FINAL
FIRST FIVE-YEAR REVIEW REPORT
for

SAN GABRIEL VALLEY SUPERFUND SITE (AREA 4)
PUENTE VALLEY OPERABLE UNIT
CITY OF INDUSTRY, CITY OF LA PUENTE
LOS ANGELES COUNTY, CALIFORNIA

Prepared by:
U.S. Environmental Protection Agency Region 9
San Francisco, California

MARCH 2011

If you have any questions on this Final First Five-Year Review Report,
please contact Raymond Chavira, EPA Project Manager, at 415.947.4218 or via e-mail at
chavira.raymond@epa.gov

FINAL

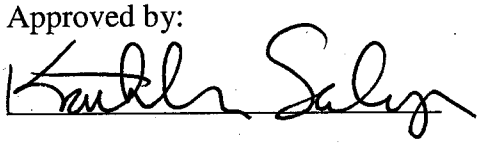
Five-Year Review Report

First Five-Year Review Report
for
San Gabriel Valley Superfund Site (Area 4)
Puente Valley Operable Unit
City of Industry, City of La Puente
Los Angeles County, California

March 2011

PREPARED BY:

United States Environmental Protection Agency
Region 9
San Francisco, California

Approved by: 

Date: 3/2/11

Kathleen Salyer
Assistant Director, Superfund Division
California Site Cleanup Branch
U.S. Environmental Protection Agency, Region 9

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Acronyms and Abbreviations

µg/L	micrograms per liter
1,1-DCE	1,1-dichloroethene
AOC	Administrative Order of Consent
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BRA	Baseline Risk Assessment
CAO	Cleanup and Abatement Order
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COPC	constituent of potential concern
CTR	California Toxics Rule
CWA	Clean Water Act
DNAPL	Dense Non-Aqueous Phase Liquid
DWR	California Department of Water Resources
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
FS	Feasibility Study
ft	feet
gpm	gallons per minute
ICs	institutional controls
LARWQCB	Regional Water Quality Control Board, Los Angeles Region
MCL	maximum contaminant level
mg/L	milligrams per liter
MSL	mean sea level
NDMA	n-nitrosodimethylamine
NPL	National Priorities List
NTR	National Toxics Rule

O&M	operation and maintenance
PCE	tetrachloroethene
PHG	Public Health Goal
ppb	parts per billion
PRP	Potentially Responsible Party
PVOU	Puente Valley Operable Unit
PVSC	Puente Valley Steering Committee
RA	remedial action
RAP	Remedial Action Plan
RAOs	remedial action objectives
RD	remedial design
RI	Remedial Investigation
ROD	Record of Decision
SIP	State Implementation Policy
SOW	Statement of Work
STLC	soluble threshold limit concentration
SVE	soil vapor extraction
TCE	trichloroethene
TMDL	Total Maximum Daily Load
UAO	Unilateral Administrative Order
UTC	United Technologies Corporation
VOC	volatile organic compound
WIP	Well Investigation Program

Executive Summary

The purpose of the Five-Year Review is to evaluate whether the planned remedies for the PVOU, specified in the Interim Record of Decision (ROD) (EPA, 1998) and Explanation of Significant Differences (ESD) (EPA, 2005), remain protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this Five-Year Review Report. In addition, this report identifies issues found during the review and provides recommendations and proposed follow-up actions to address those issues.

The PVOU aquifer includes shallow, intermediate, and deep groundwater zones. Groundwater contamination in the PVOU occurs primarily in the shallow and intermediate zones of the PVOU aquifer. Sources for the groundwater contamination include releases of chemicals from operations by firms previously or currently engaged in metal cleaning, coating, and manufacturing; chemical product manufacturing, including plastics and aerosols; electric component manufacturing; printing; rubber manufacturing; and die casting. Volatile organic compounds (VOCs) are the primary contaminants, with tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), and 1,4-dioxane comprising the most commonly detected contaminants. The uppermost, or shallow groundwater zone or aquifer unit located in the mouth of Puente Valley contains most of the contaminant mass from the various sources. VOC contaminant concentrations in portions of the shallow zone are hundreds of times drinking water standards. In the intermediate zone, VOC contaminant concentrations are lower, but still exceed drinking water standards. In response to the contamination, water companies have shut down contaminated wells, installed new treatment facilities, and taken other steps to ensure that they can continue to supply clean drinking water to the public.

In September 1998, EPA issued an Interim Record of Decision (ROD) to address the shallow zone and intermediate zone groundwater contamination. The selected remedy in the 1998 Interim ROD is to contain contaminant migration at the mouth of the Puente Valley and discharge treated groundwater to a municipal supply line or surface water. The IROD also required groundwater monitoring in the Mid Valley area of the PVOU. In 2005, EPA issued an Explanation of Significant Differences (ESD) to update the 1998 Interim ROD after the groundwater in the PVOU was found to be contaminated by 1,4-dioxane and perchlorate.

The containment remedy that was selected in the 1998 Interim ROD and 2005 ESD has not been fully constructed and is not yet operational. This review identified two issues that need to be addressed during remedy implementation in order for the remedy to achieve the remedial action objectives (RAOs) identified in the Interim ROD and the ESD. The first issue is the detection of PCE and TCE at low level concentrations below MCLs from two new production wells (B24A and B24B) screened in the deep zone. The second issue is that naturally occurring selenium was identified as a constituent of potential ecological concern. If discharge to surface water is to be implemented as part of the interim remedy at PVOU, there would be a potentially complete pathway for selenium to reach ecological receptors.

EPA is currently working with the responsible parties to address these issues in the design of the remedy. Once the design is finalized and the remedy is fully constructed and operational, it is anticipated that the remedy will achieve the RAOs and be protective of human health and the environment. Meanwhile, institutional controls (governmental controls) are effectively preventing unacceptable human exposure to contaminated Site groundwater.

The next Five-Year Review for PVOU will be completed by March 2016, five years from the approval date of this review.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name : San Gabriel Valley (Area 4), Puente Valley Operable Unit		
EPA ID: CAD980817985		
Region: 9	**State:** California	**City/County:** Eastern Los Angeles County

SITE STATUS	
NPL status: X Final □Deleted □ Other (specify) _____	
Remediation status (choose all that apply): □ Operating □ Complete	
Multiple OUs? □ YES X NO	**Construction completion date:** 2013 (planned)
Has site been put into reuse? X YES □ NO	

REVIEW STATUS	
Reviewing agency: X EPA □ State □ Tribe □ Other Federal Agency _____	
Author name: Raymond Chavira	
Author title: Remedial Project Manager	**Author affiliation:** EPA Region 9
Review period: July 2010 – February 2011	
Date(s) of site inspection: September 10, 2010	
Type of review: X Statutory □ Policy □ Post-SARA □ Pre-SARA □ NPL-Removal only □ Non-NPL Remedial Action Site □ NPL State/Tribe-lead □ Regional Discretion)	
Review Number: X 1 (first) □ 2 (second) □ 3 (third) □ Other (specify)	
Triggering action:	
□ X Actual RA Onsite Construction	□ Actual RA
□ Construction Completion	□ Previous Five-year Review Reports
Other (specify): Construction start	
Triggering action date: February 27, 2006	
Due date (five years after triggering action date): February 27, 2011	

Five–Year Review Summary Form, cont'd

Issues:

- PCE and TCE have been detected at low concentrations below MCLs from two new production wells (B24A and B24B) screened in the deep zone.
- Selenium is considered a constituent of potential ecological concern. If discharge to surface water is to be implemented as part of the interim remedy at PVOU, there would be a potentially complete pathway for selenium to reach ecological receptors.

Recommendations and Follow-up Actions:

- Perform close monitoring of the new production wells B24A and B24B and evaluate the nature and extent of contamination in the deep zone if VOCs continue to be detected in these wells.
- Evaluate and select other end use(s) for the treated groundwater. For surface water discharge of treated groundwater, ARARs for applicable water quality criteria (e.g., selenium), and a full-scale ecological risk assessment should be completed.

Protectiveness Statement:

The interim remedy for the Puente Valley Operable Unit is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Although potential contaminant migration issues and a potentially complete ecological exposure pathway associated with surface water discharge have been identified, EPA is currently working with the responsible parties to address these issues in the design of the remedy. Once the design is finalized and the remedy is fully constructed and operational, it is anticipated that the remedy will achieve the RAOs and be protective of human health and the environment. Meanwhile, institutional controls (governmental controls) are effectively preventing unacceptable human exposure to contaminated Site groundwater.

Other Comments:

None

1.0 Introduction

The United States Environmental Protection Agency (EPA) has conducted a Five-Year Review of the planned remedial actions at the Puente Valley Operable Unit (PVOU, or the Site) of the San Gabriel Valley Superfund Site in eastern Los Angeles County, California.

The purpose of the Five-Year Review is to evaluate whether the planned remedies for the PVOU, specified in the Interim Record of Decision (ROD) (EPA, 1998) and Explanation of Significant Differences (ESD) (EPA, 2005), remain protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this Five-Year Review Report. In addition, this report identifies issues found during the review and provides recommendations and proposed follow-up actions to address those issues.

This review is required by federal statute. EPA must implement Five-Year Reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan). CERCLA Section 121(c), as amended, states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the Site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. 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 National Contingency Plan; 40 Code of Federal Regulations §300.430(f)(4)(ii) 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 action no less often than every five years after the initiation of the selected remedial action.*

This is the first statutory Five-Year Review Report for the PVOU. This Five-Year Review Report has been completed because hazardous substances, pollutants, or contaminants remain at the PVOU above levels that allow for unrestricted use and unlimited exposure.

2.0 Site Chronology

Table 2-1 provides a chronology of significant events at the San Gabriel Valley Superfund Site, Puente Valley Operable Unit (PVOU).

TABLE 2-1
Chronology of Events at the San Gabriel Valley Superfund Site (Area 4 - Puente Valley Operable Unit).

Event	Date
Groundwater contamination by volatile organic compounds (VOCs) first discovered in San Gabriel Basin.	1979
Four broad areas of contamination within the San Gabriel Basin are placed on EPA's National Priorities List (NPL); PVOU is designated as Area 4.	1984
EPA initiates its enforcement efforts in PVOU by searching historical federal, state, and local records for evidence of chemical usage, handling, and disposal in PVOU.	1985
Regional Water Quality Control Board, Los Angeles Region (LARWQCB) initiates its Well Investigation Program (WIP) to identify sources of groundwater contamination in PVOU.	1985
EPA and LARWQCB enter into a cooperative agreement to expand the WIP.	1989
EPA sends General Notice of Liability letters to 109 entities in and around the Puente Valley area.	1990 to 1993
EPA sends Special Notice letters to 58 potentially responsible parties (PRPs) requesting that these PRPs present a good faith offer to perform the Interim Remedial Investigation/Feasibility Study (RI/FS) for the PVOU.	May 1993
Forty-two of the 58 PRPs form the Puente Valley Steering Committee (PVSC) and agree to conduct the Interim RI/FS.	September 1993
EPA completes preliminary baseline risk assessment for PVOU.	March 1994
PVSC conducts an Interim RI for PVOU.	1994 to 1996
PVSC conducts the FS for the PVOU.	1996 to 1997
EPA issues the Interim Record of Decision (Interim ROD) which calls for containment of the VOC-contaminated groundwater in the shallow and intermediate groundwater zones at the mouth of Puente Valley and Mid-Valley groundwater monitoring.	September 1998
EPA issues a unilateral administrative order (UAO) to Carrier Corporation (Carrier, now a subsidiary of the United Technologies Corporation [UTC]) and requires Carrier to address the shallow zone contamination in PVOU. After Carrier submits a "Statement of Sufficient Cause" declining to perform the work as specified in its UAO, EPA undertakes the Remedial Design (RD) work for the shallow zone as a fund-lead project.	2001
EPA issues a separate UAO to TRW Inc. (acquired by Northrop Grumman Corp. in 2002) that requires TRW to address the intermediate zone contamination in PVOU. TRW notifies EPA of its commitment to perform the work specified in its UAO.	March 2002

TABLE 2-1
Chronology of Events at the San Gabriel Valley Superfund Site (Area 4 - Puente Valley Operable Unit).

Event	Date
Northrop Grumman submits the *Compliance, Sentinel and Investigatory Well Network Plan (CSIWNP) for the Intermediate Zone* to EPA in April 2002. Seven, , single-port, monitoring wells and one multiple-port monitoring well are installed in the intermediate zone.	February 2002 to August 2003
EPA conducts additional field investigation to support the RD for the shallow zone. Eleven monitoring wells are installed in the shallow zone to characterize the extent of Shallow Zone contamination.	July 2002 to March 2003
LARWQCB requests the PRPs in the PVOU to sample selected shallow, facility-specific monitoring wells within the area of VOC contamination for emergent chemicals including perchlorate, 1,4-dioxane, n-nitrosodimethylamine (NDMA) and hexavalent chromium.	2002
EPA splits out the groundwater portion of the former Benchmark facility from the PVOU regional remedy to address groundwater contamination south of Puente Creek; under Cleanup and Abatement Order (CAO) 89-034 LARWQCB maintains lead regulatory agency status for the former Benchmark facility.	2003
EPA continues negotiation with Carrier. Carrier submits the Remedial Work Plan for the Installation and Testing of Extraction Wells for the Shallow Zone Remedy.	December 2004
LARWQCB requires Northrop Grumman under CAO 89-034 to design and install a groundwater extraction and treatment system to contain the 1,4-dioxane plume in the shallow zone groundwater downgradient of the former Benchmark facility.	February 2005
Northrop Grumman submits the Remedial Action Plan (RAP) for the former Benchmark facility.	June 2005
EPA issues an Explanation of Significant Differences (ESD) to update the 1998 Interim ROD to address 1,4-dioxane and perchlorate contamination.	June 2005
Northrop Grumman proposes to revise the design of the Benchmark system by combining the two offsite groundwater extraction components originally proposed in the RAP into a single extraction well network. LARWQCB approves the request and four extraction wells are installed on East Nelson Avenue downgradient of the former Benchmark facility.	2006
Northrop Grumman submits three Remedial Design/Remedial Action (RD/RA) work-plan-related documents for the PVOU intermediate zone remedy: (1) *RD/RA Work Plan for the PVOU Intermediate Zone Remedy*; (2*) Groundwater Extraction Well Specifications for the PVOU Intermediate Zone Remedy*; and (3) *Analysis of Intermediate Zone Remedy Hydraulic Capture*.	2006
The EPA and Carrier enter into a consent decree in which Carrier/UTC commits to design, construct, operate, maintain, monitor, and evaluate the PVOU shallow zone interim remedy north of Puente Creek, as well as implement westernmost plume and mid-valley monitoring.	April 2006
Carrier/UTC installs and tests nine extraction wells as part of the shallow zone remedy.	March 2006 to August 2007
Northrop Grumman installs and tests six extraction wells as part of the intermediate zone remedy.	2006 and 2007

TABLE 2-1
Chronology of Events at the San Gabriel Valley Superfund Site (Area 4 - Puente Valley Operable Unit).

Event	Date
Northrop Grumman submits the Compliance/General Monitoring Plan for the intermediate zone remedy.	March 2008
Carrier/UTC submits the Draft Workplan for the Compliance and Sentinel Well Network for the shallow zone remedy.	July 2008
Northrop Grumman submits the Pre-Final Design Report for the Intermediate Zone Remedy.	July 2008
Carrier/UTC installs two monitoring wells as part of the Westernmost Plume Area monitoring program and two deep monitoring wells as part of the Mid-Valley monitoring program	2008
Carrier/UTC installs six compliance wells and two sentinel wells for the shallow zone remedy.	2008 and 2009
Carrier/UTC submits the Design Basis Report, the Pre-Final Construction Specifications, and Pre-Final Drawings for the shallow zone remedy.	February 2009
Northrop Grumman submits the Final Design Report for the intermediate zone remedy.	March 20, 2009
Carrier/UTC submits the Preliminary Final Design Submittal for the Interim Shallow Zone Remedy.	June 2009
EPA and Northrop Grumman enter into a consent decree for the remediation of the intermediate zone aquifer in PVOU.	August 2009
Northrop Grumman installs the pipelines for the intermediate zone remedy	August – October 2009
Los Angeles County Department of Public Works, Flood Control Division (L.A. County) and LARWQCB object to discharge of the treated groundwater from the shallow zone and the intermediate zone remedies into the LA County permitted municipal system as the water is estimated to contain selenium concentrations exceeding the California Toxics Rule (CTR) criterion of 5 micrograms per liter (µg/L). EPA subsequently requests UTC and Northrop Grumman to conduct a focused feasibility study to evaluate alternative end uses of PVOU treated water.	September 2009
LARWQCB proposes to transfer the lead agency status of the former Benchmark facility to EPA. The area south of Puente Creek becomes part of the PVOU interim remedy to address shallow zone groundwater contamination south of Puente Creek.	March 2010
Carrier/UTC submits the Focused Feasibility Study Report of Remedial Alternatives for the PVOU shallow zone remedy.	May 2010
Northrop Grumman submits the Feasibility Study Addendum for the PVOU intermediate zone remedy.	May 2010

3.0 Background

The Puente Valley Operable Unit of the San Gabriel Valley Superfund Site is located in eastern Los Angeles County, California. Puente Valley is an approximately 12.5-mile-long by 2 to 2.5-mile-wide sub-basin located within the southeastern portion of the Main San Gabriel Basin (see Figure 3-1 at the end of this section). The majority of land in the Puente Valley is zoned and used for commercial and industrial purposes. The PVOU is located primarily within the City of Industry, as well as the City of La Puente and an unincorporated area of Los Angeles County. The most prevalent groundwater contaminants found in the PVOU include the volatile organic compounds (VOCs) tetrachloroethene (PCE), trichloroethene (TCE), and 1,1-dichloroethene (1,1-DCE), and 1,4-dioxane and perchlorate.

3.1 Physical Characteristics

The Puente Valley is a tributary basin to the Main San Gabriel Basin. The Main San Gabriel Basin is bounded by several geologic features including the San Gabriel Mountains to the north the Raymond Basin fault to the northwest, and a crescent-shaped system of low hills to the south, southwest and southeast. The hills making up the system are, from west to east, the Repetto, Merced, Puente, and San Jose Hills. The only significant divide along this boundary is the Whittier Narrows, which falls between the Merced and the Puente Hills (Figure 3-1). Whittier Narrows is the lowest point in the San Gabriel Basin and it serves as the surface water and groundwater discharge locale for the basin (California Department of Water Resources [DWR], 1966).

The Puente Valley is a "horn-shaped" valley that opens into the Main San Gabriel Basin on the west and on the north. Puente Valley is bounded to the north by San Jose Hills and to the south by Puente Hills. The ground surface elevations in Puente Valley range from about 800 feet above mean sea level (MSL) at the eastern boundary to about 300 feet MSL where it meets the Main San Gabriel Basin (CH2M HILL, 1997).

