion requires a protectiveness deferred determination for this FYR. In the next five years an investigation will be conducted to gather information on the existence or non-existence of these pathways. The results of this investigation will be discussed in the next FYR, at which time a protectiveness determination will be made.

6.3.2.2 Toxicity values

EPA’s Integrated Risk Information System (IRIS) has a program to update toxicity values used by the Agency in risk assessment when newer scientific information becomes available. In the past five years, there have been a number of changes to the toxicity values for certain contaminants of concern at the Site. Revisions to the toxicity values for TCE, PCE, 1,4-dioxane, methylene chloride, carbon tetrachloride, cis-1,2-DCE, and 1,2,3-TCP indicate changes in risk from exposure to these chemicals, such that risk is now considered to exist at levels different than previously considered. Table 7 shows the changes in toxicity values for these contaminants. TCE, PCE, and 1,4-dioxane are discussed further; hexavalent chromium, for which a new final standard is expected soon, is also discussed.

Table 7. Changes in Toxicity Values in the Last Five Years

| Contaminant | Toxicity Value | RI Value ^a | November 2012 RSL Table Value | Change |
|----------------------|------------------------------|-----------------------|-------------------------------|----------------|
| PCE | SFO (kg-day/mg) | 5.10E-02 | 2.10E-03 | Less stringent |
| | RfD _o (mg/kg-day) | 1.00E-02 | 6.00E-03 | More stringent |
| TCE | SFO (kg-day/mg) | 1.10E-02 | 4.60E-02 | More stringent |
| | RfD _o (mg/kg-day) | 1.00E-02 | 5.00E-04 | More stringent |
| 1,4-dioxane | SFO (kg-day/mg) | 1.10E-02 ^b | 1.00E-01 | More stringent |
| | RfD _o (mg/kg-day) | -- | 3.00E-02 | More stringent |
| cis-1,2-DCE | SFO (kg-day/mg) | -- | -- | No change |
| | RfD _o (mg/kg-day) | 1.00E-02 ^b | 2.00E-03 | More stringent |
| Carbon tetrachloride | SFO (kg-day/mg) | 1.30E-01 | 7.00E-02 | Less stringent |
| | RfD _o (mg/kg-day) | 7.00E-04 | 4.00E-03 | Less stringent |
| Methylene chloride | SFO (kg-day/mg) | 7.50E-03 ^b | 2.00E-03 | Less stringent |
| | RfD _o (mg/kg-day) | 6.00E-02 ^b | 6.00E-03 | More stringent |
| 1,2,3-TCP | SFO (kg-day/mg) | 2.00E+00 ^b | 3.00E+01 | More stringent |
| | RfD _o (mg/kg-day) | 6.00E-03 ^b | 4.00E-03 | More stringent |

Notes

^a As listed in SFV RI

^b Because toxicity values from the original risk assessment were not provided, these values are as listed in the EPA Region 9 2004 Preliminary Remediation Goals (PRGs) Table.

^c SFO = oral slope factor

^d RfD_o = oral reference dose

TCE and PCE: Groundwater results are compared to EPA regional screening levels (RSLs; previously called preliminary remediation goals [PRGs]) as a first step in determining whether response actions may be needed to address potential human health exposures. The RSLs are chemical-specific concentrations that correspond to an excess cancer risk level of 1×10^{-6} (or a hazard quotient (HQ) of 1 for noncarcinogens) developed for standard exposure scenarios (e.g., residential and commercial/industrial). RSLs are not de facto cleanup standards for a Superfund site, but they do provide a good indication of whether actions may be needed. In September 2011, EPA completed a review of the TCE toxicity literature and posted on IRIS both cancer and non-cancer toxicity values which resulted in lower RSLs for TCE. The screening level for chronic exposure for cancer excess risk level of 1×10^{-6} is 0.44 $\mu\text{g/L}$. EPA uses an excess cancer risk range between 10^{-4} and 10^{-6} for assessing potential exposures, which means a TCE concentration between 0.44 and 44 $\mu\text{g/L}$. The current MCL for TCE is 5 $\mu\text{g/L}$, which is within the revised protective carcinogenic risk range. EPA's 2011 Toxicological Review for TCE also developed safe levels that include at least a 10-fold margin of safety for health effects other than cancer. Any concentration below the non-cancer RSL indicates that no adverse health effect from exposure is expected. Concentrations significantly above the RSL may indicate an increased potential of non-cancer effects. The non-cancer RSL for TCE is 2.6 $\mu\text{g/L}$. EPA considers the TCE MCL of 5 $\mu\text{g/L}$ protective for both cancer and non-cancer effects.

EPA also recently reassessed PCE toxicity literature for both cancer and non-cancer effects and released the toxicological review in February 2012, posted on IRIS. The reassessment determined that risk for cancer in excess of 1×10^{-6} was a less stringent risk criterion than previously assumed, and EPA has raised the cancer RSL for PCE to 9.7 $\mu\text{g/L}$. The non-cancer RSL was also revised based on adverse neurological effects and resulted in a non-cancer risk RSL of 35 $\mu\text{g/L}$. The PCE MCL of 5 $\mu\text{g/L}$ remains protective for both carcinogenic and non-cancer effects. Table 8 summarizes the RSLs for TCE and PCE.

Table 8. Summary of Drinking Water RSLs for TCE and PCE

| Contaminant of Concern | RSL for cancer excess risk level of 1×10^{-6} ($\mu\text{g/L}$) | RSL for non-cancer hazard ($\mu\text{g/L}$) |
|-------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| TCE | 0.44 | 2.6 |
| PCE | 9.7 | 35 |

1,4-Dioxane: There are currently no federal or state MCLs for 1,4-dioxane. The current RSL is 0.67 $\mu\text{g/L}$ (or equivalent units: parts per billion [ppb]). CDPH established a Notification Level (formerly "action level") for 1,4-dioxane at 3 $\mu\text{g/L}$. Notification to the CDPH is required in the event treated water with a concentration exceeding a notification level is delivered to a municipal water purveyor. In 2010, EPA revised its 1,4-dioxane risk evaluation such that a 10^{-6} risk level corresponds to 0.35 $\mu\text{g/L}$, as noted in IRIS, though the RSL table has not yet been updated. In response to EPA's revision, CDPH revised its notification level from 3 to 1 $\mu\text{g/L}$ in November 2010.

Hexavalent Chromium: There is currently no MCL specific for hexavalent chromium; however, there is a federal MCL for total chromium at 100 $\mu\text{g/L}$ (ppb) and a California MCL for total chromium at 50 $\mu\text{g/L}$ (ppb). These total chromium MCLs assume that the majority of chromium in drinking water is in the hexavalent state.

In 2010, EPA updated its RSLs for hexavalent chromium. The RSL update was based on a revised toxicity assessment by the New Jersey Department of Environmental Protection following new toxicity information from the National Toxicology Program. The current hexavalent chromium RSL for tap water ingestion is 0.031 $\mu\text{g/L}$ (ppb). The EPA IRIS program is conducting its own reassessment of the toxicity of hexavalent chromium and EPA has committed to revise the chromium MCL upon completion of the IRIS reassessment. Any potential change to these chemicals will need to be addressed in subsequent five-year reviews.

In addition, the California Office of Environmental Health Hazard Assessment released a new Public Health Goal for hexavalent chromium at 0.02 $\mu\text{g/L}$ (ppb) in 2010. The California Department of Public Health (CDPH) released a proposed MCL for hexavalent chromium of 10 ppb in August 2013. Once new federal and/or state MCLs for hexavalent chromium are adopted, further evaluation regarding the protectiveness of the remedy will be completed.

6.3.3. Ecological Review

A brief ecological risk assessment was performed during the 1992 SFV RI. No threatened or endangered species were found to use the area. There is limited habitat use of the Los Angeles River by water fowl, although most of the habitat potential has been displaced through development and urbanization of the site. The ecological exposure pathway of primary concern for Area 2 is the discharge of contaminated groundwater to surface water bodies (i.e. the Los Angeles River, recharge basins, and other lake like bodies of water) and of treated effluent to the Los Angeles River. There is no information to indicate that untreated groundwater from the GNOU or GSOU reaches the surface water bodies. Discharges of untreated water to the Los Angeles River are expected to be infrequent, seasonal, and localized. These discharges usually occur to facilitate well development, well rehabilitation, or other treatment facility operational repairs requiring discharge of untreated water. Treated water discharged from the groundwater treatment system is required to be within discharge limits for VOCs and for hexavalent chromium (at 8 µg/L) (see section 5.3.1).

The 1992 RI suggests the potential for GSOU groundwater discharge to the Los Angeles River under rising water conditions (usually associated with major precipitation events) if the GSOU extraction wellfield is not operating. However, this scenario is unlikely given that the GSOU PRPs are under an order to ensure operation of the extraction wells year round. To evaluate the impact of such an event on water fowl should it ever occur, the 1992 RI compared maximum contaminant concentrations in groundwater to Los Angeles River ambient water quality criteria and sediment quality criteria. The RI concluded that there no ecological risk posed to water fowl. No complete ecological exposure pathways and/or significant exposures are expected to occur in Area 2.

6.4. *Data Review*

To evaluate whether the interim remedies at the GNOU and the GSOU are meeting RAOs and remain protective of human health and the environment, data and other information regarding groundwater quality throughout Area 2, the performance of the groundwater extraction and treatment system, and plume containment achieved by the extraction wells were reviewed.

Data that were reviewed include plume maps generated by CH2M Hill (EPA oversight contractor), data used to generate those plume maps, available monthly reports on the GOU by CDM Smith (January 2008 – December 2012), data (July 2010 – January 2012) and figures given to the review team during the site visit, the Revised Hydraulic Containment Technical Memorandum, the Extraction Well GS-1 Evaluation, Draft Emerging Compounds Evaluation Technical Memorandum, Final Remedial Investigation Work Plan, Final Site Characterization Technical Memorandum, and Results of Capture Modeling and Recommendations for Hydraulic Containment Monitoring.

A complete list of documents reviewed, with their sources, is shown in Appendix A.

6.4.1. Area 2 Groundwater Quality

The primary contaminants of concern (COCs) in Area 2 are TCE and PCE. The compounds chromium, 1,4-dioxane, 1,2,3-TCP, and perchlorate are considered emerging contaminants. Nitrate is also present in

groundwater. Plume maps or plotted extraction well data for these contaminants in Area 2 are shown in Figure 4 through Figure 15. Each plume map was constructed using the most recent data available from a well within that plume area from the period from January 2006 to July 2011. The plots were given to the review team during the site inspection. Appendix G contains additional summary information regarding VOC and chromium concentrations in extraction wells from January 2008 – December 2012. NDMA was also identified as an emerging contaminant in extraction well GS-1.

6.4.1.1 PCE and TCE

The PCE and TCE plumes in Area 2 have fluctuated in extent and concentration since the completion of the previous FYR. The fluctuations may have resulted from changing groundwater levels, migration of plumes, or changes in geochemical conditions in the aquifer; alternatively, they may reflect the incorporation of additional (or more recent) water quality data. Figure 4 through Figure 7 show the PCE and TCE plume maps for the Shallow and Deeper zones of Area 2. Over the last five years, PCE concentrations appear to be increasing in extraction wells GN-2 and GS-1 (Figure 8 and Figure 9). Over the last five years, TCE concentrations appear to be increasing in extraction well GN-3 and potentially in GS-3 as well (Figure 10 and Figure 11).

Results presented in the *Emerging Contaminants Evaluation ERM 2012*) show PCE and TCE concentrations at levels above their respective MCLs in monitoring wells down-gradient of the GNOU and GSOU extraction wells. In particular, shallow monitoring well GS-P13 (screened at 30-50 feet bgs in the Shallow Zone) shows PCE and TCE concentrations of 5.1 µg/L and 81 µg/L, respectively. Also, PCE and TCE were detected at levels above the MCLs in shallow monitoring well GN-P11 (screened depth 60-80 feet bgs), which is across the Los Angeles River southwest of the Glendale Water Treatment Plant. The study also found that the migration inhibition remedial action objective is not being achieved, i.e. complete capture between wells GN-2 and GN-3 in the GNOU, and between all wells in the GSOU, is not being achieved. Due to the size of the data section in the *Emerging Contaminants Evaluation* document (over 1000 pages) EPA is unable to include the raw data as an appendix, although EPA is happy to furnish a copy of this report upon request.

6.4.1.2 Chromium

Generally, the chromium plumes (which are dominated by hexavalent chromium) have fluctuated in extent and concentrations. Figure 12 and Figure 13 show total chromium and hexavalent chromium plume maps for the Shallow Zone of Area 2. Total and hexavalent chromium have been detected in Shallow Zone monitoring wells down-gradient of the GNOU and GSOU extraction wells. Over the last five years, hexavalent chromium concentrations appear to be decreasing in extraction wells GN-2 and GS-3 (Figure 14 and Figure 15), but increasing in GN-3 (Figure 14). The current GOU facility does not treat for chromium, but wellhead chromium treatment by WBA at GS-3 and RCF at GN-3 were implemented in the last five years, though RCF operation has ceased because it was a demonstration scale pilot designed for research purposes. The WBA is still in operation because it can treat up to 400 gpm of water whereas the RCF was designed to treat 100 gpm of water. At this time the PRPs have voluntarily integrated the operation of the WBA into treatment facility operations.

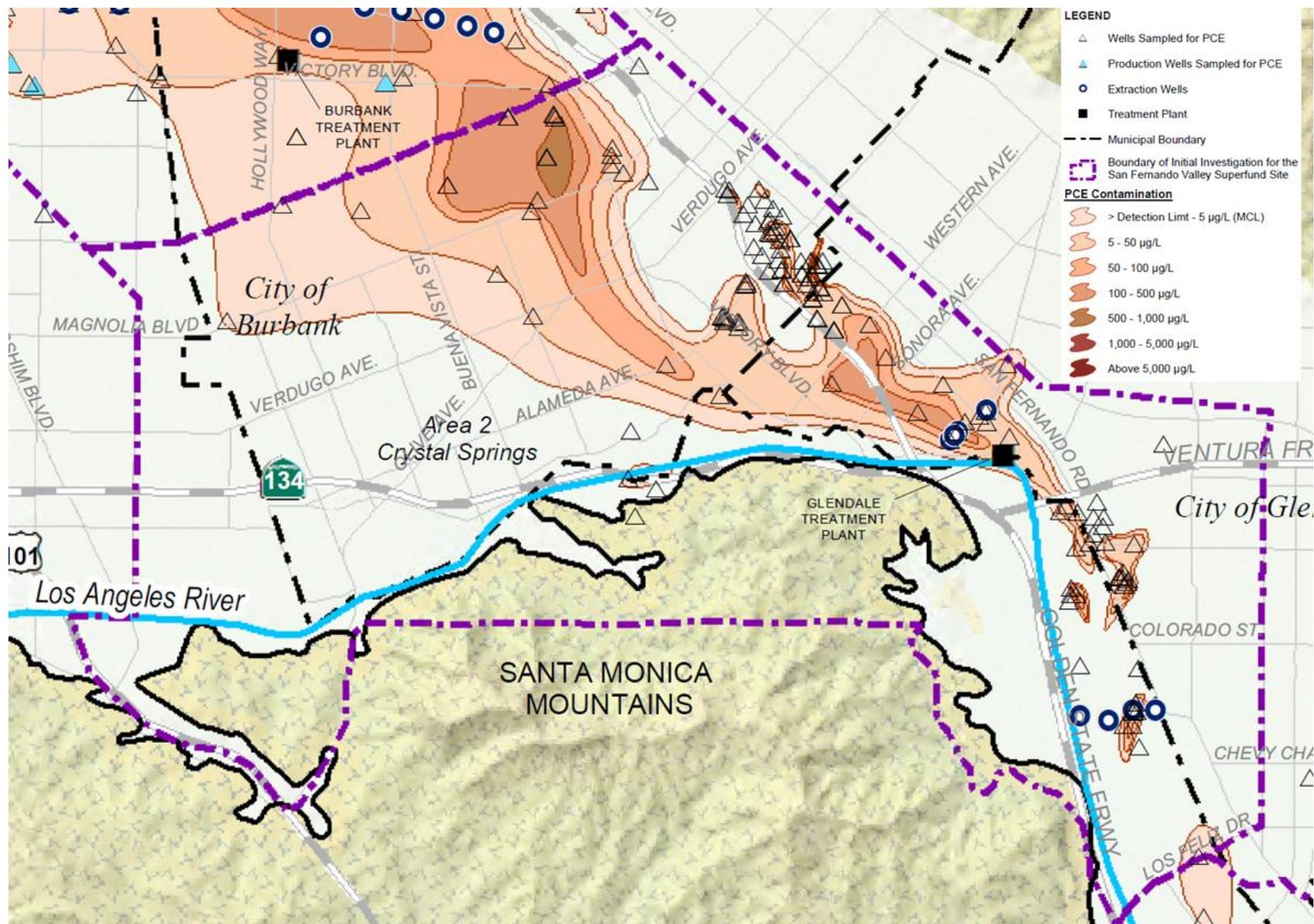


Figure 4. PCE in the Shallow Zone (Most Recent Concentration January 2006-2011)

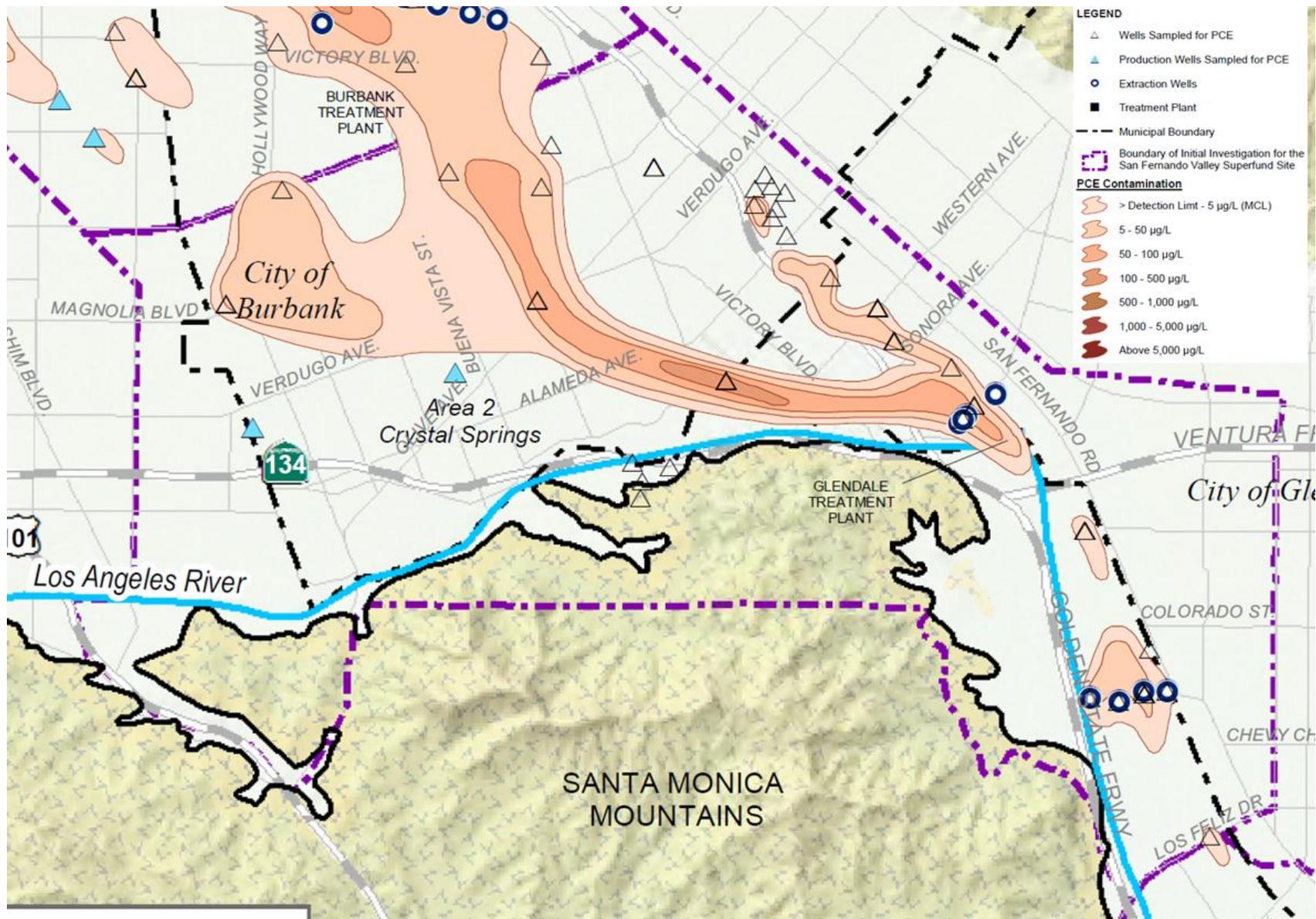


Figure 5. PCE in the Deeper Zone (Most Recent Concentration January 2006-2011)

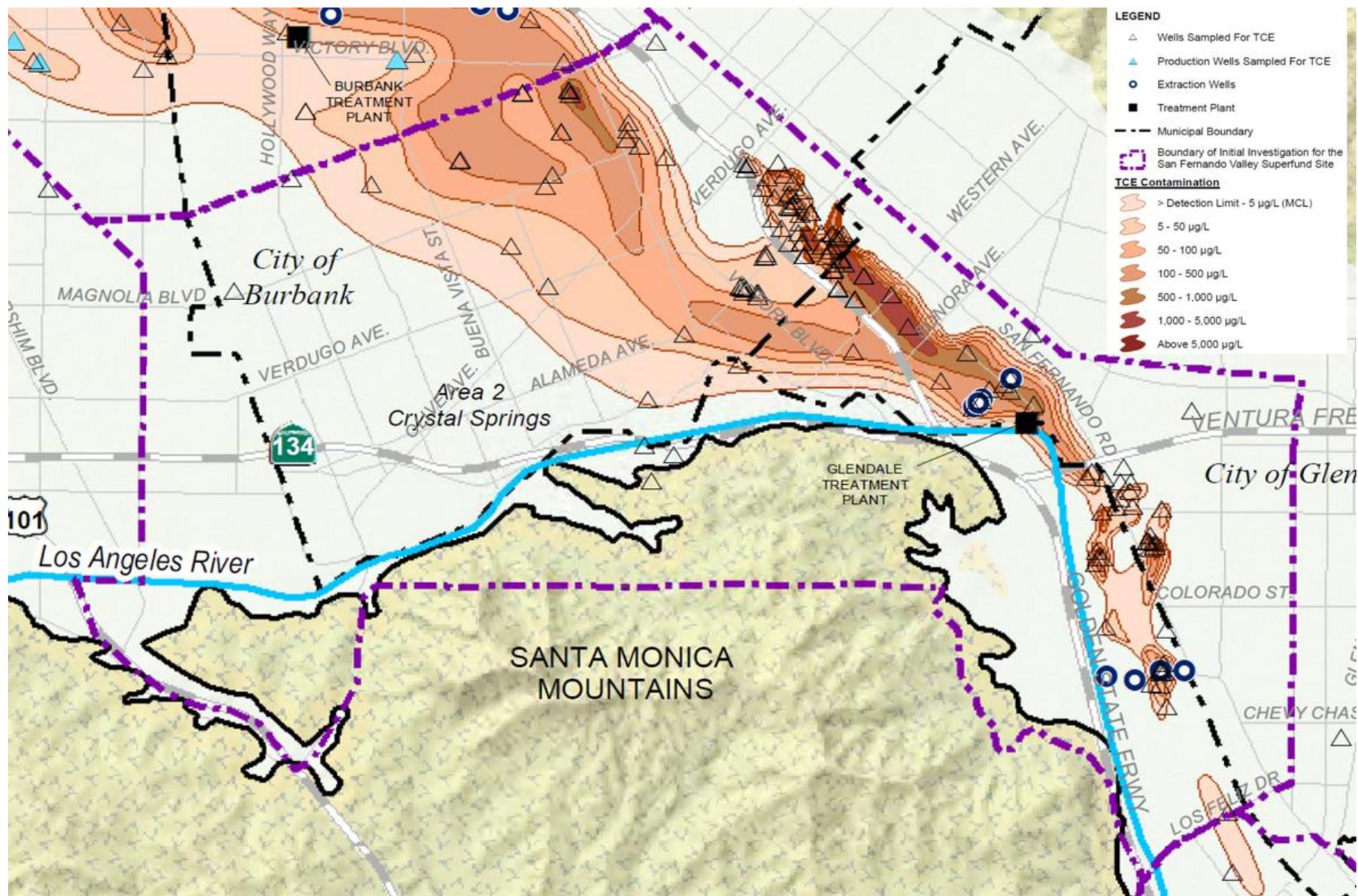


Figure 6. TCE in the Shallow Zone (Most Recent Concentration January 2006-2011)

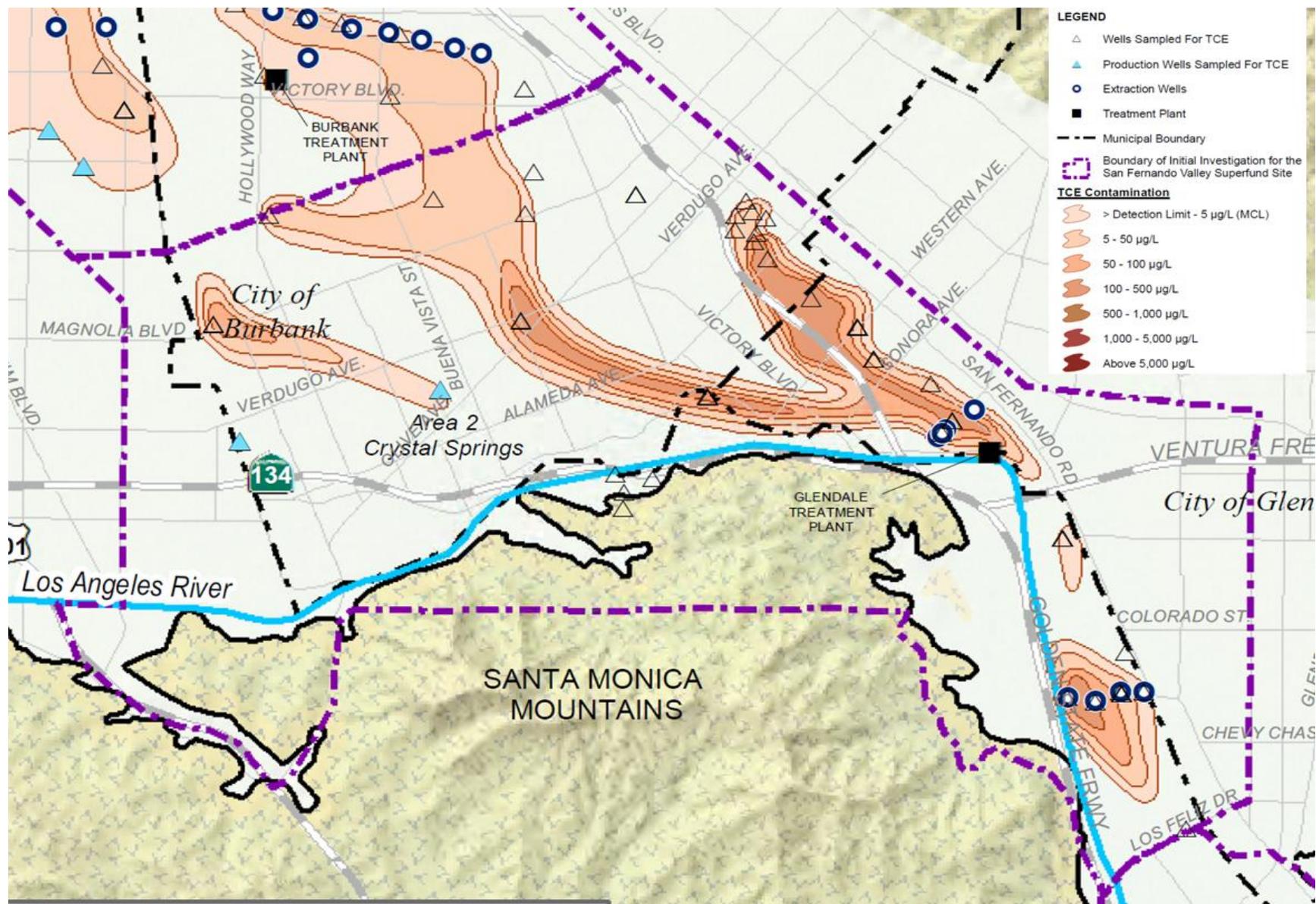


Figure 7. TCE in the Deeper Zone (Most Recent Concentration January 2006-2011)