The primary surface water bodies in the San Gabriel Basin are the San Gabriel River and Rio Hondo and their tributaries (Figure 3-1). Both the San Gabriel River and Rio Hondo headwaters originate in the San Gabriel Mountains and exit the San Gabriel Basin at Whittier Narrows.

San Jose Creek, a tributary of the San Gabriel River, is the primary surface water drainage within the Puente Valley (Figure 3-1). It is a perennial stream sustained by discharges from municipal and industrial wastewater treatment plants, and discharge of groundwater into the stream through the weep holes at the channel bottom. Most of the channel reaches of San Jose Creek within the Puente Valley are concrete-lined. The lined portions of the channel are underlain by a subdrain system designed to allow shallow groundwater beneath the concrete channel to flow into the surface water channel through weep holes in the concrete walls (CH2M HILL, 1997). Puente Creek is a lined channel tributary to San Jose Creek. Both San Jose Creek and Puente Creek convey stormwater runoff, which occurs primarily during the winter rainy season.

The Puente Valley region has a Mediterranean climate with dry summers and precipitation occurring mainly in the winter months. The mean seasonal temperature in Puente Valley ranges from 54 degrees Fahrenheit in January to 90 degrees Fahrenheit in July and August (http://countrystudies.us/united-states/weather/California/, 2011).

3.2 Geology and Hydrogeology

3.2.1 Main San Gabriel Basin

The principal water-bearing formations of the Main San Gabriel Valley Basin are unconsolidated and semi-consolidated sediments which range in size from coarse gravel to fine-grained sands. These water- bearing sediments extend from a few hundred feet thick along the edges of the Basin to more than 4,000 feet thick near the center of the Basin and are surrounded and underlain by relatively impermeable marine sedimentary bedrock.

The Basin's major sources of natural recharge are infiltration of rainfall on the valley floor and percolation of runoff from the adjacent mountains. The Basin also receives imported water and return flow from applied water. Subsurface groundwater flow into the San Gabriel Basin occurs across the Raymond Fault in the northwest, the Sierra Madre Fault in the north, and the Cucamonga Fault in the northeast.

Except where large pumping centers create depressions in the water table, groundwater generally flows from the perimeters of the Basin toward Whittier Narrows and from there into the Central Basin. Most of the surface streams in the San Gabriel Basin are concrete lined except the San Gabriel River and an approximately three-mile reach of the Rio Hondo. Stream-channel recharge of groundwater only occurs along the unlined stretches through the bottom of the stream channels. Other surface water features include several lakes in the vicinity of Whittier Narrows and groundwater spreading facilities within the Main San Gabriel Basin, predominantly in the northern part of the San Gabriel Basin near Azusa. These surface water bodies and spreading basins also recharge the groundwater aquifer in the Main San Gabriel Basin (CH2M HILL, 2002).

3.2.2 Puente Valley

Subsurface Sediments

The alluvial sedimentary deposits found in the Puente Valley are primarily derived from consolidated marine sedimentary rocks in the Puente and San Jose Hills. These deposits range in thickness from approximately 1,300 feet in the northwest, near the mouth of the valley where it meets the Main San Gabriel Basin, to less than 25 feet in the eastern portion and along the Puente Valley perimeter. In general, the alluvial sediments in the Puente Valley are finer-grained and have higher clay contents than deposits found in the Main San Gabriel Basin. Specifically, the Puente Basin consists predominantly of fine-grained sediments with interbedded coarser-grained lenses. These units are generally discontinuous, but local lenses of sand and gravel are hydraulically connected at a regional scale in some locations. Near the mouth of Puente Valley, a transition in sediment composition from fine- to coarse-grained facies occurs where the valley meets the Main San Gabriel Basin. The bedrock underlying the alluvial sediments in Puente Valley is composed primarily of relatively impermeable consolidated marine sedimentary rocks.

Within the Puente Basin, two deep fault systems, the Walnut Creek Fault and the Handorf Fault, are inferred to occur near the mouth of the Puente Valley (Figure 3-1). However, these fault systems are believed to have little to no impact on shallow groundwater movement in Puente Valley (CH2M HILL, 1997).

Definition of PVOU Hydrogeologic Units

Although the coarse-grained units are generally discontinuous, three primary relatively higher permeability zones within the Puente Valley were identified during the initial Remedial Investigation/Feasibility Study (RI/FS) (CH2M HILL, 1997) based primarily on hydrologic and water quality data from monitoring wells installed throughout Puente Valley. These relatively higher permeability zones are referred to in the ROD and ESD as the shallow, intermediate, and deep zones. Relatively finer-grained confining layers dominated by silt and clay, separate and contribute to localized vertical head and water quality differences between aquifer zones.

In the "mouth of Puente Valley," (Figure 3-2) where Puente Valley meets the San Gabriel Basin, the shallow zone generally encompasses the upper 150 to 200 feet of the saturated aquifer, including the interval between the water table and approximately 250 to 300 feet below ground surface (bgs) (EPA, 2005). The shallow zone does not extend below the depths corresponding to the current upper perforated intervals of the San Gabriel Valley Water Company (SGVWC) production wells B7C and B11B (280 and 302 feet bgs, respectively, and Suburban Water Systems production well 147W3 (300 feet bgs) (EPA, 2005). The hydrostratigraphy in the mouth of valley area dips to the north and west, as the geology of Puente Valley transitions to the Main San Gabriel Basin; therefore, the depths of the hydrogeologic units increase to the north and west.

The shallow zone contains most of the VOC contaminant mass. VOC contaminant concentrations in portions of the shallow zone are hundreds of times drinking water standards (EPA, 2005). The majority of the contaminant mass originating at the mouth of the Puente Valley is migrating within the shallow zone to the North and Northwest; however, there is a downward hydraulic gradient in the area and some contaminant mass is migrating downward and into the intermediate zone, particularly in the eastern area (Figure 3-2).

The intermediate zone located between the shallow and the deep zones is comprised of two separate hydrogeologic intervals: the upper interval and the lower intermediate zone intervals. The term intermediate zone refers to both the upper and the lower intermediate zone intervals. Several production wells at the mouth of Puente Valley produce water from the intermediate zone (e.g., upper screened intervals of 280 and 300 feet below ground surface), although the deep zone is the primary source for groundwater production in the mouth of Puente Valley. In most portions of the mouth of valley, the intermediate zone is separated from the shallow and the deep (production) zones by semi-confining units.

VOC contaminant concentrations found in the intermediate zone, while lower than those found in the shallow zone, exceed drinking water standards (Figure 3-2). All the VOC contamination in the intermediate zone originated in the shallow zone from either the mouth of Puente Valley or from sources in the Mid-Valley Area. The Mid-Valley Area generally encompasses the area spanning from the Azusa Avenue to the Puente Creek (Figure 3-2). In the western portion of the mouth of Puente Valley, intermediate zone contamination may

primarily originate from Mid-Valley sources, in contrast, for the eastern portion of the mouth of Puente Valley, the main source of intermediate zone contamination is shallow zone contamination from the mouth of the Puente Valley that has migrated down into the intermediate zone, as indicated by the presence of 1,4-dioxane in intermediate zone groundwater. The majority of the contaminant mass in the intermediate zone is present in the upper intermediate zone interval.

The deep zone is the main portion of the aquifer that is used for domestic groundwater production. In general, at the mouth of Puente Valley, the deep zone extends from a depth of approximately 400 to 1,130 feet bgs (EPA, 2005). Because production wells at the mouth of Puente Valley produce most of their water from this zone, hydraulic heads observed in this zone are comparatively lower than those found in the shallow and intermediate zones. Historically, this zone has not exhibited contamination. In Puente Valley, areal recharge of precipitation is the primary component of groundwater inflow. The subsurface groundwater inflow contribution from the adjacent Spadra Basin at the east boundary is relatively minor (CH2M HILL, 1997).

Groundwater discharge (loss of groundwater) from the Puente Valley includes subsurface groundwater flow from the Puente Valley into the Main San Gabriel Basin from there to Whittier Narrows, discharge (flow) of shallow groundwater into the bottom of San Jose Creek, and pumpage from several large public water supply wells in the B7 Well Field located at the mouth of the Puente Valley. The B7 well field includes San Gabriel Valley Water Company's (SGVWC's) wells B7, B9 and B11 and Suburban Water Systems' well 147W3. While all of these wells extract most of their water from the deep zone, some of the wells also get a substantial amount of water from the intermediate zone as well.

Climatically induced regional water level fluctuations and groundwater pumping from the public water supply wells are the most important forces that control water level changes in the Puente Valley. Based on monitoring well data, regional groundwater levels in the San Gabriel Basin have declined approximately 40 feet over the past five years (2005 to 2010).

3.3 Land Use

The predominant land use in Puente Valley is industrial. Ninety-six percent of the City of Industry is zoned for industrial uses, and the remaining four percent is zoned for commercial uses. As of 1997, nearly 85 percent of the land within the City has been developed and accommodates about 1,700 businesses. The cities of La Puente and Walnut, which occupy small portions of the Puente Valley, are zoned for residential purposes. A minor portion of the PVOU also occurs within an unincorporated area of Los Angeles County.

Prior to the early 1950s, Puente Valley was primarily used for agricultural purposes (CH2M HILL, 1997).

3.4 History of Contamination

VOC groundwater contamination in the San Gabriel Basin was first discovered in 1979. In May 1984, EPA placed four broad areas of groundwater contamination within the San Gabriel Basin onto its National Priorities List (NPL); Puente Valley is designated as Area 4. Beginning in 1985, EPA initiated its enforcement efforts in PVOU by searching historical

federal, state, and local records for evidence of chemical usage, handling and disposal in PVOU.

In 2002, the LARWQCB requested the potentially responsible parties (PRPs) in the PVOU to collect and analyze groundwater samples from selected shallow, facility-specific monitoring wells within the area of VOC contamination for emergent chemicals including perchlorate, 1,4-dioxane, n-nitrosodimethylamine (NDMA) and hexavalent chromium. Although all of the four emergent compounds were detected in groundwater analytical samples, the results indicated that only 1,4-dioxane was present at concentrations requiring treatment.

Sources of groundwater contamination correlated with chemical usage by firms engaged in various business operations including metal cleaning, coating, and manufacturing; chemical product manufacturing including plastics and aerosols; electric component manufacturing; printing; rubber manufacturing; and die casting (EPA, 1998).

3.5 Initial Responses

In 1989, EPA entered into an agreement with the LARWQCB to expand its Well Investigation Program (WIP). These joint efforts led to the development and initiation of several response actions within the PVOU by the two major PRPs, Carrier Corporation (now a wholly owned subsidiary of the United Technologies Corporation [UTC]) and Northrop Grumman (formerly known as TRW), as a result of LARWQCB's requests or through its Cleanup and Abatement Orders (CAOs).

Under LARWQCB's CAO #86-1, Carrier took response actions by removing a degreaser sump, removing 189 gallons of free-phase dense non-aqueous phase liquid (DNAPL) from the uppermost aquifer, remediating soil using soil vapor extraction (SVE) beginning in June 1988, and operating a groundwater extraction and treatment system beginning in 1986 at its BDP Carrier facility located in the mid-valley area of the PVOU (CDM, 1996).

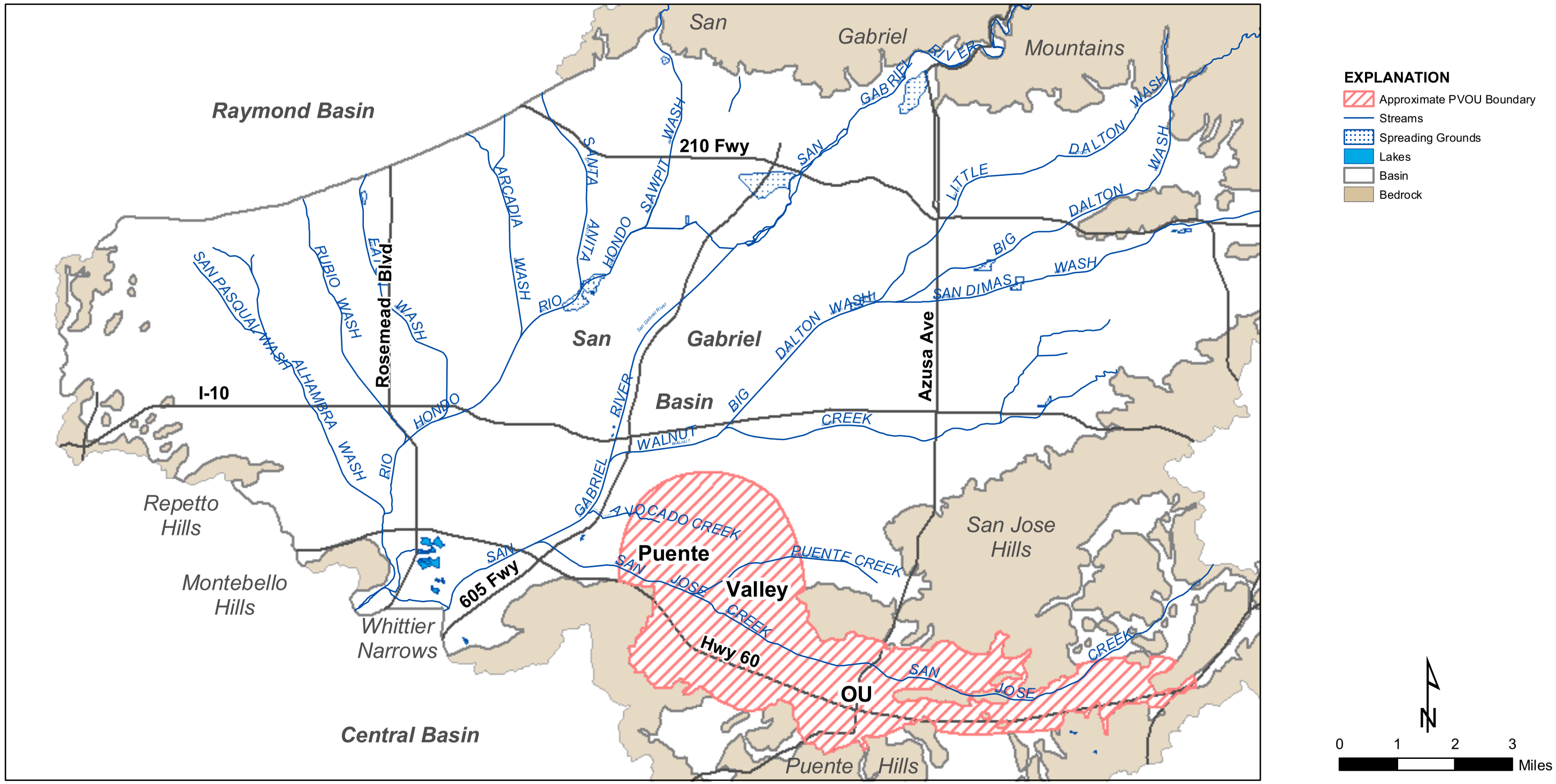
LARWQCB issued CAO #89-034 to TRW in April 1989. In response, TRW removed underground storage tanks (USTs) and contaminated soil at the former Benchmark Technology facility. TRW also started operation of an SVE system in 1993 and a groundwater extraction system and treatment system in 1995 (Orion, 2005). As of 2009, all remedial systems have been shut down at the former Benchmark facility, pending further EPA response decisions regarding groundwater remediation.

3.6 Basis for Taking Actions

In 1994, EPA completed the *Preliminary Baseline Risk Assessment for the Puente Valley Operable Unit* (EPA, 1994). The purpose of the risk assessment was to evaluate potential adverse human health effects from exposure to contaminated groundwater.

The risk assessment concluded that actual or threatened releases of hazardous substances at this Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

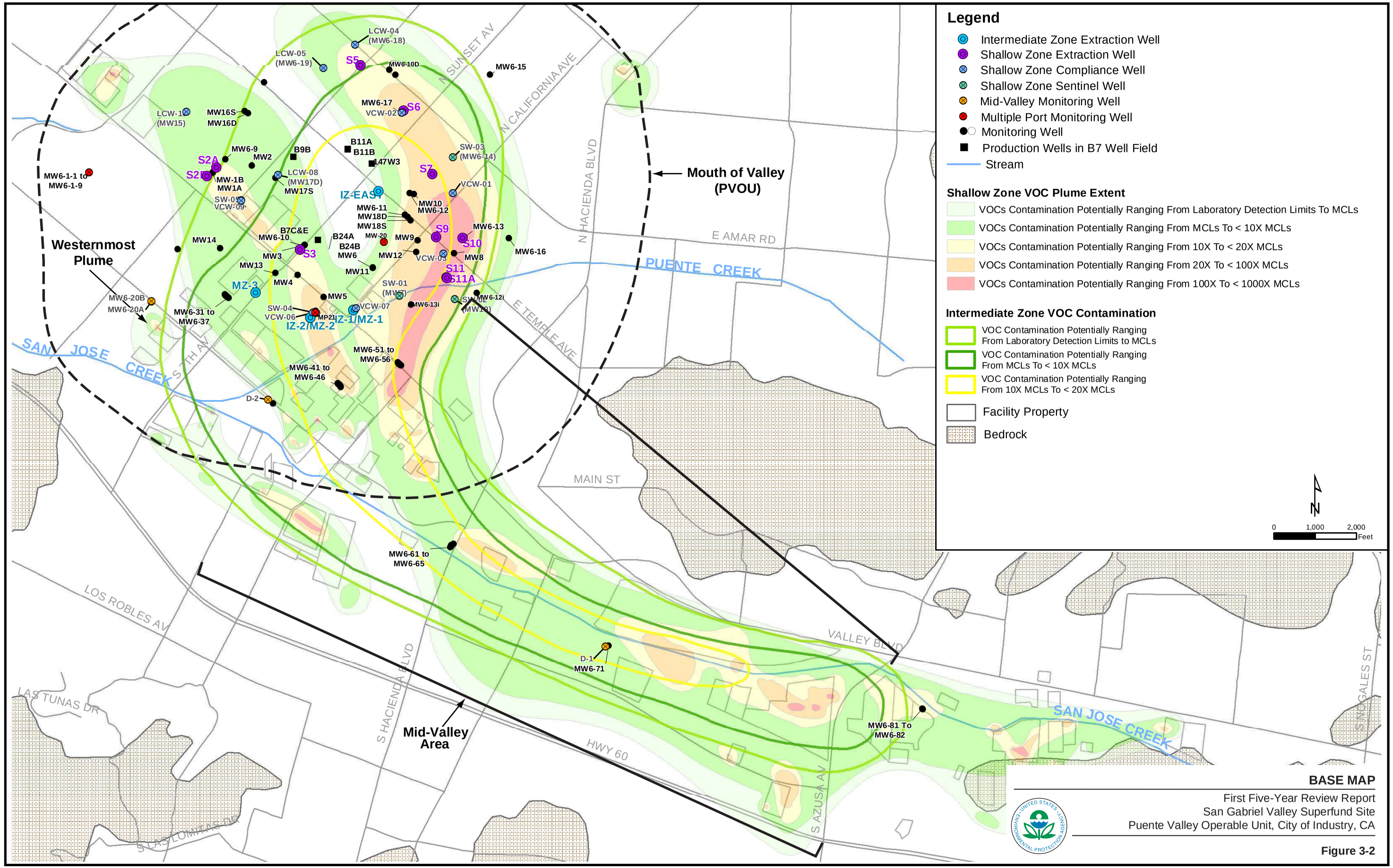
VOCs are the primary contaminants, with PCE, TCE, and 1,1-DCE comprising the most commonly detected contaminants. Groundwater contamination was also found to occur primarily in the shallow and the intermediate zones of the PVOU aquifer.



SITE LOCATION MAP

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 3-1



BASE MAP

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 3-2

ES012111042922BAO base_map.ai 02-17-11 dash

4.0 Remedial Actions

4.1 Remedy Selection

In 1998, and 2005, EPA issued an Interim ROD and an ESD, respectively, to address the shallow zone and intermediate zone groundwater contamination.

4.1.1 The 1998 Interim ROD

EPA issued the Interim ROD in 1998 based on the findings of the Interim RI/FS completed in 1997. As stated in the Interim ROD, the Remedial Action Objectives (RAOs) for the PVOU are to:

- Prevent exposure of the public to contaminated ground water,
- Inhibit contaminant migration from the more highly contaminated portions of the aquifer to the less contaminated areas or depths,
- Reduce the impact of continued contaminant migration on downgradient water supply wells, and
- Protect future uses of less contaminated and uncontaminated areas.

The 1998 Interim ROD includes plans for containing the VOC-contaminated groundwater in the shallow and intermediate groundwater zones at the mouth of the PVOU, and treating it to remove the VOC contaminants. It also allows for the use of existing water supply wells to provide intermediate zone containment. The remedy also required groundwater monitoring of the Mid-Valley area of the PVOU to monitor potential migration of contamination, to provide an early warning of up-valley conditions that may impact the mouth of Puente Valley, and to provide information that will aid in the selection of an appropriate final remedy.

The 1998 Interim ROD selected discharge of the treated groundwater to surface water or to a water supply line for municipal use. The performance criteria for the shallow zone remedy require lateral and vertical containment of VOC contamination exceeding 10 times the Applicable or Relevant and Appropriate Requirements (ARARs) (California and federal MCLs), while the performance criteria for the intermediate zone remedy require lateral and vertical containment of VOCs exceeding the ARARs.

4.1.2 The 2005 ESD

In 2005, EPA issued an Explanation of Significant Differences (ESD) to update the 1998 Interim ROD after the discovery of groundwater contamination by 1,4-dioxane and perchlorate in the PVOU.

The 2005 ESD maintains the performance criteria for both the shallow zone and intermediate zone remedy previously set forth in the 1998 Interim ROD:

- For the shallow zone remedy, lateral and vertical containment of VOCs and 1,4-dioxane exceeding 10 times their respective contaminant levels (based on MCLs and State Notification Levels).
- For the intermediate zone remedy, lateral and vertical containment of VOCs and 1,4-dioxane exceeding their respective contaminant levels (based on MCLs and State Notification Levels).

The ESD also stated that the treatment of perchlorate may be necessary in order to meet surface water discharge requirements pursuant to the Interim ROD, as modified by the ESD. If the end use of the treated water is an offsite activity, such as delivery into a public water supply, perchlorate treatment may be necessary to comply with all current federal, state and local laws and regulations, including any necessary drinking water permits.

4.1.3 The Shallow Zone Remedy South of Puente Creek

The former Benchmark Technology facility located south of Puente Creek is understood to be the largest single source of VOC and 1,4-dioxane contamination in the eastern portion of the shallow aquifer at the mouth of the Puente Valley. This portion of the shallow zone remedial action was part of the remedy in the 1998 ROD. In 2003, the groundwater contamination downgradient of the former Benchmark facility was to be addressed by a facility-specific cleanup through a Cleanup and Abatement Order (CAO) administered by the LARWQCB. However, the cleanup was never implemented and in May 2010, lead agency status was transferred from the LARWQCB to EPA and the groundwater contamination downgradient of the Benchmark facility is again being addressed as part of the PVOU cleanup.

4.2 Remedy Implementation

4.2.1 Implementation of the Shallow Zone Remedy

Following the issuance of the 1998 Interim ROD, EPA conducted additional field investigation to support the remedial design (RD) for the shallow zone remedy. Eleven monitoring wells were installed in the shallow zone between July 2002 and March 2003. Discrete-depth samples were collected during the installation of these investigative monitoring wells to determine a profile of the shallow zone plume at each location. These field efforts led to an updated site conceptual model of the VOC contamination in the shallow zone of the PVOU. Specifically, the eastern lobe of the shallow zone plume originating from the former Benchmark facility was found to extend laterally much further north and vertically deeper than what had been concluded earlier during the development of the RI/FS between 1994 and 1997.

EPA prepared a preliminary design of the shallow zone extraction network based on the updated shallow zone contaminant distributions. The preliminary design proposed a treatment plant that would receive effluent piped from shallow zone remedy extraction wells located to the north of the Puente Creek.

Following negotiations between EPA and Carrier/UTC which resulted in an agreement in principle for performance of the shallow zone remedy, Carrier/UTC took over the preliminary design in December 2004 and continued the RD/RA work for the shallow zone

remedy. In April 2006, EPA and Carrier entered into a consent decree in which Carrier/UTC committed to design, construct, operate, maintain, monitor, and evaluate the PVOU shallow zone interim remedy north of Puente Creek. In addition, the consent decree requires Carrier/UTC to implement and conduct the Mid-Valley monitoring program and the monitoring program for the Westernmost Plume Area.

Carrier/UTC installed nine shallow zone extraction wells between March 2006 and August 2007. Geophysical borehole logs were conducted and discrete-depth samples were collected during the installation of these extraction wells. Aquifer tests were conducted following the installation of the extraction wells. Data generated from the installation of the extraction wells provided additional information regarding the subsurface hydrogeology and the lateral and vertical distribution of chemical contaminants.

Carrier/UTC submitted the final design of the shallow zone remedy in June 2009; however, construction of the remedy was delayed. The Los Angeles County Department of Public Works, Flood Control Division (L.A. County) and the LARWQCB objected to the planned discharge of treated groundwater from the shallow zone and intermediate zone remedies to Puente and San Jose Creeks, because the treated groundwater was estimated to contain naturally occurring selenium concentrations exceeding the California Toxics Rule (CTR) criterion of 5 micrograms per liter (µg/L). L.A. County, which owns and operates the flood control channel, would not permit access to discharge treated groundwater into its system because it asserted the discharge could potentially result in a violation of its NPDES MS4 permit. In August 2009, EPA requested Carrier/UTC to conduct a focused feasibility study to address the discharge issue. In response, Carrier/UTC submitted the *Focused Feasibility Study for the PVOU Shallow Zone Remedy* in May 2010 (Geotrans, 2010) describing alternative end uses of the treated groundwater.

From 2009 to August 2010, in addition to installing the shallow zone extraction wells and conducting the focused feasibility study to address the discharge issue, Carrier/UTC has also completed the following:

- Installation of two mid-valley deep zone groundwater monitoring wells
- Installation of eight monitoring wells that will be utilized as sentinel and compliance wells following startup of the PVOU shallow zone groundwater extraction, conveyance, and treatment system
- Installation of two Westernmost Plume Area groundwater monitoring wells
- Completion of five Mid-Valley Area groundwater monitoring events
- Completion of five Westernmost Plume Area monitoring events
- Completion of five voluntary mouth of the valley groundwater sampling and monitoring events

4.2.2 Implementation of the Intermediate Zone Remedy

In April 2002, pursuant to a Unilateral Administrative Order (UAO) issued by EPA, Northrop Grumman started the RD activities for the intermediate zone remedy by submitting the Compliance, Sentinel and Investigatory Well Network Plan (CSIWNP) for the

intermediate zone and subsequently installing seven, single-port and one, multiple-port monitoring wells into the intermediate zone between February 2002 and August 2003. Subsequent sampling of these wells led to a more detailed understanding of the lateral and vertical extent of the intermediate zone groundwater contamination.

Between March and July 2006, Northrop Grumman proposed an intermediate zone extraction system composed of six extraction wells with a combined design extraction rate ranging between 1,150 gallons per minute (gpm) and 1,450 gpm (Orion, 2006). Northrop Grumman installed the six extraction wells between 2006 and 2007.

A consent decree between EPA and Northrop Grumman for performance of remedial design and remedial action was entered in August 2009 superseding the previous UAO.

In July 2009, EPA conditionally approved the Final Design for the Intermediate Zone Remedy. In August 2009, Northrop Grumman installed the pipelines for the intermediate zone remedy, and planned to begin construction of the intermediate zone groundwater treatment plant in September 2009. However, the final installation of the connection of the pipelines to the storm drain and construction of the treatment plant for the intermediate zone remedy was halted after L.A. County and the LARWQCB objected to the discharge of the treated groundwater from the intermediate zone remedy to San Jose Creek, due to concerns regarding potential non-compliance with the L.A. County MS4 permit, as described above. In July 2009, EPA requested Northrop Grumman conduct a feasibility study to evaluate other options for the disposal or reuse of treated groundwater. In response, Northrop Grumman submitted a *Feasibility Study Addendum for the PVOU Intermediate Zone Remedy* in May 2010 (Orion and CDM, 2010).

Besides installing the intermediate zone extraction wells, completing the construction of the intermediate zone remedy pipeline system, and conducting the feasibility study to address the discharge issues, Northrop Grumman has also conducted groundwater sampling of selected wells on a semi-annual basis from 2002 to 2007, and submitted the *Compliance / General Monitoring Plan* for the intermediate zone remedy in March 2008.

4.2.3 Implementation of the Remedy to Address Contaminated Groundwater South of Puente Creek

On February 23, 2005, the LARWQCB (2005a) issued a letter to Northrop Grumman requiring the design and installation of a groundwater extraction and treatment system to contain the shallow zone groundwater plume downgradient of the former Benchmark facility. This system was to include the two regional shallow zone remedial action extraction wells for the PVOU (S8 and S12, located along Nelson Avenue) to intercept contaminated groundwater originating from the former Benchmark site and prevent it from migrating into the downgradient groundwater areas to the north of Puente Creek.

The extraction wells along Valley Boulevard were designed to extract groundwater primarily from the shallow zone at a depth interval approximately 90 to 100 ft bgs. The LARWQCB (2005b) approved the Remedial Action Plan in a letter dated 30 August 2005.

In 2006, Northrop Grumman proposed to revise the design of the Benchmark system into a single extraction network located along Nelson Avenue (Orion, 2006). In 2006, extraction wells EW1, EW3, and EW4 were installed along Nelson Avenue, and EW2 was installed one

block north of Nelson Avenue on the eastern end of Flagstaff Street to approximately 100 ft bgs.

EPA is currently reviewing the current plans for the south of Puente Creek remedial action and evaluating how this action will be integrated into the overall PVOU regional remedy.

5.0 Progress Since the Last Five-Year Review

This is the first five-year review for this Site. There are no recommendations from a previous review.

6.0 Five-Year Review Process

EPA's Five-Year Review team is a multi-disciplinary team of engineers, scientists, toxicologists, and environmental protection specialists, with technical support from EPA contractor CH2M HILL. Raymond Chavira is the EPA Remedial Project Manager for the PVOU.

The Five-Year Review team established the schedule for the Five-Year Review. The schedule has included community notification and involvement, a site inspection, document review, data review, and development and review of the Five-Year Review Report.

6.1 Community Notification and Involvement

EPA announced the 2010 Five-Year Review in a public notice published in three local newspapers on October 8, 2010. EPA plans to publish another public notice announcing the availability of this Five-Year Review Report in the local newspapers. Copies of the Final Five-Year Review Report will be available at the La Puente Public Library, West Covina Library, Rosemead Library, Hacienda Heights Public Library, and the EPA Superfund Records Center in San Francisco. Electronic copies of the Final Five-Year Review Report will be available on EPA Region 9's website: http://www.epa.gov/region9/pvou/

Over the last few years, EPA has conducted door-to-door construction notifications and regularly notified the residents and business owners around the vicinity of the Project Site of upcoming construction activities in the area. Additionally, to disseminate cleanup information and answer questions from the public, EPA has held several community open houses, and attended a parents' meeting at Nelson Elementary in early 2010.

EPA updated its Community Involvement Plan in 2008 and will continue to engage and inform the community about the investigation and cleanup of the Site.

6.2 Document Review

As a part of the five-year review process, numerous documents related to Site cleanup activities were reviewed. The documents chosen for review primarily focused on cleanup activities completed from 2005 to present, but ranged in publication date from 1998 to the present. Appendix A provides a list of the documents reviewed as part of this Five-Year Review.

6.3 Data Review

The PVOU aquifer is composed of three water bearing zones including the shallow zone, the intermediate zone, and the deep zone. Groundwater contamination in the PVOU is understood to be limited to the shallow and the intermediate zones. In the shallow zone, VOC contaminant concentrations have been detected up to 1,000 times MCLs; in the intermediate zone, VOC contaminant concentrations range from less than MCLs to 20 times MCLs. Plume maps were developed for the PVOU shallow and intermediate zone aquifers.

A detailed discussion of the data review analysis, including plume maps, can be found in Appendix B.

The key findings from the review of the PVOU shallow and intermediate zone remedies are presented below.

Shallow Zone Containment System North of Puente Creek

Groundwater analytical sampling data from 2003 was used in the design of the PVOU shallow zone remedy. These data indicate that contamination levels in the shallow zone are generally stable or declining. The only exception to this observation is monitoring well LCW-04 (also known as MW6-18) where TCE concentrations have been increasing since 2008. Concentrations at LCW-04 currently exceed the 10 times MCL performance criterion for the shallow zone remedy selected in the Interim ROD. Once the remedy is operational, further evaluation to assess contamination migration in this area will be conducted to determine if the system is sufficient to achieve hydraulic control.

The Mid-Valley Monitoring Program

Another integral part of the interim remedy is the Mid-Valley monitoring program designed to monitor potential contaminant migration from the intermediate zone into the deep zone. Two deep monitoring wells were installed to complete the monitoring network for the Mid-Valley monitoring program. The Mid-Valley monitoring wells have been sampled on a quarterly basis since 2008, and analytical sampling results indicate that contamination has not migrated into the deep zone.

Intermediate Zone Remedy

The intermediate zone at the mouth of the Puente Valley is now understood to consist of two distinct, relatively isolated aquifer units, i.e., the upper and lower intermediate zone intervals. The upper intermediate zone interval corresponds to the hydrogeologic zone defined in the original site conceptual model and contains the most significant contamination mass. The intermediate zone extraction wells were installed to hydraulically contain groundwater contamination in both the upper and the lower intermediate zone intervals upgradient of the production well field, and are not designed to capture contamination that has already bypassed the remedy wells and entered into the B7 Well Field. Once the remedy is operational, the radius of capture on the lateral extent of groundwater contamination in the intermediate zone downgradient of the production well field can be assessed. Additionally, further investigation to better define the downgradient extent of the groundwater contamination in the intermediate zone in this area will likely be needed.

Deep Production Wells

In 2007 and 2008, low level PCE and TCE contamination below MCLs was detected in groundwater from the two new production wells B24A and B24B in the B7 Well Field (California Department of Public Health, 2010). However, subsequent sampling conducted in 2009 and 2010 did not detect VOC contamination at these well locations.

Containment Remedy South of Puente Creek

The former Benchmark facility south of Puente Creek is the primary source of VOC and 1,4-dioxane contamination to the PVOU shallow zone and also appears to be a significant source of contamination to the eastern portion of the upper intermediate zone interval. Based on our current understanding of Site geology and chemically affected groundwater, the four groundwater extraction wells installed by Northrop Grumman, which are not yet operational, appear to be installed with screens that are too shallow to adequately contain the contamination originating from the former Benchmark facility. In addition, the water table has dropped 40 feet over the past five years, and the four downgradient Benchmark extraction wells are almost dry. Additional site investigation is needed to assess the lateral and vertical extent of contamination downgradient of the former Benchmark facility and south of Puente Creek, and deeper extraction wells may be needed to supplement the groundwater extraction system in this area.

Westernmost Plume Area Monitoring Program

Although not part of the interim remedy, the Westernmost Plume Area Monitoring Program was instituted to determine if containment of shallow zone groundwater in the Westernmost Plume area is necessary. VOC concentrations exceeding 20 times MCLs historically have been detected in the Westernmost Plume Area. This plume appears to be separated from the comingled shallow zone plume, which originates from the former Oakite facility. Although two new downgradient monitoring wells have been installed, all five of the Oakite facility wells have been paved over and are no longer accessible (GeoTrans, 2009). As such, the Westernmost Plume Area Monitoring network is currently incomplete.

6.4 Site Inspection

Inspection at the Site was conducted on September 10, 2010, by the EPA Project Manager and a CH2M HILL engineer. The purpose of the inspection was to assess and confirm the integrity of the remedy components that have been constructed to date. The site inspection checklist and select inspection photographs are provided in Appendix C of this Five-Year Review Report.

The remedy components that have been constructed consist of extraction wells and compliance wells for the shallow zone remedy, and extraction wells, associated vaults, and conveyance pipelines for the intermediate zone remedy. Representative components were inspected and were found to have been installed in accordance with plans and specifications, as documented in construction oversight reports on file at the EPA Region 9 office.

The existing B7 treatment plant facility that may be retrofitted and expanded to provide treatment of extracted groundwater from the intermediate zone was also inspected and was found to be in good condition. This facility was inspected because it continues to be a viable option as part of the remedy. The treatment plant is enclosed by a fence, with access only through a locking gate at the front of the facility.

No significant issues were identified during the inspection.

7.0 Technical Assessment

This section presents the technical assessment of the PVOU remedy.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The containment remedy that was selected in the 1998 Interim ROD and 2005 ESD has not been fully constructed and is not yet operational. The site inspection did not identify any significant issues with the remedy components that have been constructed to date. However, the data review identified the following two issues that need to be addressed in order for the remedy to achieve RAOs indentified in the Interim ROD and ESD:

- PCE and TCE have been detected at low concentrations below MCLs from two new production wells (B24A and B24B) screened in the deep zone.
- Selenium is considered a constituent of potential ecological concern. If discharge to surface water is to be implemented as part of the interim remedy at PVOU, there would be a potentially complete pathway for selenium to reach ecological receptors.

An evaluation of institutional controls (ICs) was performed to determine whether exposure to Site COPCs is sufficiently being prevented while the remedy is under construction (Appendix D). As discussed in Appendix D, the Main San Gabriel Basin Watermaster's authority to regulate and allocate water resources prevents unregulated pumping that could interfere with the remedy, and drinking water regulations prevent unacceptable exposure to contaminated Site groundwater. Therefore, these ICs (governmental controls) are effectively protecting human health at the Site while the remedy is being implemented.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?