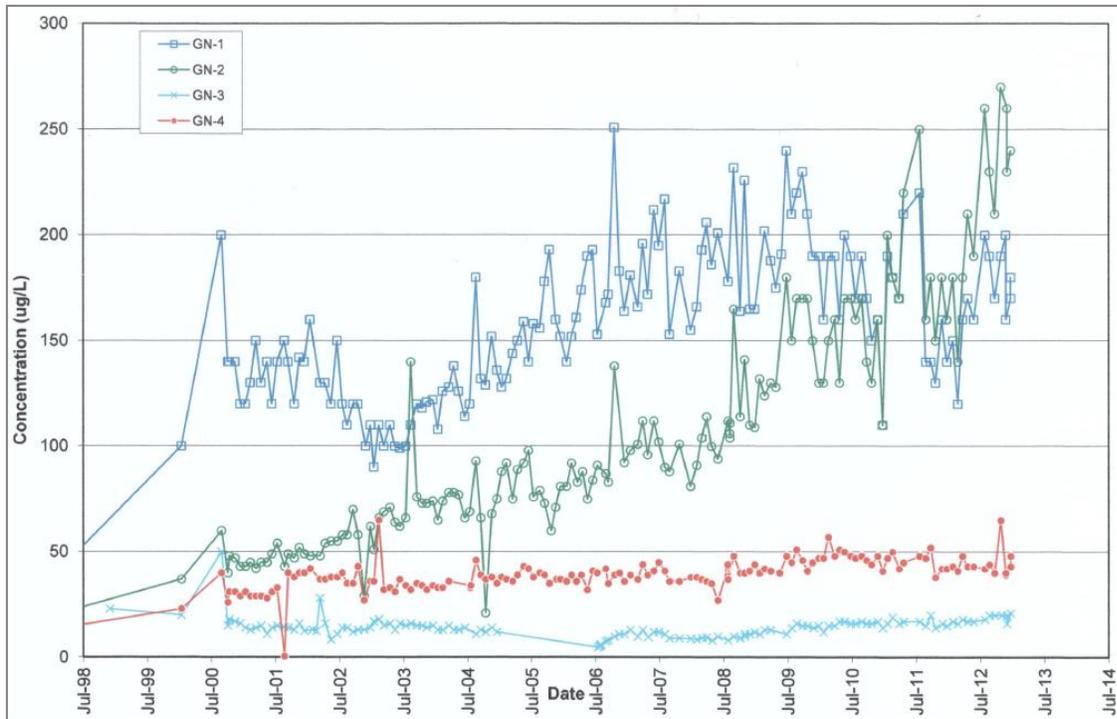


Figure 8. PCE in the North Extraction Wells

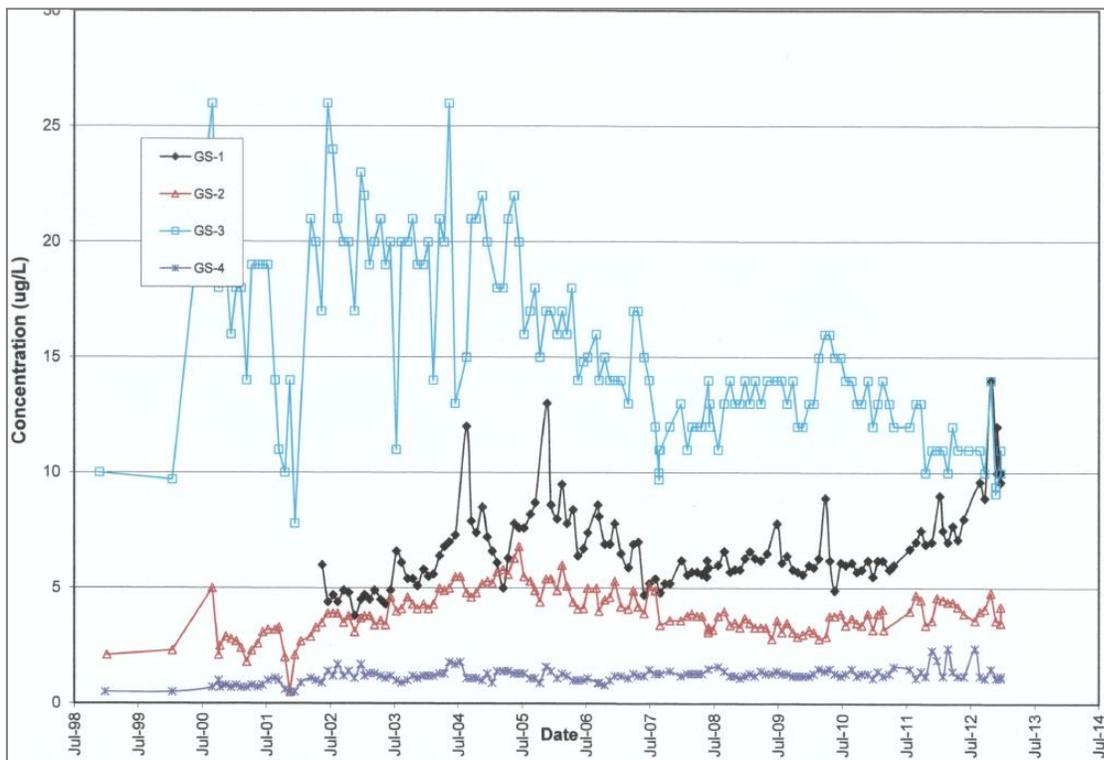


Figure 9. PCE in the South Extraction Wells

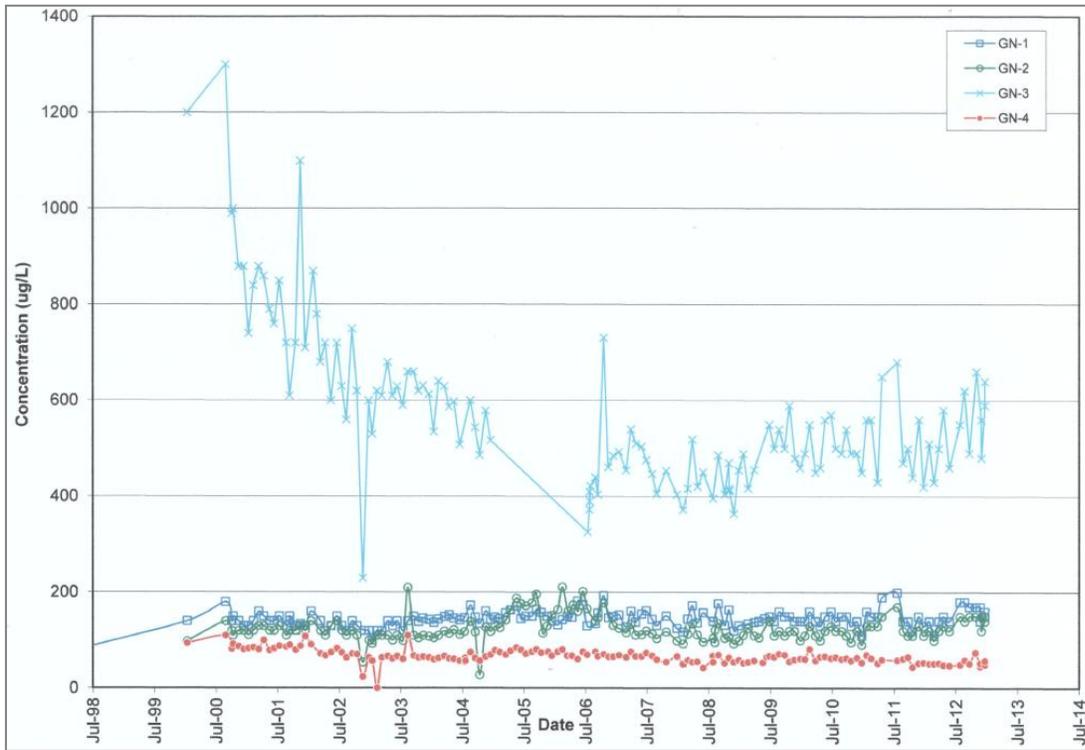


Figure 10. TCE in the North Extraction Wells

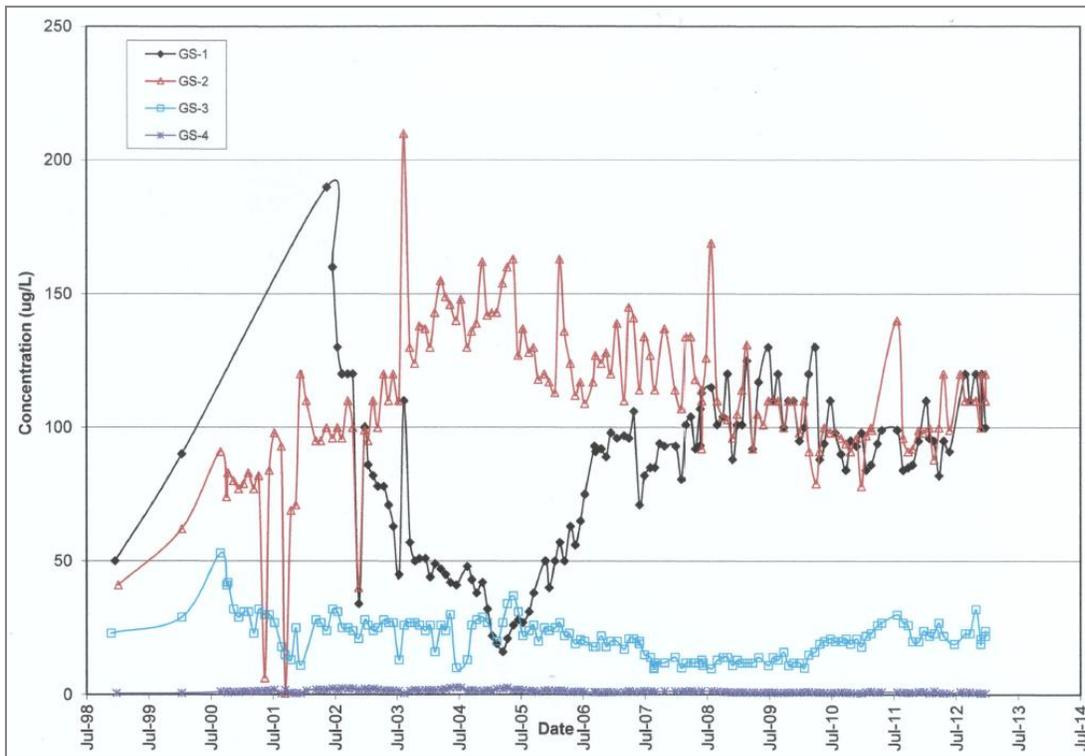


Figure 11. TCE in the South Extraction Wells

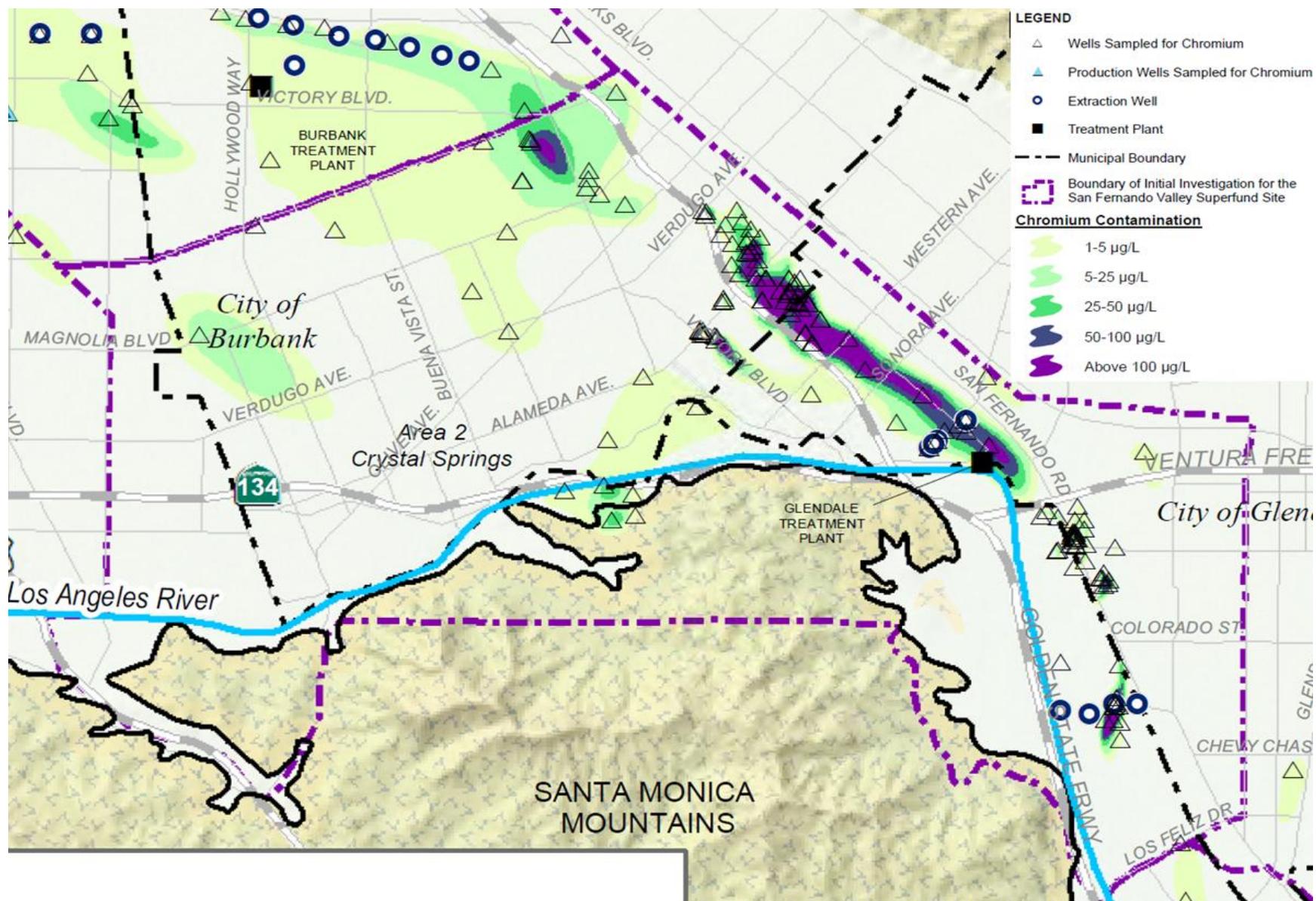


Figure 12. Total Chromium in the Shallow Zone (Most Recent Concentration January 2006-2011)

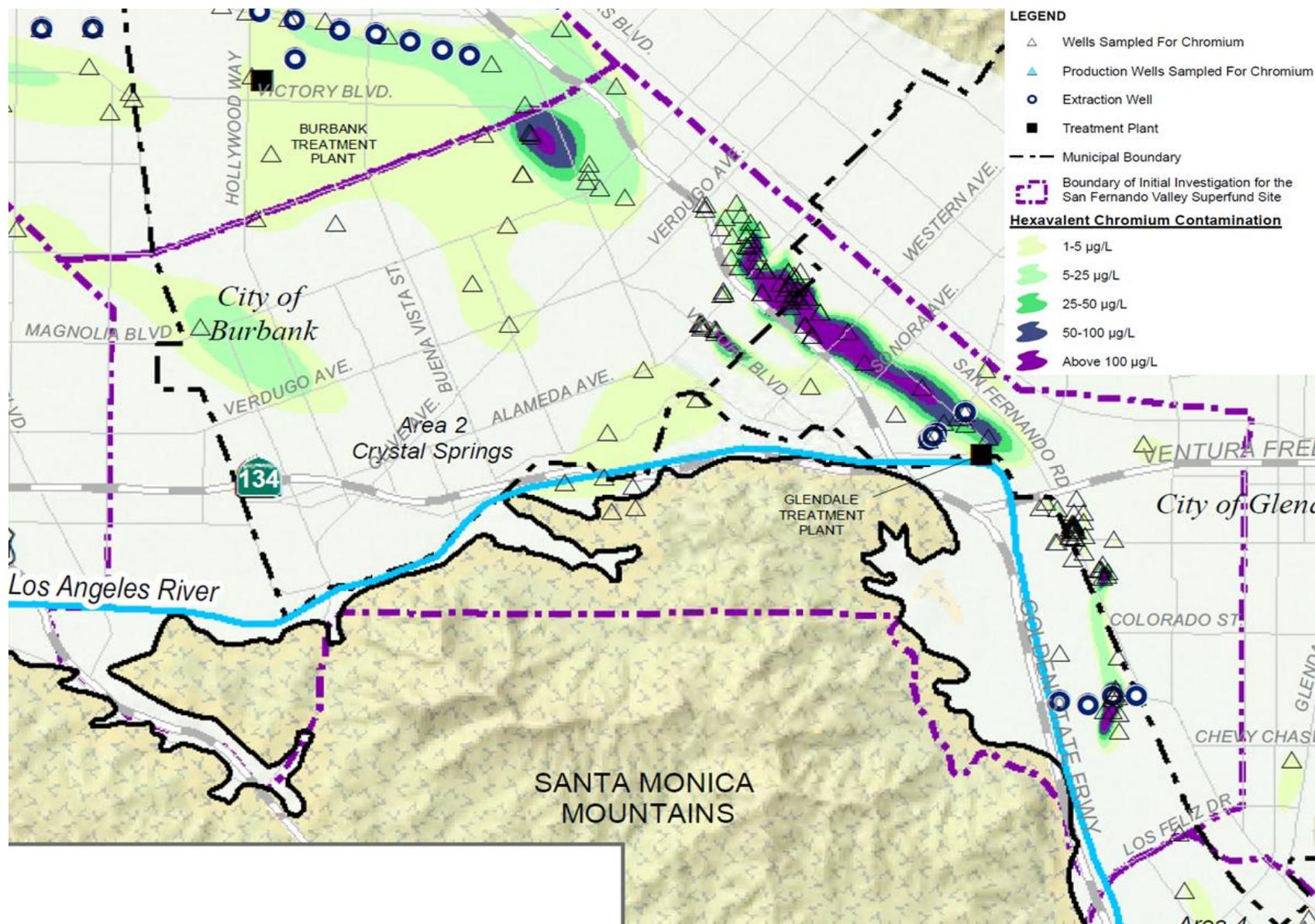


Figure 13. Hexavalent Chromium in the Shallow Zone (Most Recent Concentration January 2006-2011)

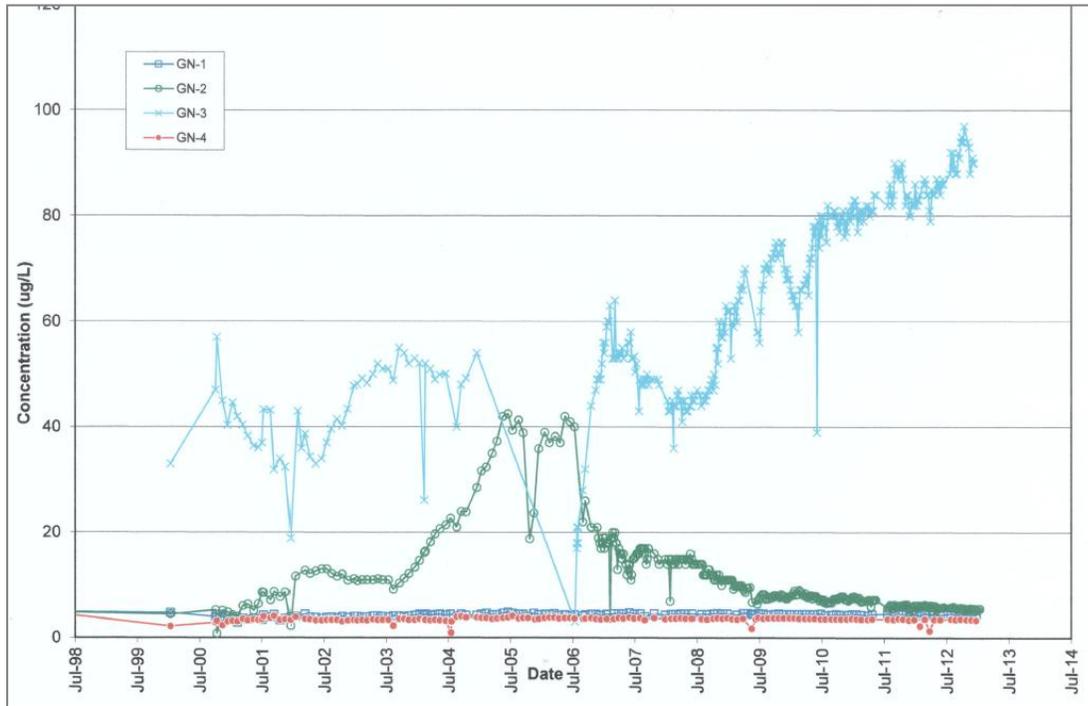


Figure 14. Hexavalent Chromium in the North Extraction Wells

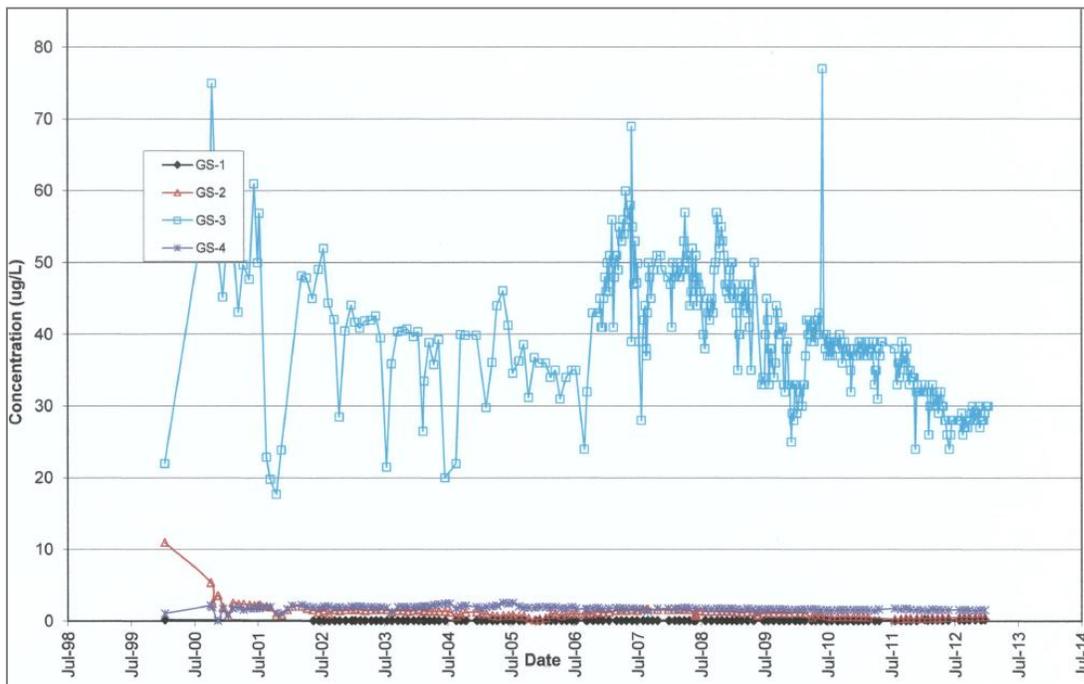


Figure 15. Hexavalent Chromium in the South Extraction Wells

*(For Figures 16-27 please refer to Appendix H and I)

6.4.1.3 Emerging Contaminants

Concentrations of 1, 4-dioxane are frequently detected at levels exceeding the CDPH notification level of 1 µg/L in Area 2 (Appendix H). 1,4-dioxane concentrations are not reported in the monthly progress reports for individual extraction wells or in the influent or effluent of the treatment plant. The treatment plant does not treat for 1,4-dioxane. Based on data received during the site inspection, from January 2009 to October 2012, 1,4-dioxane has been detected in extraction wells GS-1 and GS-2. Over that period, detected concentrations (16 samples, 5 non-detects) of 1,4-dioxane in GS-1 ranged from 1.5 to 2.6 µg/L, and averaged 2.05 µg/L, though there is no apparent trend. In GS-2, there was one detection (1.2 µg/L in the September 2012 sample) out of six samples.

Concentrations of 1, 2, 3-TCP have frequently been detected at levels exceeding the CDPH notification levels of 0.005 µg/L in Area 2. 1,2,3-TCP concentrations are not reported in the monthly progress reports for individual extraction wells or in the influent or effluent of the treatment plant. Based on data received during the site inspection, over the last five years, 1,2,3-TCP concentrations above the notification level have been detected in all extraction wells except GS-3 and GS-4. 1, 2, 3-TCP concentrations appear to be increasing in extraction wells GN-2 and GS-2, but decreasing in GS-1. The treatment plant effectively treats 1,2,3-TCP via the LPGAC treatment process, and 1,2,3-TCP is the primary driver for replacement of used LPGAC units with fresh GAC.

Perchlorate has been detected in some areas of the Shallow Zone of Area 2 at levels above the state MCL of 6 µg/L, though perchlorate concentrations are not reported in the monthly progress reports for individual extraction wells or in the influent or effluent of the treatment plant. Based on data received during the site inspection, perchlorate has been detected in extraction wells GN-3 and GS-4, though not above the state MCL.

Nitrate is present in Area 2 groundwater at levels in excess of the MCL (Appendix H, Figure 21). The presence of nitrate is speculated to occur as a result of past agricultural and sewage disposal practices in the SFV. Nitrate is not targeted for treatment as part of the GOU interim remedy. When elevated nitrate concentrations are present in groundwater produced by extraction wells or municipal water supply wells in Area 2, they are mitigated by blending with imported water from other sources. Blending, disinfection, and other routine municipal water treatment and delivery operations in Area 2 are performed by the City of Glendale. Nitrate concentrations above its MCL of 45 mg/L have been detected in several portions of the Shallow Zone in Area 2, and in the northwestern portion of the Deeper Zone.

More information about the emerging contaminants including concentrations detected and trends can be found in Appendix H.

6.4.1.4 Other VOCs

In addition to PCE and TCE, other VOCs are present in Area 2. 1,1-DCE was detected at a level above the state MCL of 6 µg/L in at least one sample each from extraction wells GN-2, GN-3, GS-1, and GS-2. 1,2-DCA was detected at a level above the state MCL of 0.5 µg/L in all 56 samples from extraction well GN-3. Carbon tetrachloride was detected at a level above the state MCL of 0.5 µg/L in numerous samples from extraction wells GN-1, GN-2, GN-3, GS-2, GS-3, and GS-4. Cis-1,2-DCE was detected at a level

above the state MCL of 6 µg/L in nearly all the samples from extraction wells GS-1 and GS-2. The treatment plant effectively treats these other VOCs to non-detect levels.

Appendix G summarizes the extraction well concentrations reported in the January 2008 to December 2012 monthly progress reports

6.4.1.5 NDMA

Prior to July 2007, NDMA concentrations in well GS-1 were generally below the CDPH notification level of 0.01 µg/L. NDMA concentrations increased substantially after July 2007, which coincided with a nitrification-denitrification process change at the Los Angeles-Glendale Water Reclamation Plant (LAGWRP). The treatment process change included the addition of a polymer that led to the formation of NDMA in the tertiary treated water present in the LAGWRP pond. In March 2012, the polymer dosing was reduced and, in May 2012, treated effluent was piped directly to the outfall to the Los Angeles River, bypassing the LAGWRP pond. NDMA concentrations in GS-1 decreased substantially in the following months, and were near or below the notification level about November 2012.

6.4.2. Groundwater Extraction and Treatment System

Approximately 29 billion gallons of groundwater have been extracted by the GOU wells and treated since 2000, roughly 10 billion gallons of which were extracted and treated from January 2008 to December 2012. In the last five years, monthly extracted volumes ranged from 285 to 712 acre feet (acre-ft), with a median of 650 acre-ft. Average flow rates in the treatment plant ranged from 2,150 to 5,226 gpm, with median and average flow rates of 4,831 gpm and 4,683 gpm, respectively. Monthly extraction volumes below roughly 550 acre-ft and average flow rates below roughly 4,100 gpm were generally a result of the GN-4 and GS-2 well rehabilitation activities in June 2009 and April– June 2011. Appendix I includes a plot of total monthly extracted volumes from 2008 – 2012; and average flow rates produce a similar plot. Considering down time for the GN-4 and GS-2 rehabilitations, an increase in flow rate on GS-3 resulting from the installation of WBA, and other variations in monthly extracted volumes from individual wells. Total extracted volumes and treatment plant flow rates have been reasonably consistent in the last five years.

Table 9 summarizes the contaminant concentrations measured in the treatment plant influent from 2008 – 2012. Of the contaminants sampled for, detected, and reported, only TCE, PCE, and carbon tetrachloride concentrations in the plant influent were found at levels above their respective MCLs.

Table 9. Summary of Plant Influent Contaminant Concentrations

| Contaminant | Max | Min | Median | Average | Number of Samples | Number of Non-detects |
|---------------------------------|------|------|--------|---------|-------------------|-----------------------|
| TCE (µg/l) | 151 | 68 | 96 | 98 | 58 | 0 |
| PCE (µg/l) | 140 | 26 | 72 | 73 | 58 | 0 |
| Benzene (µg/l) | -- | -- | -- | -- | 58 | 58 |
| Carbon Tetrachloride (µg/l) | 1.8 | 0.78 | 1.3 | 1.2 | 58 | 2 |
| 1,1-DCA (µg/l) | 0.57 | 0.57 | 0.57 | 0.57 | 58 | 57 |
| 1,2-DCA(µg/l) | -- | -- | -- | -- | 58 | 58 |
| 1,1-DCE (µg/l) | 6 | 0.8 | 4 | 3.6 | 58 | 1 |
| cis-1,2-DCE (µg/l) | 3.5 | 0.55 | 2.7 | 2.6 | 58 | 1 |
| trans-1,2-DCE (µg/l) | 1.4 | 0.5 | 0.6 | 0.7 | 58 | 26 |
| 1,1,2-TCA (µg/l) | -- | -- | -- | -- | 0 | -- |
| Xylenes (µg/l) | -- | -- | -- | -- | 0 | -- |
| Total Chromium (µg/l) | -- | -- | -- | -- | 0 | -- |
| Chromium VI (hexavalent) (µg/l) | -- | -- | -- | -- | 0 | -- |
| Nitrate-N (mg/l as Nitrogen) | -- | -- | -- | -- | 0 | -- |

From 2008 – 2012, VOC concentrations in the treatment system effluent have been nondetect, and have been so since the beginning of operations. During that period, an estimated 18,400 lbs of VOCs have been removed. Monthly estimated VOC removal ranged from 149.1 to 444.1 lbs with a median of 314 pounds. Estimated monthly VOC removals of less than 235 lbs were a result of GN-4 rehabilitation activities in June 2009. Figure 16 shows a plot of estimated monthly VOC removal from 2008 – 2012. Approximately 42,700 lbs of VOCs have been removed since 2000. Considering down time for the GN-4 rehabilitation and variations in extraction rates from individual wells, estimated monthly VOC removal has been slowly increasing over the past five (and more) years.

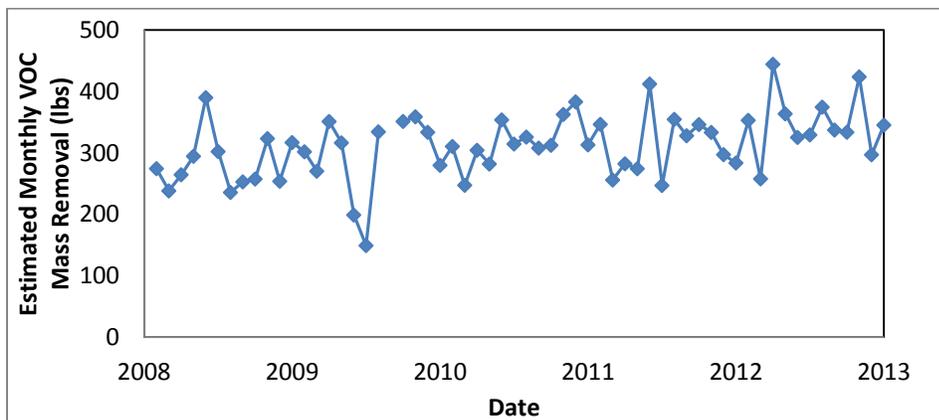
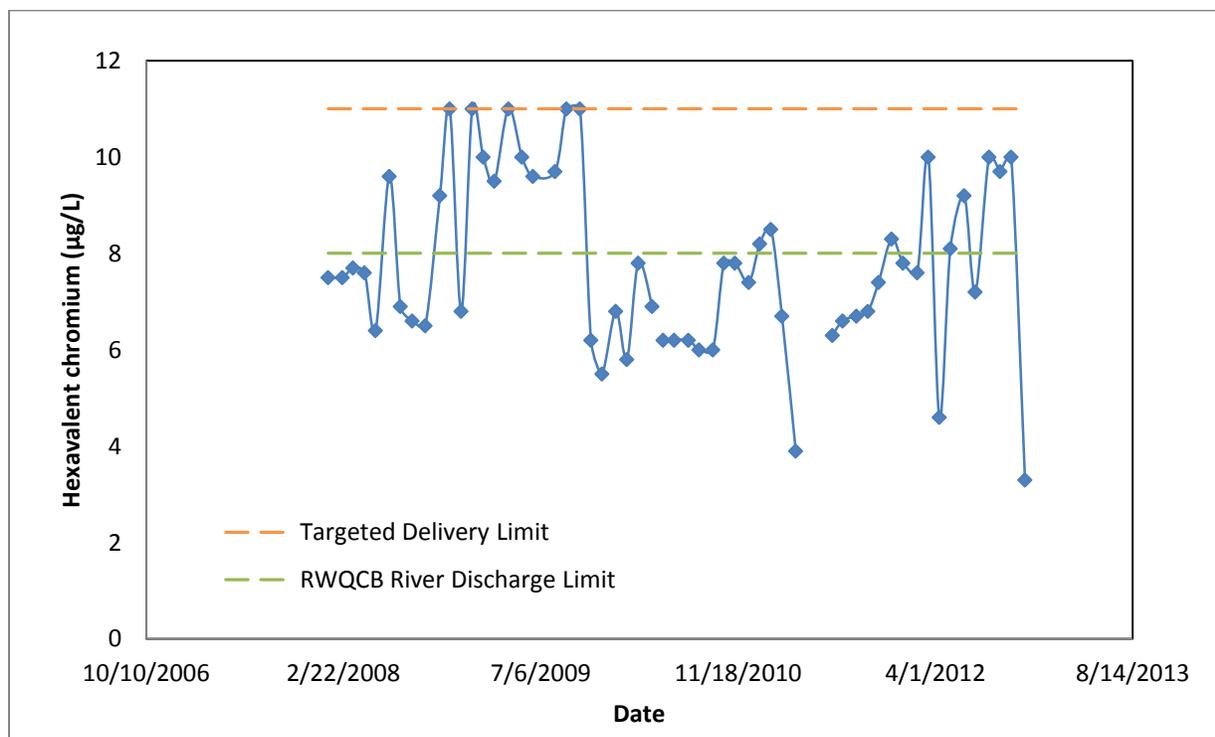


Figure 16. Estimated Monthly VOC Removal from 2008 – 2012

Over the last five years, effluent hexavalent chromium concentrations have ranged from 3.3 to 11 µg/L (Figure 17) and averaged 7.8 µg/L.

Nitrate has not been sampled in the effluent in the last five years.



| Well | Design (gpm) | Flow (gpm) |
|---------|--------------|------------|
| GN-1 | 566 | 682 |
| GN-2 | 567 | 655 |
| GN-3 | 567 | 376 |
| GN-4 | 1,600 | 1,667 |
| Total = | 3,300 | 3,380 |

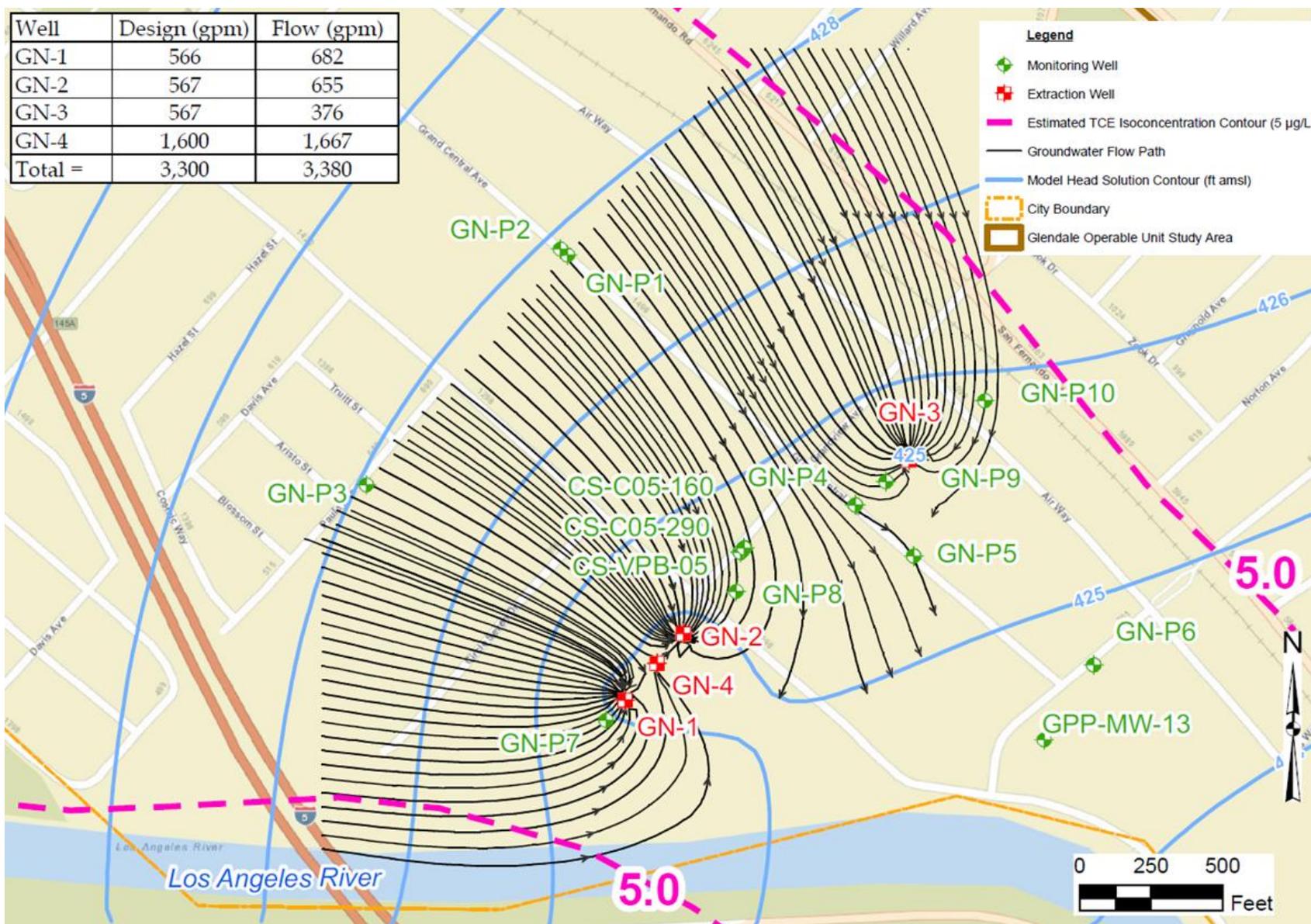


Figure 18. GNOU Hydraulic Containment Simulation at Recent Pumping Rates

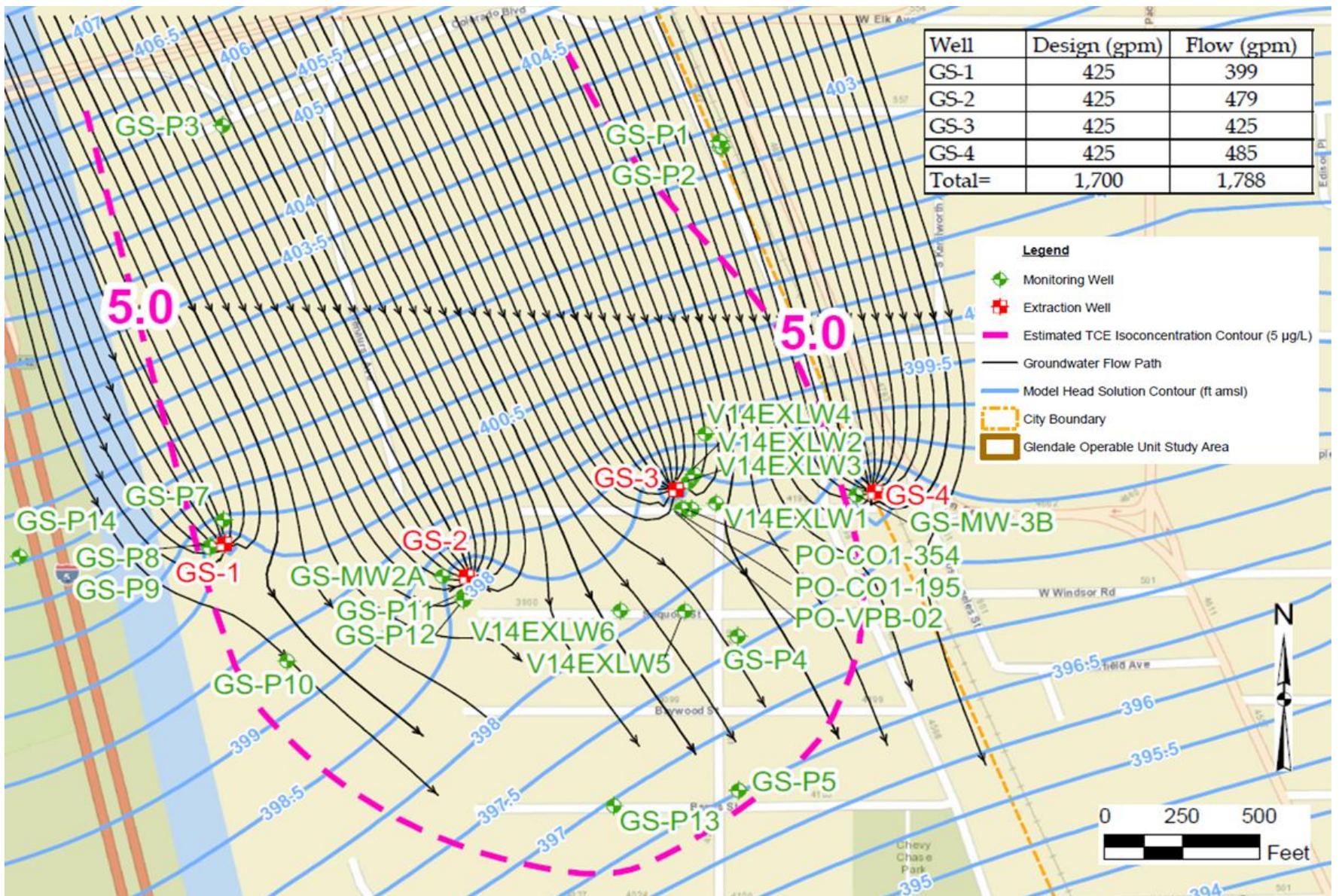


Figure 19. GSOU Hydraulic Containment Simulation at Recent Pumping Rates

6.5. Site Inspection

The GOU was inspected on Thursday, February 28, 2013. Charles Cron (CDM Smith, Lead O&M Specialist) guided the inspection. Attendees included Daniel Hutton (CDM Smith, Project Manager), ZiZi Searles (EPA, Remedial Project Manager), Leo Chan (City of Glendale Water and Power, Project Engineer), Karen Meade (CH2M Hill, Project Manager), David Sullivan (USACE, Geologist), and Aaron King (USACE, Environmental Engineer). The group met at the Glendale Water Treatment Plant. There, Mr. Cron described the operations of the air stripping and GAC treatment system and answered questions. All treatment facility components appeared to be in good condition and operating as desired. Required site documents were well organized. Both chemical feed rooms (sodium hypochlorite and blended polyphosphate) were clean and ventilated. CDM Smith appears to be very proactive when it comes to maintaining and optimizing the treatment system.