No. The evaluation of the validity of exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection is presented below.

Standards and To Be Considered

The ARARs for the PVOU were originally presented in the 1998 Interim ROD, and additional ARARs were established in the 2005 ESD. A regulatory review was conducted to determine if regulations promulgated since the issuance of the Interim ROD and ESD, or regulations that were in place but not considered at the time the Interim ROD and ESD were issued, may impact the protectiveness of the interim remedy on human health and the environment (Appendix E). Federal and state laws, regulations, and policies that have been

promulgated or changed over the past five years, or that are otherwise applicable to the PVOU interim remedy, are described in Appendix E.

Based on observed selenium concentrations in areal groundwater analytical samples, anticipated discharges from both the shallow and intermediate zones would likely exceed the California Toxics Rule (CTR) freshwater criterion of 5 parts per billion (ppb), and would violate a legally applicable water quality criterion at the point of discharge to surface waters. If discharges of treated groundwater to surfaces waters were to exceed any applicable CTR criterion during the interim remedy, it is possible that the remedy would not be adequately protective of the environment.

Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The remedial actions for groundwater at the PVOU are still expected to be protective of human health based on a review of current Site conditions, exposure pathways, and toxicity values. There have not been any changes in Site conditions or human health exposure pathways since remedy selection. There have been a number of changes to the toxicity values for specific COPCs in groundwater at the PVOU since the baseline human health risk assessment was prepared in 1994, but these do not change the general conclusions of the original risk assessment. A detailed discussion of the Risk Assessment and Toxicology Analysis review for human health can be found in Appendix F.

The 1994 baseline ecological risk assessment was based on a qualitative evaluation of the regional VOC load and additive load from the PVOU project that would be present in the surface water at San Jose Creek, and did not identify any adverse impact to aquatic organisms. However, the PVOU treated groundwater is estimated to contain naturally occurring selenium concentrations exceeding the CTR criterion of 5 µg/L. Selenium is considered a constituent of potential ecological concern because of its bioaccumulative properties. If discharge to surface water is to be implemented as part of the interim remedy at PVOU, there would be a potentially complete pathway for selenium to reach ecological receptors, and a full-scale ecological risk assessment should be performed. Other end uses of the treated groundwater are currently being considered. A discussion of the Ecological Risk Assessment Problem Formulation is provided in Appendix G.

Cleanup Levels and Remedial Action Objectives

The remedy selected in the Interim ROD and ESD is considered an interim groundwater containment remedy, so cleanup standards were not established for the restoration of groundwater; therefore, there are no changes in the status of cleanup levels.

The RAOs identified in the Interim ROD and ESD are still sufficiently comprehensive and valid. The remedy is still under construction; therefore progress toward achieving the RAOs cannot yet be evaluated.

7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

As discussed in Section 7.2, the treated groundwater was estimated to contain naturally occurring selenium concentrations exceeding the CTR criterion of 5 µg/L. Selenium is considered a constituent of potential ecological concern, but was not identified as such in the Interim ROD and ESD. If discharge to surface water is still the preferred discharge option for the interim remedy, there would be a potentially complete pathway for selenium to reach ecological receptors, and it is possible that the remedy would not be adequately protective of the environment.

No weather-related events or natural disasters have affected the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

7.4 Technical Assessment Summary

The containment remedy that was selected in the 1998 Interim ROD and 2005 ESD has not been fully constructed and is not yet operational. The site inspection did not identify any significant issues with the remedy components that have been constructed to date; however, the data review identified several issues related to contaminant migration that need to be addressed during remedy implementation in order for the remedy to achieve the RAOs identified in the Interim ROD and the ESD. Meanwhile, institutional controls are effectively preventing unacceptable exposure to contaminated Site groundwater.

There are changes in standards identified as ARARs in the ROD and newly promulgated standards, related to surface water discharge that could call into question the protectiveness of the remedy. Selenium concentrations in treated groundwater discharges from both the shallow and intermediate zones would likely exceed the CTR freshwater criterion of 5 ppb, and would thus violate a water quality criterion at the point of discharge to surface waters. If treated groundwater (i.e., treatment for VOCs, 1,4-dioxane, and perchlorate) is discharged to surfaces waters as part of the interim remedy, there would be a potentially complete pathway for selenium to reach ecological receptors, and it is possible that the remedy would not be adequately protective of the environment.

EPA is currently working with the responsible parties to address the contaminant migration issues, and to evaluate other end uses for the treated groundwater. Once these issues are addressed, the remedy upon completion is expected to be protective of human health and the environment as intended by the ROD and as modified by the ESD.

8.0 Issues

Table 8-1 summarizes the issues identified during the five-year review process for the PVOU.

TABLE 8-1
Issues

Issue	Affects Protectiveness? (Y/N)	
	Current	**Future**
PCE and TCE have been detected at low concentrations below MCLs from two new production wells (B24A and B24B) screened in the deep zone.	N	Y
Selenium is considered a constituent of potential ecological concern. If discharge to surface water is to be implemented as part of the PVOU interim remedy, there would be a potentially complete pathway for selenium to reach ecological receptors.	N	Y

9.0 Recommendations and Follow-up Items

Issues and recommendations identified during the five-year review process for the PVOU are presented in Table 9-1 below.

TABLE 9-1
Recommendations

Issue	Recommendations / Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date
PCE and TCE have been detected at low concentrations below MCLs from two new production wells (B24A and B24B) screened in the deep zone.	Perform close monitoring of these two wells and evaluate the nature and extent of contamination in the deep zone if VOCs continue to be detected in these wells.	Northrop Grumman	EPA	2012
Selenium is considered a constituent of potential ecological concern. If discharge to surface water is to be implemented as part of the interim remedy at PVOU, there would be a potentially complete pathway for selenium to reach ecological receptors.	Evaluate and select other end use(s) for the treated groundwater. For surface water discharge of treated groundwater, ARARs for applicable water quality criteria (e.g., selenium), and a full-scale ecological risk assessment should be completed.	Carrier/UTC Northrop Grumman	EPA	2012

The containment remedy that was selected in the 1998 Interim ROD and 2005 ESD has not been fully constructed and is not yet operational. However, the data review identified several design issues that do not affect protectiveness but need to be addressed during design: assess contamination migration in the shallow zone and the impact on the shallow zone remedy as currently designed; evaluate data relative to the intermediate zone contamination downgradient of the B7 production well field area; perform additional investigation to assess the lateral and vertical extent of groundwater contamination downgradient of the former Benchmark facility and south of Puente Creek; and, complete the monitoring network for the Westernmost Plume Area by locating the former Oakite facility wells, or installing new wells if existing wells are inaccessible or inoperable.

10.0 Protectiveness Statement

The interim remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Although potential contaminant migration issues and a potentially complete ecological exposure pathway associated with surface water discharge have been identified, EPA is currently working with the responsible parties to address these issues in the design of the remedy. Once the design is finalized and the remedy is fully constructed and operational, it is anticipated that the remedy will achieve the RAOs and be protective of human health and the environment. Meanwhile, institutional controls (governmental controls) are effectively preventing unacceptable human exposure to contaminated Site groundwater.

11.0 Next Review

The next comprehensive Five-Year Review for PVOU will be completed by March 2016, five years from the signature date of this review.

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Appendix A
Documents Reviewed

APPENDIX A

Documents Reviewed

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Appendix B
Data Review Memorandum

San Gabriel Valley Superfund Site
Puente Valley Operable Unit Five Year Review

Data Review Memorandum

PREPARED FOR: United States Environmental Protection Agency, Region 9

PREPARED BY: CH2M HILL

DATE: November 4, 2010

1.0 Introduction

This technical memorandum presents the findings of a review of monitoring data for the shallow and intermediate zone groundwater remedies for the Puente Valley Operable Unit (PVOU) Superfund Site located in Los Angeles County, California. As described in the 1998 Interim Record of Decision (Interim ROD), the selected remedy for PVOU is Alternative 3: containment of groundwater contaminated with volatile organic compounds (VOCs) in the shallow and intermediate groundwater zones at the mouth of Puente Valley (EPA, 1998). Containment will be achieved by creating hydraulic control with groundwater extraction wells, treating the extracted groundwater to remove VOCs, and groundwater monitoring to evaluate and confirm plume capture. The Interim ROD also states that the selected alternative with be implemented using a performance based approach. The Environmental Protection Agency, Region 9, (EPA) updated the Interim ROD in June 2005 by issuing an Explanation of Significant Differences (ESD) in response to the detection of two emerging compounds, 1,4-dioxane and perchlorate, in PVOU groundwater (EPA, 2005).

The selected remedy described in the Interim ROD is classified as an interim action. Additional remediation may be needed in the future to clean up contamination remaining in the ground water. EPA will use the information collected during operation of the selected interim remedy to design the final remedy.

This technical memorandum evaluates data collected since the issuance of the Interim ROD and the ESD in the context of the initial site conceptual model (SCM) upon which the Interim ROD was based. The changes in known plume extents, refinements made to the SCM, and potential gaps in the data being collected are discussed.

2.0 Background

The PVOU is part of the San Gabriel Valley Superfund Site located in eastern Los Angeles County, California. Puente Valley is a 12-1/2-mile-long and 2- to 2-1/2-mile-wide subbasin, located within the southeastern portion of the Main San Gabriel Basin. The PVOU also includes the "mouth of Puente Valley" that includes the portion of the San Gabriel Basin that contains the groundwater contamination plumes that originate in Puente Valley. The majority of the Puente Valley is highly industrialized and is located primarily within the

City of Industry. The PVOU also includes land within the City of La Puente and unincorporated Los Angeles County. VOCs such as tetrachloroethene (PCE), trichloroethene (TCE), and 1,1-dichloroethene (1,1-DCE), and the emergent compound 1,4-dioxane are the most prevalent contaminants found in the groundwater within the San Gabriel Basin and the PVOU. EPA identified four broad areas of groundwater contamination within the San Gabriel Basin for listing onto the National Priorities List (NPL) in May 1984; Puente Valley is Area 4.

In April 1993, EPA issued a draft statement of work (SOW) for an interim remedial investigation (RI)/feasibility study (FS) to address groundwater contamination in the PVOU (CH2M, 1997). The Puente Valley Steering Committee (PVSC), which was formed by 42 of the potentially responsible parties (PRPs), conducted the Interim RI/FS from 1994 to 1997. Based on the findings of the Interim RI/FS, EPA issued the Interim ROD to address the shallow zone and intermediate zone groundwater contamination in PVOU in September 1998.

2.1 Hydrogeologic Setting

The San Gabriel Basin is a down dropped fault block formed by downward movement along faults near the basin perimeter, creating a bowl shaped structure bearing permeable alluvial sediments (CDM, 1996). The principal water-bearing formations of the San Gabriel Basin are relatively coarse-grained, undifferentiated alluvial sediments derived mostly from the crystalline rocks of the San Gabriel Mountains, as well as the Repetto, Merced, Puente, and San Jose Hills. The water-bearing sediments are surrounded by, and underlain by, relatively impermeable bedrock. The aquifer system in the main San Gabriel Basin is characterized by thick deposits of alluvium with interbedded and laterally discontinuous lenses of unconsolidated sediments.

The Puente Valley subbasin is filled with sediments derived from the Puente and San Jose Hills. These deposits range in thickness from approximately 1,300 feet in the northwest, near the mouth of the valley where it meets the Main San Gabriel Basin, to less than 25 feet in the east portion and along the valley perimeter. In general, the alluvial sediments in Puente Valley are finer-grained and have higher clay contents than deposits in the Main San Gabriel Basin. Near the mouth of Puente Valley, a transition in sediment composition from fine- to coarse-grained facies occurs where the valley meets the Main San Gabriel Basin. The bedrock underlying the alluvial sediments in Puente Valley is composed primarily of consolidated marine sedimentary rocks and is relatively impermeable (CDM, 1996).

Although the coarse-grained units are generally discontinuous, three relatively higher permeable zones within the Puente Valley were identified during the Interim RI/FS (CH2M, 1997). These relatively higher permeable zones are informally referred to as the shallow zone, intermediate zone, and deep production zones. Relatively fine-grained confining zones dominated by silt and clay separate the more permeable zones and locally contribute to vertical head and water quality difference between aquifer zones.

In Puente Valley, areal recharge of precipitation is the primary component of groundwater inflow. Subsurface groundwater inflow at the east boundary from the adjacent Spadra Basin is relatively minor (CH2M, 1997). Major groundwater discharge components include discharge to San Jose Creek, pumping of groundwater for public water supply in the B7 Well Field located at the mouth of the Puente Valley, and groundwater flow toward the

Main San Gabriel Basin and subsequently into the Central Basin through Whittier Narrows. Climatically induced regional water level fluctuation and extractions from the public water supply wells are the most important forces that control water level changes in the Puente Valley.

2.2 Groundwater Contamination in PVOU

Groundwater contamination in the PVOU is regional in scale. Groundwater contamination (in the form of VOCs such as PCE, TCE, 1,1-DCE, and 1,4-dioxane) is primarily found in the shallow and the intermediate zones of the PVOU aquifers. VOCs also have been detected in groundwater from several municipal drinking water supply wells located in the B7 Well Field at concentrations above maximum contaminant levels (MCLs). Although not part of the remedy, water treatment with air stripping has been implemented by the water purveyors to remove VOCs from these water supply wells. Identified sources of the groundwater contamination in the PVOU include industries engaged in metal cleaning, coating, and manufacturing; chemical product manufacturing; plastics; aerosols; electric component manufacturing; printing; rubber manufacturing; and die casting (EPA, 1998).

3.0 Remedial Action Objectives

As stated in the 1998 Interim ROD, EPA's Remedial Action Objectives (RAOs) for PVOU are to:

- Prevent exposure of the public to contaminated ground water;
- Inhibit contaminant migration from the more highly contaminated portions of the aquifer to the less contaminated areas or depths;
- Reduce the impact of continued contaminant migration on downgradient water supply wells; and
- Protect future uses of less contaminated and uncontaminated areas.

The RAOs for the PVOU do not include numeric, chemical-specific objectives in the aquifer or a time frame for restoration because it is an interim action. The performance criteria established in the Interim ROD and ESD include the following:

- For the shallow zone remedy, lateral and vertical containment of VOCs and 1,4-dioxane exceeding 10 times their respective containment levels (based on MCLs and State Notification Levels); and
- For the intermediate zone remedy, lateral and vertical containment of VOCs and 1,4-dioxane exceeding their respective containment levels (based on MCLs and State Notification Levels).

4.0 Data Review

The Interim ROD for the PVOU issued in 1998 was based on findings from the Interim RI/FS conducted between 1994 and 1997. Subsequent field investigations supporting the remedial design and remedial actions generated additional data that led to a refined understanding of contaminant distributions in the PVOU aquifer zones and an updated SCM for the PVOU. This section describes the updated SCM in comparison with the initial SCM upon which the Interim ROD was based. In addition, this section reviews the

effectiveness of the shallow zone and intermediate zone remedies.

4.1 Site Conceptual Model for PVOU

Initial SCM Developed for RI

The Interim RI conducted in the 1990s led to the development of the initial SCM for PVOU. Based on the initial SCM, the Interim ROD selected a remedy to contain contaminant migration at the mouth of Puente Valley. The initial SCM included the following components:

- The hydrostratigraphic units in the mouth of Puente Valley dip to the north and west.
- 1997 plume maps were developed for the PVOU shallow and intermediate zone aquifers and are presented on Figures 1 and 2, respectively. Groundwater contamination is primarily within the shallow and the intermediate zones. In the shallow zone, VOC contaminant concentrations are as high as 1,000 times MCLs; in the intermediate zone, VOC contaminant concentrations range from less than MCLs to 20 times MCLs.
- Three major aquifer units, including the shallow zone, intermediate zone, and the deep production zones were identified. The three aquifer zones were defined based on the definition of the "663" zone (intermediate zone) and the need to distinguish this aquifer from the aquifers above and below.
- The "663" zone (intermediate zone) plays a significant role in transmitting contaminants at depth, i.e., the contaminants originating in the mid-valley region are transmitted through the intermediate zone into the mouth of Puente Valley and eventually on to production wells in the B7 Well Field. Containment of contamination in the intermediate zone is critical to preventing adverse impacts to deep zone wells that are used for drinking water supply.

Refined SCM Following Field Investigations Supporting the Remedial Design

As a part of the design process, EPA performed additional field investigations to aid in the understanding of the extent of groundwater contamination and subsurface conditions at the mouth of Puente Valley. EPA conducted a shallow zone field investigation including baseline groundwater sampling of existing monitoring wells, cone penetration testing with in-situ groundwater sampling, and the installation of eleven new monitoring wells in 2002 and 2003. In 2002 and 2003, Northrop Grumman Systems Corporation (Northrop Grumman), the lead responsible party for the intermediate zone remedy, conducted an additional field investigation of the intermediate zone including the installation of seven conventional monitoring wells and one multiple-port monitoring well and subsequent sampling of these wells.

Following the field investigations, the interpretation of the extent of contamination and the characteristics of the subsurface were refined. The shallow zone contamination becomes deeper as it migrates down-dip to the north within the mouth of Puente Valley. Likewise, the subsurface geology in the intermediate zone, which lies below the shallow zone, also dips down as the contamination migrates north within the mouth of Puente Valley.

Consequently, the contamination in the shallow and intermediate zones is located at greater depths at the mouth of the Puente Valley than at upgradient locations.

Figures 3 and 4 show the refined shallow and intermediate zone plume extents, respectively, based upon 2003 data. These refined plume maps were included in the 2005 ESD. The shallow and the intermediate zone remedies were also designed based on the refined plume maps.

Further Refinement of the SCM Following the ESD

Following the issuance of the ESD for PVOU in 2005, nine shallow zone and six intermediate zone extraction wells were installed and aquifer-tested in 2006 and 2007. Additional hydrogeologic data were collected during the installation of compliance and sentinel monitoring wells for the shallow zone remedy in 2008 and 2009 and the installation of two explorative borings (BH-01 and BH-02) downgradient of the former Benchmark facility to the south of the Puente Creek in 2010. Data acquired during and after the installation of these wells provided valuable information to evaluate and further refine the SCM for the PVOU. In summary the additional data from 2008-2009 indicated the following:

- The newly acquired data generally support the original SCM, i.e., the PVOU aquifer is composed of three aquifer zones including the shallow zone, intermediate zone, and the deep production zone. These hydrostratigraphic units dip to the north and west. Groundwater contamination in PVOU is limited to the shallow and the intermediate zones.