Mr. Cron then led the group on a tour of the extraction wells, beginning with extraction well GN-3 and the full-scale RCF system. Mr. Cron described the RCF process and answered questions. The RCF process was shut down in July 2012. The RCF was an automated 100-gpm process that worked very well if the hexavalent chromium goal is 5 µg/L. A smaller pilot-scale system using zero-valent iron was also on site. Then, the group traveled to the DreamWorks property, located extraction wells GN-1, GN-2, and GN-4 and inspected GN-4. Extraction well GN-4 and its vault appeared to be in good condition and operating as desired. The group then toured the GSOU extraction wells, stopping at GS-1 near the LAGWRP facility and at GS-3. Well GS-1 appeared to be in good condition. GS-1 has greater sampling requirements than the other extraction wells due to its proximity to the Los Angeles River and the NDMA detections. The WBA well-head treatment on GS-3, which treats 425 gpm, also appeared to be in good condition and operating as desired. Formaldehyde leaches from resin on startup flushing, so three large tanks are kept on site for storage and biological treatment. Resin disposal has been another issue; in addition to chromium, the resin also removes uranium (this is an unintended consequence; uranium is not a COC).

The completed Site Inspection Checklist is given in Appendix D. Site inspection photographs are provided in Appendix E.

6.6. Interviews

During the FYR process, interviews were conducted with parties impacted by the Site, including the current OU operators and regulatory agencies involved in Site activities or aware of the Site. The purpose of the interviews was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy that have been implemented to date. All of the interviews were conducted during the Site visit between February 26 and February 28, 2013. Interviews are summarized below and completed interview forms are included in Appendix C.

Charles Cron, Lead O&M Specialist, CDM Smith; and Daniel Hutton, Project Manager, CDM Smith (O&M contractor); 28 February, 2013. Mr. Cron and Mr. Hutton both agreed that the system was well-designed, is flexible, is adaptable to changing water quality regulations, and had been consistently operable and able to meet extraction and water quality requirements. There have not been problems with

access controls or the construction of the remedy. There have been no O&M problems in the last five years. The only unusual issues were with the WBA; specifically with formaldehyde leaching from new resin and with resin disposal because the resin also removes uranium.

Leighton Fong, Civil Engineer, City of Glendale Water and Power; and Leo Chan, Project Engineer, City of Glendale Water and Power; 28 February, 2013. Mr. Fong and Mr. Chan both agreed that the project is well-run; that CDM and GRG are supportive and go beyond the call of duty, and take ownership and pride in their work. The remedy is achieving the desired mass removal rates and the desired extraction rates, but there might be some leakage (regarding containment). There have not been problems with access controls or the construction of the remedy. O&M issues include: 1) sometimes wells trip (shut off due to low voltage), go offline, and sound a general alarm; to address this, CDM put electrical monitoring instruments on some of the wells; and 2) metering to air strippers failed causing a temporary shutdown until the meters were replaced within a month, but this is not unexpected since the equipment is old, so it tends to fail. Some successes with system O&M include splitting of the influent pipeline and improved reliability of the chlorine injection system. LPGAC regeneration is being considered.

Karen Meade, Project Manager, CH2M Hill (EPA oversight contractor), 28 February 2013. Ms. Meade felt the project has been impressive; the City and CDM are very proactive, and GRG seems fairly proactive and supportive of current operations. There have not been problems with access controls or the construction of the remedy. Problems with system operations/O&M include: 1) particle tracking in the Hydraulic Containment Technical Memorandum shows escape from north and south wells, even when all wells are operating, and the alternatives shown in the same memorandum still do not show complete capture; 2) PCE and TCE concentrations are above the MCL down-gradient of the south extraction wells; 3) well GN-P11 on the other side of the Los Angeles River has relatively high concentrations of PCE and TCE, so there is a question regarding new sources or sources not completely defined. Successes include waste minimization during well rehabilitation and carbon regeneration on-site.

Thomas Tsui, Associate Sanitary Engineer, CDPH; and Chi Diep, Senior Sanitary Engineer, CDPH; 27 February 2013. Mr. Tsui and Mr. Diep noted that the GOU runs better than other OUs; it's newer, and it benefited from experience of other OUs. It's easy to oversee, and it's well covered from the permit point of view. There have not been problems with access controls or the construction of the remedy. The system runs well most of the time; the only issue has been with NDMA in GS-1. Identifying the source was a problem, and there was some concern about the drinking water quality from GS-1 prior to the decommissioning of the LAGWRP detention pond. There was also a malfunction of a magnetic flow meter in the air stripping tower. It's old equipment (more than 10 years old). The extraction wells need attention to keep from failing; some wells have to be rehabilitated quite often. A current project to split the influent pipeline may change O&M procedures, but will save money and time and allow the treatment system to operate while wells are rehabilitated. Research has been completed to evaluate different hexavalent chromium treatment technologies. The only unusual issue is that, often during well rehabilitation, bacteria problems occur and take time to flush out. The sources of bacteria and E. coli aren't known, though they don't often get E. coli detections.

Larry Moore, Staff Environmental Scientist, Los Angeles RWQCB; and Alex Lapolstol, Technical Consultant, E2 Consulting Engineers; 26 February 2013. The discussion covered SFV Areas 1 and 2. Mr. Moore and Mr. Lapolstol felt that, overall, the projects are a positive thing; the only unfortunate aspect being that it takes longer than they would like to do things. However, it is a slow process. It is difficult to contain plumes the way the remedy has been operated. For the GOU, PCE, TCE, total chromium, and hexavalent chromium have been found down-gradient of well GS-3. The characterization of the GOU is insufficient. Part of the plume has gone off-site of the Excello facility [the Excello Plating Company, located about 1 mile SSE of the treatment plant, and about 100 yards from extraction well GS-3]. There have not been problems with access controls or the construction of the remedies.

Richard Slade, ULARA Watermaster; and Anthony Hicke, Assistant to the Watermaster; 28 February 2013. The discussion covered SFV Areas 1 and 2. Mr. Slade and Mr. Hicke noted that the plumes are still there and have spread more. It seems like the people involved never want to commit to anything without more data, delaying cleanup. COCs are contaminating new wells [wells not specified]. The groundwater model needs updating. The project has been frustrating because things in all OUs take too long. The remedy has not performed as expected. The plumes are as big as or bigger than they were twenty years ago. Production has moved "stuff" around. But something is better than nothing. Improvement is needed, sooner rather than later. The hydrogeology is not well defined or understood. There have not been problems with access controls or the construction of the remedies.

Tedd Yargeau, Senior Scientist, Department of Toxic Substances Control (DTSC); 6 May 2013. The discussion covered SFV Areas 1 and 2. Mr. Yargeau felt that the remedy was functioning as expected and noted that all of the remedies appear to be head in the right direction and that the projects are a positive for the SFV. Contaminant levels appear to be decreasing. DTSC does not deal directly with O&M, but is aware of EPA's O&M oversight activities. DTSC feels that EPA has done a good job managing a complex site.

6.7. Institutional Controls

There are no specifically tailored institutional control (IC) instruments in place within Area 2, although there is an effective governmental control in place to assist with the prevention of contaminated groundwater. The primary governmental control is the 1979 Final Judgment in *Los Angeles v. San Fernando*, (Superior Court Case No. 650079) (*LA v. San Fernando*). The 1979 Final Judgment in *LA v. San Fernando* upheld the Pueblo Right of the City of Los Angeles to all groundwater in the ULARA Basin from precipitation within the ULARA and all surface and groundwater flows from the Sylmar and Verdugo Basins. 14 Cal. 3d 199 (1975). *LA v. San Fernando* also established the water rights of the cities of Los Angeles, Glendale, and Burbank to all water imported from outside the Basin and either spread or delivered within the Basin. With the exception of a few legacy entities including a few cemeteries and a hotel, only the Cities that are party to the Judgment have the authority to extract groundwater from the basin.

The Final Judgment created the entity known as "Watermaster" with full authority to administer the adjudication, under the auspices of the Superior Court. Under the final judgment in *LA v. San Fernando*, with the exception of certain minor historical water rights holders, only the cities of Los Angeles,

Burbank, and Glendale are permitted to extract groundwater from the Basin. Each of these municipalities administers a public water system, which is regulated by the California Department of Public Health (CDPH).

Governmental controls on the use of groundwater as drinking water include EPA and State of California-promulgated MCLs and California State Action Levels that require drinking water standards to be met before delivery of the treated water to the potable water supply. These drinking water controls and the Watermaster's authority to regulate and allocate water resources eliminate unregulated use of area groundwater; therefore, the interim remedies are currently protective of human health.

7. Technical Assessment

7.1. Question A: Is the remedy functioning as intended by the decision documents?

Remedial Action Performance

The remedy is functioning as intended by the decision documents. The median and average treatment facility flow rates over the last five years are 4,831 gpm and 4,683 gpm, respectively, both of which are below the design flow rate of 5,000 gpm. The remedial action continues to provide water to the City of Glendale that meets all water quality requirements, including primary drinking water quality standards. As of late, though, the treatment system has been more consistently meeting the design flow rate. Excluding the three months when GS-2 rehabilitation was occurring (April – June 2011), the average flow rate has been greater than 5,000 gpm in 17 of the last 36 months.

The remedial action objective calling for inhibition of contaminant migration is not being met. EPA interprets the phrase “inhibition” to mean full hydraulic control of contaminated groundwater. The *Hydraulic Containment Technical Memorandum* (summarized in Section 6.4.3) provides evidence that complete capture is not achieved in either the GNOU or the GSOU. EPA is taking action to ensure that the remedy fully contains contaminated groundwater.

System Operations/O&M

Current operating procedures, as implemented, are sufficient to maintain the current level of effectiveness of the treatment system. O&M costs have slowly risen over time, in an expected and reasonable manner. Large, unexpected variances in costs have not occurred, and are not anticipated.

Opportunities for System Optimization

- Optimizing the treatment facilities sampling requirements.
- LPGAC regeneration
- Installation of an additional extraction well(s) to achieve 100% capture

Early Indicators of Potential Issues

Equipment breakdowns have been infrequent and not unexpected. The plant operator, CDM, is proactive in their approach to maintenance.

The publication of the draft MCL for hexavalent chromium and preliminary findings of the GCOU RI/FS indicate that the current GSOU and GNOU interim remedy may be inadequate to meet the goals of maintaining capture and containment for a drinking water end use at some point in the near future.

Implementation of Institutional Controls and Other Measures

There are no specifically tailored institutional control (IC) instruments in place within Area 2. However, the governmental controls in place at the site are effective in preventing exposure to contaminated groundwater.

7.2. Question B: Are the exposure assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of Remedy Selection Still Valid?

Exposure assumptions and RAOs used at the time of remedy selection are still valid. Toxicity data for some VOCs have changed, but this does not affect the protectiveness of the remedy because treated water is non-detect for VOCs. Cleanup levels were not established at the time of remedy selection. No ARARs have changed in a way that would affect the protectiveness of the remedy. However, the recently released draft MCL of 10 µg/L for hexavalent chromium) may affect the duration of the remedy and/or the treatment technology being used if the current system cannot treat hexavalent chromium to the required level. Groundwater modeling and contaminant concentrations in wells downgradient of the GCOU show that full containment is not being achieved and suggests some contamination is migrating past capture zone in the GSOU.

Changes in Standards and TBCs

There have been no changes to ARARs identified in the ROD that affect the protectiveness of the remedy. The 1,4-dioxane notification level changed from 3 to 1 µg; the treatment system does not treat for 1,4-dioxane. Concentrations of 1,4-dioxane in extraction wells GS-1 and GS-2 exceeded the notification level at least once from January 2009 to October 2012; plant influent and effluent data for 1,4-dioxane were unavailable. The proposed MCL of 10 µg/L for hexavalent chromium may affect the duration of the remedy and the treatment technology being used if the treatment technology can not treat hexavalent chromium to at or below to the draft level.

Changes in Exposure Pathways

The exposure pathways evaluated in the RI have not changed, but the vapor intrusion pathway for contaminant migration has not been evaluated. New ecological routes of exposure have not been identified.

No new contaminants of concern have been identified; EPA has been aware of emerging contaminants such as hexavalent chromium, 1,4-dioxane, 1,2,3-TCP, and NDMA. The primary source of the NDMA in GS-1 was determined to be the upgradient LAGWRP pond. Discontinued use and pond draining and during the later part of 2012 has led to substantially lower NDMA concentrations in GS-1.

Formaldehyde is leached from resin during startup of the WBA process, and is being treated by microbial action in storage tanks; alternative resins are being investigated. The resin also removes uranium from the groundwater, creating a waste handling issue when it is time to dispose of the resin. Because of the manner in which these unanticipated WBA byproducts are handled, protectiveness is not affected. Physical site conditions or the understanding of these conditions has not changed.

Changes in Toxicity and Other Contaminant Characteristics

Toxicity factors for TCE, PCE, 1,4-dioxane, methylene chloride, carbon tetrachloride, cis-1,2-DCE, and 1,2,3-TCP have changed in the last five years. However, VOCs are treated to non-detect levels at the treatment system. The current GOU LPGAC vessels are used to ensure that 1,2,3-TCP does not increase to a concentration above the CDPH notification level. Other contaminant characteristics have not changed in a way that could affect the protectiveness of the remedy. Also, cleanup levels for groundwater were not selected for this site.

Changes in Risk Assessment Methods

Standardized risk assessment methodologies have not changed in a way that could affect the protectiveness of the remedies.

Expected Progress Towards Meeting RAOs

The remedy is partially meeting the RAOs set forth in the 1993 GNOU and GSOU RODs in substantial VOC contaminant mass has been removed from the shallow zone of the aquifer in and around the GNOU and GSOU wellfields. However, the remedy is not fully capturing and containing groundwater contamination. Groundwater model particle tracking and downgradient VOC and metals concentrations indicate that groundwater contaminants in the North and South Plumes are not completely captured, so contaminant migration is not inhibited. The installation of additional extraction well(s) is needed to fully achieve plume capture and containment.

7.3. Question C: Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has come to light which could affect the protectiveness of the remedy. There are no newly identified ecological risks. There have been no impacts from natural disasters.

7.4. Technical Assessment Summary

The extraction and treatment systems are functioning as intended by the decision documents. The remedial action continues to provide water to the City of Glendale that meets all water quality

requirements. Partial inhibition of migration is being achieved, although groundwater model particle tracking and contaminant concentrations in wells downgradient of the GSOU show that complete containment is not being achieved.

Groundwater model particle tracking results indicate that contamination is escaping between wells the GNOU and GSOU. To mitigate the escape of contamination the installation of a new extraction well in the GSOU between well GS-2 and GS-3 was proposed. EPA is working to implement the aforementioned improvements and to address areas where only partial hydraulic containment is being achieved through the installation of additional extraction wells.

Treatment plant operating procedures, as implemented, are sufficient to maintain the current level of effectiveness of that system. O&M costs are within expected norms. The plant is actively managed to improve and, where possible, optimize system operations and reduce costs. Governmental controls in place at the site are effective in preventing exposure to contaminated groundwater. There have been no changes in ARARs that would affect the protectiveness of the remedy. Regional groundwater vapor intrusion has not yet been evaluated, but may be a viable exposure pathway in Area 2. CDPH released a proposed MCL of 10 µg/L for hexavalent chromium in the August 2013 that may affect the duration of the remedy and/or the treatment technology being used if the current system cannot treat hexavalent chromium to the required level.

8. Issues

Table 10 summarizes the current issues for the San Fernando Valley Area 2 Site.

Table 10. Current Issues for the San Fernando Valley Area 2 Site

| Issue | Affects Current Protectiveness (Yes or No) | Affects Future Protectiveness (Yes or No) |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------|
| 1. The regional groundwater vapor intrusion pathway has not been evaluated for the Area 2 Site. | Yes* | Yes |
| 2. The remedy is not fully capturing and containing groundwater contamination. | No | Yes |

* The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database only accepts “Yes” or “No” entries regarding whether an issue affects current or future protectiveness. However, this protectiveness determination has been deferred because there is not enough information to make the determination. For the purposes of the CERCLIS database, a “defer” determination is equivalent to “yes” entry.

9. Recommendations and Follow-up Actions

Table 11 provides recommendations to address the current issues at the San Fernando Valley Area 2 Site.

Table 11. Recommendations to Address Current Issues at the San Fernando Valley Area 2 Site

| Issue | Recommendations/ Follow-Up Actions | Party Responsible | Oversight Agency | Milestone Date | Affects Protectiveness? (Yes or No) | |
|-------|-------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|----------------|-------------------------------------|--------|
| | | | | | Current | Future |
| 1 | Complete an evaluation of the regional groundwater vapor intrusion pathway for the San Fernando Valley Superfund Sites. | EPA | EPA | 09/2018 | Yes* | Yes |
| 2 | Evaluate installation and operation of new wells to achieve plume capture and containment. | EPA | EPA | 09/2016 | No | Yes |

* The CERCLIS database only accepts “Yes” or “No” entries regarding whether an issue affects current or future protectiveness. However, this protectiveness determination has been deferred because there is not enough information to make the determination. For the purposes of the CERCLIS database, a “defer” determination is equivalent to “yes” entry.

In addition, the following recommendations that may improve effectiveness of the remedy but do not affect current or future protectiveness were identified during the Five-Year Review:

- Involvement of the ULARA Watermaster as often as practicable in evaluation of current remedies and future designs should be explored.
- PCE and TCE were detected at levels above the MCLs in shallow monitoring well GN-P11, which is across the Los Angeles River southwest of the Glendale Water Treatment Plant. The nature and extent of contamination across the Los Angeles River in the GNOU should be more fully characterized.
- CDPH released a draft MCL of 10 µg/L in August 2013. Relevant parties should continue to monitor the situation and continue reasonable preparations to achieve the new hexavalent chromium MCL.

11. Protectiveness Statement

GNOU

A protectiveness determination of the remedy for the GNOU cannot be made at this time until further information is obtained. Further information will be obtained by evaluating the regional groundwater vapor intrusion pathway in Area 2. It is expected that a vapor intrusion investigation will take approximately five years, at which time a protectiveness determination will be made. In addition, to be protective in the long term, complete hydraulic capture of the plume must be established.

GSOU

A protectiveness determination of the remedy for the GSOU cannot be made at this time until further information is obtained. Further information will be obtained by evaluating the regional groundwater vapor intrusion pathway in Area 2. It is expected that a vapor intrusion investigation will take approximately five years, at which time a protectiveness determination will be made. In addition, to be protective in the long term, complete hydraulic capture of the plume must be established.

12. Next Five Year Review

This is a statutory Site that requires ongoing Five Year Reviews as long as waste is left on site that does not allow for unlimited use and unrestricted exposure. The next Five Year Reviews will be due within five years of the signature date of this FYR.

Appendix A: List of Documents Reviewed

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- Arcadis and Hazen and Sawyer. 2013. Chromium Research Effort by the City of Glendale, California, Project Report – Draft. Prepared by Arcadis U.S., Inc. and Hazen and Sawyer for the City of Glendale Water and Power. January 2013.
- CDM. 2003. Revised Glendale Water Treatment Plant Operations and Maintenance Manual. October 2003.
- CDM Smith. 2012. Glendale Operable Unit Extraction Well GS-2 Rehabilitation Report, Glendale, California. Prepared by CDM Smith for the Glendale Respondents Group and the City of Glendale. February 2012.
- CDM Smith. 2008-2012. Glendale Operable Unit O&M of the Upstream Facilities Progress Reports No. 87 – 146. January 2008 – December 2012.
- CH2M Hill. 2010. Results of Capture Modeling and Recommendations for Hydraulic Containment Monitoring, Glendale South Operable Unit Extraction Wells Technical Memorandum.. Prepared by CH2M Hill for EPA. February 2010.
- CH2M Hill. 2010. San Fernando Valley Basin Groundwater Elevations in Shallow Zone, December 2010. July 2011
- CH2M Hill. 2012. Final Remedial Investigation Work Plan, San Fernando Valley Area 2 Superfund Site Glendale Chromium Operable Unit. Prepared by CH2M Hill for EPA. April 2012.
- EPA. 1993. Glendale North Operable Unit Record of Decision, San Fernando Valley Area 2 Superfund Site, Los Angeles County, California. EPA Region 9. June 1993.
- EPA. 1993. Glendale South Operable Unit Record of Decision, San Fernando Valley Area 2 Superfund Site, Los Angeles County, California. EPA Region 9. June 1993.
- EPA. 2002. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). November 2002.
- EPA. 2008. First Five-Year Review Report for San Fernando Valley – Area 2 Superfund Site, Los Angeles County, California. EPA Region 9. September 2008.
- EPA. 2012. Vapor Intrusion Screening Level Calculator. Updated November 2012.
<http://www.epa.gov/oswer/vaporintrusion/guidance.html#Item6>
- EPA. 2013 OSWER Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air (External Review Draft). April 2013.
<http://www.epa.gov/epawaste/hazard/correctiveaction/eis/vapor/complete.pdf>

- ERM (Environmental Resources Management). 2010. Final Focused Feasibility Study Work Plan, San Fernando Valley Superfund Sites, Area 2 – Crystal Springs, Glendale North and Glendale South Operable Units. December 2010.
- ERM. 2011. Focused Feasibility Study Final Work Plan Addendum, Glendale Operable Unit – Area 2, San Fernando Valley Superfund Sites. October 2011.
- ERM. 2011. Fourth Quarter 2010 Remedial Investigation Well Sampling Report San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group February 2011.
- ERM. 2012. Draft Extraction Well GS-1 Evaluation Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. June 2012.
- ERM. 2012. Draft Emerging Compounds Evaluation Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. October 2012.
- ERM. 2012. Final Site Characterization Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. October 2012.
- ERM. 2012. Revised Draft Hydraulic Containment Evaluation Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. October 2012.
- James M. Montgomery, Inc. 1992. Remedial Investigation of Groundwater Contamination in the San Fernando Valley. Prepared by James M. Montgomery, Inc. and submitted to the City of Los Angeles Department of Water and Power. December 1992.
- RWQCB (California Regional Water Quality Control Board). 2002. Final Chromium VI Investigation Report, San Fernando Valley, Phase I Inspections. August 2002.
- ULARA (Upper Los Angeles River Area Watermaster). 2012. Annual Report Watermaster Service in the Upper Los Angeles River Area (ULARA) Los Angeles County, California, 2010-2011 Water Year. May 2012.

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Appendix B: Press Notices

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Press Notice

Public Notice

The United States Environmental Protection Agency (EPA)
Start of Five-Year Review of Groundwater Cleanup
San Fernando Valley Superfund Sites (Areas 1 and 2)

The EPA has begun the Second Five-Year Review (FYR) process for cleanup actions undertaken at the San Fernando Valley Superfund Sites (SFV Sites) for Areas 1 and 2. Area 1 includes North Hollywood and Burbank Operable Units (OUs). Area 2 includes Glendale North and South OUs, and the Glendale Chromium OU. EPA often addresses clean-up at a large site by breaking the site into small operable units (OUs) to manage cleanup actions. This notice addresses the FYRs for Areas 1 (North Hollywood and Burbank OUs) and 2 (Glendale North and South OUs). Upon completion of the review EPA will issue two separate reports that evaluate whether the cleanup actions for Areas 1 and 2 remain protective of human health and the environment.

The Review Process: When EPA's cleanup action leaves some waste in place or the action will take longer than five years to complete, the Superfund law requires an evaluation of the protectiveness of the cleanup systems every five years until the site has been cleaned up sufficiently to allow unrestricted use. The purpose of the FYR is to publically document the effectiveness of cleanup systems and to measure progress towards achieving cleanup goals. FYRs consist of evaluating the effectiveness of clean-up in both the short and long-term, facility inspections, and the analysis of 2008-2013 groundwater data. The FYR will report the amount of contaminant mass being removed by groundwater treatment facilities, evidence of natural processes that may assist with the breakdown of chemicals, cleanup progress within the Superfund sites, and treatment facility operations. This review also includes interviews with regulators, government officials, and community representatives. To date, previous FYR reviews conducted for Areas 1 and 2 have shown the clean-up systems to be protective of human health and the environment. The 2013 FYRs will comment on the status of 2008 recommendations and offer new recommendations if necessary. The 2008 FYR for Areas 1 and 2 are available on EPA's web page and at the information repositories listed below. Both 2013 FYR reports will be completed by September 30, 2013 and copies will be made available to the public via the websites.

Community Involvement: EPA invites the community to learn more about the Sites, the FYR review process and provide input to EPA. Interviewees can contact Jackie Lane, Community Involvement Coordinator **no later than July 31, 2013** at (415) 972-3236 or by email at lane.jackie@epa.gov to be interviewed.

Information and Repositories: **Area 1:** Burbank Public Library, 110 North Glen Oaks Blvd, Burbank, CA or call (818) 238-5580 and Los Angeles Public Library, 630 W. Fifth St., Los Angeles CA 90071 or call (213) 228-7000. **Area 2:** City of Glendale Public Library, 222 East Harvard St. Glendale, CA or call (818) 548-2021 and Los Angeles Public Library, 630 W. Fifth St., Los Angeles CA 90071 or call (213) 228-7000.

EPA Web Page: Area 1: www.epa.gov/region09/SanFernandoNorthHollywood
Area 2: www.epa.gov/region09/SanFernandoGlendale

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Appendix C: Interview Forms

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Interview Forms

| Five-Year Review Interview Record | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------|-------------------------------------------------------------|
| Site: | San Fernando Valley Area 2 Superfund Site | EPA ID No: | CAD980894901 |
| Interview Type: | Visit | | |
| Location of Visit: | GOU Treatment Facility | | |
| Date: | 2/28/2013 | Time: | 10:00 AM |
| Interviewer: | ZiZi Searles David Sullivan Aaron King | Title: | RPM Geologist Environmental Engineer |
| | | Organization: | USEPA USACE USACE |
| Individuals Contacted | | | |
| Name: | Charles Cron | Title: | Lead O&M Specialist |
| Telephone: | (818) 550-5975 | Address: | 800 Flower St Glendale, CA 91201 |
| Name: | Daniel Hutton | Title: | Project Manager |
| Telephone: | (909) 579-3500 | Address: | 9220 Cleveland Ave, Suite 100 Rancho Cucamonga, CA 91730 |
| Summary of Conversation | | | |
| <p>1) What is your overall impression of the project (general sentiment)?</p> <p>The designers of the system did a great job. The system is flexible, even with changing water quality regulations. The system has consistently been able to operate and meet extraction and water quality requirements.</p> | | | |
| <p>2) What is your current role and your agency's role with respect to the site?</p> <p>Mr. Cron is the site manager and Mr. Hutton is the project manager; both ensure compliance while minimizing water loss.</p> | | | |
| <p>3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.</p> <p>There are multiple points of communication every day, whether between Charles, Dan, Leo, and/or EPA. Also, there are monthly stakeholder meetings.</p> | | | |
| <p>4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.</p> <p>No.</p> | | | |
| <p>5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>Somehow, the Glendale Police Department has received three 911 calls from the site that are not alarm triggered. It is not known why or how this occurs. All responses by local authorities have been false alarms.</p> | | | |
| <p>6) Is the remedy functioning as expected? How well is the remedy performing?</p> <p>Yes. The remedy is performing better than expected with respect to mass removal and extraction rates. CDPH's flexibility has been very encouraging.</p> | | | |

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Trend charts show several COC concentrations, including VOCs and chromium, are climbing in some wells, in accordance with predictions.

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

There are operators on-site 8 hours per day, 7 days per week, daily inspections, and 24/7 remote monitoring.

9) What are the annual O&M costs for your organization's involvement at the site?

Funding has not been an issue for justifiable expenses. Roughly \$4.3 million is budgeted for the coming year.

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

Nothing in the last five years, excluding the WBA. And the uranium disposal issue.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Resin disposal has been an unexpected difficulty because of the uranium content of the spent resin (uranium originates in the groundwater and the resin removes it from the groundwater). Also, formaldehyde has been found to leach from the resin on startup, so a system to contain and treat the water used during startup has been implemented.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

Plant and process optimization occurred years ago. CDPH is open to reducing sampling.

13) What effects have site operations had on the surrounding community?

The plant provides 25% of the City's water supply, and the water meets drinking water standards.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

No.

15) Do you feel well informed about the site's activities and progress?

Yes.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

CDM is keeping an eye on the chromium MCL development, but also EPA's carcinogenic VOC rule.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No. The desires and expectations of all parties are being met. The cooperativeness of all parties makes it much easier.

Five-Year Review Interview Record

| | |
|-------------------------------------------------------------------|--------------------------------|
| Site: San Fernando Valley Area 2 Superfund Site | EPA ID No: CAD980894901 |
| Interview Type: Visit | |
| Location of Visit: City of Glendale Water and Power Office | |
| Date: 2/28/2013 Time: 1:00 PM | |

| | | |
|----------------------------------|------------------------|----------------------------|
| Interviewer: ZiZi Searles | Title: RPM | Organization: USEPA |
| David Sullivan | Geologist | USACE |
| Aaron King | Environmental Engineer | USACE |

Individuals Contacted

| | | | | | |
|-------------------|----------------|-----------------|---------------------------------------------------|----------------------|----------------------------------|
| Name: | Leighton Fong | Title: | Civil Engineer II | Organization: | City of Glendale Water and Power |
| Telephone: | (818) 548-3982 | Address: | 141 N Glendale Ave, Level 4 Glendale, CA 91206 | | |
| Name: | Leo Chan | Title: | Project Engineer | Organization: | City of Glendale Water and Power |
| Telephone: | (818) 548-3905 | Address: | 141 N Glendale Ave, Level 4 Glendale, CA 91206 | | |

Summary of Conversation

1) What is your overall impression of the project (general sentiment)?

The project is well-run. CDM and GRG are supportive and go beyond the call of duty; and they take ownership and pride in their work.

2) What is your current role and your agency's role with respect to the site?

City owns the operable unit, oversees plant operation, and reports to CDPH, EPA, etc. Also, the City is in charge of permitting, disposal, manifesting, and invoice review. They have a focus on water loss prevention.

3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

GWP talks to Charles at least every other day, and receives daily status reports by e-mail and monthly reports.

4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

The Bureau of Sanitation wanted to split a sample of the industrial waste discharge from GS-3 (formaldehyde), but was not notified when the last sample was taken.

5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

There has been no vandalism. Someone broke into the control panel at extraction well GS-3, but nothing was taken or broken.

6) Is the remedy functioning as expected? How well is the remedy performing?

The remedy is getting mass removal and the desired extraction rates, but there might be some leakage (regarding containment).

7) What does the monitoring data show? Are there any trends that show

contaminant levels are decreasing?

VOCs remain steady. Chromium concentrations are declining in GS-3 and increasing in GN-3.

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

Charles and his staff are very conscientious and stable. They are very responsible and on top of problems.

9) What are the annual O&M costs for your organization's involvement at the site?

To be given at a later date. GRG pays for the O&M; all justified costs are fine.

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

Sometimes, the wells will trip (under voltage), go offline, and sound a general alarm. CDM put electrical monitoring on some of the wells.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Metering to the packed towers failed causing a temporary shutdown. The meters were replaced within a month. Nothing unexpected; the equipment is old, so it tends to fail.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

The influent splitter pipe is a positive change. LPGAC regeneration is being considered. They have improved the reliability of the chlorine injection.

13) What effects have site operations had on the surrounding community?

With the WBA at GS-3, they had to add a sound blanket because of complaints about the noise. There have not been any new complaints.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

No.

15) Do you feel well informed about the site's activities and progress?

Yes. The monthly stakeholder meetings keep GWP well informed.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

NPDES is an ongoing issue for discharging well-rehab water.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

EPA is working on remedy optimization, and there is uncertainty regarding the new remedy.

Five-Year Review Interview Record

| | |
|---------------------------------------------------------------------|----------------------------------------------------------|
| Site: San Fernando Valley Area 2 Superfund Site | EPA ID No: CAD980894901 |
| Interview Type: Visit | |
| Location of Visit: Restaurant near GWP Offices | |
| Date: 2/28/2013 Time: 2:45 PM | |
| Interviewer: ZiZi Searles David Sullivan Aaron King | Title: RPM Geologist Environmental Engineer |
| Organization: USEPA USACE USACE | |

Individuals Contacted

| | | |
|----------------------------------|-------------------------------------------------------------------------|--------------------------------|
| Name: Karen Meade | Title: Project Manager | Organization: CH2M Hill |
| Telephone: (714) 429-2000 | Address: 6 Hutton Centre Drive, Suite 700 Santa Ana, CA 92707 | |

Summary of Conversation

1) What is your overall impression of the project (general sentiment)?

The project has been impressive. The City and CDM are very proactive and aware of requirements. Monthly meetings are effective. GRG seems fairly proactive, and supportive of current operations, and there have been no budget issues.

2) What is your current role and your agency's role with respect to the site?

CH2M Hill is EPA's contractor to provide oversight of ongoing remedial work.

3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

CH2M Hill attends the monthly meetings. Weekly site inspections were performed during the construction and startup of the WBA and RCF facilities.

4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

No.

5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

As Charles talked about...

6) Is the remedy functioning as expected? How well is the remedy performing?

Work to date has helped inhibit migration and mass removal; containment could be better. GS-3 is not getting capture. Particle tracking in the Hydraulic Containment Technical Memorandum shows escape from north and south wells, even when all wells are operating. The alternatives shown in the same memorandum still do not show complete capture. It would be better to look at it as one OU rather than two. It is functioning as expected, but there is room for improvement, and doesn't believe there is complete containment.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Capture doesn't appear to have been achieved or there was a loss of capture due to GS-3 down time. PCE and TCE concentrations are above the MCL down-gradient of the south extraction wells. Down-gradient well GS-P13 (screen depth 30-50 feet) has high PCE and TCE concentrations, whereas down-gradient wells GS-P4 and GS-P5 (screened depth is deeper at approximately 100 feet) have low concentrations of PCE and TCE. Also, GN-P11 on the other side of the LA River has relatively high concentrations of PCE and TCE, which might be from a different source, so there is a question regarding new sources or sources not completely defined.

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

N/A

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

The Draft O&M Manual for WBA has not been integrated to the Site O&M Manual.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

As Charles said earlier, plus resin issues at the WBA, but it's being worked on. Looking at re-activated carbon use. Should look at other resins that don't produce the formaldehyde issue.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

Waste minimization during well rehabilitation; carbon regeneration on-site

13) What effects have site operations had on the surrounding community?

There was a noise issue at the WBA, but it was addressed through the use of noise attenuation blankets.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

No.

15) Do you feel well informed about the site's activities and progress?

Yes.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

Only the chromium MCL to be released in the summer.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No. Charles is very proactive on permitting and other issues.

ive-Year Review Interview Record

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------|
| Site: San Fernando Valley Area 2 Superfund Site | EPA ID No: CAD980894901 | |
| Interview Type: Visit | | |
| Location of Visit: CDPH Office | | |
| Date: 2/27/2013 Time: 3:40 PM | | |
| Interviewer: ZiZi Searles David Sullivan Aaron King | Title: RPM Geologist Environmental Engineer | Organization: USEPA USACE USACE |
| Individuals Contacted | | |
| Name: Thomas Tsui | Title: Associate Sanitary Engineer | Organization: CDPH |
| Telephone: (818) 551-2036 | Address: 500 N Central Ave, Suite 500 Glendale, CA 91203 | |
| Name: Chi Diep | Title: Senior Sanitary Engineer | Organization: CDPH |
| Telephone: (818) 551-2039 | Address: 500 N Central Ave, Suite 500 Glendale, CA 91203 | |
| Summary of Conversation | | |
| <p>1) What is your overall impression of the project (general sentiment)?</p> <p>It runs better than other OUs, it's newer, and so it benefited from experience of other OUs. It's easy to oversee, and it's well covered from the permit point of view.</p> <p>2) What is your current role and your agency's role with respect to the site?</p> <p>To ensure potable water produced by the site meets standards and policy requirements for impaired sources. Review reports, be involved in future design changes, and to evaluate hexavalent chromium treatment.</p> <p>3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.</p> <p>Gets monthly reports, sampling reports, and does an inspection every 3 years. 2010 was the last inspection - nothing unique noted.</p> <p>4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.</p> <p>99.5% of the time it runs good. Only issue has been with NDMA in GS-1. Identifying the source was a problem, and there was some concern about the drinking water quality from GS-1 prior to the decommissioning of the LAGWRP detention pond. There was also a malfunction of a mag meter in the air stripping tower. It's old equipment, more than 10 years old. The extraction wells need attention to keep from failing. They have to rehab some wells every year, but others not as often.</p> <p>5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>There are occasional access issues with DreamWorks, but otherwise, there are no issues. The site is secure.</p> <p>6) Is the remedy functioning as expected? How well is the remedy performing?</p> <p>Remedy functions as expected; it meets expectations and treatment goals, and there haven't been any violations.</p> <p>7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?</p> | | |

There aren't any decreasing trends; it's pretty steady, though hexavalent chromium is increasing a little.

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

Yes. Personnel are there every day and there is a SCADA system.

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

No, but there is project coming up that requires separation of a pipeline that may change O&M procedures. GOU wells in general are only 200 feet deep, so when they do the rehabs, per industry standards, they often get bacteria problems that take time to flush out. The sources of bacteria and E. coli aren't known, though they don't often get E. coli hits.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

The only thing has been the mag meter in the tower. It took 4-7 days to change.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

The pipeline separation project will be a money and time saving improvement. There's also the hex chrome research.

13) What effects have site operations had on the surrounding community?

Some residents have complained of noise near the WBA wellhead treatment. The OU put sound blankets up in response.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

An elected official has voiced desire to have CDPH attend board meetings of the LA county board of supervisors, regarding hex chrome, but they haven't done that yet.

15) Do you feel well informed about the site's activities and progress?

Yes. City of Glendale has gone through significant personnel changes lately, so the contacts aren't as tight as they used to be.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

The only thing is the upcoming hexavalent chromium MCL. That, and the reduction in the 1,4 dioxane NL.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

It runs well, but there's always room for improvement, but nothing in particular. GRG and CDM have been responsive and CDPH appreciates EPA's involvement with GS-1. Overall, a great team effort.

Five-Year Review Interview Record

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|----------------------------------------------------------------|--------------------------------|
| Site: San Fernando Valley Areas 1 and 2 Superfund Sites | EPA ID No: CAD980894901 |
|----------------------------------------------------------------|--------------------------------|

Interview Type: Visit

Location of Visit: Los Angeles Regional Water Quality Control Board Office

Date: 2/26/2013 **Time:** 3:00 PM

| | | | | | |
|---------------------|----------------------------------------------|---------------|--------------------------------------------|----------------------|-------------------------|
| Interviewer: | ZiZi Searles David Sullivan Aaron King | Title: | RPM Geologist Environmental Engineer | Organization: | USEPA USACE USACE |
|---------------------|----------------------------------------------|---------------|--------------------------------------------|----------------------|-------------------------|

Individuals Contacted

| | | | | | |
|-------------------|----------------|-----------------|-----------------------------------------------------|----------------------|-------------------------|
| Name: | Larry Moore | Title: | Staff Environmental Scientist | Organization: | Los Angeles RWQCB |
| Telephone: | (213) 576-6730 | Address: | 320 W 4th Street Suite 200 Los Angeles, CA 90013 | | |
| Name: | Alex Lapolstol | Title: | Technical Consultant | Organization: | E2 Consulting Engineers |
| Telephone: | (213) 576-6801 | Address: | 320 W 4th Street Suite 200 Los Angeles, CA 90013 | | |

Summary of Conversation

1) What is your overall impression of the project (general sentiment)?

It's a positive project; the only unfortunate thing being that it takes longer than they would like to do things. However, it is a slow process because of due process.

2) What is your current role and your agency's role with respect to the site?

RWQCB works to identify PRPs, and make sure PRPs are in compliance and responsible. Mr. Moore works as a state employee on site cleanup with an emphasis on chromium, but is still involved with VOCs. Mr. Lapolstol provides support on behalf of EPA to identify chromium PRPs (though in some cases VOCs and chromium overlap), fulfill EPA information needs, and assist the state in enforcing the water code.

3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

RWQCB conducts site inspections, reviews work plans, completes chemical use questionnaires from PRPs, and oversees the cleanup process. EPA provides concurrence with cleanup levels. Mr. Lapolstol is the "eyes and ears" of EPA so that EPA isn't surprised by what the RWQCB is doing.

4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

There have been no public complaints, and no PRP complaints that have required a response. Glendale, Burbank, and LADWP complain about the slow pace of investigations and response times of EPA and RWQCB. PRPs complain about paying for cleanup.

5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No, though residents near the former Exello plating facility admitted to trespassing and rolling around in the dirt when the facility was still operational, but that did not occur in the last five years.

6) Is the remedy functioning as expected? How well is the remedy performing?

For the NHO, EPA has spent lots of money on the remedy, but unless LADWP uses appropriate pumping rates, it's a moot point; they're just spreading contamination around. It is difficult to contain plumes the way the remedy has been operated. For the GOU, PCE, TCE, total chromium, and hexavalent chromium have been found down gradient of GS-3. The characterization of the GOU is insufficient. Part of the plume has gone off-site of the Excello facility.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

The BOU has not been completely assessed in regard to chromium. Honeywell (NHO) has been remediating an on-site source by injecting calcium polysulfide, and has been seeing reductions in off-site wells. Decreasing chromium concentrations have not been observed in the GOU; the plume appears to be shifting, rather than decreasing in concentrations.

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

RWQB has no day-to-day interactions with facilities, but receives monthly updates from the GOU.

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

N/A

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

N/A

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

N/A

13) What effects have site operations had on the surrounding community?

For example, the BOU is pumping their own water, meaning they don't have to purchase all of their water from the Metropolitan Water District. The water is clean, and no one sees the plant; it's a great benefit. In general, the public is interested. If the site has a Cleanup and Abatement Order, the PRP must do community outreach before RWQCB will issue a closure.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

Nothing to add; refer to response to question 13.

15) Do you feel well informed about the site's activities and progress?

Yes. The updates and contact with EPA are sufficient.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

OEHHA developed a PHG for hexavalent chromium, which is the precursor for development of an MCL. This will result in higher costs for treatment facilities, which will be passed on to consumers.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No.

Five-Year Review Interview Record

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| Site: San Fernando Valley Areas 1 and 2 Superfund Sites | EPA ID No: CAD980894901 | | | | |
| Interview Type: Visit | | | | | |
| Location of Visit: ULARA Watermaster Office | | | | | |
| Date: 2/28/2013 Time: 4:00 PM | | | | | |
| Interviewer: | ZiZi Searles David Sullivan Aaron King | Title: | RPM Geologist Environmental Engineer | Organization | : USEPA USACE USACE |
| Individuals Contacted | | | | | |
| Name: | Richard Slade | Title: | ULARA Watermaster | Organization: | ULARA Watermaster |
| Telephone: | (818) 506-0418 | Address: | 12750 Ventura Blvd, Suite 202 Studio City, CA 91604 | | |
| Name: | Anthony Hicke | Title: | Assistant to the Watermaster | Organization: | ULARA Watermaster |
| Telephone: | (818) 506-0418 | Address: | 12750 Ventura Blvd, Suite 202 Studio City, CA 91604 | | |
| Summary of Conversation | | | | | |
| <p>1) What is your overall impression of the project (general sentiment)?</p> <p>The plumes are still there and have spread more. It seems like the people involved never want to commit to anything without more data, delaying cleanup. COCs are contaminating new wells, and newly contaminating old ones. The model needs updating. The project has been frustrating because things in all OUs take too long.</p> <p>2) What is your current role and your agency's role with respect to the site?</p> <p>Court-appointed Watermaster. The Watermaster accounts for extractions and protects the pumping rights and water quality in the Upper Los Angeles River Area per the 1979 judgment.</p> <p>3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.</p> <p>There are Quarterly EPA meetings. GOU and BOU extraction reports are provided, though the Watermaster was unaware that 14 more wells had been installed at the GOU. There are Quarterly Administrative Committee meetings as part of the judgment.</p> <p>4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.</p> <p>N/A</p> <p>5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>N/A</p> <p>6) Is the remedy functioning as expected? How well is the remedy performing?</p> | | | | | |

No. The remedy has not performed as expected. The plumes are as big or bigger than they were twenty years ago. Production has moved "stuff" around. But something is better than nothing. A lot of improvement is needed, sooner rather than later. There is a goal, and it has to be met. The Judge might be unhappy if the Watermaster were to give her an update on the Sites.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

The Watermaster has only seen plume maps, but would like to see more depth-discrete plume maps.

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

N/A

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

N/A

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

N/A

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

The wells should be pumped more efficiently to capture the most contamination, through, for example, the use of packers and static spinners.

13) What effects have site operations had on the surrounding community?

The wells cannot be pumped to safe yield or are forced to exceed safe yield, which ultimately means it costs more for customers to buy water, due in part to cities having to buy outside water. The region will need a new safe yield study soon.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

N/A

15) Do you feel well informed about the site's activities and progress?

The Watermaster receives a lot of PRP reports (not all of them), but trusts regulators to review these. The Watermaster likes to be kept informed.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

Yes.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

Older wells in the NHO and BOU lack sanitary seals. Static surveys should be performed to ascertain the direction of groundwater flow within the wells. Also, it cannot be assumed that water removed from the same depth at different wells comes from the same aquifer system; the hydrogeology is not well defined or understood.

Five-Year Review Interview Record

| | |
|--------------------------------------------------------------------|--------------------------------|
| Site: San Fernando Valley Area 1 and Area 2 Superfund Sites | EPA ID No: CAD980894893 |
|--------------------------------------------------------------------|--------------------------------|

Interview Type: Phone

Location of Visit: N/A

Date: 5/6/2013 **Time:** 11:00 AM

| | | |
|----------------------------------|------------------------|----------------------------|
| Interviewer: ZiZi Searles | Title: RPM | Organization: USEPA |
| Aaron King | Environmental Engineer | USACE |

Individuals Contacted

| | | |
|----------------------------------|-------------------------------------------------------------|---------------------------|
| Name: Tedd Yargeau | Title: Senior Scientist | Organization: DTSC |
| Telephone: (818) 212-5340 | Address: 9211 Oakdale Avenue Chatsworth, CA 91311 | |

Summary of Conversation

1) What is your overall impression of the project (general sentiment)?

Overall, the projects are very good. Things are moving forward with the GCOU and things are going well with the BOU. There have been some issues in the NHOU with bringing in other responsible parties.

2) What is your current role and your agency's role with respect to the site?

Peer-reviewing documents. DTSC ensures that the state's interests are represented.

3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

There have been no recent site visits, though DTSC is well aware of what is going on due to communications from EPA and PRPs.

4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

No.

5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No.

6) Is the remedy functioning as expected? How well is the remedy performing?

The remedies are functioning for the most part with the exception of the NHOU (regarding containment). However, all of the remedies are headed in the right direction.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Contaminant levels are definitely decreasing, except for hexavalent chromium in some wells in the NHOU.

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

There is no oversight on behalf of the state but DTSC is aware of EPA's oversight.

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

The only new thing is the new and emerging compounds, especially hexavalent chromium. The second remedy for the NHOU will treat for hexavalent chromium, and the GOU is actively working on a chromium remedy.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Bringing more PRPs on board has been a challenge in the NHOU.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

EPA has been trying to be more efficient in sampling by reducing the number of mobilizations.

13) What effects have site operations had on the surrounding community?

DTSC has not heard any complaints; EPA has been running a great outreach program.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

There was a recent inquiry regarding a real estate purchase in the San Fernando Valley and whether the presence of the contamination could affect the value of the property. DTSC responded that property values would not be affected.

15) Do you feel well informed about the site's activities and progress?

Yes. EPA has actively notified DTSC.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

The MCL for hexavalent chromium may impact protectiveness, and the challenge has been how to address it. EPA has moved in the right direction, and technologies are being tested that could treat hexavalent chromium down to what the MCL might be.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No. EPA has done a very good job at managing a complex project, and DTSC certainly appreciates it.

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Appendix D: Site Inspection Checklist

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Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------|--|-----------------------------------------------------------------|--|---------------------------------------|--|
| Site name: San Fernando Valley- Area 2 | Date of inspection: 28 February 2013 | | | | | | | | | | | | |
| Location: Glendale/Los Angeles County/California | EPA ID: CAD980894901 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: USACE | Weather/temperature Sunny, calm wind, 73 degrees F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table style="width: 100%; margin-top: 10px;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input checked="" type="checkbox"/> Access controls</td> <td><input checked="" type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Other: _____</td> </tr> </table> | | <input type="checkbox"/> Landfill cover/containment | <input type="checkbox"/> Monitored natural attenuation | <input checked="" type="checkbox"/> Access controls | <input checked="" type="checkbox"/> Groundwater containment | <input checked="" type="checkbox"/> Institutional controls | <input type="checkbox"/> Vertical barrier walls | <input checked="" type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input type="checkbox"/> Landfill cover/containment | <input type="checkbox"/> Monitored natural attenuation | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input checked="" type="checkbox"/> Groundwater containment | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional controls | <input type="checkbox"/> Vertical barrier walls | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | |
| 1. O&M site manager <u>Charles Cron</u> <u>Lead O&M Specialist</u> <u>28 February 2013</u> | | | | | | | | | | | | | |
| Name | Title Date | | | | | | | | | | | | |
| Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | | | | | | | | | | | | | |
| Problems, suggestions; <input checked="" type="checkbox"/> Report attached <u>See Appendix C</u> | | | | | | | | | | | | | |
| 2. O&M staff _____ | | | | | | | | | | | | | |
| Name | Title Date | | | | | | | | | | | | |
| Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | | | | | | | | | | | | | |
| Problems, suggestions; <input type="checkbox"/> Report attached <u>See Appendix C</u> | | | | | | | | | | | | | |

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

Agency: RWQCB

Contact: Larry Moore Staff Environmental Scientist 26 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

Agency: EPA Consultant

Contact: Alex Lapolstol Technical Consultant 26 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

Agency: CDPH

Contact: Thomas Tsui Associate Sanitary Engineer 27 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

Agency: City of Glendale Water and Power

Contact: Leighton Fong Civil Engineer II 28 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

4. **Other interviews** (optional) Report attached.

Karen Meade, CH2M Hill; Richard Slade and Anthony Hicke, ULARA Watermaster; Leo Chan, City of Glendale Water and Power; Chi Diep; CDPH; Dan Sutton; CDM Smith; See Appendix C

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

- | | | | |
|-------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|------------------------------|
| <input checked="" type="checkbox"/> O&M manual | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Maintenance logs | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |

Remarks Monthly reports show daily maintenance logs

2. **Site-Specific Health and Safety Plan** Readily available Up to date N/A

- | | | | |
|------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|------------------------------|
| <input checked="" type="checkbox"/> Contingency plan/emergency response plan | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
|------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|------------------------------|

Remarks None

| | | | | |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------|-----------------------------------------|
| 3. | O&M and OSHA Training Records | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>Training records are also tracked on a corporate system</u> | | | | |
| 4. | Permits and Service Agreements | | | |
| | <input checked="" type="checkbox"/> Air discharge permit | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input type="checkbox"/> Waste disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input checked="" type="checkbox"/> Other permits <u>CDPH</u> | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 5. | Gas Generation Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 6. | Settlement Monument Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 7. | Groundwater Monitoring Records | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 8. | Leachate Extraction Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 9. | Discharge Compliance Records | | | |
| | <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input checked="" type="checkbox"/> Water (effluent) | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 10. | Daily Access/Security Logs | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| IV. O&M COSTS | | | | |
| 1. | O&M Organization | | | |
| | <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State | | |
| | <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP | | |
| | <input type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility | | |
| | <input checked="" type="checkbox"/> Other Contractor <u>CDM Smith is contracted by the City of Glendale.</u> | | | |

| | |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. | O&M Cost Records |
| | <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate <input type="checkbox"/> Breakdown attached <p style="text-align: center;">Total annual cost by year for review period if available</p> From <u>Jan 2010</u> To <u>Dec 2010</u> <u>\$2,917,282.34</u> <input checked="" type="checkbox"/> Breakdown attached Date Date Total cost From <u>Jan 2011</u> To <u>Dec 2011</u> <u>\$3,224,070.94</u> <input checked="" type="checkbox"/> Breakdown attached Date Date Total cost From <u>Jan 2012</u> To <u>Dec 2012</u> <u>\$3,157,578.17</u> <input checked="" type="checkbox"/> Breakdown attached Date Date Total cost |
| 3. | Unanticipated or Unusually High O&M Costs During Review Period |
| | Describe costs and reasons: <u>None</u> |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Fencing | |
| 1. | Fencing damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>Security fence and gate in good condition.</u> |
| B. Other Access Restrictions | |
| 1. | Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks <u>Has 4 surveillance cams, which are monitored at the power substation. There are intrusion alarms at all buildings, well covers, and control panels.</u> |
| C. Institutional Controls (ICs) | |

| | | | | |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-----------------------------------------|
| 1. | Implementation and enforcement | | | |
| | Site conditions imply ICs not properly implemented | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| | Site conditions imply ICs not being fully enforced | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| | Type of monitoring (<i>e.g.</i> , self-reporting, drive by) <u>N/A</u> | | | |
| | Frequency <u>N/A</u> | | | |
| | Responsible party/agency <u>N/A</u> | | | |
| | Reporting is up-to-date | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| | Reports are verified by the lead agency | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| | Specific requirements in deed or decision documents have been met | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| | Violations have been reported | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| | Other problems or suggestions: <input type="checkbox"/> Report attached | | | |
| | <u>No problems or suggestions; See Section 6.7</u> | | | |
| 2. | Adequacy | <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input type="checkbox"/> N/A |
| | Remarks <u>None</u> | | | |
| D. General | | | | |
| 1. | Vandalism/trespassing | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No vandalism evident | |
| | Remarks <u>No trespassing. Minor graffiti on front gate and an exposed pipeline near the Los Angeles River.</u> | | | |
| 2. | Land use changes on site | <input checked="" type="checkbox"/> N/A | | |
| | Remarks <u>None</u> | | | |
| 3. | Land use changes off site | <input checked="" type="checkbox"/> N/A | | |
| | Remarks <u>None</u> | | | |
| VI. GENERAL SITE CONDITIONS | | | | |
| A. Roads | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A | | |
| 1. | Roads damaged | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Roads adequate | <input type="checkbox"/> N/A |
| | Remarks <u>None</u> | | | |
| B. Other Site Conditions | | | | |
| | Remarks <u>In general, site is clean and in good condition.</u> | | | |
| VII. LANDFILL COVERS | | | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A | | |
| VIII. VERTICAL BARRIER WALLS | | | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A | | |

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Groundwater Extraction Wells, Pumps, and Pipelines <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. | Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>None</u> |
| 2. | Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks <u>None</u> |
| 3. | Spare Parts and Equipment <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks <u>None</u> |
| B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| C. Treatment System <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. | Treatment Train (Check components that apply) <input checked="" type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input checked="" type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input checked="" type="checkbox"/> Additive (<i>e.g.</i> , chelation agent, flocculent) <u>Polyphosphate antiscalant</u> <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>7,180 – 8,000 acre-ft</u> <input type="checkbox"/> Quantity of surface water treated annually <u>None</u> Remarks <u>None</u> |
| 2. | Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks <u>None</u> |

| | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------|
| 3. | Tanks, Vaults, Storage Vessels | <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input checked="" type="checkbox"/> Proper secondary containment | <input type="checkbox"/> Needs Maintenance |
| Remarks <u>Materials in tanks properly identified</u> | | | | | |
| 4. | Discharge Structure and Appurtenances | <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks <u>None</u> | | | | | |
| 5. | Treatment Building(s) | <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair | |
| <input checked="" type="checkbox"/> Chemicals and equipment properly stored | | | | | |
| Remarks <u>None</u> | | | | | |
| 6. | Monitoring Wells (pump and treatment remedy) | <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | | | |
| Remarks <u>Monitoring wells were not visited on the site inspection</u> | | | | | |
| D. Monitoring Data | | | | | |
| 1. | Monitoring Data | <input checked="" type="checkbox"/> Is routinely submitted on time | | <input checked="" type="checkbox"/> Is of acceptable quality | |
| 2. | Monitoring data suggests: | <input type="checkbox"/> Groundwater plume is effectively contained | | <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation | | | | | |
| 1. | Monitoring Wells (natural attenuation remedy) | <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | | | |
| Remarks <u>This is not an MNA remedy, it is a containment remedy.</u> | | | | | |
| X. OTHER REMEDIES | | | | | |
| <u>N/A</u> | | | | | |

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

The purposes of the remedy are plume containment, mass removal, and maintaining an extraction rate of 5,000 gpm. Mass removal and the targeted extraction rate are being achieved, but the extent of plume containment is unknown. The only challenge has been extraction well maintenance routines; wastewater is generated and must be dealt with. Routine operations have not been affected by bacteria; bacteria is only an issue during well rehabilitation.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

There have been no O&M challenges along these lines in the last 5 years. Adequate time has been available to schedule any necessary maintenance.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

The influent line pipe was split so that the system would not have to completely shut down during well rehabilitation. CDM Smith is looking at different ways to treat or use wastewater generated during well rehab. Looking to recycle backwash water through the plant, which CDPH is considering. CDPH has shown an increased willingness to allow increased flow rates through LPGAC units during change outs.

**Glendale Operable Unit
O&M Expenses**

| 2010 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| City Utility Charges | 34,682.28 | 27,333.07 | 33,882.34 | 24,428.91 | 30,388.72 | 34,838.95 | 32,389.30 | 46,684.20 | 32,732.81 | 33,423.51 | 35,183.25 | 30,844.46 | 396,811.80 |
| CDM | 453,397.56 | 112,267.65 | 261,005.55 | 217,053.81 | 163,631.12 | 109,267.67 | 203,945.68 | 132,018.93 | 372,933.82 | 170,099.26 | 91,878.22 | 202,959.13 | 2,490,458.40 |
| KJ | 6,483.85 | 2,820.29 | 3,033.00 | 2,187.10 | 1,475.39 | 1,050.60 | 3,227.76 | 3,250.05 | 787.88 | 1,323.55 | 1,830.39 | 2,542.28 | 30,012.14 |
| Total | 494,563.69 | 142,421.01 | 297,920.89 | 243,669.82 | 195,495.23 | 145,157.22 | 239,562.74 | 181,953.18 | 406,454.51 | 204,846.32 | 128,891.86 | 236,345.87 | 2,917,282.34 |

| 2011 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| City Utility Charges | 32,810.38 | 29,606.89 | 27,186.40 | 27,641.15 | 27,299.10 | 31,878.08 | 27,911.94 | 52,997.92 | 35,594.48 | 32,198.38 | 27,869.03 | 36,282.62 | 389,276.37 |
| CDM | 262,446.06 | 323,519.87 | 329,940.74 | 312,855.82 | 89,242.55 | 372,601.47 | 203,828.10 | 119,290.44 | 308,828.52 | 72,614.11 | 170,111.61 | 247,087.97 | 2,812,367.26 |
| KJ | 3,488.76 | 3,802.66 | 1,519.18 | 1,519.14 | 2,728.84 | | 1,865.59 | 1,067.34 | 1,283.64 | 1,423.98 | 1,529.55 | 2,198.63 | 22,427.31 |
| Total | 298,745.20 | 356,929.42 | 358,646.32 | 342,016.11 | 119,270.49 | 404,479.55 | 233,605.63 | 173,355.70 | 345,706.64 | 106,236.47 | 199,510.19 | 285,569.22 | 3,224,070.94 |

| 2012 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| City Utility Charges | 26,300.48 | 30,384.79 | 38,721.92 | 33,985.71 | 30,355.86 | 25,046.96 | 32,324.48 | 41,905.62 | 56,291.79 | 37,391.11 | 45,087.66 | 44,321.30 | 442,117.67 |
| CDM | 133,122.66 | 320,919.98 | 439,411.05 | 87,663.85 | 280,193.77 | 124,285.81 | 221,764.23 | 162,328.95 | 277,785.71 | 248,289.29 | 88,599.33 | 302,272.96 | 2,686,637.58 |
| KJ | 6,225.06 | 3,060.56 | 1,277.20 | 625.34 | 1,911.94 | 1,874.60 | 2,934.41 | 2,581.46 | 1,302.74 | 1,295.09 | 2,102.48 | 3,632.04 | 28,822.92 |
| Total | 165,648.20 | 354,365.33 | 479,410.17 | 122,274.90 | 312,461.57 | 151,207.37 | 257,023.12 | 206,816.02 | 335,380.24 | 286,975.49 | 135,789.46 | 350,226.30 | 3,157,578.17 |

Notes

City Utility Charges - Water and power costs, City oversight, CDPH charges. Credit given for energy and lab costs City would have incurred.

CDM Charges - Labor and materials to operate GWTP and wells, includes chemicals, lab analysis, and GAC.

KJ -Kennedy/Jenks expenses as cost consultant.

Not included are the Operational Loss payments, the Settlement Agreement payments (\$124,000/yr from 2008 - 2011) or property easements fees.

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Appendix E: Photographs from Site Inspection Visit

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Photographs from Site Inspection Visit



Photo 1. GOU Air strippers



Photo 2. One train of VPGAC units



Photo 3. One train (air stripper and three VPGAC units)



Photo 4. VPGAC units



Photo 5. LPGAC units



Photo 6. Air strippers and VPGAC units



Photo 7. Air intake/filter for air stripper



Photo 8. Backwash/recycle equipment



Photo 9. Backwash/recycle equipment



Photo 10. Anti-scalant chemical feed



Photo 11. Anti-scalant storage tank



Photo 12. Anti-scalant feed room entrance



Photo 13. Sodium hypochlorite feed room entrance



Photo 14. Hypochlorite feed



Photo 15. Sodium hypochlorite storage tank



Photo 16. Stormwater treatment system



Photo 17. Heater upstream of VPGAC units



Photo 18. RCF Pilot System



Photo 19. More RCF system components



Photo 20. RCF Pilot System with zero valent iron columns

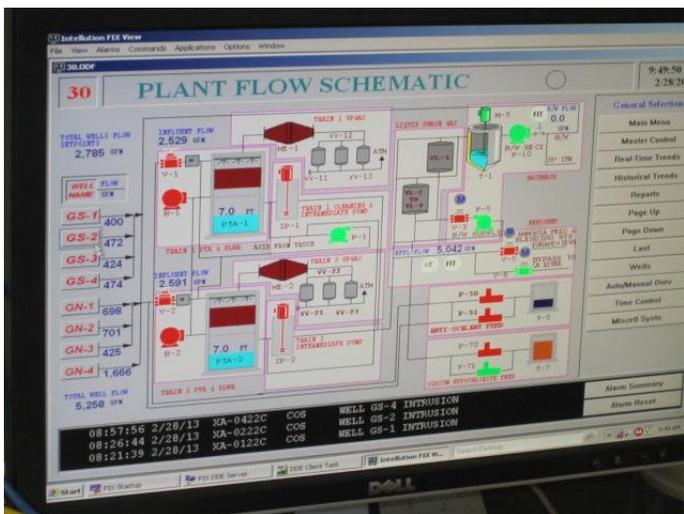


Photo 21. GOU SCADA Display

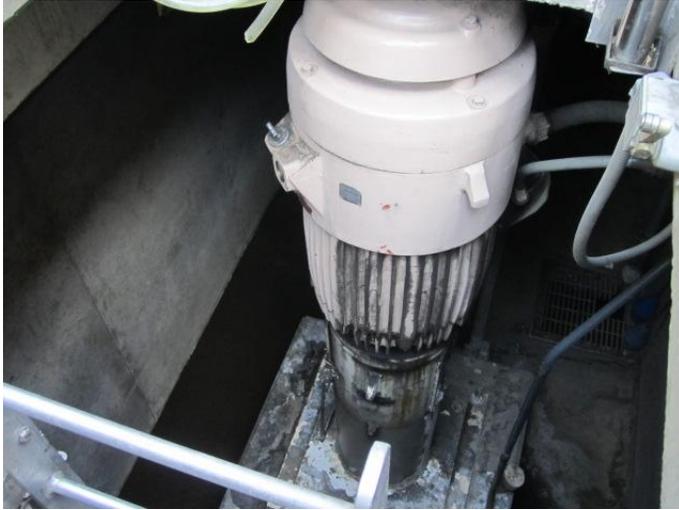


Photo 22. Extraction well GN-4 (from outside the vault)



Photo 23. Extraction well GN-4



Photo 24. Extraction well GN-4



Photo 25. Extraction well GN-4

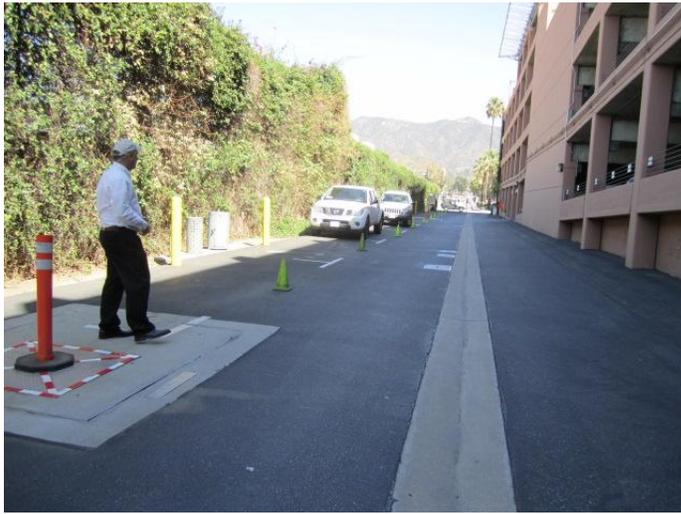


Photo 26. Locations of extraction wells GN-4 (orange marker in foreground) and GN-2 (orange marker in background)



Photo 27. Sample point for GN-4



Photo 28. Extraction well GS-1



Photo 29. LAGWRP Outfall

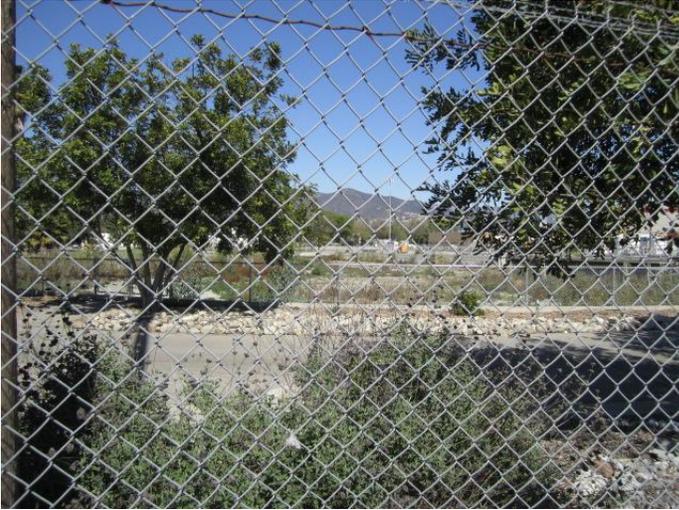


Photo 30. Former LAGWRP Detention Pond (behind second fence)



Photo 31. Well-head WBA process at GS-3



Photo 32. Water storage units for degradation of formaldehyde from initial flushing of ion-exchange resin

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Appendix F: ARARs Summary

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ARARs Summary

Chemical-specific ARARs

Chemical-specific ARARs are discussed in section **Error! Reference source not found.**1. Table 1 summarizes the chemical-specific ARARs.

Action-specific ARARs

Action-specific ARARs identified include Air Quality Standards, Hazardous Waste Management Regulations, and Water Quality Standards for ReInjection. These are summarized in Table 2.

In California, the authority for enforcing the standards established under the Clean Air Act has been delegated to the State. The program is administered by the South Coast Air Quality Management District (SCAQMD).

The State of California has been authorized by the EPA to develop and enforce its own hazardous waste regulations in lieu of the Federal program. These requirements are found in 22 CCR Division 4.5. The source of the VOCs in groundwater is unknown and, therefore, cannot be definitively classified as listed hazardous wastes. However, EPA determined in both RODs that the contaminants are sufficiently similar in nature to listed hazardous wastes that certain substantive requirements of California's hazardous waste regulations are relevant and appropriate at the site.

To-Be-Considered (TBC) Criteria

Two TBC criteria were identified for the GOU and are summarized in Table 3. As noted previously, the 1,4-dioxane notification level was revised from 3 to 1 µg/L in November 2010.