- The intermediate zone contamination at the mouth of the Puente Valley extends into the coarse-grained units deeper than what was discovered during the Interim RI. For the purpose of addressing the intermediate zone contamination, the intermediate zone at the mouth of the valley consists of two distinct, relatively isolated aquifer units, i.e., the upper and lower intermediate zone. The upper intermediate zone (also referred to as the Merged Zone) corresponds to the intermediate zone defined in the original SCM, and it contains the vast majority of the intermediate zone contamination mass.

- Figures 5 and 6 illustrate the refined plume maps that incorporate the field data obtained after the installation of the shallow zone and intermediate zone remedy extraction wells, and the shallow zone compliance/sentinel monitoring wells. Except for the leading edge of the eastern lobe of the shallow plume where there is evidence of plume migration, the shallow zone (Figures 3 and 5) and intermediate zone (Figures 4 and 6) plume extents remain largely unchanged from 2003.

4.2 Review of the Shallow Zone Remedy

Shallow Zone Containment System North of Puente Creek

The PVOU shallow zone remedy, which includes nine shallow zone remedy extraction wells, was designed based on the plume map developed in 2003 as shown on Figure 3. Discrete-depth sampling and geophysical borehole logging were conducted during the installation of the shallow extraction wells to screen these wells over zones containing the contamination exceeding the shallow zone performance criteria.

A review of historical VOC data for shallow zone monitoring wells revealed that, in general, groundwater contamination concentrations in the shallow zone aquifer is stable or decreasing (GeoTrans, 2010). The only exception to this observation is well LCW-04 (also designated as MW6-18), which is located at the leading edge of the eastern lobe of the shallow zone plume (Figure 5), and was installed during the field investigation conducted in 2003. Figure 7 presents time series plots of MW6-18. The TCE concentration at MW6-18 has been relatively stable, ranging from approximately 20 µg/L to 30 µg/L from 2003 to 2008. However, an increasing TCE concentration trend has been observed at this well since 2008. The most recent TCE concentration, measured in November 2009, was 64.3 µg/L, well above the performance criteria of 10 times MCL (10xMCL) for TCE (50 µg/L) (Figure 7).

The nearest shallow extraction well (S5) is located about 400 feet to the south (upgradient) of LCW-04. Therefore, the current monitoring data suggest that the 10xMCL contamination in the shallow zone has migrated downgradient of extraction well S5. Extraction well S5 was designed to intercept the contaminated groundwater from the upgradient areas and was not designed to reverse regional groundwater flow to capture the contamination in the downgradient area. Analysis of plume migration in this area is recommended to assess the plume migration rate and to determine whether shallow zone extraction well S5 is adequate to capture the shallow zone plume exceeding 10xMCLs at this location. It may be necessary to install an additional extraction well downgradient of MW6-18 if hydraulic control of the area exceeding the 10xMCL contour is not provided by extraction well S5.

Westernmost Plume Area Monitoring Program

The westernmost plume is located at the mouth of Puente Valley and to the west of the comingled shallow zone plume (Figures 1, 3, and 5). VOC concentrations exceeding 20 times MCLs historically have been detected in this area. This plume appears to be separated from the comingled shallow plume and originate from the Oakite facility. Although containment of the westernmost plume by the interim shallow zone remedy is not currently required, monitoring of the westernmost plume is an integral part of the shallow zone remedy.

Carrier Corporation (Carrier), the lead responsible party for the shallow zone remedy, agreed to implement the westernmost plume area monitoring and submitted the *Westernmost Plume Area Monitoring Well Installation Work Plan* as Appendix D of the *Remedial Design Work Plan, Interim Shallow Zone Remedy, Puente Valley Operable Unit* in 2005 (GeoTrans, 2005). The Remedial Design Work Plan proposed a westernmost plume monitoring network comprised of five existing Oakite facility wells (MW-1, MW-2, MW-4, MW-5, and MW-6) and two newly installed wells downgradient of the Oakite facility. Carrier installed and sampled the two new monitoring wells MW6-20A and MW6-20B in 2008 and submitted the draft well completion report in 2009 (GeoTrans, 2009a). MW6-20A and MW6-20B haven been monitored on a quarterly basis since September 2008 and there has been no indication of either lateral or vertical contaminant migration in this area.

However, all five of the Oakite facility wells have been paved over and are no longer accessible (GeoTrans, 2009a). As such, the westernmost plume monitoring network is currently incomplete and may not serve the purpose as defined in IROD and ESD. Efforts should be made to locate the Oakite facility wells. If the Oakite facility wells are no longer

accessible or operable, then the need for new monitoring wells should be evaluated to complete the westernmost plume monitoring network.

The Mid-Valley Monitoring Program

As part of the shallow zone groundwater remedy, the Consent Decree requires Carrier to implement the PVOU mid-valley monitoring including the installation and monitoring of sufficient wells in the intermediate and deep production groundwater zones in the mid-valley area to monitor vertical and horizontal contaminant migration.

Carrier installed two deep monitoring wells, D-1 and D-2, in 2008 and submitted the draft well completion report in 2009 (GeoTrans, 2009b). The two deep monitoring wells have been sampled on a quarterly basis since they were installed in July 2008. No groundwater contamination has been detected in groundwater from these two wells.

4.3 Review of the Intermediate Zone Remedy

The intermediate zone extraction wells were installed to contain contamination in both the upper and the lower intermediate zones, based on the discrete-sampling results conducted during well installation. However, the 2008-2009 field investigations revealed potential data gaps in the SCM. One significant data gap is the extent of contamination to the north of the production well field within the intermediate aquifer. The active municipal drinking water supply wells in the PVOU well field include San Gabriel Valley Water Company (SGVWC)'s wells B7C, B7E, B9B, B11A (shutdown in 2005)and B11B and Suburban Water Systems' well 147W3 (see Figure 6). These wells pump groundwater primarily from the deep production zone. However, production wells, B7C, B11A, B11B and 147W3 also partially extract groundwater from the contaminated intermediate zone, and VOC contamination has been detected at these wells. There are insufficient monitoring wells within the intermediate zone downgradient of these production wells to estimate the extent of the plume.

The RAOs for the PVOU remedy include inhibiting contaminant migration from the more highly contaminated portions of the aquifer to the less contaminated areas or depths, and reducing the impact of contaminant migration on these water supply wells. Based on an agreement between Northrop Grumman and SGVWC, production at B7C, B11A and B11B will be replaced with production wells screened only in the uncontaminated deep production zone. Two replacement wells (B24A and B24B) were installed in the vicinity of B7C in 2005 as replacement wells for the production wells partially screened in the intermediate zone including B7C, B11A and B11B. They were installed in the vicinity of B7C and are screened only in the deep production zone (both are screened from 600 to 1200 feet below ground). Production at B24A and B24B started in late 2006. However, VOC contamination has been detected in groundwater from the two new production wells B24A and B24B with multiple detection of PCE (up to 4.2 μg/L) and TCE (up to 1.3 μg/L) at B24B in 2007 and 2008, and one detection of PCE contamination (0.88 μg/L) at B24A in 2008. No VOC contamination was detected at these two wells in the subsequent samplings in 2009 and 2010. The nature of VOC contamination at B24A and B24B can't be determined at this time. Close monitoring is recommended and further evaluation is needed should there be more detections of VOC contamination in the future.

The only remaining production well that will continue to extract groundwater from the intermediate zone is 147W3. VOC contamination has been detected at this well since the

early 1980s, but historically has remained below MCLs. In March 2010, groundwater from 147W3 contained concentrations of 7 µg/L PCE, 6.6 µg/L TCE and 9 µg/L 1,1-DCE, which exceed their respective MCLs, but subsequent sampling confirmed that concentrations are consistently below the MCLs.

One primary objective of the interim remedy for the intermediate zone is to prevent migration of contaminated groundwater originating from the mid-valley region into the production wells in the B7 Well Field. Five of the intermediate zone extraction wells (IZ-1, MZ-1, IZ-2, MZ-2, and MZ-3) were installed in a line perpendicular to groundwater flow upgradient of well B7C (Figure 6) to capture contamination originating in the mid-valley region. These intermediate zone extraction wells are not designed to capture contamination that has already bypassed the remedy wells and entered into the B7 Well Field. Further investigation is needed to better understand groundwater contamination in this area. Evaluation of additional actions to mitigate the contamination in this area should be conducted following the collection of field data. Intermediate zone extraction well IZ-EAST, which is located just upgradient of 147W3, contains contamination originating primarily from the vicinity of the former Benchmark facility. In addition, a new monitoring well (M2) is proposed to be installed to the north of 147W3 to monitor the groundwater entering the well from the north.

4.4 Review of the Containment Remedy South of Puente Creek

The former Benchmark facility is the largest single source of VOC and 1,4-dioxane contamination to the PVOU shallow zone. The remedy for the former Benchmark facility is specifically designed to mitigate the highly contaminated groundwater to the south of Puente Creek emanating from this former facility. The lead regulatory agency for this remedy was recently changed from the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB) to EPA.

During 2009 and 2010, GeoTrans, on behalf of Carrier, installed two exploratory borings south of Puente Creek (BH-01 and BH-02) within the shallow zone VOC plume downgradient of the former Benchmark facility to assess the vertical extent of groundwater contamination upgradient of the PVOU shallow zone remedy. These borings were located approximately 200 feet (BH-01) and 1300 feet (BH-02) south of Puente Creek. Discrete-depth groundwater samples from BH-01 contained VOC concentrations exceeding 100 times MCLs (exceeding 2900 ug/L total VOCs) at 133 ft bgs and concentrations near 10 times MCLs at 193 ft bgs. Groundwater samples from BH-02 contained VOC concentrations exceeding 10 times MCLs at a depth of 147 ft bgs and exceeding MCLs at 167 ft bgs.

These data indicate that the four extraction wells installed by Northrop Grumman downgradient of the former Benchmark facility south of Puente Creek (EW1, EW2, EW3, and EW4) in 2006, which are screened from the water table to approximately 100 ft bgs, are not deep enough to contain contamination originating from the former Benchmark facility exceeding 10 times or even 100 times MCLs. Furthermore, the depth to groundwater in this vicinity has dropped approximately 40 feet of the past five years, and therefore, the four Benchmark downgradient extraction wells extend below the water table by only about five to 10 feet. Therefore, deeper extraction wells are needed to supplement the groundwater extraction system downgradient of the former Benchmark facility. Prior to installation of deeper extraction wells south of Puente Creek, further site characterization downgradient of

the former Benchmark facility and south of Puente Creek is needed to assess the lateral extent and depth of contamination.

5.0 Summary and Conclusions

The following summarizes the findings from the review of the PVOU shallow and intermediate zone remedies:

- The selected remedy for PVOU was based on the initial SCM developed during the Interim RI/FS with the primary goal of containing contamination at the mouth of the Puente Valley. Data acquired subsequent to the issuance of the Interim ROD generally support the initial SCM, i.e., the PVOU aquifers are composed of three aquifer zones including the shallow zone, intermediate zone, and the deep production zone. These hydrostratigraphic units dip to the north and west. Groundwater contamination in PVOU is limited to the shallow and the intermediate zones.

- The PVOU shallow zone remedy was designed based on the plume map refined in 2003. Sampling results indicate that contamination in the shallow zone is generally stable or declining. The only exception to this observation is monitoring well LCW-04 (also known as MW6-18) where TCE concentrations have been increasing since 2008. Concentrations at LCW-04 currently exceed the 10xMCL performance criterion for the shallow zone remedy set forth in the Interim ROD. Further evaluation is needed to assess contamination migration in this area and the impact on the current shallow remedy. An additional groundwater extraction well downgradient of this well may be necessary to achieve hydraulic control of the eastern lobe of the shallow zone plume.

- Monitoring of the westernmost plume area downgradient of the Oakite facility is an integral part of the shallow zone remedy. The proposed monitoring network consists of five monitoring wells previously installed on the Oakite facility and two new monitoring wells located downgradient (to the north) of the plume. The two new monitoring wells were installed in 2008 and have subsequently been monitored on a quarterly basis. However, all five of the Oakite facility wells have been paved over. As such, the monitoring network for the Westernmost Plume Area is considered incomplete. Efforts should be made to locate the Oakite facility wells, and assess if they are still operable. If these wells are no longer accessible or operable, then new monitoring wells may be needed to complete the westernmost plume monitoring network. The sampling results from the two recently installed downgradient monitoring wells indicate concentrations that appear stable and well below 10 times MCLs.

- Another integral part of the interim remedy is the mid-valley monitoring program designed to monitor potential contaminant migration into the deep aquifer zone from the intermediate zone. Two deep monitoring wells were installed to complete the monitoring network for the mid-valley monitoring program. The mid-valley monitoring wells have been sampled on a quarterly basis since 2008, and do not indicate any contamination migration into the deep production zone.

- The intermediate zone at the mouth of the Puente Valley is now understood to consist of two distinct, relatively isolated aquifer units, i.e., the upper and lower intermediate zone. The upper intermediate zone (Merged Zone) corresponds to the intermediate zone defined in the original SCM and it contains the vast majority of the intermediate zone contamination mass. The intermediate zone extraction wells were installed to contain contamination in both the upper and the lower intermediate zone upgradient of the production well field, and are not designed to capture contamination that has already bypassed the remedy wells and entered into the B7 Well Field. The lateral extent of contamination and contaminant concentrations in the intermediate zone downgradient of the production well field are currently uncertain. Further investigation to better define the downgradient extent of the groundwater contamination in the intermediate zone is recommended. Evaluation of additional actions to mitigate the intermediate zone contamination downgradient of the production well field should be conducted following the collection of field data.
- The former Benchmark facility south of Puente Creek is the primary source of VOC and 1,4-dioxane contamination to the PVOU shallow zone and also appears to be significant source of contamination to the eastern portion of the upper intermediate zone (Merged Zone). The four groundwater extraction wells installed by Northrop Grumman are not sufficiently deep to contain the contamination originating from the former Benchmark facility, and do not serve the function of formerly planned shallow zone remedy extraction wells S8 and S12. In addition, the water table has dropped 40 feet over the past 5 years, and the four downgradient Benchmark extraction wells are almost dry. Additional site investigation is needed to assess the lateral and vertical extent of contamination downgradient of the former Benchmark facility and south of Puente Creek, and deeper extraction wells are needed to supplement the groundwater extraction system in this area.
- PCE and TCE contamination has been detected in groundwater from the two new production wells B24A and B24B in 2007 and 2008. No VOC contamination was detected at these wells in the subsequent samplings conducted in 2009 and 2010. These wells are installed in the deep production zone which is expected to be free of VOC contamination. Close monitoring of these two wells is recommended and the nature of contamination should be evaluated if another detection of VOC contamination is observed in the future.

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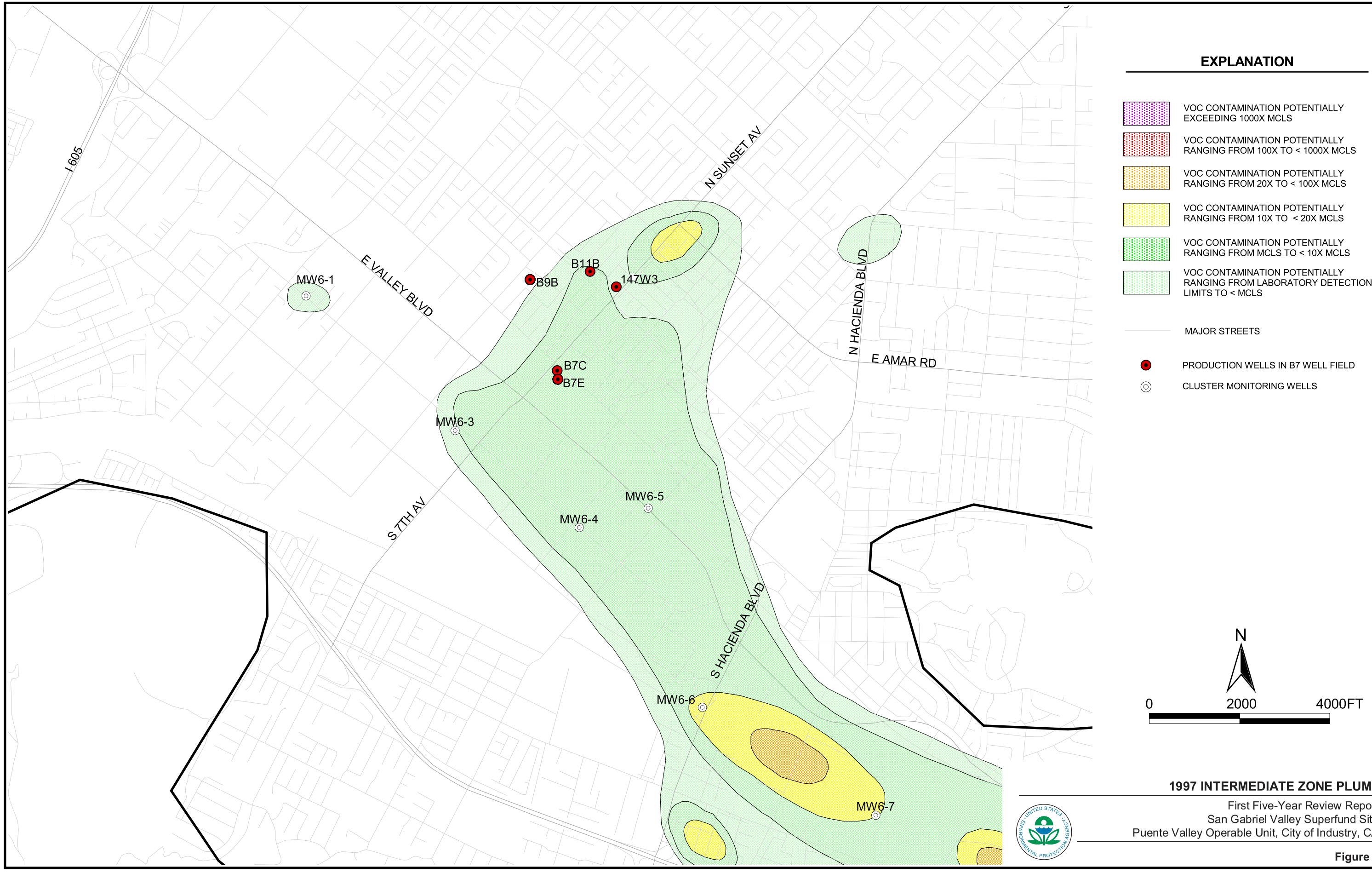
1997 SHALLOW ZONE PLUME