Table 1. Chemical-specific ARARs

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|----------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| SDWA (2 USC 300 et seq.) | National Primary Drinking Water Standards, including 40 CFR 141.61 and 40 CFR 141.62 | Chemical-specific drinking water standards and MCLs have been promulgated under the SDWA; MCLGs above zero are considered chemical-specific ARARs under the NCP (40 CFR 300.430(e)(2)(i)(B)). When the MCLGs are equal to zero, which is generally the case for a chemical considered to be a carcinogen, the MCL is considered the chemical-specific ARAR instead of the MCLG (40 CFR 300.430(e)(2)(i)(C)). Established MCLs for COCs are listed in Error! Reference source not found.. | There have been no changes to the federal MCLs since the last FYR. Protectiveness is not affected. | The MCLs are ARARs for the purpose of establishing performance standards for the treated water from the GOU treatment plant. | N/A |
| California Safe Drinking Water Act | California Safe Drinking Water Regulations, including 22 CCR 64431 and 22 CCR 64444 | Contains provision for California domestic water quality; establishes MCLs for primary drinking water chemicals. Established MCLs for COCs are listed in Error! Reference source not found.. | There have been no changes to the state MCLs since the last FYR. Protectiveness is not affected. | The MCLs are ARARs for the purpose of establishing performance standards for COCs in the water extracted from the basin and treated at the treatment plants. | N/A |
| California Domestic Water Quality Monitoring Regulations | CCR Title 22 Sections 64421 – 64445.2 | Requires monitoring for any treated water which will be delivered to a distribution system. | No changes have been made to this requirement. Protectiveness is not affected. | Substantive monitoring requirements are relevant and appropriate to ensure that treated effluent is meeting performance standards. | N/A |
| California Secondary Drinking Water Standards (SDWS) | 22 CCR 64471 | Secondary Drinking Water Standards were promulgated to address the taste, odor, and appearance of drinking water, and apply the action of supplying the treated water to a public water supplier. | No changes have been made to this requirement. Protectiveness is not affected. | 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. | N/A |

Table 2. Action-specific ARARs

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|-----------------------------------------------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Clean Air Act SCAQMD | Regulation XIII | Regulation XIII requires that stationary sources of air emissions meet best available technology standards. | Rules 1309 (Emission Reduction Credits and Short Term Credits), 1315 (Federal New Source Tracking System), and 1325 (Federal PM _{2.5} New Source Review Program) of Regulation XIII have been amended or adopted since the previous FYR, but none of the changes affect protectiveness. | For air strippers, SCAQMD considers vapor phase GAC (with 90-99% removal efficiency) devices to be BACT. These are pre-construction requirements, so it is assumed that all applicable requirements were obtained before treatment units went on-line. | Latest amendment was on June 3, 2011. |
| Clean Air Act SCAQMD | Rule 1401 | Rule 1401 specifies limits for individual cancer risk and excess cancer cases from new or modified stationary sources which emit carcinogenic air contaminants. The rule requires Best Available Control Technology (BACT) for toxic air discharge for new stationary sources where a lifetime maximum individual cancer risk of one in one million or greater is estimated to occur. | The list of chronic and acute toxic air contaminants was expanded, but this does not affect protectiveness. | As Rule 1401 is a pre-construction regulation, it is assumed that all applicable requirements were attained before the treatment units went on-line. If the air stripping treatment system is modified significantly, substantive provisions of Rule 1401 will still apply. | Latest amendment was on September 10, 2010. |
| Clean Air Act SCAQMD | Rule 401, Rule 402, Rule 403 | Limit the visible emissions from a point source (Rule 401), 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). | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | These rules limit or prohibit visible, odorous or injurious, and particulate emissions from the treatment facility. | N/A |
| California Hazardous Waste Regulations, General Requirements | 22 CCR 66264.14, 66264.18, and 66264.25 | These sections specify security requirements (66264.14), location standards (66264.18), and precipitation standards (66264.25). | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | These are pre-construction requirements, so it is assumed that all applicable requirements were obtained before treatment units went on-line. | N/A |

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|--------------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| California Hazardous Waste Regulations, General Requirements | 22 CCR 66264.15, 66264.16, and 66264.30-66264.56 | These sections specify general inspection requirements (66264.15), personnel training (66264.16), and Preparedness and Prevention and Contingency and Emergency Preparedness (66264.30-66264.56) | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | The treatment plant is required to have health and safety plans and operation and maintenance plans under CERCLA that are substantively equivalent to these sections. | N/A |
| California Hazardous Waste Regulations, Generator Requirements | 22 CCR 66264.600 - .603 ; 22 CCR 66264.111- .115 | 22 CCR 66264.600 - .603 contains requirements for miscellaneous units (air stripper is considered a miscellaneous unit). 22 CCR 66264.111- .115 contains closure requirements for the air stripper. The air stripper should be designed, operated, maintained, and closed in a manner that will ensure the protection of human health and the environment. | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | The substantive requirements for miscellaneous units and related substantive closure requirements appropriate and relevant for the air stripper. | N/A |
| California Hazardous Waste Regulations, Generator Requirements | 22 CCR 66262.34 and 66264.170-.178 | Waste stored on-site over 90 days should be placed in containers or tanks that are in compliance with California Waste Regulations. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | Storage of hazardous waste accumulated on-site must be in compliance with substantive requirements for interim status facilities. | N/A |
| California Land Disposal Restrictions, Requirements for Generators | 22 CCR 66268 | Compliance with land disposal regulation treatment standards is required if hazardous waste (contaminated groundwater or spent GAC) is placed on land. | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | Hazardous waste hauled off-site must meet “land-ban” requirements. | N/A |

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|-------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Groundwater Reinjection | 40 CFR 144.12-.13 | Federal Underground Injection Control Plan 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 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 CFR 144.12 was amended in December 2010, but the amendment does not affect protectiveness. | These regulations are applicable to any treated water that is reinjected into the groundwater. | Dec 10, 2010 |
| Groundwater Reinjection or Discharge to Surface Water | State Water Resources Control Board Resolution 68-16 | Requires that reinjected water not unreasonably degrade existing water quality. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | Resolution 68-16 (Statement of Policy with respect to Maintaining High Quality of Waters in California) does not contain substantive requirements in and of itself. These regulations are applicable to any treated water that is reinjected into the groundwater or discharged to surface water. | N/A |
| Groundwater Reinjection | RCRA Section 3020 | Provides that the ban on the disposal of hazardous waste into a formation which contains an underground source of drinking water shall not apply to the injection of contaminated groundwater into the aquifer if: 1) such reinjection is part of a response action under CERCLA, 2) such contaminated groundwater is treated to substantially reduce hazardous constituents prior to such reinjection, and 3) such response action will, upon completion, be sufficient to protect human health and the environment. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | This regulation is applicable to any treated water that is reinjected into the groundwater. | N/A |

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|-------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Treated Groundwater Discharge to Surface Water | Water Quality Control Plan for Los Angeles River Basin (RWQCB) | Treated water that is discharged, on a short term basis, to the Los Angeles River is subject to the National Pollutant Discharge Elimination System (NPDES) Program which is implemented by the Los Angeles RWQCB. In establishing effluent limitations for such discharges, the Los Angeles RWQCB considers the Basin Plan, which incorporates Resolution 68-16, and the best available technology economically achievable. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | This requirement is applicable to any treated water that is discharged to surface water. | N/A |
| Mineral Quality Objectives for Treated Groundwater Discharge to Surface Water | Water Quality Control Plan for Los Angeles River Basin (RWQCB) | The Los Angeles RWQCB established mineral quality objectives for individual surface waters for the Los Angeles River Watershed. The mineral quality objective for nitrate in the Los Angeles River of 36 mg/L (8 mg/L nitrate-N). | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | 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. This requirement is applicable to any treated water that is discharged to surface water. | N/A |

Table 3. To Be Considered Criteria

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| California PHGs, California Environmental Protection Agency, and OEHHA | California Calderon-Sher SDWA of 1996, California Health and Safety Code 116365 | OEHHA has adopted PHGs for chemicals in drinking water. PHGs are levels of drinking water contaminants at which adverse health effects are not expected to occur from a lifetime of exposure. | No changes have been made to this requirement. Protectiveness is not affected. | In the absence of MCLs, the state PHGs adopted by OEHHA have been considered during selection of performance standards for extracted groundwater. | N/A |
| CDPH Drinking Water Notification Levels | California Health and Safety Code 116455 | CDPH has established drinking water notification levels (formerly known as action levels) based on health effects, but in some cases they are based on taste and odor values for chemicals without MCLs. | CDPH revised its notification level for 1,4-dioxane from 3 to 1 µg/L. Notification levels are not ARARs. Protectiveness is not affected. | In the absence of MCLs, the drinking water notification levels established by CDPH have been considered during selection of performance standards for extracted groundwater. | December 14, 2010 |

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**Appendix G: Summary of Contaminant
Concentrations in GOU
Extraction Wells from January
2008 – December 2012**

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Summary of Contaminant Concentrations in GOU Extraction Wells from January 2008 – December 2012

Highlighted cells indicate that values are above the most stringent performance standard listed in **Error! Reference source not found.** Maximum, minimum, median, and average values are based on detected values; non-detect values were not included in these calculations.

| Contaminant | Summary Parameter | Well | | | | | | | |
|-------------------------------------|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | Well GN-1 | Well GN-2 | Well GN-3 | Well GN-4 | Well GS-1 | Well GS-2 | Well GS-3 | Well GS-4 |
| 1,1,2,2-Tetrachloroethane (µg/L) | Max | -- | -- | -- | -- | -- | -- | -- | -- |
| | Min | -- | -- | -- | -- | -- | -- | -- | -- |
| | Median | -- | -- | -- | -- | -- | -- | -- | -- |
| | Average | -- | -- | -- | -- | -- | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| 1,1,2-Trichloroethane (µg/L) | Max | -- | -- | 0.54 | -- | -- | -- | -- | -- |
| | Min | -- | -- | 0.53 | -- | -- | -- | -- | -- |
| | Median | -- | -- | 0.54 | -- | -- | -- | -- | -- |
| | Average | -- | -- | 0.54 | -- | -- | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 54 | 57 | 57 | 56 | 58 | 59 |
| 1,1-Dichloroethane (1,1-DCA) (µg/L) | Max | -- | 1.6 | 3.4 | -- | 1.8 | 1.2 | -- | -- |
| | Min | -- | 0.5 | 1 | -- | 0.83 | 0.56 | -- | -- |
| | Median | -- | 0.6 | 2.1 | -- | 1.2 | 0.8 | -- | -- |
| | Average | -- | 0.76 | 2.00 | -- | 1.21 | 0.80 | -- | -- |
| | Number of Samples | 58 | 57 | 56 | 57 | 57 | 56 | 57 | 59 |
| | Number of Non-detects | 58 | 52 | 0 | 57 | 2 | 0 | 57 | 59 |
| 1,1-Dichloroethene (1,1-DCE) (µg/L) | Max | 0.54 | 9.8 | 54 | -- | 17 | 12 | 1.2 | -- |
| | Min | 0.54 | 0.51 | 2.72 | -- | 7.5 | 5.3 | 0.5 | -- |
| | Median | 0.54 | 1.1 | 39.5 | -- | 11 | 8.05 | 0.64 | -- |
| | Average | 0.54 | 1.37 | 37.5 | -- | 11.3 | 8.02 | 0.70 | -- |

| | | | | | | | | | |
|---------------------------------------------|-----------------------|------|-------|------|------|-------|-------|------|------|
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 57 | 5 | 0 | 57 | 2 | 0 | 19 | 59 |
| 1,2-Dichloroethane (1,2-DCA) (µg/L) | Max | -- | -- | 1.7 | -- | 116 | -- | -- | -- |
| | Min | -- | -- | 1 | -- | 1.3 | -- | -- | -- |
| | Median | -- | -- | 1.3 | -- | 58.7 | -- | -- | -- |
| | Average | -- | -- | 1.29 | -- | 58.7 | -- | -- | -- |
| | Number of Samples | 58 | 57 | 56 | 57 | 57 | 56 | 57 | 59 |
| | Number of Non-detects | 58 | 57 | 0 | 57 | 55 | 56 | 57 | 59 |
| Benzene (µg/L) | Max | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Min | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Median | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Average | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| Carbon Tetrachloride (µg/L) | Max | 1.1 | 0.9 | 13 | -- | -- | 1.9 | 1.3 | 4.7 |
| | Min | 0.6 | 0.5 | 6.9 | -- | -- | 0.51 | 0.75 | 1.8 |
| | Median | 0.78 | 0.55 | 9.2 | -- | -- | 1.3 | 0.98 | 3.3 |
| | Average | 0.78 | 0.57 | 9.38 | -- | -- | 1.19 | 0.99 | 3.36 |
| | Number of Samples | 58 | 57 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 2 | 16 | 0 | 57 | 56 | 11 | 2 | 1 |
| Chromium VI (µg/L) | Max | 4.7 | 42 | 94 | 4.4 | 0.24 | 1.7 | 57 | 16 |
| | Min | 4.2 | 5.4 | 43 | 1.4 | 0.065 | 0.28 | 23 | 1.5 |
| | Median | 4.5 | 7.85 | 76.5 | 3.6 | 0.12 | 0.805 | 38 | 1.7 |
| | Average | 4.50 | 9.32 | 70.6 | 3.59 | 0.14 | 0.92 | 38.8 | 1.93 |
| | Number of Samples | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 0 | 0 | 1 | 30 | 0 | 1 | 0 |
| cis-1,2-Dichloroethene (cis-1,2-DCE) (µg/L) | Max | -- | 2.7 | 5.8 | 0.6 | 22 | 17 | -- | -- |
| | Min | -- | 0.6 | 2.3 | 0.58 | 8.8 | 9 | -- | -- |
| | Median | -- | 0.895 | 3.6 | 0.59 | 13 | 13 | -- | -- |
| | Average | -- | 0.93 | 3.62 | 0.59 | 13.1 | 12.6 | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 55 | 58 | 59 |

| | | | | | | | | | |
|-------------------------------------------------|-----------------------|------|------|------|------|------|------|------|------|
| | Number of Non-detects | 58 | 0 | 0 | 55 | 1 | 0 | 58 | 59 |
| Perchloroethylene (PCE) (µg/L) | Max | 232 | 270 | 20 | 65 | 110 | 4.8 | 18 | 2.5 |
| | Min | 110 | 75 | 7.3 | 27 | 4.5 | 2.8 | 10 | 1 |
| | Median | 179 | 155 | 15 | 44 | 6.2 | 3.6 | 13 | 1.3 |
| | Average | 179 | 157 | 14.3 | 44.1 | 8.54 | 3.66 | 12.8 | 1.37 |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Total Chromium (µg/L) | Max | 7.7 | 36 | 88 | 5.7 | 3.5 | 5.9 | 55 | 5.7 |
| | Min | 2.8 | 4.6 | 42 | 2.1 | 1.1 | 1 | 22 | 1.1 |
| | Median | 4.7 | 7.7 | 73.5 | 3.8 | 1.55 | 1.7 | 37 | 2.1 |
| | Average | 4.83 | 9.37 | 68.2 | 3.9 | 1.79 | 1.78 | 38.0 | 2.31 |
| | Number of Samples | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 1 | 0 | 0 | 40 | 14 | 0 | 2 |
| trans-1,2-Dichloroethene (trans-1,2-DCE) (µg/L) | Max | -- | -- | -- | -- | 13 | 5.3 | -- | -- |
| | Min | -- | -- | -- | -- | 1 | 2.8 | -- | -- |
| | Median | -- | -- | -- | -- | 1.5 | 4.1 | -- | -- |
| | Average | -- | -- | -- | -- | 1.72 | 4.14 | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 1 | 1 | 58 | 59 |
| Trichloroethylene (TCE) (µg/L) | Max | 200 | 170 | 680 | 82 | 146 | 169 | 34 | 1.74 |
| | Min | 110 | 1.6 | 364 | 43 | 80.6 | 1.4 | 9.7 | 0.57 |
| | Median | 140 | 119 | 490 | 59 | 98 | 101 | 18 | 0.90 |
| | Average | 146 | 117 | 493 | 59.2 | 101 | 105 | 18.1 | 0.99 |
| | Number of Samples | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Xylenes (µg/L) | Max | -- | -- | -- | -- | -- | -- | -- | -- |
| | Min | -- | -- | -- | -- | -- | -- | -- | -- |
| | Median | -- | -- | -- | -- | -- | -- | -- | -- |
| | Average | -- | -- | -- | -- | -- | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |

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**Appendix H: SFV Area 2 Emerging
Contaminants plume maps and
well data**

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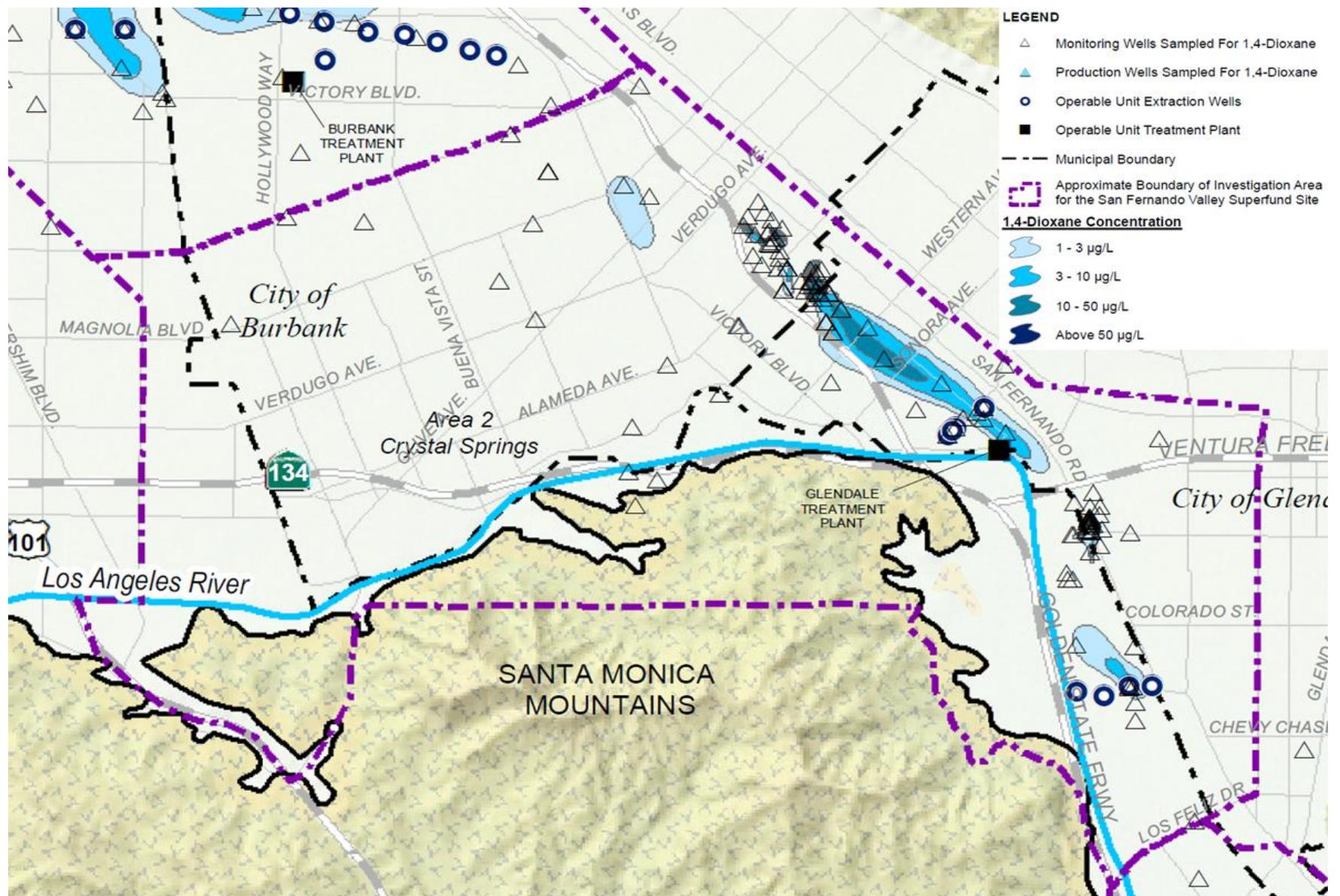


Figure 1. 1,4-Dioxane in the Shallow Zone (Most Recent Concentration January 2006-2011)

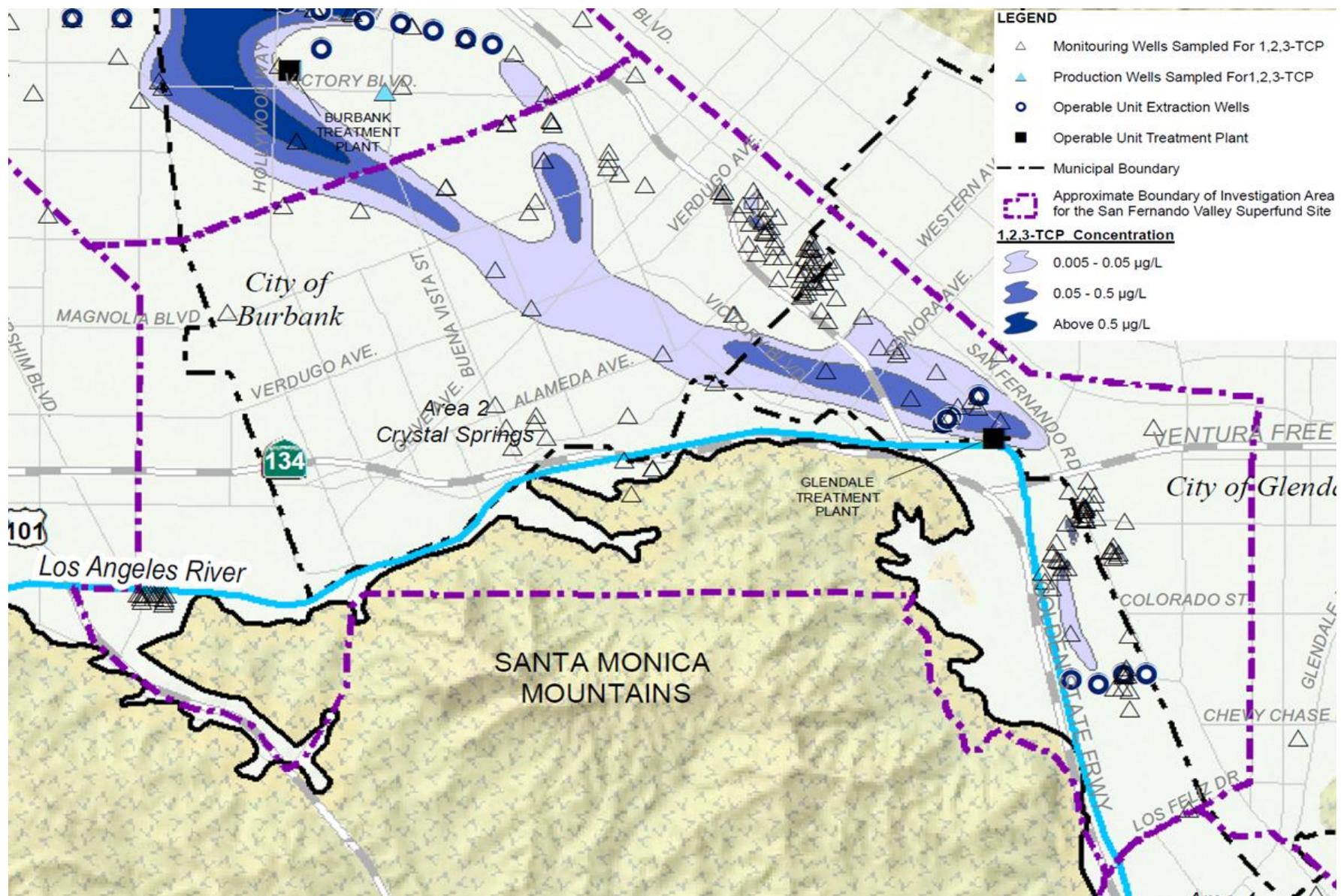


Figure 2. 1,2,3-TCP in the Shallow Zone (Most Recent Concentration January 2006-2011)

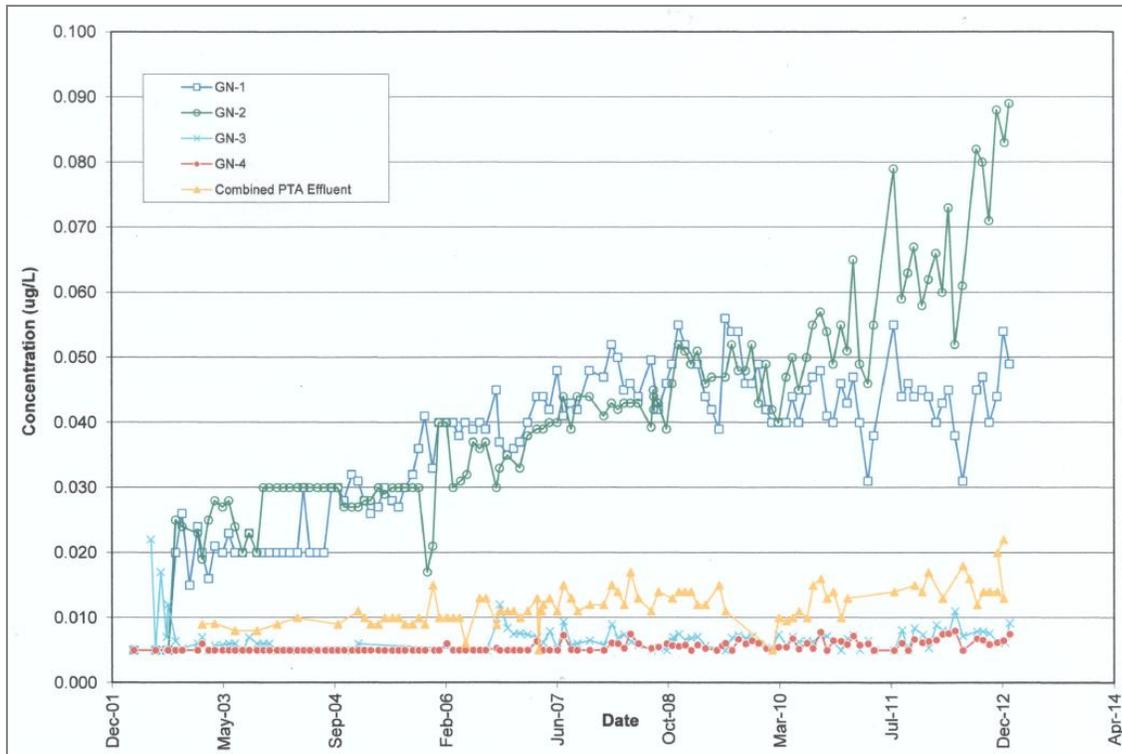


Figure 3. 1,2,3-TCP in the North Extraction Wells

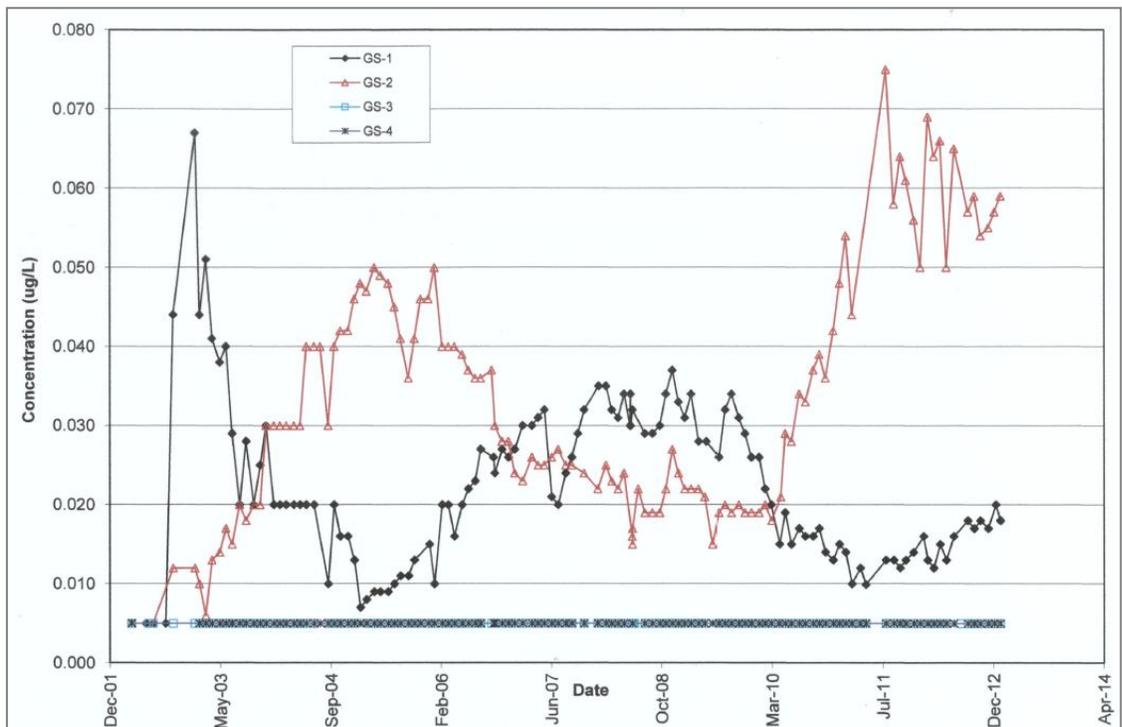


Figure 4. 1,2,3-TCP in the South Extraction Wells

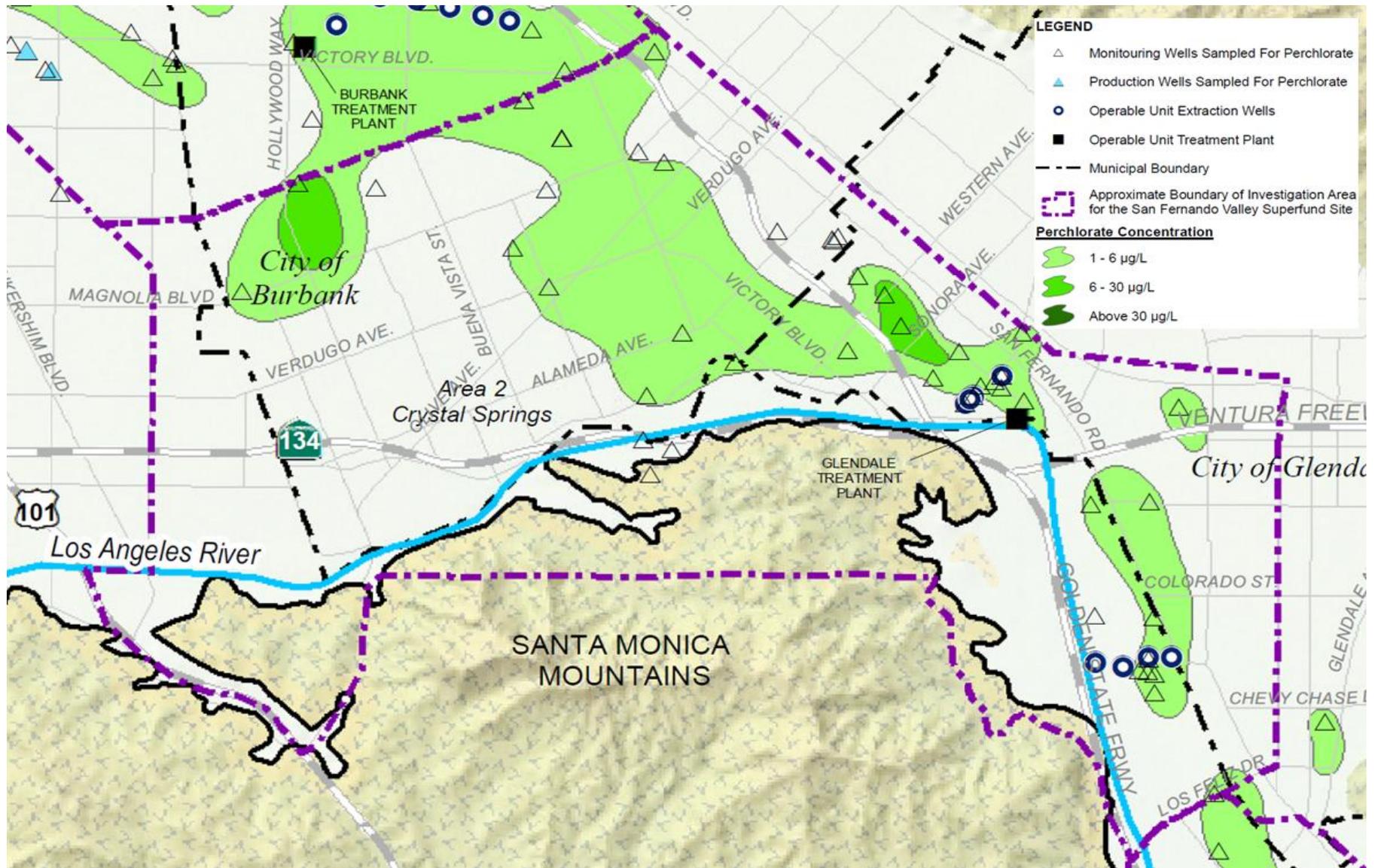


Figure 5. Perchlorate in the Shallow Zone (Most Recent Concentration January 2006-2011)

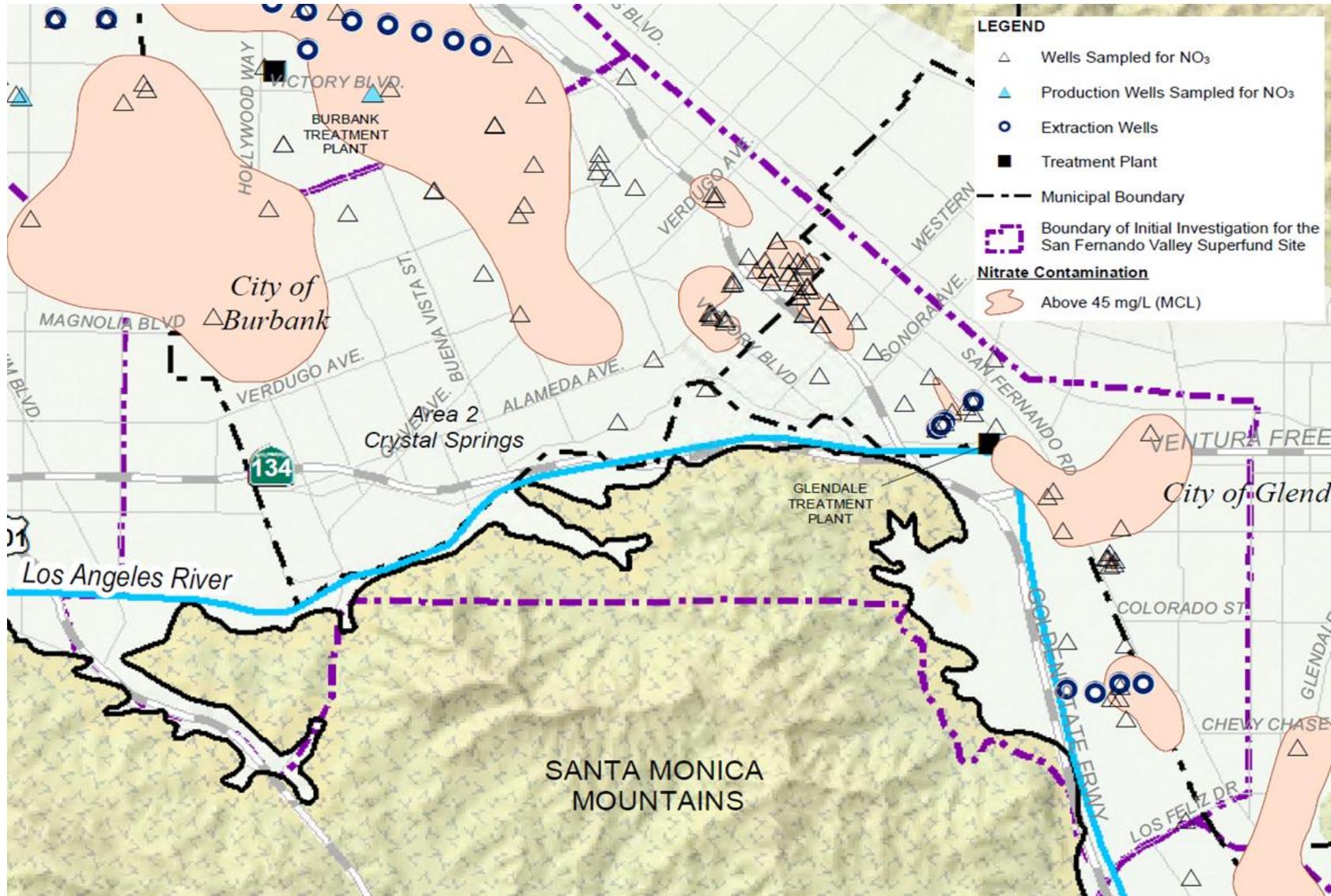


Figure 6. Nitrate in the Shallow Zone (Most Recent Concentration January 2006-2011)



Figure 7. Nitrate in the Deeper Zone (Most Recent Concentration January 2006-2011)

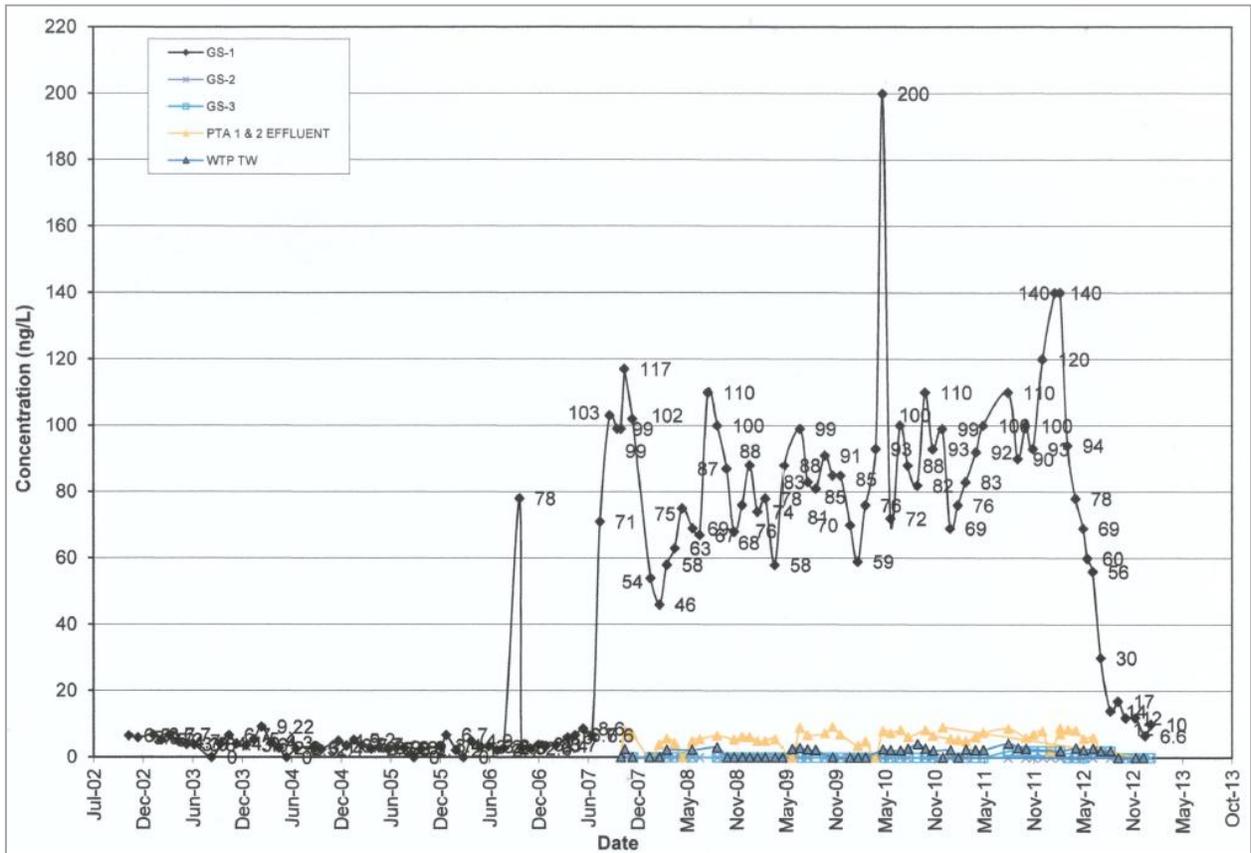


Figure 8. NDMA in Extraction Well GS-1

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**Appendix I: SFV GOU Treatment System and
Extract Well Pumping Data**

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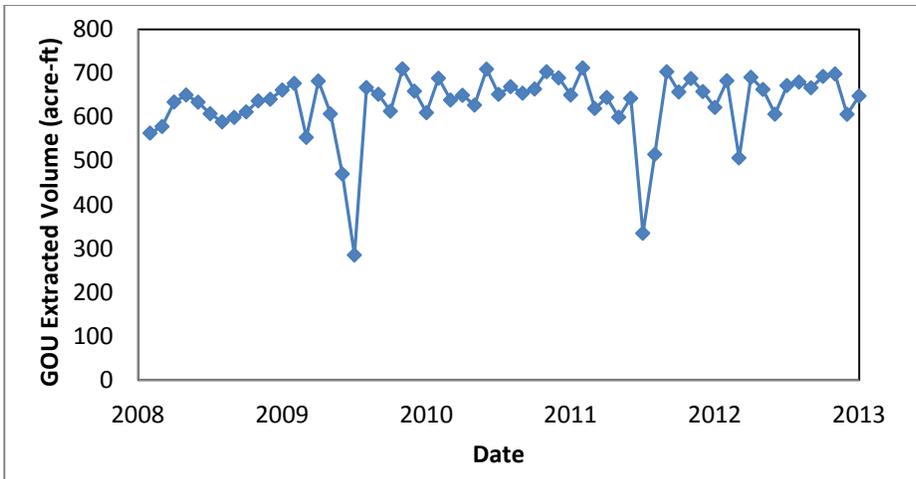


Figure 9. Monthly Extracted and Treated Volume for GWTP from 2008 – 2011

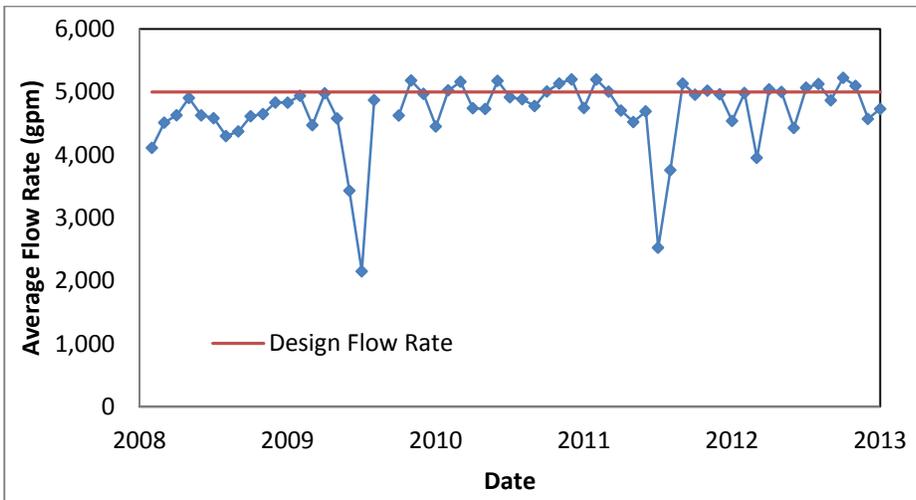


Figure 10. Monthly Average Flow Rate for GWTP from 2008 – 2011

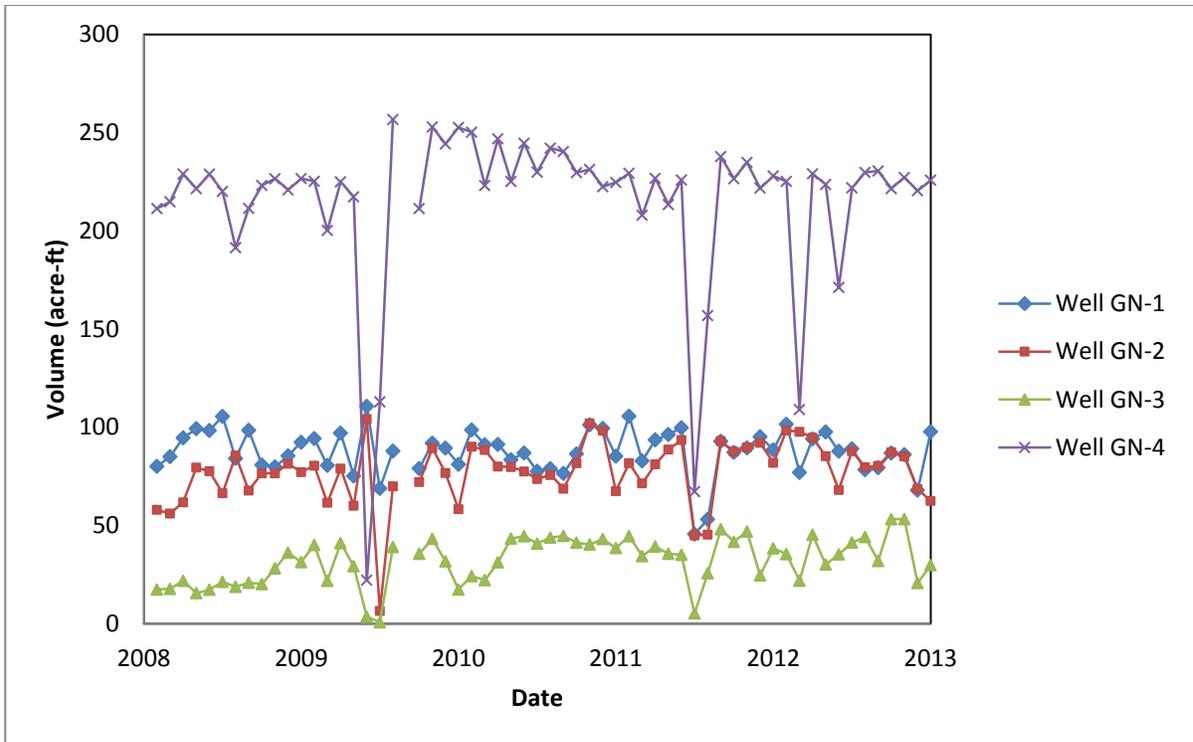


Figure 11. Monthly Extracted Volumes for GNOU Extraction Wells from 2008 – 2011

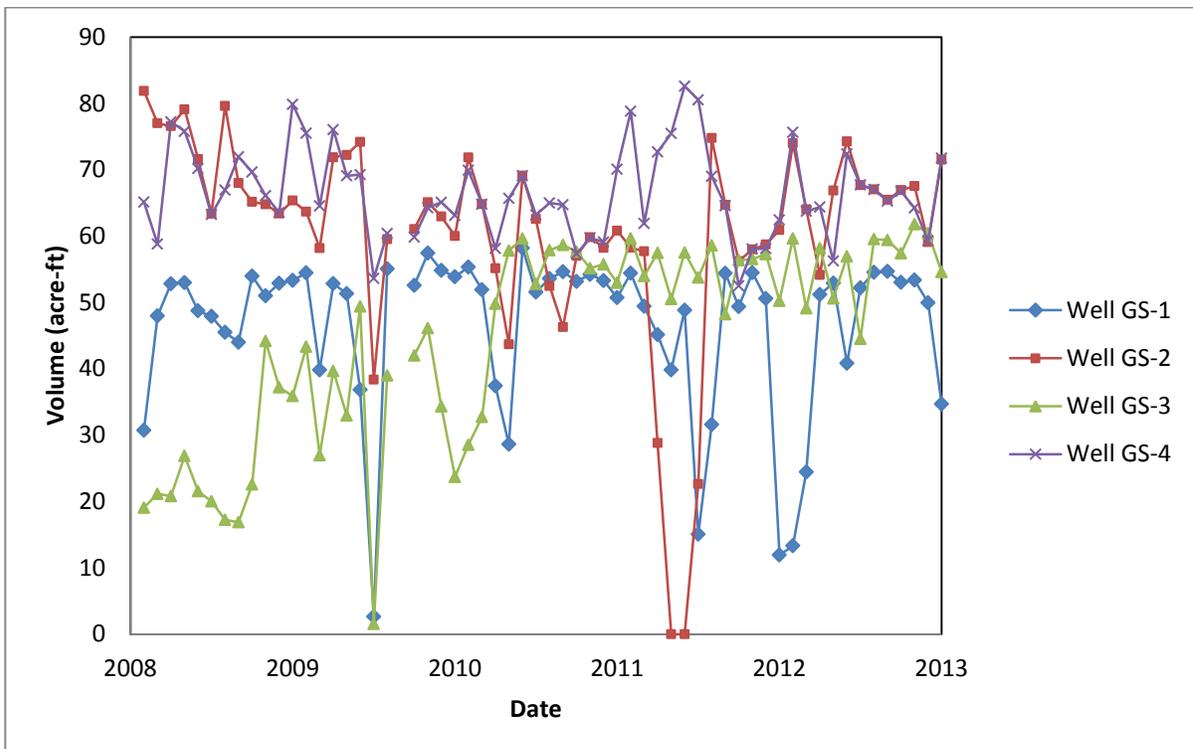


Figure 12. Monthly Extracted Volumes for GSOU Extraction Wells from 2008 – 2011

Appendix A: List of Documents Reviewed

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- Arcadis and Hazen and Sawyer. 2013. Chromium Research Effort by the City of Glendale, California, Project Report – Draft. Prepared by Arcadis U.S., Inc. and Hazen and Sawyer for the City of Glendale Water and Power. January 2013.
- CDM. 2003. Revised Glendale Water Treatment Plant Operations and Maintenance Manual. October 2003.
- CDM Smith. 2012. Glendale Operable Unit Extraction Well GS-2 Rehabilitation Report, Glendale, California. Prepared by CDM Smith for the Glendale Respondents Group and the City of Glendale. February 2012.
- CDM Smith. 2008-2012. Glendale Operable Unit O&M of the Upstream Facilities Progress Reports No. 87 – 146. January 2008 – December 2012.
- CH2M Hill. 2010. Results of Capture Modeling and Recommendations for Hydraulic Containment Monitoring, Glendale South Operable Unit Extraction Wells Technical Memorandum.. Prepared by CH2M Hill for EPA. February 2010.
- CH2M Hill. 2010. San Fernando Valley Basin Groundwater Elevations in Shallow Zone, December 2010. July 2011
- CH2M Hill. 2012. Final Remedial Investigation Work Plan, San Fernando Valley Area 2 Superfund Site Glendale Chromium Operable Unit. Prepared by CH2M Hill for EPA. April 2012.
- EPA. 1993. Glendale North Operable Unit Record of Decision, San Fernando Valley Area 2 Superfund Site, Los Angeles County, California. EPA Region 9. June 1993.
- EPA. 1993. Glendale South Operable Unit Record of Decision, San Fernando Valley Area 2 Superfund Site, Los Angeles County, California. EPA Region 9. June 1993.
- EPA. 2002. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). November 2002.
- EPA. 2008. First Five-Year Review Report for San Fernando Valley – Area 2 Superfund Site, Los Angeles County, California. EPA Region 9. September 2008.
- EPA. 2012. Vapor Intrusion Screening Level Calculator. Updated November 2012.
<http://www.epa.gov/oswer/vaporintrusion/guidance.html#Item6>
- EPA. 2013 OSWER Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air (External Review Draft). April 2013.
<http://www.epa.gov/epawaste/hazard/correctiveaction/eis/vapor/complete.pdf>

- ERM (Environmental Resources Management). 2010. Final Focused Feasibility Study Work Plan, San Fernando Valley Superfund Sites, Area 2 – Crystal Springs, Glendale North and Glendale South Operable Units. December 2010.
- ERM. 2011. Focused Feasibility Study Final Work Plan Addendum, Glendale Operable Unit – Area 2, San Fernando Valley Superfund Sites. October 2011.
- ERM. 2011. Fourth Quarter 2010 Remedial Investigation Well Sampling Report San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group February 2011.
- ERM. 2012. Draft Extraction Well GS-1 Evaluation Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. June 2012.
- ERM. 2012. Draft Emerging Compounds Evaluation Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. October 2012.
- ERM. 2012. Final Site Characterization Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. October 2012.
- ERM. 2012. Revised Draft Hydraulic Containment Evaluation Technical Memorandum, San Fernando Valley Superfund Sites Area 2 – Crystal Springs Glendale North and Glendale South Operable Units. Prepared by ERM for the Glendale Respondents Group. October 2012.
- James M. Montgomery, Inc. 1992. Remedial Investigation of Groundwater Contamination in the San Fernando Valley. Prepared by James M. Montgomery, Inc. and submitted to the City of Los Angeles Department of Water and Power. December 1992.
- RWQCB (California Regional Water Quality Control Board). 2002. Final Chromium VI Investigation Report, San Fernando Valley, Phase I Inspections. August 2002.
- ULARA (Upper Los Angeles River Area Watermaster). 2012. Annual Report Watermaster Service in the Upper Los Angeles River Area (ULARA) Los Angeles County, California, 2010-2011 Water Year. May 2012.

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Appendix B: Press Notices

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Press Notice

Public Notice

The United States Environmental Protection Agency (EPA)
Start of Five-Year Review of Groundwater Cleanup
San Fernando Valley Superfund Sites (Areas 1 and 2)

The EPA has begun the Second Five-Year Review (FYR) process for cleanup actions undertaken at the San Fernando Valley Superfund Sites (SFV Sites) for Areas 1 and 2. Area 1 includes North Hollywood and Burbank Operable Units (OUs). Area 2 includes Glendale North and South OUs, and the Glendale Chromium OU. EPA often addresses clean-up at a large site by breaking the site into small operable units (OUs) to manage cleanup actions. This notice addresses the FYRs for Areas 1 (North Hollywood and Burbank OUs) and 2 (Glendale North and South OUs). Upon completion of the review EPA will issue two separate reports that evaluate whether the cleanup actions for Areas 1 and 2 remain protective of human health and the environment.

The Review Process: When EPA's cleanup action leaves some waste in place or the action will take longer than five years to complete, the Superfund law requires an evaluation of the protectiveness of the cleanup systems every five years until the site has been cleaned up sufficiently to allow unrestricted use. The purpose of the FYR is to publically document the effectiveness of cleanup systems and to measure progress towards achieving cleanup goals. FYRs consist of evaluating the effectiveness of clean-up in both the short and long-term, facility inspections, and the analysis of 2008-2013 groundwater data. The FYR will report the amount of contaminant mass being removed by groundwater treatment facilities, evidence of natural processes that may assist with the breakdown of chemicals, cleanup progress within the Superfund sites, and treatment facility operations. This review also includes interviews with regulators, government officials, and community representatives. To date, previous FYR reviews conducted for Areas 1 and 2 have shown the clean-up systems to be protective of human health and the environment. The 2013 FYRs will comment on the status of 2008 recommendations and offer new recommendations if necessary. The 2008 FYR for Areas 1 and 2 are available on EPA's web page and at the information repositories listed below. Both 2013 FYR reports will be completed by September 30, 2013 and copies will be made available to the public via the websites.

Community Involvement: EPA invites the community to learn more about the Sites, the FYR review process and provide input to EPA. Interviewees can contact Jackie Lane, Community Involvement Coordinator **no later than July 31, 2013** at (415) 972-3236 or by email at lane.jackie@epa.gov to be interviewed.

Information and Repositories: **Area 1:** Burbank Public Library, 110 North Glen Oaks Blvd, Burbank, CA or call (818) 238-5580 and Los Angeles Public Library, 630 W. Fifth St., Los Angeles CA 90071 or call (213) 228-7000. **Area 2:** City of Glendale Public Library, 222 East Harvard St. Glendale, CA or call (818) 548-2021 and Los Angeles Public Library, 630 W. Fifth St., Los Angeles CA 90071 or call (213) 228-7000.

EPA Web Page: Area 1: www.epa.gov/region09/SanFernandoNorthHollywood
Area 2: www.epa.gov/region09/SanFernandoGlendale

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Appendix C: Interview Forms

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Interview Forms

| Five-Year Review Interview Record | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------|-------------------------------------------------------------|
| Site: | San Fernando Valley Area 2 Superfund Site | EPA ID No: | CAD980894901 |
| Interview Type: | Visit | | |
| Location of Visit: | GOU Treatment Facility | | |
| Date: | 2/28/2013 | Time: | 10:00 AM |
| Interviewer: | ZiZi Searles David Sullivan Aaron King | Title: | RPM Geologist Environmental Engineer |
| | | Organization: | USEPA USACE USACE |
| Individuals Contacted | | | |
| Name: | Charles Cron | Title: | Lead O&M Specialist |
| Telephone: | (818) 550-5975 | Address: | 800 Flower St Glendale, CA 91201 |
| Name: | Daniel Hutton | Title: | Project Manager |
| Telephone: | (909) 579-3500 | Address: | 9220 Cleveland Ave, Suite 100 Rancho Cucamonga, CA 91730 |
| Summary of Conversation | | | |
| <p>1) What is your overall impression of the project (general sentiment)?</p> <p>The designers of the system did a great job. The system is flexible, even with changing water quality regulations. The system has consistently been able to operate and meet extraction and water quality requirements.</p> | | | |
| <p>2) What is your current role and your agency's role with respect to the site?</p> <p>Mr. Cron is the site manager and Mr. Hutton is the project manager; both ensure compliance while minimizing water loss.</p> | | | |
| <p>3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.</p> <p>There are multiple points of communication every day, whether between Charles, Dan, Leo, and/or EPA. Also, there are monthly stakeholder meetings.</p> | | | |
| <p>4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.</p> <p>No.</p> | | | |
| <p>5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>Somehow, the Glendale Police Department has received three 911 calls from the site that are not alarm triggered. It is not known why or how this occurs. All responses by local authorities have been false alarms.</p> | | | |
| <p>6) Is the remedy functioning as expected? How well is the remedy performing?</p> <p>Yes. The remedy is performing better than expected with respect to mass removal and extraction rates. CDPH's flexibility has been very encouraging.</p> | | | |

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Trend charts show several COC concentrations, including VOCs and chromium, are climbing in some wells, in accordance with predictions.

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

There are operators on-site 8 hours per day, 7 days per week, daily inspections, and 24/7 remote monitoring.

9) What are the annual O&M costs for your organization's involvement at the site?

Funding has not been an issue for justifiable expenses. Roughly \$4.3 million is budgeted for the coming year.

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

Nothing in the last five years, excluding the WBA. And the uranium disposal issue.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Resin disposal has been an unexpected difficulty because of the uranium content of the spent resin (uranium originates in the groundwater and the resin removes it from the groundwater). Also, formaldehyde has been found to leach from the resin on startup, so a system to contain and treat the water used during startup has been implemented.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

Plant and process optimization occurred years ago. CDPH is open to reducing sampling.

13) What effects have site operations had on the surrounding community?

The plant provides 25% of the City's water supply, and the water meets drinking water standards.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

No.

15) Do you feel well informed about the site's activities and progress?

Yes.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

CDM is keeping an eye on the chromium MCL development, but also EPA's carcinogenic VOC rule.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No. The desires and expectations of all parties are being met. The cooperativeness of all parties makes it much easier.

Five-Year Review Interview Record

| | |
|-------------------------------------------------------------------|--------------------------------|
| Site: San Fernando Valley Area 2 Superfund Site | EPA ID No: CAD980894901 |
| Interview Type: Visit | |
| Location of Visit: City of Glendale Water and Power Office | |
| Date: 2/28/2013 Time: 1:00 PM | |

| | | |
|----------------------------------|------------------------|----------------------------|
| Interviewer: ZiZi Searles | Title: RPM | Organization: USEPA |
| David Sullivan | Geologist | USACE |
| Aaron King | Environmental Engineer | USACE |

Individuals Contacted

| | | | | | |
|-------------------|----------------|-----------------|---------------------------------------------------|----------------------|----------------------------------|
| Name: | Leighton Fong | Title: | Civil Engineer II | Organization: | City of Glendale Water and Power |
| Telephone: | (818) 548-3982 | Address: | 141 N Glendale Ave, Level 4 Glendale, CA 91206 | | |
| Name: | Leo Chan | Title: | Project Engineer | Organization: | City of Glendale Water and Power |
| Telephone: | (818) 548-3905 | Address: | 141 N Glendale Ave, Level 4 Glendale, CA 91206 | | |

Summary of Conversation

1) What is your overall impression of the project (general sentiment)?

The project is well-run. CDM and GRG are supportive and go beyond the call of duty; and they take ownership and pride in their work.

2) What is your current role and your agency's role with respect to the site?

City owns the operable unit, oversees plant operation, and reports to CDPH, EPA, etc. Also, the City is in charge of permitting, disposal, manifesting, and invoice review. They have a focus on water loss prevention.

3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

GWP talks to Charles at least every other day, and receives daily status reports by e-mail and monthly reports.

4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

The Bureau of Sanitation wanted to split a sample of the industrial waste discharge from GS-3 (formaldehyde), but was not notified when the last sample was taken.

5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

There has been no vandalism. Someone broke into the control panel at extraction well GS-3, but nothing was taken or broken.

6) Is the remedy functioning as expected? How well is the remedy performing?

The remedy is getting mass removal and the desired extraction rates, but there might be some leakage (regarding containment).

7) What does the monitoring data show? Are there any trends that show

contaminant levels are decreasing?

VOCs remain steady. Chromium concentrations are declining in GS-3 and increasing in GN-3.

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

Charles and his staff are very conscientious and stable. They are very responsible and on top of problems.

9) What are the annual O&M costs for your organization's involvement at the site?

To be given at a later date. GRG pays for the O&M; all justified costs are fine.

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

Sometimes, the wells will trip (under voltage), go offline, and sound a general alarm. CDM put electrical monitoring on some of the wells.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Metering to the packed towers failed causing a temporary shutdown. The meters were replaced within a month. Nothing unexpected; the equipment is old, so it tends to fail.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

The influent splitter pipe is a positive change. LPGAC regeneration is being considered. They have improved the reliability of the chlorine injection.

13) What effects have site operations had on the surrounding community?

With the WBA at GS-3, they had to add a sound blanket because of complaints about the noise. There have not been any new complaints.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

No.

15) Do you feel well informed about the site's activities and progress?

Yes. The monthly stakeholder meetings keep GWP well informed.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

NPDES is an ongoing issue for discharging well-rehab water.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

EPA is working on remedy optimization, and there is uncertainty regarding the new remedy.

Five-Year Review Interview Record

| | |
|---------------------------------------------------------------------|----------------------------------------------------------|
| Site: San Fernando Valley Area 2 Superfund Site | EPA ID No: CAD980894901 |
| Interview Type: Visit | |
| Location of Visit: Restaurant near GWP Offices | |
| Date: 2/28/2013 Time: 2:45 PM | |
| Interviewer: ZiZi Searles David Sullivan Aaron King | Title: RPM Geologist Environmental Engineer |
| Organization: USEPA USACE USACE | |

Individuals Contacted

| | | |
|----------------------------------|-------------------------------------------------------------------------|--------------------------------|
| Name: Karen Meade | Title: Project Manager | Organization: CH2M Hill |
| Telephone: (714) 429-2000 | Address: 6 Hutton Centre Drive, Suite 700 Santa Ana, CA 92707 | |

Summary of Conversation

1) What is your overall impression of the project (general sentiment)?

The project has been impressive. The City and CDM are very proactive and aware of requirements. Monthly meetings are effective. GRG seems fairly proactive, and supportive of current operations, and there have been no budget issues.

2) What is your current role and your agency's role with respect to the site?

CH2M Hill is EPA's contractor to provide oversight of ongoing remedial work.

3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

CH2M Hill attends the monthly meetings. Weekly site inspections were performed during the construction and startup of the WBA and RCF facilities.

4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

No.

5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

As Charles talked about...

6) Is the remedy functioning as expected? How well is the remedy performing?

Work to date has helped inhibit migration and mass removal; containment could be better. GS-3 is not getting capture. Particle tracking in the Hydraulic Containment Technical Memorandum shows escape from north and south wells, even when all wells are operating. The alternatives shown in the same memorandum still do not show complete capture. It would be better to look at it as one OU rather than two. It is functioning as expected, but there is room for improvement, and doesn't believe there is complete containment.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Capture doesn't appear to have been achieved or there was a loss of capture due to GS-3 down time. PCE and TCE concentrations are above the MCL down-gradient of the south extraction wells. Down-gradient well GS-P13 (screen depth 30-50 feet) has high PCE and TCE concentrations, whereas down-gradient wells GS-P4 and GS-P5 (screened depth is deeper at approximately 100 feet) have low concentrations of PCE and TCE. Also, GN-P11 on the other side of the LA River has relatively high concentrations of PCE and TCE, which might be from a different source, so there is a question regarding new sources or sources not completely defined.

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

N/A

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

The Draft O&M Manual for WBA has not been integrated to the Site O&M Manual.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

As Charles said earlier, plus resin issues at the WBA, but it's being worked on. Looking at re-activated carbon use. Should look at other resins that don't produce the formaldehyde issue.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

Waste minimization during well rehabilitation; carbon regeneration on-site

13) What effects have site operations had on the surrounding community?

There was a noise issue at the WBA, but it was addressed through the use of noise attenuation blankets.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

No.

15) Do you feel well informed about the site's activities and progress?

Yes.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

Only the chromium MCL to be released in the summer.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No. Charles is very proactive on permitting and other issues.

ive-Year Review Interview Record

| | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------|
| Site: San Fernando Valley Area 2 Superfund Site | EPA ID No: CAD980894901 | |
| Interview Type: Visit | | |
| Location of Visit: CDPH Office | | |
| Date: 2/27/2013 Time: 3:40 PM | | |
| Interviewer: ZiZi Searles David Sullivan Aaron King | Title: RPM Geologist Environmental Engineer | Organization: USEPA USACE USACE |
| Individuals Contacted | | |
| Name: Thomas Tsui | Title: Associate Sanitary Engineer | Organization: CDPH |
| Telephone: (818) 551-2036 | Address: 500 N Central Ave, Suite 500 Glendale, CA 91203 | |
| Name: Chi Diep | Title: Senior Sanitary Engineer | Organization: CDPH |
| Telephone: (818) 551-2039 | Address: 500 N Central Ave, Suite 500 Glendale, CA 91203 | |
| Summary of Conversation | | |
| <p>1) What is your overall impression of the project (general sentiment)?</p> <p>It runs better than other OUs, it's newer, and so it benefited from experience of other OUs. It's easy to oversee, and it's well covered from the permit point of view.</p> <p>2) What is your current role and your agency's role with respect to the site?</p> <p>To ensure potable water produced by the site meets standards and policy requirements for impaired sources. Review reports, be involved in future design changes, and to evaluate hexavalent chromium treatment.</p> <p>3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.</p> <p>Gets monthly reports, sampling reports, and does an inspection every 3 years. 2010 was the last inspection - nothing unique noted.</p> <p>4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.</p> <p>99.5% of the time it runs good. Only issue has been with NDMA in GS-1. Identifying the source was a problem, and there was some concern about the drinking water quality from GS-1 prior to the decommissioning of the LAGWRP detention pond. There was also a malfunction of a mag meter in the air stripping tower. It's old equipment, more than 10 years old. The extraction wells need attention to keep from failing. They have to rehab some wells every year, but others not as often.</p> <p>5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>There are occasional access issues with DreamWorks, but otherwise, there are no issues. The site is secure.</p> <p>6) Is the remedy functioning as expected? How well is the remedy performing?</p> <p>Remedy functions as expected; it meets expectations and treatment goals, and there haven't been any violations.</p> <p>7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?</p> | | |

There aren't any decreasing trends; it's pretty steady, though hexavalent chromium is increasing a little.

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

Yes. Personnel are there every day and there is a SCADA system.

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

No, but there is project coming up that requires separation of a pipeline that may change O&M procedures. GOU wells in general are only 200 feet deep, so when they do the rehabs, per industry standards, they often get bacteria problems that take time to flush out. The sources of bacteria and E. coli aren't known, though they don't often get E. coli hits.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

The only thing has been the mag meter in the tower. It took 4-7 days to change.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

The pipeline separation project will be a money and time saving improvement. There's also the hex chrome research.

13) What effects have site operations had on the surrounding community?

Some residents have complained of noise near the WBA wellhead treatment. The OU put sound blankets up in response.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

An elected official has voiced desire to have CDPH attend board meetings of the LA county board of supervisors, regarding hex chrome, but they haven't done that yet.

15) Do you feel well informed about the site's activities and progress?

Yes. City of Glendale has gone through significant personnel changes lately, so the contacts aren't as tight as they used to be.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

The only thing is the upcoming hexavalent chromium MCL. That, and the reduction in the 1,4 dioxane NL.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

It runs well, but there's always room for improvement, but nothing in particular. GRG and CDM have been responsive and CDPH appreciates EPA's involvement with GS-1. Overall, a great team effort.

Five-Year Review Interview Record

Site: San Fernando Valley Areas 1 and 2 Superfund Sites **EPA ID No:** CAD980894901

Interview Type: Visit

Location of Visit: Los Angeles Regional Water Quality Control Board Office

Date: 2/26/2013 **Time:** 3:00 PM

| | | | | | |
|---------------------|----------------------------------------------|---------------|--------------------------------------------|----------------------|-------------------------|
| Interviewer: | ZiZi Searles David Sullivan Aaron King | Title: | RPM Geologist Environmental Engineer | Organization: | USEPA USACE USACE |
|---------------------|----------------------------------------------|---------------|--------------------------------------------|----------------------|-------------------------|

Individuals Contacted

| | | | | | |
|-------------------|----------------|-----------------|-----------------------------------------------------|----------------------|----------------------|
| Name: | Larry Moore | Title: | Staff Environmental Scientist | Organization: | Los Angeles RWQCB |
| Telephone: | (213) 576-6730 | Address: | 320 W 4th Street Suite 200 Los Angeles, CA 90013 | | |

| | | | | | |
|-------------------|----------------|-----------------|-----------------------------------------------------|----------------------|-------------------------|
| Name: | Alex Lapolstol | Title: | Technical Consultant | Organization: | E2 Consulting Engineers |
| Telephone: | (213) 576-6801 | Address: | 320 W 4th Street Suite 200 Los Angeles, CA 90013 | | |

Summary of Conversation

- 1) What is your overall impression of the project (general sentiment)?

It's a positive project; the only unfortunate thing being that it takes longer than they would like to do things. However, it is a slow process because of due process.

- 2) What is your current role and your agency's role with respect to the site?

RWQCB works to identify PRPs, and make sure PRPs are in compliance and responsible. Mr. Moore works as a state employee on site cleanup with an emphasis on chromium, but is still involved with VOCs. Mr. Lapolstol provides support on behalf of EPA to identify chromium PRPs (though in some cases VOCs and chromium overlap), fulfill EPA information needs, and assist the state in enforcing the water code.

- 3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

RWQCB conducts site inspections, reviews work plans, completes chemical use questionnaires from PRPs, and oversees the cleanup process. EPA provides concurrence with cleanup levels. Mr. Lapolstol is the "eyes and ears" of EPA so that EPA isn't surprised by what the RWQCB is doing.

- 4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

There have been no public complaints, and no PRP complaints that have required a response. Glendale, Burbank, and LADWP complain about the slow pace of investigations and response times of EPA and RWQCB. PRPs complain about paying for cleanup.

- 5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No, though residents near the former Exello plating facility admitted to trespassing and rolling around in the dirt when the facility was still operational, but that did not occur in the last five years.

- 6) Is the remedy functioning as expected? How well is the remedy performing?

For the NHO, EPA has spent lots of money on the remedy, but unless LADWP uses appropriate pumping rates, it's a moot point; they're just spreading contamination around. It is difficult to contain plumes the way the remedy has been operated. For the GOU, PCE, TCE, total chromium, and hexavalent chromium have been found down gradient of GS-3. The characterization of the GOU is insufficient. Part of the plume has gone off-site of the Excello facility.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

The BOU has not been completely assessed in regard to chromium. Honeywell (NHO) has been remediating an on-site source by injecting calcium polysulfide, and has been seeing reductions in off-site wells. Decreasing chromium concentrations have not been observed in the GOU; the plume appears to be shifting, rather than decreasing in concentrations.

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

RWQB has no day-to-day interactions with facilities, but receives monthly updates from the GOU.

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

N/A

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

N/A

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

N/A

13) What effects have site operations had on the surrounding community?

For example, the BOU is pumping their own water, meaning they don't have to purchase all of their water from the Metropolitan Water District. The water is clean, and no one sees the plant; it's a great benefit. In general, the public is interested. If the site has a Cleanup and Abatement Order, the PRP must do community outreach before RWQCB will issue a closure.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

Nothing to add; refer to response to question 13.

15) Do you feel well informed about the site's activities and progress?

Yes. The updates and contact with EPA are sufficient.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

OEHHA developed a PHG for hexavalent chromium, which is the precursor for development of an MCL. This will result in higher costs for treatment facilities, which will be passed on to consumers.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No.