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 1

GIS2:\PVOU\Plots\2010\5YR_Figures.apr



1997 INTERMEDIATE ZONE PLUME

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 2

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2003 SHALLOW ZONE PLUME

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 3

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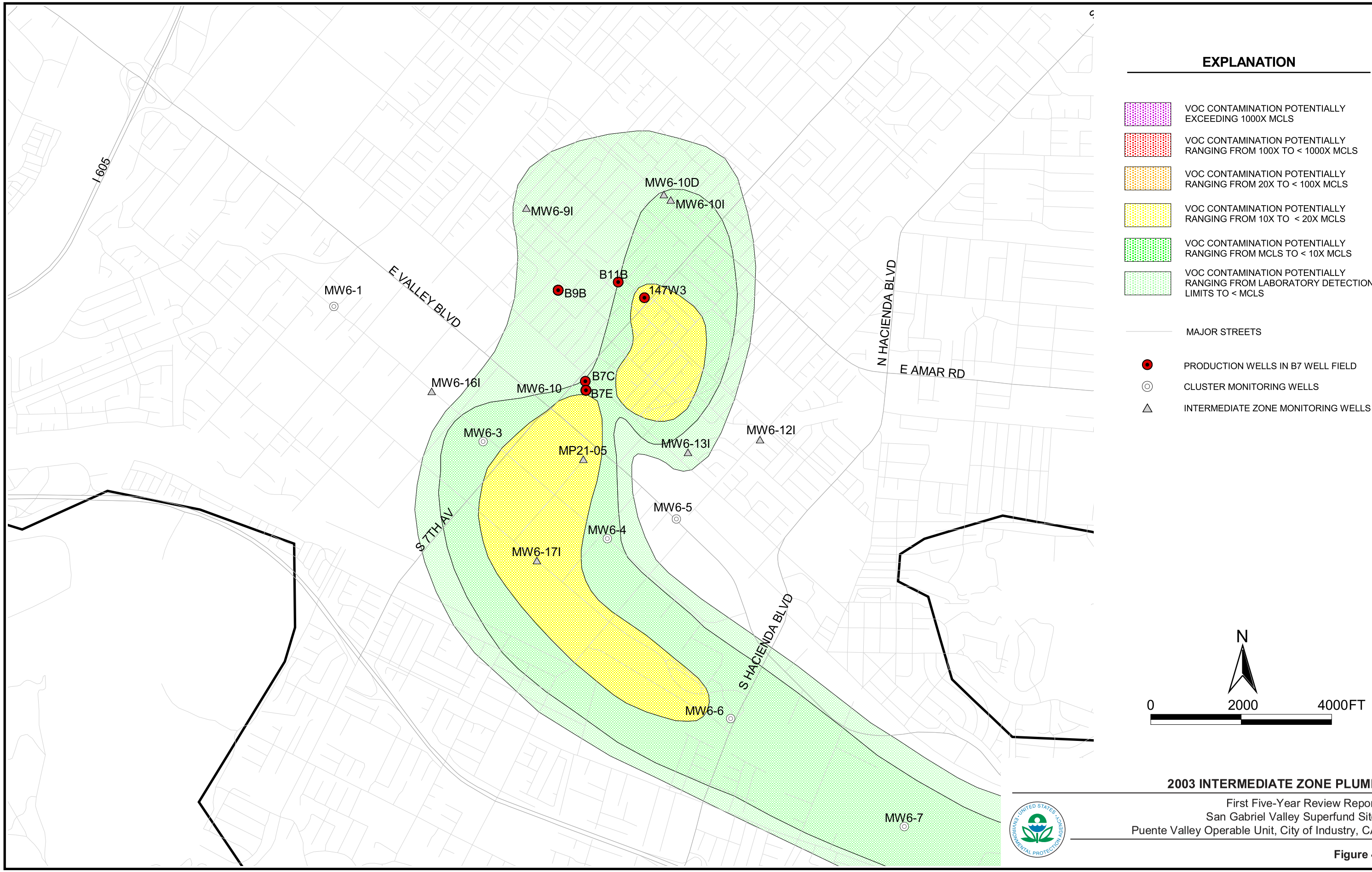

2003 INTERMEDIATE ZONE PLUME

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 4

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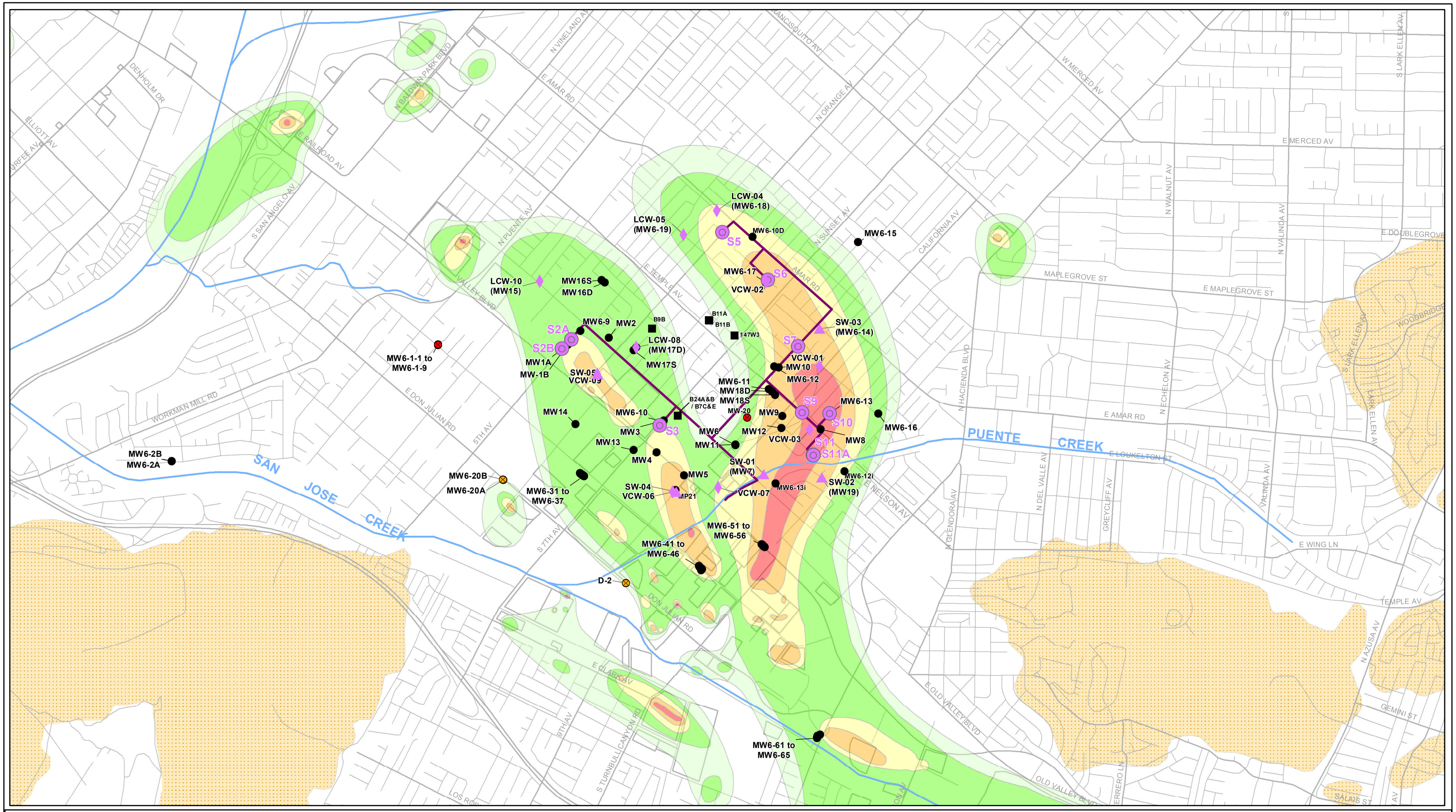


EXPLANATION

- Shallow Zone Extraction Wells
- Shallow Sentinel Wells
- Shallow Compliance Wells
- Mid-Valley Monitoring Wells
- Multiple Port Monitoring Wells
- Monitoring Wells
- Production Wells in B7 Well Field
- Shallow Zone Pipeline
- Stream
- Facility Property
- Bedrock

Shallow Zone VOC Contamination

- VOCs Contamination Potentially Ranging From Laboratory Detection Limits To MCLs
- VOCs Contamination Potentially Ranging From MCL To < 10X MCLs
- VOCs Contamination Potentially Ranging From 10X To < 20X MCLs
- VOCs Contamination Potentially Ranging From 20X To < 100X MCLs
- VOCs Contamination Potentially Ranging From 100X To < 1000X MCLs

N

2,000 0 2,000 Feet

2010 SHALLOW ZONE PLUME

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 5

EXPLANATION

- Intermediate Zone (IZ) Extraction Wells
- Other IZ Monitoring Wells (Existing)
- Other IZ Monitoring Wells (Proposed)
- Intermediate Zone Sentinel Wells (Existing)
- Intermediate Zone Compliance Wells (Existing)
- Intermediate Zone ComplianceWells (Proposed)
- Mid-Valley Monitoring Wells
- Multiple Port Monitoring Wells
- Monitoring Wells
- Production Wells in B7 Well Field
- Intermediate Zone Pipeline
- Stream
- Facility Property
- Bedrock

Intermediate Zone VOC Contamination

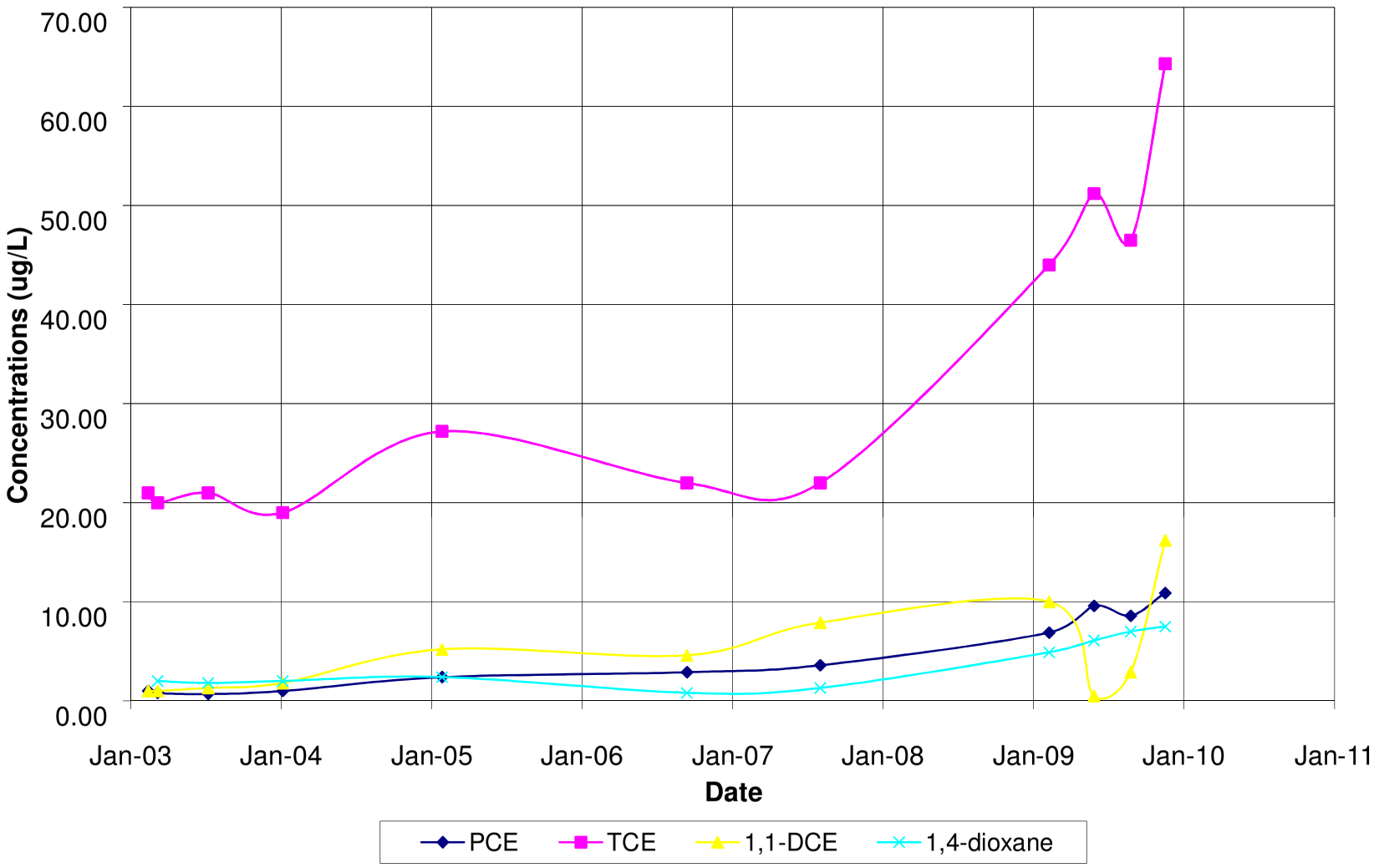
- VOC Contamination Potentially Ranging From Laboratory Detection Limits to MCLs
- VOC Contamination Potentially Ranging From MCLs To < 10X MCLs
- VOC Contamination Potentially Ranging From 10X MCLs To < 20X MCLs

N

2,000 0 2,000 Feet

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 6



TIME SERIES PLOTS FOR LCW-04 (MW6-18)

First Five-Year Review Report
San Gabriel Valley Superfund Site
Puente Valley Operable Unit, City of Industry, CA

Figure 7

Appendix C
Site Inspection

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Puente Valley Operable Unit (Shallow Zone Remedy)	**Date of inspection:** September 10, 2010
Location and Region: El Monte/Industry, California	**EPA ID:** CAD980817985
Agency, office, or company leading the five-year review: U. S. Environmental Protection Agency, Region 9	**Weather/temperature:** Clear, approx. 84^{O}F

Remedy Includes: (Check all that apply)

Landfill cover/containment	Monitored natural attenuation
Access controls	Groundwater containment
Institutional controls	Vertical barrier walls
√ Groundwater pump and treatment	
Surface water collection and treatment	
Other_____	

Attachments: Inspection team roster attached √ Site map attached (See Figure 1)

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

1. **Groundwater Monitoring Records** √ Readily available Up to date N/A
Remarks:

The remedy has not been fully constructed and is not operational at this time. However, historical groundwater data and data from ongoing groundwater monitoring tasks being performed in support of the remedy are on file at the EPA Region 9 office.

III. ACCESS AND INSTITUTIONAL CONTROLS Applicable √ N/A

A. General

1. **Land use changes on site** √ N/A
Remarks:

No land use changes on site.

2. **Land use changes off site** √ N/A
Remarks:

Land use along the proposed pipeline route along public streets has not changed.

IV. GROUNDWATER/SURFACE WATER REMEDIES √ Applicable N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines √ Applicable N/A

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

√ Good condition All required wells properly operating Needs Maintenance N/A

Remarks:

Fourteen locations, including extraction wells and compliance wells, were observed during the inspection, as indicated on Figure 1. Representative extraction and compliance wells SO6 (see Photo 1), VCW-09 (see Photo 2), S11, and S11A (see Photos 3 and 4) were inspected and were generally found to be in good condition. The wellheads are not complete and do not include extraction pumps, wellhead vaults and plumbing, or associated instrumentation vaults at this time.

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

Good condition Needs Maintenance √ N/A

Remarks:

No extraction system pipelines, valves, valve boxes, or other appurtenances have been installed to date.

V. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is being constructed in accordance with the requirements of the decision documents and design specifications:

The extraction wells and compliance wells have been installed in compliance with plans and specifications. Conveyance pipelines, extraction well pumps, wellhead vaults, and associated instrumentation vaults have not yet been installed.

Describe issues and observations relating to whether the remedy is expected to be protective when it is completed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, etc.):

The remedy is designed to contain the VOC-contaminated groundwater in the shallow groundwater zone at the mouth of the Puente Valley OU, and treat it to remove the VOC contaminants. The design of the remedy, including the location of the treatment plant and the disposition of treated water, is currently being re-evaluated to address stakeholder concerns, and to ensure that the remedial action objectives are met. The remedy is expected to be protective once the design is finalized and once the remedy is fully constructed and operational.

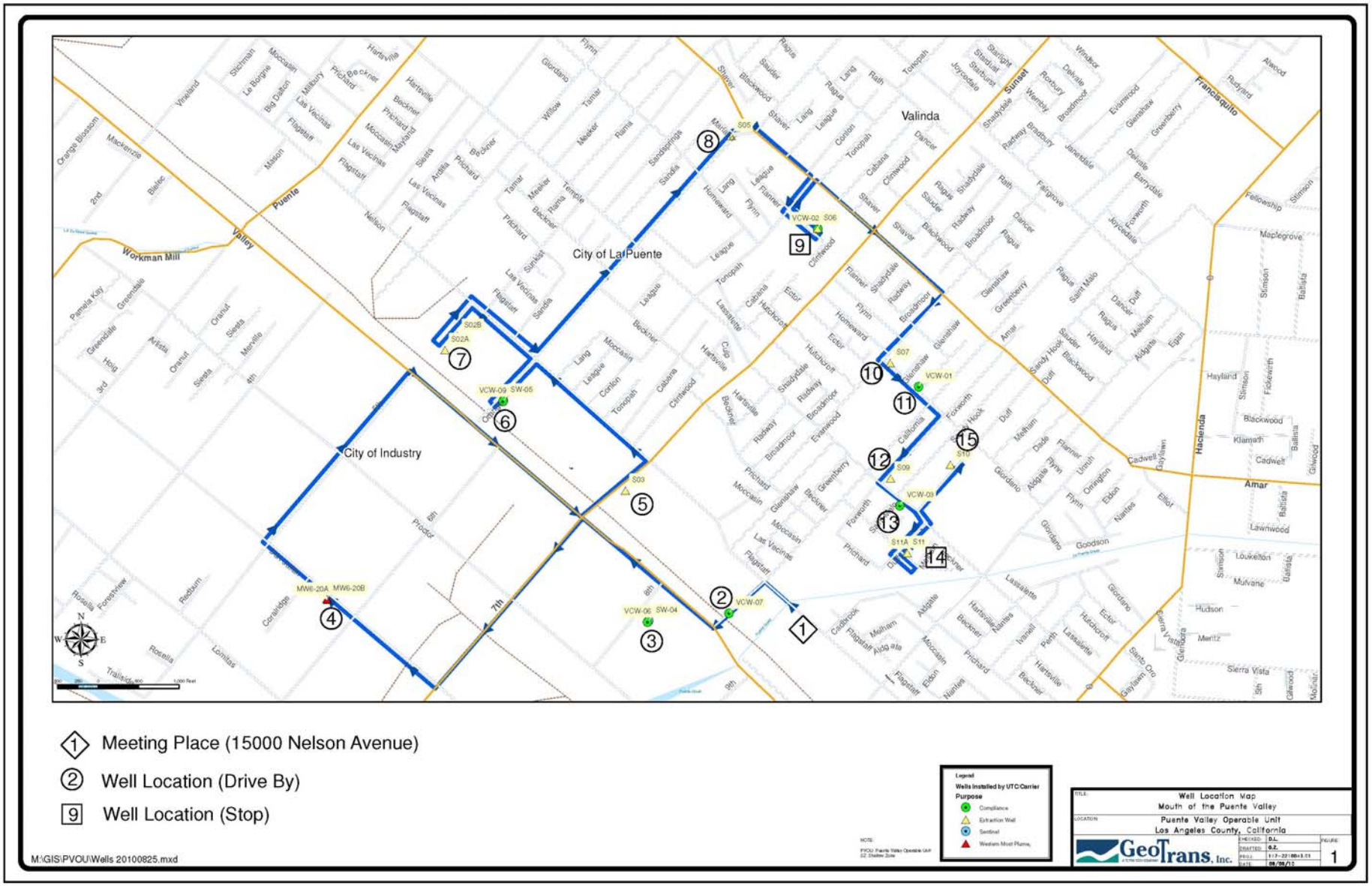

City of La Puente
City of Industry
Valinda
Workman Mill
Puente
Valley
Sunset
Francisquito
Hacienda
Amar
VCW-02
S06
VCW-09
SW-05
S02B
S02A
S03
VCW-01
S07
VCW-03
S09
S10
S11A
S11
VCW-07
VCW-06
SW-04
MW6-20A
MW6-20B
1 Meeting Place (15000 Nelson Avenue)
2 Well Location (Drive By)
9 Well Location (Stop)
Legend
Wells Installed by UTC/Carrier
Purpose
Compliance
Extraction Well
Sentinel
Western Most Plume
Well Location Map
Mouth of the Puente Valley
Puente Valley Operable Unit
Los Angeles County, California
GeoTrans, Inc.
1
M:\GIS\PVOU\Wells 20100825.mxd

Photo 1: Well Head at Extraction Well SO6

Photo 2: Well Head at VCW-09

Photo 3: Wells S11 and S11A

Photo 4: Well Head at Extraction Well S11A

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Puente Valley Operable Unit (Intermediate Zone Remedy)	**Date of inspection:** September 10, 2010
Location and Region: La Puente, Industry and Unincorporated Areas of Los Angeles County, California	**EPA ID:** CAD980817985
Agency, office, or company leading the five-year review: U. S. Environmental Protection Agency, Region 9	**Weather/temperature:** Clear, approx. 84°F

Remedy Includes: (Check all that apply)

Landfill cover/containment	Monitored natural attenuation
Access controls	Groundwater containment
Institutional controls	Vertical barrier walls
√ Groundwater pump and treatment	
Surface water collection and treatment	
Other_____	

Attachments: Inspection team roster attached √ Site map attached (See Figure 1)

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

1. **Groundwater Monitoring Records** √ Readily available Up to date N/A
Remarks:

The remedy has not been fully constructed and is not operational at this time. However, historical groundwater data and data from on-going groundwater monitoring tasks being performed in support of the remedy are on file at the EPA Region 9 office.