Five-Year Review Interview Record

| | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------|--------------------------------------------------------|----------------------|------------------------------|
| Site: San Fernando Valley Areas 1 and 2 Superfund Sites | EPA ID No: CAD980894901 | | | | |
| Interview Type: Visit | | | | | |
| Location of Visit: ULARA Watermaster Office | | | | | |
| Date: 2/28/2013 Time: 4:00 PM | | | | | |
| Interviewer: | ZiZi Searles David Sullivan Aaron King | Title: | RPM Geologist Environmental Engineer | Organization | : USEPA USACE USACE |
| Individuals Contacted | | | | | |
| Name: | Richard Slade | Title: | ULARA Watermaster | Organization: | ULARA Watermaster |
| Telephone: | (818) 506-0418 | Address: | 12750 Ventura Blvd, Suite 202 Studio City, CA 91604 | | |
| Name: | Anthony Hicke | Title: | Assistant to the Watermaster | Organization: | ULARA Watermaster |
| Telephone: | (818) 506-0418 | Address: | 12750 Ventura Blvd, Suite 202 Studio City, CA 91604 | | |
| Summary of Conversation | | | | | |
| <p>1) What is your overall impression of the project (general sentiment)?</p> <p>The plumes are still there and have spread more. It seems like the people involved never want to commit to anything without more data, delaying cleanup. COCs are contaminating new wells, and newly contaminating old ones. The model needs updating. The project has been frustrating because things in all OUs take too long.</p> <p>2) What is your current role and your agency's role with respect to the site?</p> <p>Court-appointed Watermaster. The Watermaster accounts for extractions and protects the pumping rights and water quality in the Upper Los Angeles River Area per the 1979 judgment.</p> <p>3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.</p> <p>There are Quarterly EPA meetings. GOU and BOU extraction reports are provided, though the Watermaster was unaware that 14 more wells had been installed at the GOU. There are Quarterly Administrative Committee meetings as part of the judgment.</p> <p>4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.</p> <p>N/A</p> <p>5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.</p> <p>N/A</p> <p>6) Is the remedy functioning as expected? How well is the remedy performing?</p> | | | | | |

No. The remedy has not performed as expected. The plumes are as big or bigger than they were twenty years ago. Production has moved "stuff" around. But something is better than nothing. A lot of improvement is needed, sooner rather than later. There is a goal, and it has to be met. The Judge might be unhappy if the Watermaster were to give her an update on the Sites.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

The Watermaster has only seen plume maps, but would like to see more depth-discrete plume maps.

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

N/A

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

N/A

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

N/A

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

The wells should be pumped more efficiently to capture the most contamination, through, for example, the use of packers and static spinners.

13) What effects have site operations had on the surrounding community?

The wells cannot be pumped to safe yield or are forced to exceed safe yield, which ultimately means it costs more for customers to buy water, due in part to cities having to buy outside water. The region will need a new safe yield study soon.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

N/A

15) Do you feel well informed about the site's activities and progress?

The Watermaster receives a lot of PRP reports (not all of them), but trusts regulators to review these. The Watermaster likes to be kept informed.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

Yes.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

Older wells in the NHO and BOU lack sanitary seals. Static surveys should be performed to ascertain the direction of groundwater flow within the wells. Also, it cannot be assumed that water removed from the same depth at different wells comes from the same aquifer system; the hydrogeology is not well defined or understood.

Five-Year Review Interview Record

| | |
|--------------------------------------------------------------------|--------------------------------|
| Site: San Fernando Valley Area 1 and Area 2 Superfund Sites | EPA ID No: CAD980894893 |
|--------------------------------------------------------------------|--------------------------------|

Interview Type: Phone

Location of Visit: N/A

Date: 5/6/2013 **Time:** 11:00 AM

| | | |
|----------------------------------|------------------------|----------------------------|
| Interviewer: ZiZi Searles | Title: RPM | Organization: USEPA |
| Aaron King | Environmental Engineer | USACE |

Individuals Contacted

| | | |
|----------------------------------|-------------------------------------------------------------|---------------------------|
| Name: Tedd Yargeau | Title: Senior Scientist | Organization: DTSC |
| Telephone: (818) 212-5340 | Address: 9211 Oakdale Avenue Chatsworth, CA 91311 | |

Summary of Conversation

1) What is your overall impression of the project (general sentiment)?

Overall, the projects are very good. Things are moving forward with the GCOU and things are going well with the BOU. There have been some issues in the NHOU with bringing in other responsible parties.

2) What is your current role and your agency's role with respect to the site?

Peer-reviewing documents. DTSC ensures that the state's interests are represented.

3) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give the purpose and results.

There have been no recent site visits, though DTSC is well aware of what is going on due to communications from EPA and PRPs.

4) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and the results of the responses.

No.

5) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No.

6) Is the remedy functioning as expected? How well is the remedy performing?

The remedies are functioning for the most part with the exception of the NHOU (regarding containment). However, all of the remedies are headed in the right direction.

7) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Contaminant levels are definitely decreasing, except for hexavalent chromium in some wells in the NHOU.

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

There is no oversight on behalf of the state but DTSC is aware of EPA's oversight.

9) What are the annual O&M costs for your organization's involvement at the site?

N/A

10) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness of the remedy? Please describe changes and impacts.

The only new thing is the new and emerging compounds, especially hexavalent chromium. The second remedy for the NHOU will treat for hexavalent chromium, and the GOU is actively working on a chromium remedy.

11) Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Bringing more PRPs on board has been a challenge in the NHOU.

12) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

EPA has been trying to be more efficient in sampling by reducing the number of mobilizations.

13) What effects have site operations had on the surrounding community?

DTSC has not heard any complaints; EPA has been running a great outreach program.

14) Are you aware of any community concerns regarding the site or its operation and administration? If so, please summarize the concerns.

There was a recent inquiry regarding a real estate purchase in the San Fernando Valley and whether the presence of the contamination could affect the value of the property. DTSC responded that property values would not be affected.

15) Do you feel well informed about the site's activities and progress?

Yes. EPA has actively notified DTSC.

16) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the site?

The MCL for hexavalent chromium may impact protectiveness, and the challenge has been how to address it. EPA has moved in the right direction, and technologies are being tested that could treat hexavalent chromium down to what the MCL might be.

17) Do you have any comments, suggestions, or recommendations regarding the site's management, operation, or any other aspects of the site?

No. EPA has done a very good job at managing a complex project, and DTSC certainly appreciates it.

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Appendix D: Site Inspection Checklist

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Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------|--|-----------------------------------------------------------------|--|---------------------------------------|--|
| Site name: San Fernando Valley- Area 2 | Date of inspection: 28 February 2013 | | | | | | | | | | | | |
| Location: Glendale/Los Angeles County/California | EPA ID: CAD980894901 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: USACE | Weather/temperature: Sunny, calm wind, 73 degrees F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table style="width: 100%; margin-top: 10px;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input checked="" type="checkbox"/> Access controls</td> <td><input checked="" type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Other: _____</td> </tr> </table> | | <input type="checkbox"/> Landfill cover/containment | <input type="checkbox"/> Monitored natural attenuation | <input checked="" type="checkbox"/> Access controls | <input checked="" type="checkbox"/> Groundwater containment | <input checked="" type="checkbox"/> Institutional controls | <input type="checkbox"/> Vertical barrier walls | <input checked="" type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input type="checkbox"/> Landfill cover/containment | <input type="checkbox"/> Monitored natural attenuation | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input checked="" type="checkbox"/> Groundwater containment | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional controls | <input type="checkbox"/> Vertical barrier walls | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | |
| 1. O&M site manager <u>Charles Cron</u> <u>Lead O&M Specialist</u> <u>28 February 2013</u> | | | | | | | | | | | | | |
| Name | Title Date | | | | | | | | | | | | |
| Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | | | | | | | | | | | | | |
| Problems, suggestions; <input checked="" type="checkbox"/> Report attached <u>See Appendix C</u> | | | | | | | | | | | | | |
| 2. O&M staff _____ | | | | | | | | | | | | | |
| Name | Title Date | | | | | | | | | | | | |
| Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | | | | | | | | | | | | | |
| Problems, suggestions; <input type="checkbox"/> Report attached <u>See Appendix C</u> | | | | | | | | | | | | | |

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

Agency: RWQCB

Contact: Larry Moore Staff Environmental Scientist 26 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

Agency: EPA Consultant

Contact: Alex Lapolstol Technical Consultant 26 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

Agency: CDPH

Contact: Thomas Tsui Associate Sanitary Engineer 27 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

Agency: City of Glendale Water and Power

Contact: Leighton Fong Civil Engineer II 28 February 2013

| Name | Title | Date |
|------|-------|------|
|------|-------|------|

Problems; suggestions; Report attached See Appendix C

4. **Other interviews** (optional) Report attached.

Karen Meade, CH2M Hill; Richard Slade and Anthony Hicke, ULARA Watermaster; Leo Chan, City of Glendale Water and Power; Chi Diep; CDPH; Dan Sutton; CDM Smith; See Appendix C

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

- | | | | |
|-------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|------------------------------|
| <input checked="" type="checkbox"/> O&M manual | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Maintenance logs | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |

Remarks Monthly reports show daily maintenance logs

2. **Site-Specific Health and Safety Plan** Readily available Up to date N/A

- | | | | |
|------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|------------------------------|
| <input checked="" type="checkbox"/> Contingency plan/emergency response plan | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
|------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|------------------------------|

Remarks None

| | | | | |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------|-----------------------------------------|
| 3. | O&M and OSHA Training Records | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>Training records are also tracked on a corporate system</u> | | | | |
| 4. | Permits and Service Agreements | | | |
| | <input checked="" type="checkbox"/> Air discharge permit | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input type="checkbox"/> Waste disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input checked="" type="checkbox"/> Other permits <u>CDPH</u> | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 5. | Gas Generation Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 6. | Settlement Monument Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 7. | Groundwater Monitoring Records | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 8. | Leachate Extraction Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 9. | Discharge Compliance Records | | | |
| | <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| | <input checked="" type="checkbox"/> Water (effluent) | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| 10. | Daily Access/Security Logs | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | | |
| IV. O&M COSTS | | | | |
| 1. | O&M Organization | | | |
| | <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State | | |
| | <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP | | |
| | <input type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility | | |
| | <input checked="" type="checkbox"/> Other Contractor <u>CDM Smith is contracted by the City of Glendale.</u> | | | |

| | |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. | O&M Cost Records |
| | <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate <input type="checkbox"/> Breakdown attached <p style="text-align: center;">Total annual cost by year for review period if available</p> From <u>Jan 2010</u> To <u>Dec 2010</u> <u>\$2,917,282.34</u> <input checked="" type="checkbox"/> Breakdown attached Date Date Total cost From <u>Jan 2011</u> To <u>Dec 2011</u> <u>\$3,224,070.94</u> <input checked="" type="checkbox"/> Breakdown attached Date Date Total cost From <u>Jan 2012</u> To <u>Dec 2012</u> <u>\$3,157,578.17</u> <input checked="" type="checkbox"/> Breakdown attached Date Date Total cost |
| 3. | Unanticipated or Unusually High O&M Costs During Review Period |
| | Describe costs and reasons: <u>None</u> |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Fencing | |
| 1. | Fencing damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>Security fence and gate in good condition.</u> |
| B. Other Access Restrictions | |
| 1. | Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks <u>Has 4 surveillance cams, which are monitored at the power substation. There are intrusion alarms at all buildings, well covers, and control panels.</u> |
| C. Institutional Controls (ICs) | |

| | | | |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-----------------------------------------|
| 1. Implementation and enforcement | | | |
| Site conditions imply ICs not properly implemented | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (<i>e.g.</i> , self-reporting, drive by) <u>N/A</u> | | | |
| Frequency <u>N/A</u> | | | |
| Responsible party/agency <u>N/A</u> | | | |
| Reporting is up-to-date | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed or decision documents have been met | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: <input type="checkbox"/> Report attached | | | |
| <u>No problems or suggestions; See Section 6.7</u> | | | |
| 2. Adequacy | <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | |
| D. General | | | |
| 1. Vandalism/trespassing | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No vandalism evident | |
| Remarks <u>No trespassing. Minor graffiti on front gate and an exposed pipeline near the Los Angeles River.</u> | | | |
| 2. Land use changes on site | <input checked="" type="checkbox"/> N/A | | |
| Remarks <u>None</u> | | | |
| 3. Land use changes off site | <input checked="" type="checkbox"/> N/A | | |
| Remarks <u>None</u> | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Roads damaged | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Roads adequate | <input type="checkbox"/> N/A |
| Remarks <u>None</u> | | | |
| B. Other Site Conditions | | | |
| Remarks <u>In general, site is clean and in good condition.</u> | | | |
| VII. LANDFILL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Groundwater Extraction Wells, Pumps, and Pipelines <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. | Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>None</u> |
| 2. | Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks <u>None</u> |
| 3. | Spare Parts and Equipment <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks <u>None</u> |
| B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| C. Treatment System <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. | Treatment Train (Check components that apply) <input checked="" type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input checked="" type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input checked="" type="checkbox"/> Additive (<i>e.g.</i> , chelation agent, flocculent) <u>Polyphosphate antiscalant</u> <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>7,180 – 8,000 acre-ft</u> <input type="checkbox"/> Quantity of surface water treated annually <u>None</u> Remarks <u>None</u> |
| 2. | Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks <u>None</u> |

| | | | | | |
|-----------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------|
| 3. | Tanks, Vaults, Storage Vessels | <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input checked="" type="checkbox"/> Proper secondary containment | <input type="checkbox"/> Needs Maintenance |
| Remarks <u>Materials in tanks properly identified</u> | | | | | |
| 4. | Discharge Structure and Appurtenances | <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks <u>None</u> | | | | | |
| 5. | Treatment Building(s) | <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair | |
| <input checked="" type="checkbox"/> Chemicals and equipment properly stored | | | | | |
| Remarks <u>None</u> | | | | | |
| 6. | Monitoring Wells (pump and treatment remedy) | <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| | | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks <u>Monitoring wells were not visited on the site inspection</u> | | | | | |
| D. Monitoring Data | | | | | |
| 1. | Monitoring Data | <input checked="" type="checkbox"/> Is routinely submitted on time | | <input checked="" type="checkbox"/> Is of acceptable quality | |
| 2. | Monitoring data suggests: | <input type="checkbox"/> Groundwater plume is effectively contained | | <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation | | | | | |
| 1. | Monitoring Wells (natural attenuation remedy) | <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| | | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks <u>This is not an MNA remedy, it is a containment remedy.</u> | | | | | |
| X. OTHER REMEDIES | | | | | |
| <u>N/A</u> | | | | | |

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

The purposes of the remedy are plume containment, mass removal, and maintaining an extraction rate of 5,000 gpm. Mass removal and the targeted extraction rate are being achieved, but the extent of plume containment is unknown. The only challenge has been extraction well maintenance routines; wastewater is generated and must be dealt with. Routine operations have not been affected by bacteria; bacteria is only an issue during well rehabilitation.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

There have been no O&M challenges along these lines in the last 5 years. Adequate time has been available to schedule any necessary maintenance.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

The influent line pipe was split so that the system would not have to completely shut down during well rehabilitation. CDM Smith is looking at different ways to treat or use wastewater generated during well rehab. Looking to recycle backwash water through the plant, which CDPH is considering. CDPH has shown an increased willingness to allow increased flow rates through LPGAC units during change outs.

Glendale Operable Unit
O&M Expenses

| 2010 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|
| City Utility Charges | 34,682.28 | 27,333.07 | 33,882.34 | 24,428.91 | 30,388.72 | 34,838.95 | 32,389.30 | 46,684.20 | 32,732.81 | 33,423.51 | 35,183.25 | 30,844.46 | 396,811.80 |
| CDM | 453,397.56 | 112,267.65 | 261,005.55 | 217,053.81 | 163,631.12 | 109,267.67 | 203,945.68 | 132,018.93 | 372,933.82 | 170,099.26 | 91,878.22 | 202,959.13 | 2,490,458.40 |
| KJ | 6,483.85 | 2,820.29 | 3,033.00 | 2,187.10 | 1,475.39 | 1,050.60 | 3,227.76 | 3,250.05 | 787.88 | 1,323.55 | 1,830.39 | 2,542.28 | 30,012.14 |
| Total | 494,563.69 | 142,421.01 | 297,920.89 | 243,669.82 | 195,495.23 | 145,157.22 | 239,562.74 | 181,953.18 | 406,454.51 | 204,846.32 | 128,891.86 | 236,345.87 | 2,917,282.34 |
| 2011 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
| City Utility Charges | 32,810.38 | 29,606.89 | 27,186.40 | 27,641.15 | 27,299.10 | 31,878.08 | 27,911.94 | 52,997.92 | 35,594.48 | 32,198.38 | 27,869.03 | 36,282.62 | 389,276.37 |
| CDM | 262,446.06 | 323,519.87 | 329,940.74 | 312,855.82 | 89,242.55 | 372,601.47 | 203,828.10 | 119,290.44 | 308,828.52 | 72,614.11 | 170,111.61 | 247,087.97 | 2,812,367.26 |
| KJ | 3,488.76 | 3,802.66 | 1,519.18 | 1,519.14 | 2,728.84 | | 1,865.59 | 1,067.34 | 1,283.64 | 1,423.98 | 1,529.55 | 2,198.63 | 22,427.31 |
| Total | 298,745.20 | 356,929.42 | 358,646.32 | 342,016.11 | 119,270.49 | 404,479.55 | 233,605.63 | 173,355.70 | 345,706.64 | 106,236.47 | 199,510.19 | 285,569.22 | 3,224,070.94 |
| 2012 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
| City Utility Charges | 26,300.48 | 30,384.79 | 38,721.92 | 33,985.71 | 30,355.86 | 25,046.96 | 32,324.48 | 41,905.62 | 56,291.79 | 37,391.11 | 45,087.66 | 44,321.30 | 442,117.67 |
| CDM | 133,122.66 | 320,919.98 | 439,411.05 | 87,663.85 | 280,193.77 | 124,285.81 | 221,764.23 | 162,328.95 | 277,785.71 | 248,289.29 | 88,599.33 | 302,272.96 | 2,686,637.58 |
| KJ | 6,225.06 | 3,060.56 | 1,277.20 | 625.34 | 1,911.94 | 1,874.60 | 2,934.41 | 2,581.46 | 1,302.74 | 1,295.09 | 2,102.48 | 3,632.04 | 28,822.92 |
| Total | 165,648.20 | 354,365.33 | 479,410.17 | 122,274.90 | 312,461.57 | 151,207.37 | 257,023.12 | 206,816.02 | 335,380.24 | 286,975.49 | 135,789.46 | 350,226.30 | 3,157,578.17 |

Notes

City Utility Charges - Water and power costs, City oversight, CDPH charges. Credit given for energy and lab costs City would have incurred.

CDM Charges - Labor and materials to operate GWTP and wells, includes chemicals, lab analysis, and GAC.

KJ -Kennedy/Jenks expenses as cost consultant.

Not included are the Operational Loss payments, the Settlement Agreement payments (\$124,000/yr from 2008 - 2011) or property easements fees.

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Appendix E: Photographs from Site Inspection Visit

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Photographs from Site Inspection Visit



Photo 1. GOU Air strippers



Photo 2. One train of VPGAC units



Photo 3. One train (air stripper and three VPGAC units)



Photo 4. VPGAC units



Photo 5. LPGAC units



Photo 6. Air strippers and VPGAC units



Photo 7. Air intake/filter for air stripper



Photo 8. Backwash/recycle equipment



Photo 9. Backwash/recycle equipment



Photo 10. Anti-scalant chemical feed



Photo 11. Anti-scalant storage tank



Photo 12. Anti-scalant feed room entrance



Photo 13. Sodium hypochlorite feed room entrance



Photo 14. Hypochlorite feed



Photo 15. Sodium hypochlorite storage tank



Photo 16. Stormwater treatment system



Photo 17. Heater upstream of VPGAC units



Photo 18. RCF Pilot System



Photo 19. More RCF system components



Photo 20. RCF Pilot System with zero valent iron columns

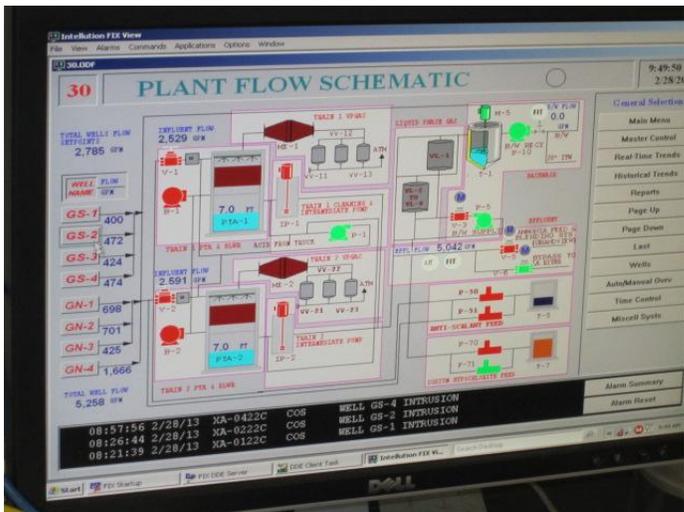


Photo 21. GOU SCADA Display



Photo 22. Extraction well GN-4 (from outside the vault)



Photo 23. Extraction well GN-4



Photo 24. Extraction well GN-4



Photo 25. Extraction well GN-4

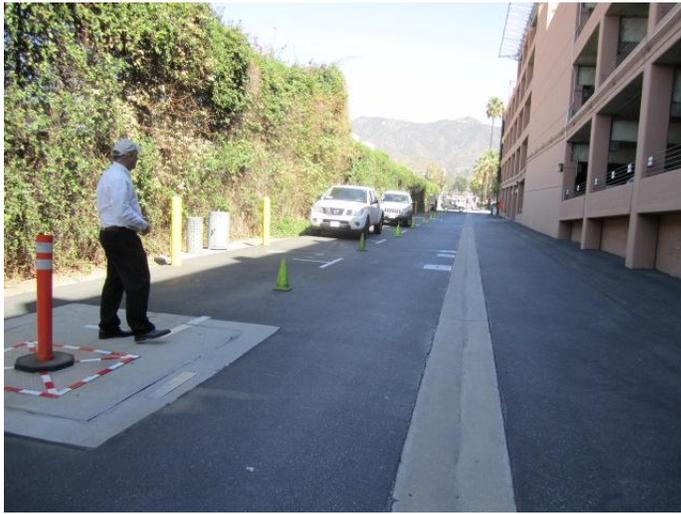


Photo 26. Locations of extraction wells GN-4 (orange marker in foreground) and GN-2 (orange marker in background)



Photo 27. Sample point for GN-4



Photo 28. Extraction well GS-1



Photo 29. LAGWRP Outfall

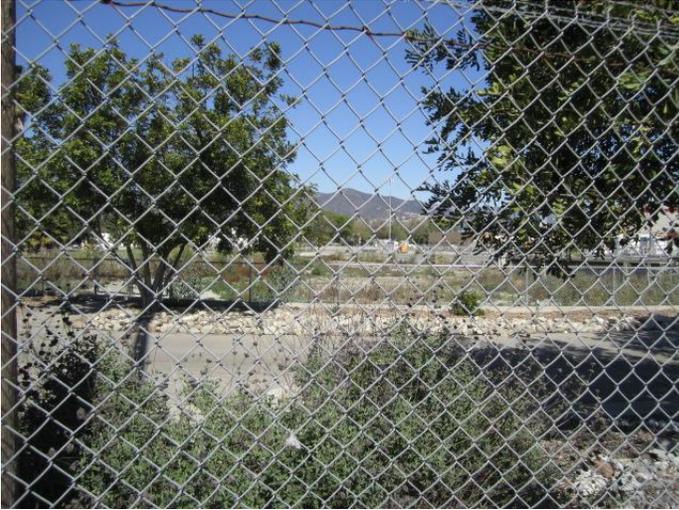


Photo 30. Former LAGWRP Detention Pond (behind second fence)



Photo 31. Well-head WBA process at GS-3



Photo 32. Water storage units for degradation of formaldehyde from initial flushing of ion-exchange resin

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Appendix F: ARARs Summary

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ARARs Summary

Chemical-specific ARARs

Chemical-specific ARARs are discussed in section **Error! Reference source not found.**1. Table 1 summarizes the chemical-specific ARARs.

Action-specific ARARs

Action-specific ARARs identified include Air Quality Standards, Hazardous Waste Management Regulations, and Water Quality Standards for ReInjection. These are summarized in Table 2.

In California, the authority for enforcing the standards established under the Clean Air Act has been delegated to the State. The program is administered by the South Coast Air Quality Management District (SCAQMD).

The State of California has been authorized by the EPA to develop and enforce its own hazardous waste regulations in lieu of the Federal program. These requirements are found in 22 CCR Division 4.5. The source of the VOCs in groundwater is unknown and, therefore, cannot be definitively classified as listed hazardous wastes. However, EPA determined in both RODs that the contaminants are sufficiently similar in nature to listed hazardous wastes that certain substantive requirements of California's hazardous waste regulations are relevant and appropriate at the site.

To-Be-Considered (TBC) Criteria

Two TBC criteria were identified for the GOU and are summarized in Table 3. As noted previously, the 1,4-dioxane notification level was revised from 3 to 1 µg/L in November 2010.

Table 1. Chemical-specific ARARs

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|----------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| SDWA (2 USC 300 et seq.) | National Primary Drinking Water Standards, including 40 CFR 141.61 and 40 CFR 141.62 | Chemical-specific drinking water standards and MCLs have been promulgated under the SDWA; MCLGs above zero are considered chemical-specific ARARs under the NCP (40 CFR 300.430(e)(2)(i)(B)). When the MCLGs are equal to zero, which is generally the case for a chemical considered to be a carcinogen, the MCL is considered the chemical-specific ARAR instead of the MCLG (40 CFR 300.430(e)(2)(i)(C)). Established MCLs for COCs are listed in Error! Reference source not found.. | There have been no changes to the federal MCLs since the last FYR. Protectiveness is not affected. | The MCLs are ARARs for the purpose of establishing performance standards for the treated water from the GOU treatment plant. | N/A |
| California Safe Drinking Water Act | California Safe Drinking Water Regulations, including 22 CCR 64431 and 22 CCR 64444 | Contains provision for California domestic water quality; establishes MCLs for primary drinking water chemicals. Established MCLs for COCs are listed in Error! Reference source not found.. | There have been no changes to the state MCLs since the last FYR. Protectiveness is not affected. | The MCLs are ARARs for the purpose of establishing performance standards for COCs in the water extracted from the basin and treated at the treatment plants. | N/A |
| California Domestic Water Quality Monitoring Regulations | CCR Title 22 Sections 64421 – 64445.2 | Requires monitoring for any treated water which will be delivered to a distribution system. | No changes have been made to this requirement. Protectiveness is not affected. | Substantive monitoring requirements are relevant and appropriate to ensure that treated effluent is meeting performance standards. | N/A |
| California Secondary Drinking Water Standards (SDWS) | 22 CCR 64471 | Secondary Drinking Water Standards were promulgated to address the taste, odor, and appearance of drinking water, and apply the action of supplying the treated water to a public water supplier. | No changes have been made to this requirement. Protectiveness is not affected. | 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. | N/A |

Table 2. Action-specific ARARs

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|-----------------------------------------------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Clean Air Act SCAQMD | Regulation XIII | Regulation XIII requires that stationary sources of air emissions meet best available technology standards. | Rules 1309 (Emission Reduction Credits and Short Term Credits), 1315 (Federal New Source Tracking System), and 1325 (Federal PM _{2.5} New Source Review Program) of Regulation XIII have been amended or adopted since the previous FYR, but none of the changes affect protectiveness. | For air strippers, SCAQMD considers vapor phase GAC (with 90-99% removal efficiency) devices to be BACT. These are pre-construction requirements, so it is assumed that all applicable requirements were obtained before treatment units went on-line. | Latest amendment was on June 3, 2011. |
| Clean Air Act SCAQMD | Rule 1401 | Rule 1401 specifies limits for individual cancer risk and excess cancer cases from new or modified stationary sources which emit carcinogenic air contaminants. The rule requires Best Available Control Technology (BACT) for toxic air discharge for new stationary sources where a lifetime maximum individual cancer risk of one in one million or greater is estimated to occur. | The list of chronic and acute toxic air contaminants was expanded, but this does not affect protectiveness. | As Rule 1401 is a pre-construction regulation, it is assumed that all applicable requirements were attained before the treatment units went on-line. If the air stripping treatment system is modified significantly, substantive provisions of Rule 1401 will still apply. | Latest amendment was on September 10, 2010. |
| Clean Air Act SCAQMD | Rule 401, Rule 402, Rule 403 | Limit the visible emissions from a point source (Rule 401), 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). | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | These rules limit or prohibit visible, odorous or injurious, and particulate emissions from the treatment facility. | N/A |
| California Hazardous Waste Regulations, General Requirements | 22 CCR 66264.14, 66264.18, and 66264.25 | These sections specify security requirements (66264.14), location standards (66264.18), and precipitation standards (66264.25). | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | These are pre-construction requirements, so it is assumed that all applicable requirements were obtained before treatment units went on-line. | N/A |

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|--------------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| California Hazardous Waste Regulations, General Requirements | 22 CCR 66264.15, 66264.16, and 66264.30-66264.56 | These sections specify general inspection requirements (66264.15), personnel training (66264.16), and Preparedness and Prevention and Contingency and Emergency Preparedness (66264.30-66264.56) | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | The treatment plant is required to have health and safety plans and operation and maintenance plans under CERCLA that are substantively equivalent to these sections. | N/A |
| California Hazardous Waste Regulations, Generator Requirements | 22 CCR 66264.600 - .603 ; 22 CCR 66264.111- .115 | 22 CCR 66264.600 - .603 contains requirements for miscellaneous units (air stripper is considered a miscellaneous unit). 22 CCR 66264.111- .115 contains closure requirements for the air stripper. The air stripper should be designed, operated, maintained, and closed in a manner that will ensure the protection of human health and the environment. | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | The substantive requirements for miscellaneous units and related substantive closure requirements appropriate and relevant for the air stripper. | N/A |
| California Hazardous Waste Regulations, Generator Requirements | 22 CCR 66262.34 and 66264.170-.178 | Waste stored on-site over 90 days should be placed in containers or tanks that are in compliance with California Waste Regulations. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | Storage of hazardous waste accumulated on-site must be in compliance with substantive requirements for interim status facilities. | N/A |
| California Land Disposal Restrictions, Requirements for Generators | 22 CCR 66268 | Compliance with land disposal regulation treatment standards is required if hazardous waste (contaminated groundwater or spent GAC) is placed on land. | No changes have been made to these requirements since that last FYR. Protectiveness is not affected. | Hazardous waste hauled off-site must meet “land-ban” requirements. | N/A |

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|-------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Groundwater Reinjection | 40 CFR 144.12-.13 | Federal Underground Injection Control Plan 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 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 CFR 144.12 was amended in December 2010, but the amendment does not affect protectiveness. | These regulations are applicable to any treated water that is reinjected into the groundwater. | Dec 10, 2010 |
| Groundwater Reinjection or Discharge to Surface Water | State Water Resources Control Board Resolution 68-16 | Requires that reinjected water not unreasonably degrade existing water quality. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | Resolution 68-16 (Statement of Policy with respect to Maintaining High Quality of Waters in California) does not contain substantive requirements in and of itself. These regulations are applicable to any treated water that is reinjected into the groundwater or discharged to surface water. | N/A |
| Groundwater Reinjection | RCRA Section 3020 | Provides that the ban on the disposal of hazardous waste into a formation which contains an underground source of drinking water shall not apply to the injection of contaminated groundwater into the aquifer if: 1) such reinjection is part of a response action under CERCLA, 2) such contaminated groundwater is treated to substantially reduce hazardous constituents prior to such reinjection, and 3) such response action will, upon completion, be sufficient to protect human health and the environment. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | This regulation is applicable to any treated water that is reinjected into the groundwater. | N/A |

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|-------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Treated Groundwater Discharge to Surface Water | Water Quality Control Plan for Los Angeles River Basin (RWQCB) | Treated water that is discharged, on a short term basis, to the Los Angeles River is subject to the National Pollutant Discharge Elimination System (NPDES) Program which is implemented by the Los Angeles RWQCB. In establishing effluent limitations for such discharges, the Los Angeles RWQCB considers the Basin Plan, which incorporates Resolution 68-16, and the best available technology economically achievable. | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | This requirement is applicable to any treated water that is discharged to surface water. | N/A |
| Mineral Quality Objectives for Treated Groundwater Discharge to Surface Water | Water Quality Control Plan for Los Angeles River Basin (RWQCB) | The Los Angeles RWQCB established mineral quality objectives for individual surface waters for the Los Angeles River Watershed. The mineral quality objective for nitrate in the Los Angeles River of 36 mg/L (8 mg/L nitrate-N). | No changes have been made to this requirement since that last FYR. Protectiveness is not affected. | 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. This requirement is applicable to any treated water that is discharged to surface water. | N/A |

Table 3. To Be Considered Criteria

| Source | Citation | Description | Effect on Protectiveness | Comments | Amendment Date |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| California PHGs, California Environmental Protection Agency, and OEHHA | California Calderon-Sher SDWA of 1996, California Health and Safety Code 116365 | OEHHA has adopted PHGs for chemicals in drinking water. PHGs are levels of drinking water contaminants at which adverse health effects are not expected to occur from a lifetime of exposure. | No changes have been made to this requirement. Protectiveness is not affected. | In the absence of MCLs, the state PHGs adopted by OEHHA have been considered during selection of performance standards for extracted groundwater. | N/A |
| CDPH Drinking Water Notification Levels | California Health and Safety Code 116455 | CDPH has established drinking water notification levels (formerly known as action levels) based on health effects, but in some cases they are based on taste and odor values for chemicals without MCLs. | CDPH revised its notification level for 1,4-dioxane from 3 to 1 µg/L. Notification levels are not ARARs. Protectiveness is not affected. | In the absence of MCLs, the drinking water notification levels established by CDPH have been considered during selection of performance standards for extracted groundwater. | December 14, 2010 |

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**Appendix G: Summary of Contaminant
Concentrations in GOU
Extraction Wells from January
2008 – December 2012**

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Summary of Contaminant Concentrations in GOU Extraction Wells from January 2008 – December 2012

Highlighted cells indicate that values are above the most stringent performance standard listed in **Error! Reference source not found.**

Maximum, minimum, median, and average values are based on detected values; non-detect values were not included in these calculations.

| Contaminant | Summary Parameter | Well | | | | | | | |
|-------------------------------------|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | Well GN-1 | Well GN-2 | Well GN-3 | Well GN-4 | Well GS-1 | Well GS-2 | Well GS-3 | Well GS-4 |
| 1,1,2,2-Tetrachloroethane (µg/L) | Max | -- | -- | -- | -- | -- | -- | -- | -- |
| | Min | -- | -- | -- | -- | -- | -- | -- | -- |
| | Median | -- | -- | -- | -- | -- | -- | -- | -- |
| | Average | -- | -- | -- | -- | -- | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| 1,1,2-Trichloroethane (µg/L) | Max | -- | -- | 0.54 | -- | -- | -- | -- | -- |
| | Min | -- | -- | 0.53 | -- | -- | -- | -- | -- |
| | Median | -- | -- | 0.54 | -- | -- | -- | -- | -- |
| | Average | -- | -- | 0.54 | -- | -- | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 54 | 57 | 57 | 56 | 58 | 59 |
| 1,1-Dichloroethane (1,1-DCA) (µg/L) | Max | -- | 1.6 | 3.4 | -- | 1.8 | 1.2 | -- | -- |
| | Min | -- | 0.5 | 1 | -- | 0.83 | 0.56 | -- | -- |
| | Median | -- | 0.6 | 2.1 | -- | 1.2 | 0.8 | -- | -- |
| | Average | -- | 0.76 | 2.00 | -- | 1.21 | 0.80 | -- | -- |
| | Number of Samples | 58 | 57 | 56 | 57 | 57 | 56 | 57 | 59 |
| | Number of Non-detects | 58 | 52 | 0 | 57 | 2 | 0 | 57 | 59 |
| 1,1-Dichloroethene (1,1-DCE) (µg/L) | Max | 0.54 | 9.8 | 54 | -- | 17 | 12 | 1.2 | -- |
| | Min | 0.54 | 0.51 | 2.72 | -- | 7.5 | 5.3 | 0.5 | -- |
| | Median | 0.54 | 1.1 | 39.5 | -- | 11 | 8.05 | 0.64 | -- |
| | Average | 0.54 | 1.37 | 37.5 | -- | 11.3 | 8.02 | 0.70 | -- |

| | | | | | | | | | |
|---------------------------------------------|-----------------------|------|-------|------|------|-------|-------|------|------|
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 57 | 5 | 0 | 57 | 2 | 0 | 19 | 59 |
| 1,2-Dichloroethane (1,2-DCA) (µg/L) | Max | -- | -- | 1.7 | -- | 116 | -- | -- | -- |
| | Min | -- | -- | 1 | -- | 1.3 | -- | -- | -- |
| | Median | -- | -- | 1.3 | -- | 58.7 | -- | -- | -- |
| | Average | -- | -- | 1.29 | -- | 58.7 | -- | -- | -- |
| | Number of Samples | 58 | 57 | 56 | 57 | 57 | 56 | 57 | 59 |
| | Number of Non-detects | 58 | 57 | 0 | 57 | 55 | 56 | 57 | 59 |
| Benzene (µg/L) | Max | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Min | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Median | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Average | -- | -- | -- | -- | 6.1 | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| Carbon Tetrachloride (µg/L) | Max | 1.1 | 0.9 | 13 | -- | -- | 1.9 | 1.3 | 4.7 |
| | Min | 0.6 | 0.5 | 6.9 | -- | -- | 0.51 | 0.75 | 1.8 |
| | Median | 0.78 | 0.55 | 9.2 | -- | -- | 1.3 | 0.98 | 3.3 |
| | Average | 0.78 | 0.57 | 9.38 | -- | -- | 1.19 | 0.99 | 3.36 |
| | Number of Samples | 58 | 57 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 2 | 16 | 0 | 57 | 56 | 11 | 2 | 1 |
| Chromium VI (µg/L) | Max | 4.7 | 42 | 94 | 4.4 | 0.24 | 1.7 | 57 | 16 |
| | Min | 4.2 | 5.4 | 43 | 1.4 | 0.065 | 0.28 | 23 | 1.5 |
| | Median | 4.5 | 7.85 | 76.5 | 3.6 | 0.12 | 0.805 | 38 | 1.7 |
| | Average | 4.50 | 9.32 | 70.6 | 3.59 | 0.14 | 0.92 | 38.8 | 1.93 |
| | Number of Samples | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 0 | 0 | 1 | 30 | 0 | 1 | 0 |
| cis-1,2-Dichloroethene (cis-1,2-DCE) (µg/L) | Max | -- | 2.7 | 5.8 | 0.6 | 22 | 17 | -- | -- |
| | Min | -- | 0.6 | 2.3 | 0.58 | 8.8 | 9 | -- | -- |
| | Median | -- | 0.895 | 3.6 | 0.59 | 13 | 13 | -- | -- |
| | Average | -- | 0.93 | 3.62 | 0.59 | 13.1 | 12.6 | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 55 | 58 | 59 |

| | | | | | | | | | |
|-------------------------------------------------|-----------------------|------|------|------|------|------|------|------|------|
| | Number of Non-detects | 58 | 0 | 0 | 55 | 1 | 0 | 58 | 59 |
| Perchloroethylene (PCE) (µg/L) | Max | 232 | 270 | 20 | 65 | 110 | 4.8 | 18 | 2.5 |
| | Min | 110 | 75 | 7.3 | 27 | 4.5 | 2.8 | 10 | 1 |
| | Median | 179 | 155 | 15 | 44 | 6.2 | 3.6 | 13 | 1.3 |
| | Average | 179 | 157 | 14.3 | 44.1 | 8.54 | 3.66 | 12.8 | 1.37 |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Total Chromium (µg/L) | Max | 7.7 | 36 | 88 | 5.7 | 3.5 | 5.9 | 55 | 5.7 |
| | Min | 2.8 | 4.6 | 42 | 2.1 | 1.1 | 1 | 22 | 1.1 |
| | Median | 4.7 | 7.7 | 73.5 | 3.8 | 1.55 | 1.7 | 37 | 2.1 |
| | Average | 4.83 | 9.37 | 68.2 | 3.9 | 1.79 | 1.78 | 38.0 | 2.31 |
| | Number of Samples | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 1 | 0 | 0 | 40 | 14 | 0 | 2 |
| trans-1,2-Dichloroethene (trans-1,2-DCE) (µg/L) | Max | -- | -- | -- | -- | 13 | 5.3 | -- | -- |
| | Min | -- | -- | -- | -- | 1 | 2.8 | -- | -- |
| | Median | -- | -- | -- | -- | 1.5 | 4.1 | -- | -- |
| | Average | -- | -- | -- | -- | 1.72 | 4.14 | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 1 | 1 | 58 | 59 |
| Trichloroethylene (TCE) (µg/L) | Max | 200 | 170 | 680 | 82 | 146 | 169 | 34 | 1.74 |
| | Min | 110 | 1.6 | 364 | 43 | 80.6 | 1.4 | 9.7 | 0.57 |
| | Median | 140 | 119 | 490 | 59 | 98 | 101 | 18 | 0.90 |
| | Average | 146 | 117 | 493 | 59.2 | 101 | 105 | 18.1 | 0.99 |
| | Number of Samples | 58 | 58 | 56 | 57 | 56 | 56 | 58 | 59 |
| | Number of Non-detects | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Xylenes (µg/L) | Max | -- | -- | -- | -- | -- | -- | -- | -- |
| | Min | -- | -- | -- | -- | -- | -- | -- | -- |
| | Median | -- | -- | -- | -- | -- | -- | -- | -- |
| | Average | -- | -- | -- | -- | -- | -- | -- | -- |
| | Number of Samples | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |
| | Number of Non-detects | 58 | 58 | 56 | 57 | 57 | 56 | 58 | 59 |

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**Appendix H: SFV Area 2 Emerging
Contaminants plume maps and
well data**

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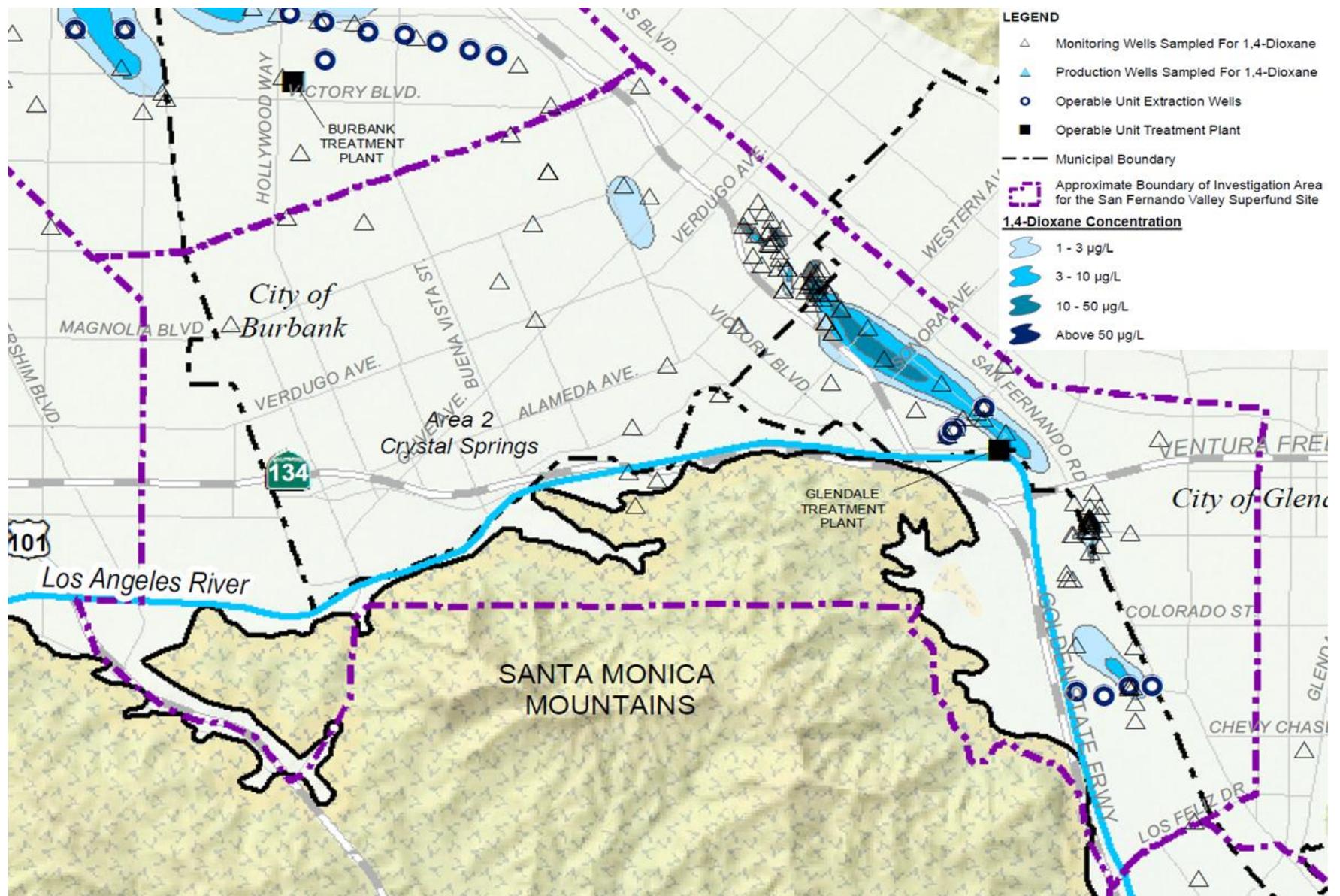


Figure 1. 1,4-Dioxane in the Shallow Zone (Most Recent Concentration January 2006-2011)

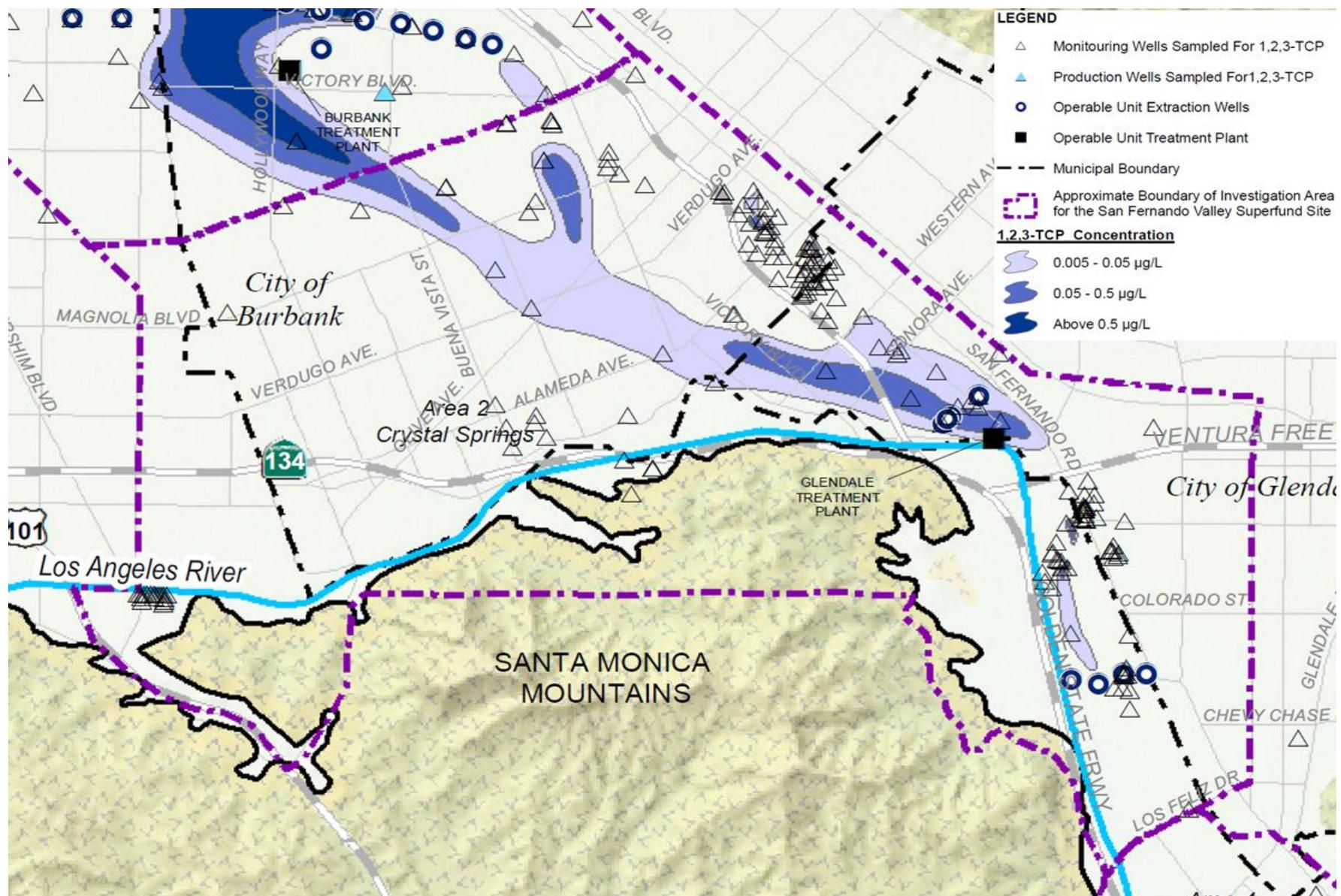


Figure 2. 1,2,3-TCP in the Shallow Zone (Most Recent Concentration January 2006-2011)

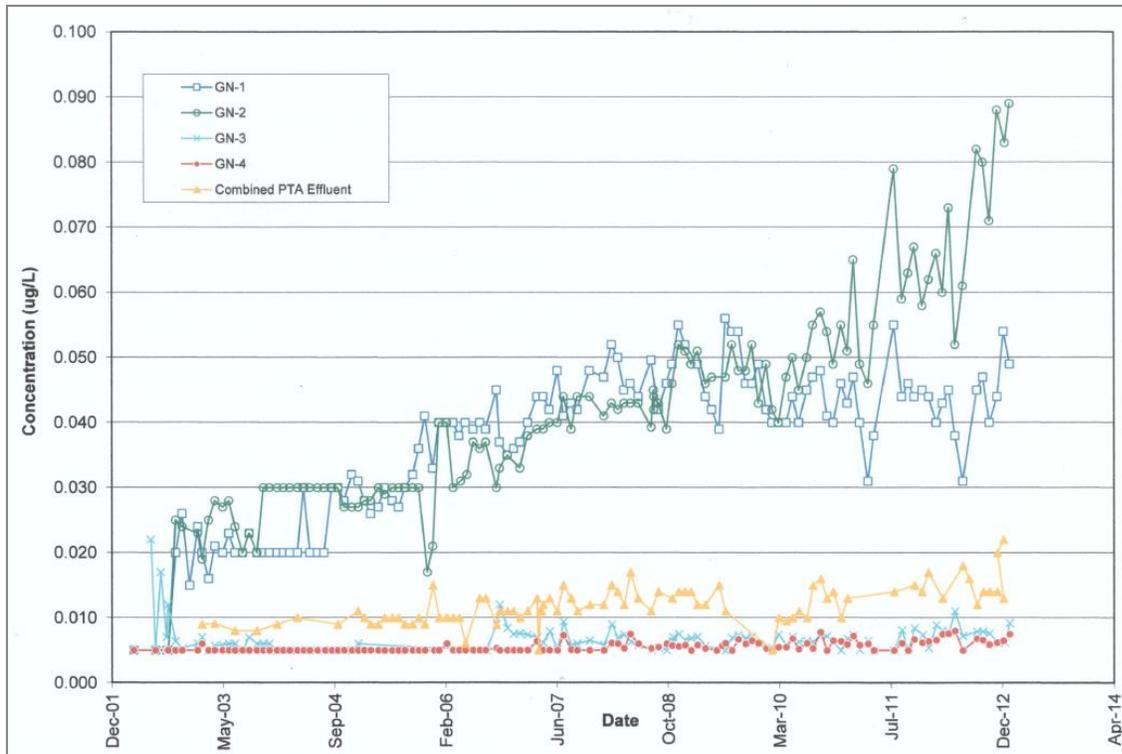


Figure 3. 1,2,3-TCP in the North Extraction Wells

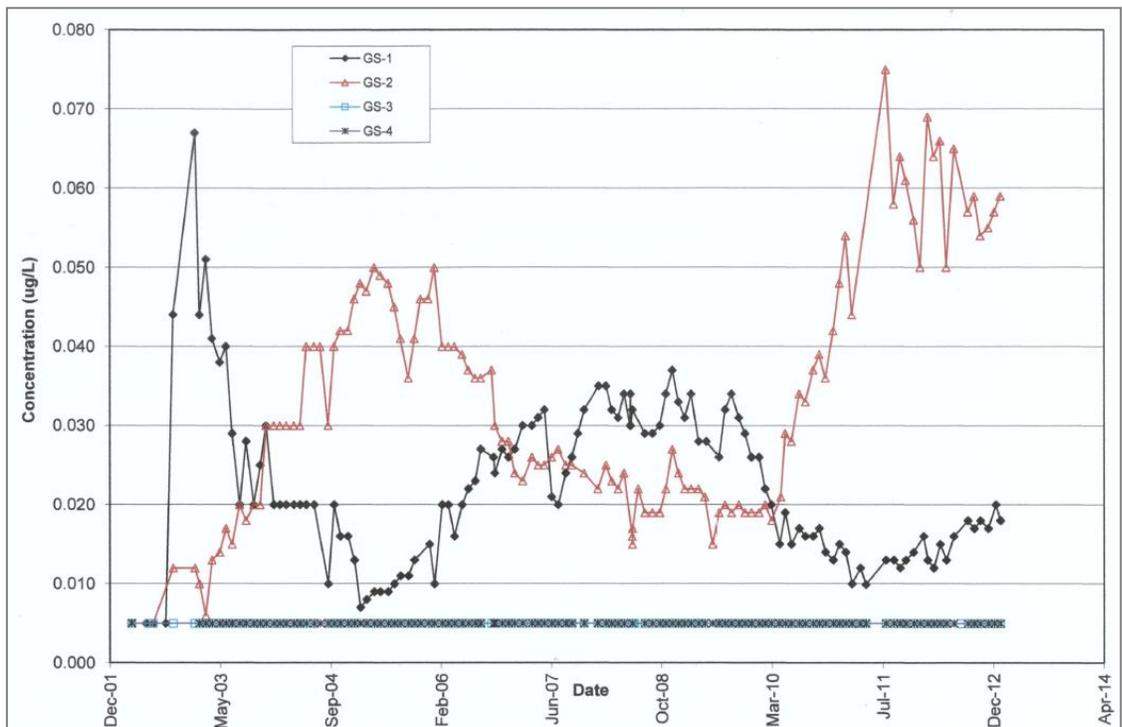


Figure 4. 1,2,3-TCP in the South Extraction Wells



Figure 5. Perchlorate in the Shallow Zone (Most Recent Concentration January 2006-2011)

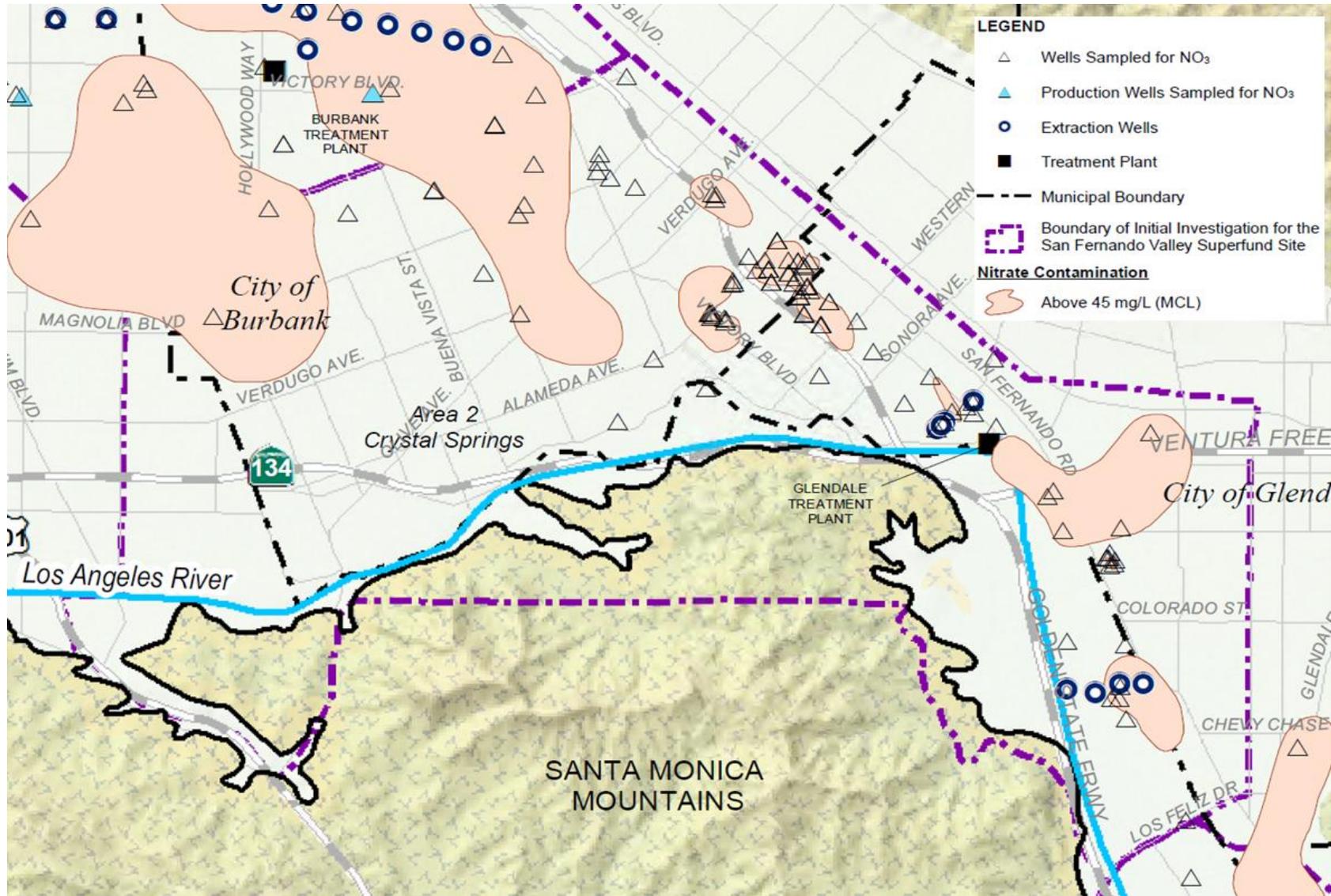


Figure 6. Nitrate in the Shallow Zone (Most Recent Concentration January 2006-2011)



Figure 7. Nitrate in the Deeper Zone (Most Recent Concentration January 2006-2011)

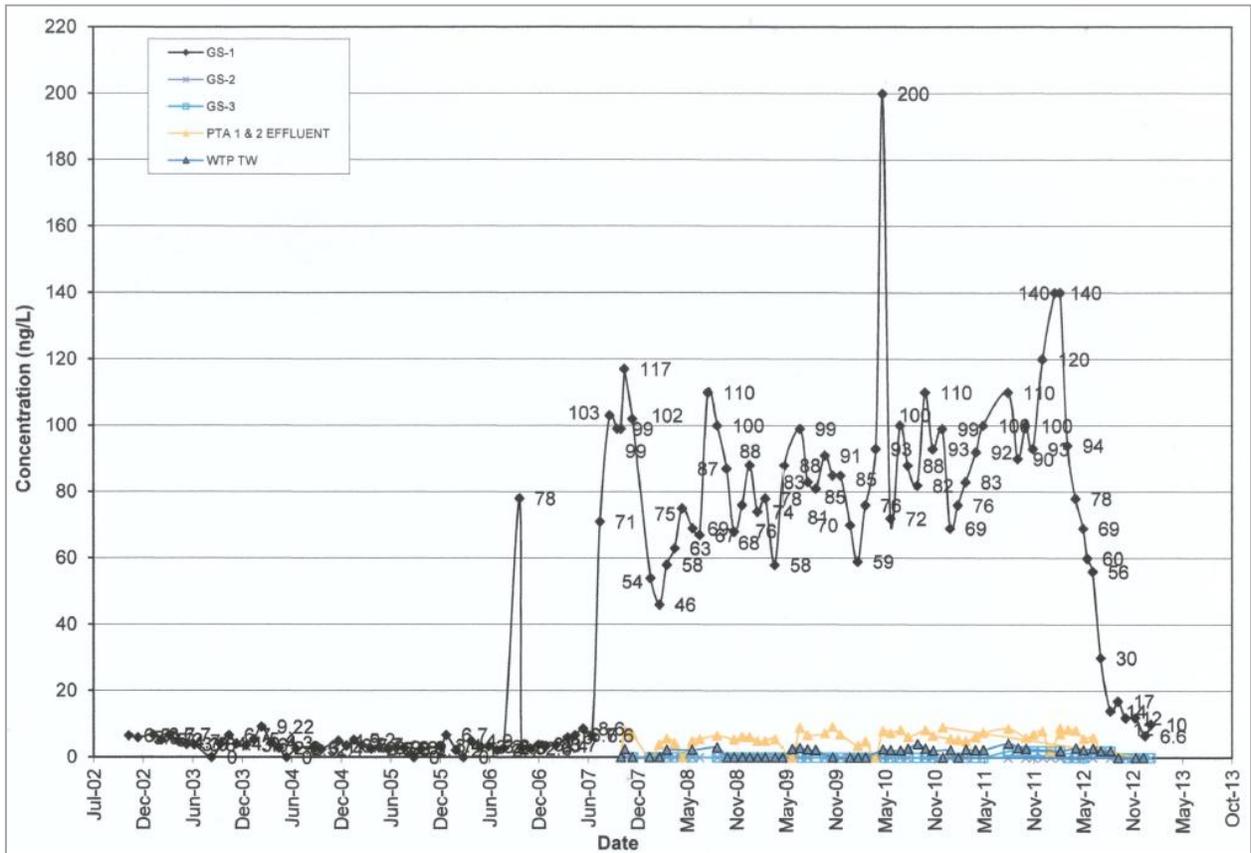


Figure 8. NDMA in Extraction Well GS-1

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**Appendix I: SFV GOU Treatment System and
Extract Well Pumping Data**

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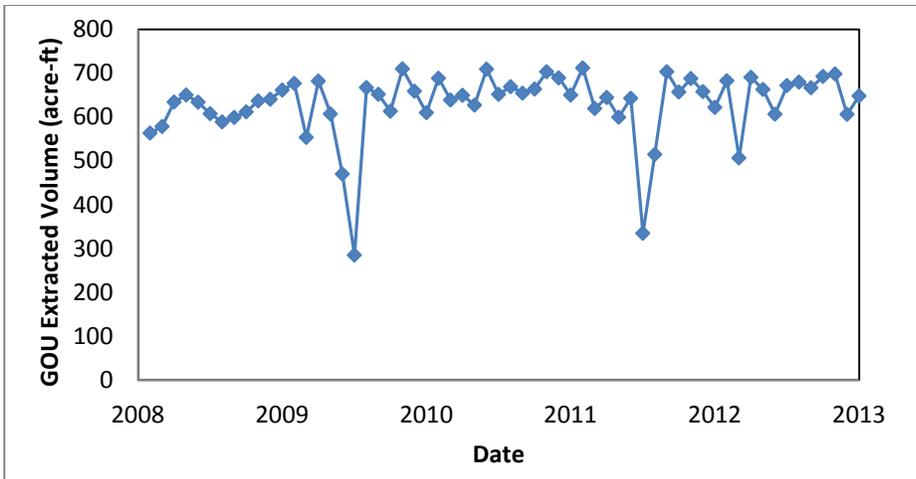


Figure 9. Monthly Extracted and Treated Volume for GWTP from 2008 – 2011

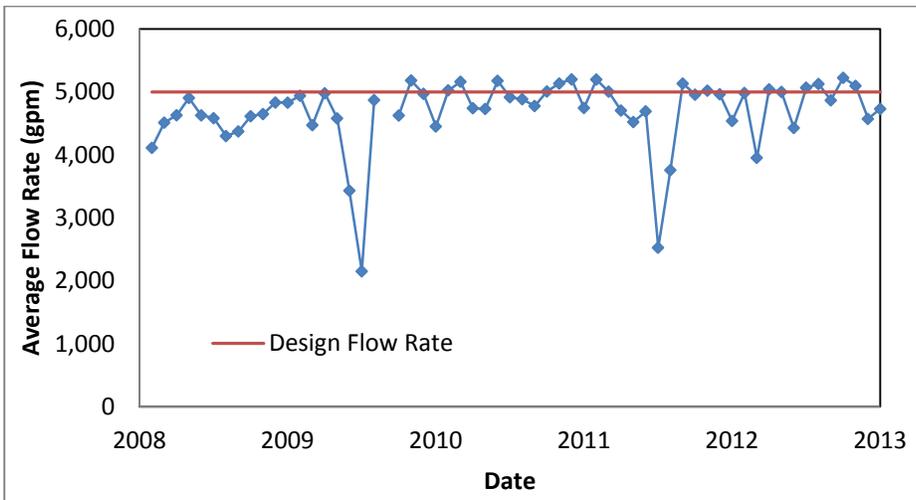


Figure 10. Monthly Average Flow Rate for GWTP from 2008 – 2011

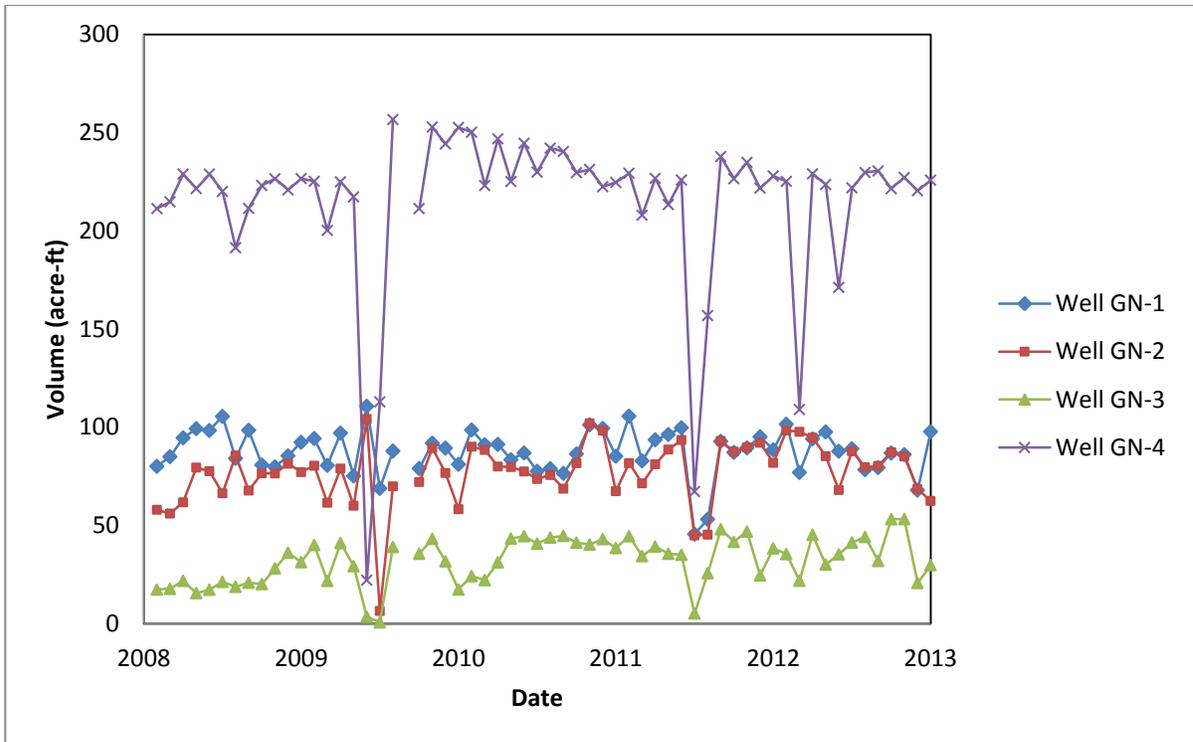


Figure 11. Monthly Extracted Volumes for GNOU Extraction Wells from 2008 – 2011

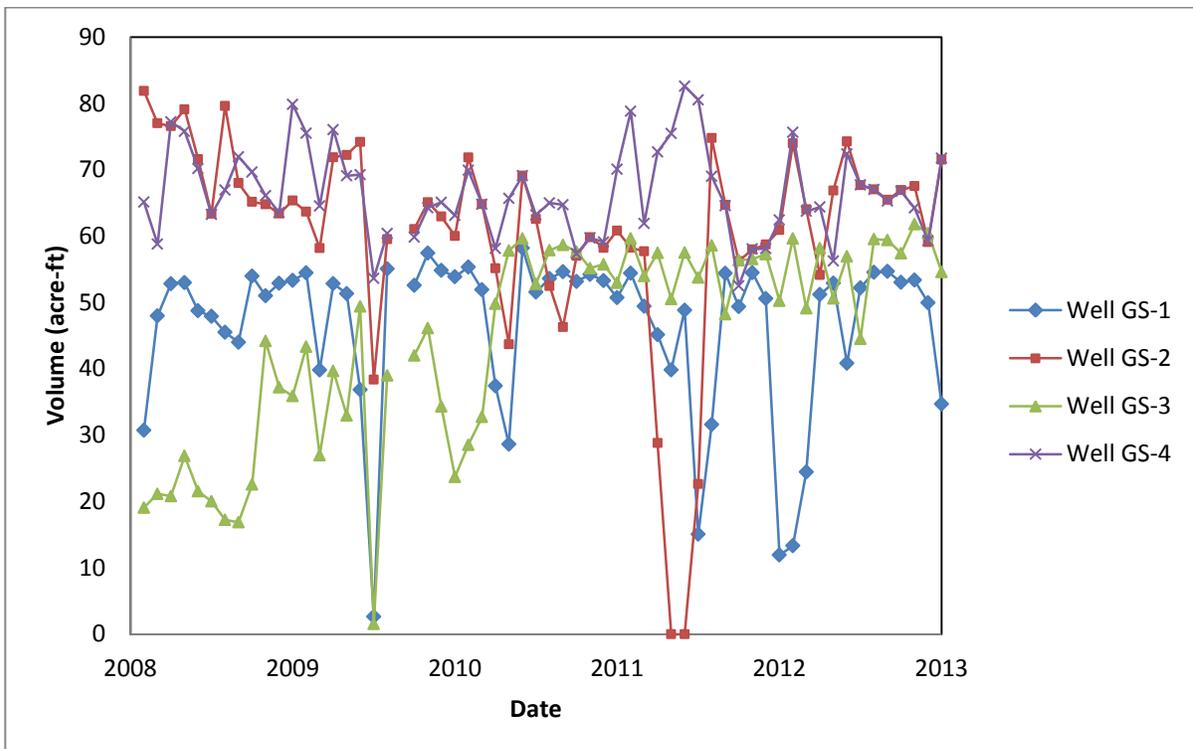


Figure 12. Monthly Extracted Volumes for GSOU Extraction Wells from 2008 – 2011