III. ACCESS AND INSTITUTIONAL CONTROLS Applicable √ N/A

A. General

1. **Land use changes on site** √ N/A
Remarks:

None

2. **Land use changes off site** √ N/A
Remarks:

No changes in land use were noted along the conveyance pipeline route.

IV. GROUNDWATER/SURFACE WATER REMEDIES	√ Applicable	N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines	√ Applicable	N/A

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

√ Good condition All required wells properly operating Needs Maintenance N/A

Remarks:

The site was inspected following the inspection route indicated in Figure 1. Six extraction well locations were observed, as identified in Figure 1. Two representative extraction well installations, identified as MZ-3 and IZ-East, were inspected.

The wellhead vault for representative extraction well MZ-3 is shown in Photo 1, and its associated instrumentation vault is shown in Photo 2. The same information for representative extraction well IZ-East is shown in Photos 3 and 4. The facilities are in good condition. The wellheads will be completed by installing the well extraction pump, electrical service, instrumentation, and local control panels during future construction activities.

Photo5 shows the existing B7 treatment plant that was originally proposed to be retrofitted and expanded to provide treatment of extracted groundwater from the intermediate zone. This facility was inspected because it continues to be a viable option as part of the remedy. The existing facility consists of a packed air stripper system complete with air blower and vapor-phase granular-activated carbon vessel for treatment of air stripper off-gas. The facility is in good condition and is currently operated by the San Gabriel Valley Water Company.

Photo 6 shows the beginning of the installed treated water effluent pipeline at the B7 treatment plant, and Photo 7 shows the end of the installed untreated water pipeline entering the B7 treatment plant. These pipelines have not been connected to the B7 treatment system because it has not yet been determined whether the facility will be used as part of the remedy.

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

Good condition Needs Maintenance

Remarks:

The conveyance pipeline connecting the various extraction wells and treated water discharge point have been installed in accordance with plans and specifications, as documented in construction oversight reports on file at EPA Region 9 offices. Representative valves, valve boxes, and other appurtenances associated with the well installations were inspected as documented in A1 above.

V. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is being constructed in accordance with the requirements of the decision documents and design specifications:

The extraction wells, associated vaults, and conveyance pipelines have been installed in compliance with plans and specifications. The final treatment plant location has not yet been finalized.

Describe issues and observations relating to whether the remedy is expected to be protective when it is completed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, etc.):

The remedy is designed to contain the VOC-contaminated groundwater in the intermediate groundwater zone at the mouth of the Puente Valley OU, and treat it to remove the VOC contaminants. The design of the remedy, including the location of the treatment plant, is currently being re-evaluated to address stakeholder concerns, and to ensure that the remedial action objectives are met. The remedy is expected to be protective once the design is finalized and once the remedy is fully constructed and operational.

Figure 1
Puente Valley Operable Unit
Intermediate Zone Remedy

Photo 1: Well Head Vault (Awaiting Well Head Completion)
at Extraction Well MZ-3

Photo 2: Instrumentation Vault (Awaiting Well Head Completion)
at Extraction Well MZ-3

Photo 3: Well Head (Awaiting Well Head Completion)
at Extraction Well IZ-East

Photo 4: Instrumentation Vault (Awaiting Well Head Completion)
at Extraction Well IZ-East

Photo 5: Existing Air Stripper at B7 Facility

Photo 6: Beginning of Treated Water Effluent Pipeline

Photo 7: Water Sampling Port at Terminus of Installed Treatment Plant Water Influent Pipeline

Appendix D
Institutional Controls Evaluation

San Gabriel Valley Superfund Site
Puente Valley Operable Unit Five Year Review

Institutional Controls Evaluation

PREPARED FOR: United States Environmental Protection Agency, Region 9

PREPARED BY: CH2M HILL

DATE: February 17, 2011

This technical memorandum presents an evaluation of institutional controls (ICs) at the Puente Valley Operable Unit (PVOU) Superfund Site.

ICs Background

ICs are used to prevent exposure to contamination, usually through restrictions on the use of media where contaminant levels do not allow for unlimited use and unrestricted exposure. ICs are also used to prevent interference with remedy components or operation of the remedy. In addition to being part of completed remedies, ICs can be used during the conduct of the remedial investigations/feasibility studies; during the implementation of remedial actions, and; during the operation and maintenance of remedial actions.

The various types of ICs, which are generally administrative and legal tools that do not involve construction or physical changes to the site, include:

1) **Government Controls –** include local laws or permits (e.g., county zoning, building permits, and Base Master Plans at military facilities);

2) **Proprietary Controls –** include property use restrictions based on private property law (e.g., easements and covenants);

3) **Enforcement Tools –** include documents that require individuals or companies to conduct or prohibit specific actions (e.g., environmental cleanup consent decrees, unilateral orders, or permits); and,

4) **Informational Devices –** include deed notices or public advisories that alert and educate people about a site.

PVOU ICs Analysis

There are no specifically tailored IC instruments required in the September 1998 Interim Record of Decision (IROD) for the San Gabriel Valley Superfund Site, Puente Valley Operable Unit (PVOU; or Site), or in the June 2005 Explanation of Significant Differences. However, there are local governmental controls in place that act as effective institutional controls to prevent groundwater pumping that could interfere with the remedy.

Administratively, two ground-water basins exist within the PVOU: the Main San Gabriel Basin and the Puente Basin. The complete Puente Basin and southeast tip of the Main San Gabriel Basin are located within the PVOU. The rights to pump ground water from these basins are adjudicated (i.e., assigned to specified users in accordance with a court judgment).

Water rights in the Main San Gabriel Basin were adjudicated in a stipulated judgment by the Superior Court of Los Angeles County in 1972 (amended in 1989) in the case *Upper San Gabriel Valley Municipal Water District v. City of Alhambra* (Case Number 924128). This adjudication resulted in assigning water rights to approximately 50 parties that each hold rights to greater than one percent of the natural safe yield of the basin (152,700 acre-feet per year, established in the judgment), and approximately 100 parties that each hold rights to less than 1 percent of the natural safe yield. The judgment also establishes the duties of a Watermaster, which includes annually determining an operating safe yield for the basin, monitoring compliance with the judgment, issuing permits for all new and increased pumping in the basin, and preparing an annual report that includes details of pumping activities in the basin. The amount of groundwater that each water rights holder can pump in any year is adjusted by prorating the pumper's prescriptive rights (percentage of natural safe yield) by the operating safe yield, as established by the Watermaster.

The majority of the ground water pumped from the Main San Gabriel Basin is used for drinking water, and supplied to the public by purveyors that are regulated as public water supply systems. Annually, pumping typically equals or exceeds the operating safe yield of the basin. When excess extraction occurs, the judgment has established provisions for assessing pumpers the cost of importing water to replenish the excess amount extracted.

Water rights in the Puente Basin were adjudicated in a stipulated judgment by the Superior Court of Los Angeles County in 1986 in the case *Puente Basin Water Agency, et al. v. City of Industry, et al.* (Case Number C369220). This adjudication resulted in assigning water rights to five primary producers in the basin. As with the Main San Gabriel Basin, the Puente Basin judgment established the duties of a Watermaster, which are similar in nature to the Main San Gabriel Basin Watermaster.

The total water available to the Puente Basin is supplied primarily by precipitation on the valley floor and adjacent watershed, and by underflow from surrounding areas. Currently, water is also being imported into the Puente Basin from the Pomona Water Reclamation Plant and from the Metropolitan Water District of Southern California by the Rowland and Walnut Water Districts (Puente Basin Watermaster, 1995).

Conclusions

The Watermaster's authority to regulate and allocate water resources prevents unregulated pumping that could interfere with the Site remedy, or lead to unacceptable exposure to contaminated Site groundwater. Therefore, these governmental controls are effectively protecting human health at the Site.

Appendix E
Applicable or Relevant and Appropriate Requirements (ARARs) Evaluation

San Gabriel Valley Superfund Site
Puente Valley Operable Unit Five-Year Review

Applicable or Relevant and Appropriate Requirements (ARARs) Evaluation

PREPARED FOR: United States Environmental Protection Agency, Region 9

PREPARED BY: CH2M HILL

DATE: February 17, 2011

This technical memorandum presents an evaluation of the Applicable or Relevant and Appropriate Requirements (ARARs) at the Puente Valley Operable Unit (PVOU) Superfund Site.

ARARs Background

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

To be applicable, a state or federal requirement must directly and fully address the hazardous substance, the action being taken, or other circumstance at a site. A requirement is applicable if the jurisdictional prerequisites of the environmental standard show a direct correspondence when objectively compared with the conditions at the PVOU site.

If a requirement is not legally applicable, the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not applicable, address problems or situations sufficiently similar to the circumstances of the response actions and are well-suited to the conditions of the site. The criteria for determining relevance and appropriateness are listed in 40 CFR 300.400(g)(2). While legally applicable requirements must be attained, compliance with relevant and appropriate requirements is based on the discretion of the Remedial Project Manager (RPM), On-Scene Coordinator (OSC), or state official responsible for planning the response action (USEPA 1998).

Pursuant to U.S. Environmental Protection Agency (EPA) guidance, ARARs are classified into three categories: chemical-specific, location-specific, and action-specific requirements, defined below:

- **Chemical-specific ARARs** include those laws and requirements that regulate the release to the environment of materials possessing certain chemical or physical characteristics or containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limitations for specific hazardous substances. If, in a specific situation, a chemical is subject to more than one discharge or exposure limit, the more stringent of the requirements should generally be applied.
- **Location-specific ARARs** are those requirements that relate to the geographical or physical position of the site, rather than the nature of the contaminants or the proposed remedial actions. These requirements may limit the placement of remedial action, and may impose additional constraints on the cleanup action. For example, location-specific ARARs may refer to activities in the vicinity of wetlands, endangered species habitat, or areas of historical or cultural significance.
- **Action-specific ARARs** are requirements that apply to specific actions that may be associated with remediation. Action-specific ARARs often define acceptable handling, treatment, and disposal procedures for hazardous substances. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Examples of action-specific ARARs include requirements applicable to landfill closure, wastewater discharge, hazardous waste disposal, and emissions of air pollutants.

To-be-considered (TBC) criteria are requirements that may not meet the definition of an ARAR as described above but still may be useful in determining whether to take action at a site or to what degree action is necessary. TBC criteria are defined in 40 CFR 300.400(g)(3). Chemical-specific TBC requirements may be applied in the absence of ARARs or when the existing ARARs are not sufficiently protective to develop cleanup levels. TBC documents are non-promulgated advisories or guidance issued by Federal or State government that are not legally binding but that may provide useful information or recommended procedures for remedial action. Although TBC criteria do not have the status of ARARs, they are considered together with ARARs to establish the required level of cleanup for protection of human health or the environment.

PVOU Background

The ARARs for the PVOU were presented originally in the *Interim Record of Decision, San Gabriel Valley Superfund Site Puente Valley Operable Unit* (IROD) (US Environmental Protection Agency, Region 9, September 1998). Later, additional ARARs were established by USEPA in the *Explanation of Significant Differences to the 1998 Interim Record of Decision, Puente Valley Operable Unit, San Gabriel Valley Superfund Sites, Area 4* (ESD) following detections of emerging chemicals in ground water underlying the PVOU (US Environmental Protection Agency, Region 9, June 14, 2005).

The purpose of this regulatory review is to determine if regulations promulgated since the issuance of the 1998 IROD and 2005 ESD, or regulations that were in place but not considered at the time the IROD and ESD were issued, may impact the protectiveness of the interim remedy on human health and the environment. In the preamble to the final National Contingency Plan, EPA states that it will not reopen remedy selection decisions contained in RODs (i.e., ARARs are normally frozen at the time of ROD signature) unless a

new or modified requirement calls into question the protectiveness of the selected remedy (55 FR 8757, March 8, 1990).

Current federal and state water quality criteria and substantive requirements of applicable NPDES permits were evaluated for pertinent updates.

PVOU ARARs Review

Review of Chemical-Specific ARARs

A summary of the chemical-specific ARARs for the PVOU interim remedy are identified in Table 1.

In the 1998 IROD, chemical-specific ARARs for VOCs were established as MCLs and nonzero MCLGs for any treated groundwater used for domestic, municipal, industrial, or agricultural purposes and for any groundwater that is discharged to the environment. Additionally, the MCLs and MCLGs were ARARs for currently uncontaminated ground water in the intermediate zone downgradient from the B7 Well Field Area.

In 2005, an ESD was issued in response to significant changes to the cleanup project that resulted from detection of 1,4-dioxane and perchlorate in groundwater. USEPA established an ARAR for perchlorate and selected a TBC requirement for NDMA in the ESD.

In addition, the ESD identified Table F of Los Angeles Regional Water Quality Control Board (LARWQCB) *General Permit No. CAG914001, Order No. R4-2002-0107, Waste Discharge Requirements for Discharges of Treated Groundwater from Investigation and/or Cleanup of Volatile Organic Compound Contaminated Sites to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties*. This table was selected as an ARAR because it generally reflects the substantive requirements or discharge levels that the state would require EPA to meet if a permit were necessary. The ARAR selected for perchlorate is higher than level set forth in the 2002 General Permit, and reflects changes made in state public health goals (PHGs) subsequent to the issuance of the General Permit in 2002. Tables 2 and 3 in Attachment 1 of the ESD provide values for current chemical-specific ARARs.

Review of Location-Specific ARARs

A summary of the location-specific ARARs are provided in Table 2. The specific regulations cited for each ARAR contained in Table 2 were reviewed for changes since the 1998 IROD and 2005 ESD were issued. The "Current Status" column presents the results of the review.

Review of Action-Specific ARARs

A summary of the action-specific ARARs are provided in Table 3. The specific regulations cited for each ARAR contained in Table 3 were reviewed for changes since the 1998 IROD and 2005 ESD were issued. The "Current Status" column presents the results of the review.

Note that Action-Specific ARARs include Basin Plan water quality objectives for total dissolved solids, sulfate, chloride, boron and nitrogen; and also includes the State's Antidegradation Policy (SWRCB Resolution 68-16). Numeric objectives for TDS and nitrate would be exceeded if treated groundwater is discharged to surface water. However, LARWQCB Resolution 98-016, dated September 14, 1998, determined that with dilution in receiving waters no violation of the State antidegradation policy would be expected, and the

selected remedy would comply with that ARAR as long as surface water is monitored and the estimated effect on receiving waters is correct.

Summary of Changes to Existing Laws and Regulations

Federal and state laws, regulations and policies that have been promulgated or changed over the past five years, or that are otherwise applicable to the PVOU interim remedy, are described below.

California Toxics Rule (CTR)

The California Toxics Rule was promulgated in May 2000, and includes numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. The criteria are applicable to all inland surface waters, closed bays, and estuaries for all Clean Water Act (CWA) purposes and programs. Of note, the freshwater chronic criterion for selenium is 5 ppb (total recoverable). To the extent these CTR criteria for toxic pollutants are not already ARARs through the Basin Plan; or the General Permit, they should be evaluated as ARARs for any discharges of treated groundwater to surface water.

Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).

The SIP was adopted by the State Water Resources Control Board in February 2005. It establishes provisions for implementation of the National Toxics Rule (NTR), CTR, and water quality objectives for priority pollutants in RWQCB Basin Plans. The goal is to establish a standardized approach for permitting discharges of toxic pollutants into non-ocean waters. The SIP is followed when setting water-quality-based effluent limitations (WQBELs) for priority pollutants in NPDES permits. To the extent these standards are not already ARARs through the Basin Plan or the General Permit, they should be evaluated as potential ARARs for any long-term discharges of treated water to surface water.

LARWQCB Order No. R4-2007-0022. Waste Discharge Requirements for Discharges of Treated Groundwater from Investigation and/or Cleanup of Volatile Organic Compound Contaminated Sites to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties. (General NPDES Permit No. CAG914001).

With adoption of this General Permit in 2007, the previous General Permit (Order No. R4-2002-0107), which is an ARAR, was rescinded. Numeric effluent limitations are provided in Table 2 of the General Permit, and other discharge specifications are provided in Section V. Discharges that exceed the water quality criteria for toxic pollutants are prohibited. Discharges may not exceed water quality screening criteria for any constituent listed in Attachment E to the General Permit except for constituents for which limitations have been established in the permit. To the extent any of the waste discharge requirements in the 2002 General Permit are determined to be no longer protective, the water quality discharge limits in the 2007 General Permit may need to evaluated as ARARs.

State Water Resources Control Board 2010 Integrated Report for CWA 305(b) and 303(d).

In the State's 2010 Integrated Report, Puente Creek is recommended for placement on the Clean Water Act 303(d) list of water quality impaired waterbodies, due to selenium

impairment. A Total Maximum Daily Load (TMDL) is scheduled for completion by 2021. The impairment finding was based on 2 exceedances of the CTR criterion out of 7 samples taken in compliance with monitoring requirements of the local Municipal Separate Storm Sewer System (MS4) permit.

San Jose Creek Reach 1 is recommended for delisting with respect to selenium based on only 12 of 171 samples exceeding the CTR criterion. Samples were obtained from Water Reclamation Plant (WRP) monitoring and MS4 monitoring along the reach. With the current finding of nonimpairment from selenium, it is unlikely that a TMDL will be finalized and approved for San Jose Creek Reach 1.

San Jose Creek Reach 1 is recommended for listing with respect to TDS due to 35 of 149 samples exceeding the Basin Plan WQO of 750 mg/L in the creek. TMDL development is scheduled for completion in 2021.

The TMDL for Puente Creek is not expected to be completed until 2021, so no selenium TMDL is likely to be implemented for Puente Creek during the term of the interim remedy. Nevertheless the CTR is being implemented, and the PVOU discharge to Puente Creek is expected to exceed the CTR freshwater criterion of 5 ppb total recoverable selenium.

References

CH2MHILL. 2008. Technical Memorandum: *Regulatory Evaluation for Future Treated Groundwater Discharges at the Puente Valley Operable Unit*. Prepared for USEPA, Region 9. August.

CH2MHILL. 2009. Technical Memorandum: *ARARs in Surface Water Discharge of Treated Groundwater at the Puente Valley Operable Unit (PVOU)*. Prepared for USEPA, Region 9, March.

USEPA. 1998. Introduction to: Applicable or Relevant and Appropriate Requirements. RCRA, Superfund & EPCRA Hotline Training Module. EPA540-R-98-020.

TABLE 1
Chemical-Specific[a] ARARs for Interim Remedy

Requirement	Citation[b,c]	ARAR Determination	Comments	Current Status
GROUND WATER - FEDERAL				
Safe Drinking Water Act (42 U.S.C., §§ 300f-j)				
National primary drinking water standards are health-based standards (MCLs) for public water systems. Additionally, Maximum Contaminant Level Goals (MCLGs) are health-based goals set at levels where known health effects would occur, and may be more stringent than MCLs.	40 CFR. Part 141	Applicable	The NCP defines MCLs as relevant and appropriate for groundwater determined to be a current or potential source of drinking water, in cases where MCLGs are not ARARs. Ground water underlying the PVOU is designated by the RWQCB has having domestic drinking water beneficial uses, so these ARARs apply.	Requirements were established in the 1998 IROD and were not changed in the 2005 ESD. If treated groundwater is to be delivered to a public water supply system, all legal requirements for drinking water in existence at the time the water is served will have to be met, since service of water to the public is considered by USEPA to be an offsite activity.
GROUND WATER – STATE				
California Drinking Water Standards				
State MCLs for sources of public drinking water may be more stringent than federal MCLs and may exist for some chemicals for which there are no federal MCLs.	California H&SC §§ 4010.1 and 4026(c)	Applicable	State MCLs apply to remedial actions in the PVOU in the same manner as federal MCLs.	Requirements were established in the1998 IROD and were not changed in the 2005 ESD. Status remains unchanged.
Waste Discharge Requirements for Discharges of Treated Groundwater from Investigation and/or Cleanup of Volatile Organic Compound Contaminated Sites to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties				
Regulates discharges of groundwater that is treated for removal of VOCs at eligible sites in Los Angeles and Ventura Counties.	LARWQCB General Permit No. CAG914001, Order No. R4-2002-0107, Waste	Applicable	According to CERCLA, onsite activities do not need to actually obtain applicable permits, but must meet their substantive requirements. Offsite activities, including delivery of water to a public drinking water	Table 4 of the General Permit was established as an ARAR in the 2005 ESD. The permit was superceded in 2007 by adoption of Order No. R4-

TABLE 1
Chemical-Specific[a] ARARs for Interim Remedy

Requirement	Citation[b,c]	ARAR Determination	Comments	Current Status
			system or wastewater treatment plant, would need to meet both substantive and administrative requirements.	2007-0022, which is substantively similar to the 2002 permit.
California Public Health Goal (PHG)				
PHG for 1,4-dioxane	1,4-dioxane Action Level, OEHHA 1998	Relevant and appropriate	Sets 3 ppb action level for 1,4-dioxane	Established as an ARAR in the 2005 ESD. Status remains unchanged.

Notes:

a Many action-specific ARARs contain chemical-specific limitations and are addressed in this action-specific ARAR table

b Only the substantive provisions of the requirements cited in this table are ARARs

c Statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the entire statutes or policies are ARARs; specific ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
CFR – Code of Federal Regulations
F.R. – Federal Register
§ – section
U.S.C. – United States Code

TABLE 2
Location-Specific ARARs for Interim Remedy

Action/Requirement	Citation[a,b]	ARAR Determination	Comments	Current Status
GROUND WATER - FEDERAL				
Endangered Species Act and implementing regulations				
The Endangered Species Act protects proposed or listed threatened or endangered species and their habitat. If a remedial action might adversely affected a proposed or listed species, USEPA will consult with USFWS to ensure regulatory requirements are following and adverse effects are avoided or mitigated.	15 U.S.C. §§ 1531-1544 40 C.F.R. § 6.302(h), 50 C.F.R. Parts 17, 222 and 402	Applicable	Applicable to any remedial actions that impact a proposed or listed threatened or endangered species or destroy or adversely modify the critical habitat of a listed species.	Requirements have not changed since issuance of the 1998 IROD and 2005 ESD. Status remains unchanged. No threatened or endangered species are known or suspected to occur in locations where remedial actions could take place.
Archaeological and Historic Preservation Act and implementing regulations				
Establishes requirements for the evaluation and preservation of historical and archaeological data that could be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	16 U.S.C. § 469 40 C.F.R. Part 6.301(c)	Applicable	Applicable if the interim remedy would affect the Workman and Temple Family Homestead Museum, located at 15415 Don Julian Road	Requirements have not changed since issuance of the 1998 IROD and 2005 ESD. Status remains unchanged.
Historic Sites, Buildings and Antiquities Act and implementing regulations				
Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable effects on them.	16 U.S.C. §§ 461-467 40 C.F.R. Part 6.301(a)	Applicable	Applicable if the interim remedy would affect any landmark or facility regulated under this Act.	Requirements have not changed since issuance of the 1998 IROD and 2005 ESD. Status remains unchanged.
GROUND WATER - STATE				
Location Standards for TSD Facilities				

TABLE 2
Location-Specific ARARs for Interim Remedy

Action/Requirement	Citation[a,b]	ARAR Determination	Comments	Current Status
Establishes location standards for Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs). The standard prohibits the placement of TSDFs within 200 feet of a fault displaced during the Holocene epoch, and requires that TSDFs located within a 100-year floodplain be capable of withstanding a 100-year flood.	C.C.R. Title 22, § 66264.18(a) and (b)	Applicable	Applicable to the construction of any new ground water extraction and treatment facilities used as part of the remedial action.	Requirements have not changed since issuance of the 1998 IROD and 2005 ESD. Status remains unchanged.
California Fish and Game Code				
Applicable sections prohibit the discharge of harmful quantities of hazardous materials into places that may have an adverse effect on fish, wildlife or plant life.	California Fish and Game Code §§ 2080; 5650(a), (b) and (f); 12015 and 12016	Applicable	Applicable if the remedial action will result in discharge of treated ground water to surface waters.	Requirements have not changed since issuance of the 1998 IROD and 2005 ESD. Status remains unchanged.

Notes:

a Only the substantive provisions of the requirements cited in this table are ARARs

b Statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the entire statutes or policies are ARARs; specific ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
C.C.R. – California Code of Regulations
CFR – Code of Federal Regulations
F.R. – Federal Register
§ – section
SCAQMD – Southern California Air Quality Management District
U.S.C. – United States Code

TABLE 3
Action-Specific ARARs[a] for Interim Remedy

Action/Requirement	Citation[b,c]	ARAR Determination	Comments	Current Status
Local Air Quality Management				
The California Air Resources Board implements the federal and state Clean Air Act and the requirements of the California Health & Safety Code through local air quality management districts. The local agency for air pollution control, South Coast Air Quality Management District (SCAQMD), has adopted rules for air stripper emissions and construction activities.	SCAQMD Regulation XIII, comprising Rules 1301 through 1313 SCAQMD Rule 1401 SCAQMD Rules 401, 402, and 403	Applicable	Rule 1303 requires use of best available control technology for all new sources of air pollution, and to meet appropriate offset requirements where emissions are in excess of one pound per day. Rule 1401 requires best available control technology for toxics be used for new stationary operating equipment. Rule 401 limits visible emissions from a point source. Rule 402 prohibits discharge of material that is odorous or causes injury, nuisance or annoyance to the public. Rule 403 limits downwind particulate concentrations.	Requirements have not changed since issuance of the 1998 IROD and 2005 ESD. Status remains unchanged.
Federal Clean Water Act and Porter-Cologne Water Quality Act The California Porter-Cologne Water Quality Act implements the federal Clean Water Act and additional standards and requirements for surface and ground water of the state.				
Water Quality Control Plan for the Los Angeles Basin Region (Basin Plan). In compliance with the CWA, and Porter-Cologne Water Quality Control Act, the Basin Plan sets water quality standards, consisting of beneficial uses, numeric and narrative water quality standards, and an antidegradation policy (Resolution 68-16), for all surface and ground waters in the region.		Applicable	Specific portions of the Basin Plan are applicable to any treated ground water discharges to surface water, land or ground water. Because Puente Creek, San Jose Creek and the San Gabriel River have municipal and domestic water supply beneficial uses, MCLs are applicable. Numeric water quality objectives for total dissolved solids, sulfate, chloride, boron and nitrogen in surface waters are applicable for discharges to surface water. Water quality objectives for ground water in the Puente and Main San Gabriel Basins are applicable for discharges that would impact ground water.	Specific portions of the Basin Plan were selected as an ARAR in the 1998 IROD, and these were unchanged in the 2005 ESD. Status remains unchanged.

TABLE 3
Action-Specific ARARs[a] for Interim Remedy

Action/Requirement	Citation[b,c]	ARAR Determination	Comments	Current Status
State's Antidegradation Policy. Requires that water quality in waters with existing high quality water be maintained until it has been demonstrated to the State that the change will be consistent with the maximum benefit to the people of the State and will not unreasonably affect present and anticipated beneficial uses of such water and will not result in water quality less than that prescribed in policies.	State Water Resources Control Board Resolution 68-16	Applicable	Applicable to discharges of treated groundwater. The RWQCB required an evaluation of TDS and nitrate in surface water discharges of treated groundwater. Remedial action discharges would not significantly affect receiving water quality according to the report, and the RWQCB determined that the antidegradation policy would not be violated as long as monitoring over time indicates that estimated impacts are correct. If discharges to surface water or ground water would contain constituents at concentrations above existing water quality standards, that discharge could potentially violate this ARAR.	This ARAR was established in the 1998 IROD and were unchanged in the 2005 ESD. There have been no changes to the antidegradation policy and this ARAR is unchanged.
Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code 13304 Requires attainment of background water quality or, if background levels cannot be restored, the best quality of water that is reasonable.	State Water Resources Control Board Resolution 92-49	Not an ARAR	Not an ARAR because the interim remedy is to contain the spread of contamination, rather than a final action to restore ground water in the PVOU.	ARARs were established in the 1998 IROD and were unchanged in the 2005 ESD. This ARAR is unchanged.
Standards Applicable to CERCLA Section 104(b) Discharges to Surface Waters				
Site investigation activities that result in temporary high-flow, high-volume discharges of contaminated ground water, would be considered to be removal actions that need to comply with ARARs to the extent practicable, considering the exigencies of the circumstances (55 Fed. Reg. 8756).	CERCLA § 104(b) 55 F.R. 8756	Relevant and appropriate	USEPA will determine the application of chemical-specific ARARs to CERCLA §104(b) activities on a case-by-case basis. Where practicable, discharges must comply with ARARs	ARARs were established in the 1998 IROD and were unchanged in the 2005 ESD. Status of this ARAR is unchanged.

TABLE 3
Action-Specific ARARs[a] for Interim Remedy

Action/Requirement	Citation[b,c]	ARAR Determination	Comments	Current Status
California Hazardous Waste Management Program. In lieu of the federal RCRA program, the State is authorized to enforce its Hazardous Waste Control Act and implementing regulations subject to USEPA authority (C.C.R. Title 22, Division 4.5). California is responsible for permitting treatment, storage, and disposal facilities.				
Hazardous Waste Generator Requirements The preamble to the NCP states that when noncontinguous facilities are treated as one site, the movement of hazardous waste from one facility to another is subject to RCRA manifest.	55 F.R. 8691	Applicable	Applicable in the event the remedial action involves multiple water treatment units at different locations and require the movement of hazardous wastes between those locations.	This ARAR was established in the 1998 IROD and was unchanged in the 2005 ESD. The status of this ARAR is unchanged.
Land Disposal Restrictions	C.C.R. Title 22	Applicable	Land disposal requirements of Title 22 may be applicable to the disposal of spent carbon generated during the treatment of ground water for removal of VOCs.	This ARAR was established in the 1998 IROD and was unchanged in the 2005 ESD. The status of this ARAR is unchanged.
Hazardous Waste TSD Facility Requirements	C.C.R. Title 22, Division 4.5, Chapter 14	Relevant and appropriate	Since the contaminated ground water is sufficiently similar to RCRA hazardous wastes, Title 22 TSDF requirements are relevant and appropriate for the design, construction, operation, and closure of any ground water treatment system.	This ARAR was established in the 1998 IROD and was unchanged in the 2005 ESD. The status of this ARAR is unchanged.

TABLE 3
Action-Specific ARARs[a] for Interim Remedy

Action/Requirement	Citation[b,c]	ARAR Determination	Comments	Current Status

Notes:

a Many action-specific ARARs contain chemical-specific limitations and are addressed in this action-specific ARAR table

b Only the substantive provisions of the requirements cited in this table are ARARs

c Statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the entire statutes or policies are ARARs; specific ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
C.C.R. – California Code of Regulations
F.R. – Federal Register
RCRA – Resource Conservation and Recovery Act
§ – section
SCAQMD – Southern California Air Quality Management District

Appendix F
Risk Assessment and Toxicology Analysis

San Gabriel Valley Superfund Site
Puente Valley Operable Unit Five Year Review

Human Health Risk Assessment and Toxicology Analysis

PREPARED FOR: United States Environmental Protection Agency, Region 9

PREPARED BY: CH2M HILL

DATE: October 20, 2010

This technical memorandum presents a human health risk assessment and toxicology analysis to support the Five-Year Review of the Puente Valley Operable Unit (PVOU) in eastern Los Angeles County, California. The Interim Record of Decision (IROD) (EPA, 1998) selecting the remedy for the PVOU was issued by US EPA in September 1998 and was revised by the Explanation of Significant Differences in 2005 (EPA, 2005). The IROD address groundwater contaminated with volatile organic compounds (VOCs). The selected remedy is containment of groundwater contaminated with VOCs in the shallow and intermediate zones at the mouth of Puente Valley to prevent further migration of existing groundwater contamination. The preliminary baseline risk assessment (RA) was conducted in 1994 for PVOU (CH2M HILL, 1994) and was reviewed as part of this evaluation.

As described in the guidance for USEPA's Comprehensive Five-Year Reviews (EPA, 2001), a key purpose of the five-year review process for a site is to determine if the remedy is, or upon completion will be, protective of human health and the environment. Protectiveness is generally defined in the National Contingency Plan (NCP) by the risk range and the Hazard Index (HI). The following three questions are part of the technical assessment of the protectiveness of the remedy, as outlined in the EPA five-year review guidance document:

- Question A – Is the remedy functioning as intended by the decision documents?
- Question B - Are the exposure assumptions, toxicity data, and remedial action objectives (RAOs) used at the time of remedy selection still valid?
- Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

To determine whether the remedy at the PVOU site remains protective of human health, the sections below evaluate changes in site conditions, changes in exposure pathways, and changes in toxicity values, since completion of the RA and selection of the Site remedy.

1.0 Changes in Site Conditions

In 2002 the Regional Water Quality Control Board, Los Angeles Region (LARWQCB) requested the Potentially Responsible Parties (PRPs) in the PVOU to sample selected shallow, facility-specific monitoring wells within the area of VOC contamination for emergent compounds 1,4-dioxane, perchlorate, NDMA and hexavalent chromium. The concentrations of hexavalent chromium and NDMA did not exceed the State Notification Levels. The concentrations of 1,4-dioxane exceeded the State Notification Level in several monitoring wells.

1,4-Dioxane was detected in groundwater at concentrations ranging from 0.46 to 8.8 µg/L in the intermediate zone (CDM, 2007) and 0.54 to 158 µg/L in shallow zone (GeoTrans, 2010). In addition, historical facility-specific sampling results have shown groundwater concentrations of around 5,000 µg/L for 1,4-dioxane (EPA, 2005). The maximum concentrations are above the EPA tap water regional screen level (RSL) of 6.1 µg/L (EPA, 2010) and California RWQCB groundwater environmental screening level (ESL) of 3 µg/L (RWQCB, 2007). Perchlorate was detected in groundwater at concentrations ranging from 1.7 to 19.4 µg/L in the intermediate zone (CDM, 2007) and 1 to 18 µg/L in the shallow zone (GeoTrans, 2010). The maximum concentrations are above California RWQCB ESL of 6 µg/L (RWQCB, 2007) but below the EPA tap water RSL 26 µg/L (EPA, 2010).

Sampling results at the shallow zone monitoring wells have shown that, in general, groundwater contamination concentrations in the shallow zone aquifer are stable or decreasing (GeoTrans, 2010). The only exception to this observation is well LCW-04 (also designated as MW6-18). An increasing trend in trichloroethene (TCE) concentration has been observed at this well since 2008 and the most recent TCE concentration measurement was 64.3 µg/L in 2009. This TCE concentration corresponds to estimated risk of 3×10^{-5} (calculated as concentration divided by EPA's tap water RSL of 2 µg/L times the target risk level of 1×10^{-6}) which is within EPA's risk management range and similar to risks indicated in the 1994 RA.

In the intermediate zone, VOC contamination has been detected in drinking water supply wells B7C, B11A, B11B and 147W3, which are partially screened in the intermediate zone. Production at B7C, B11A and B11B will be replaced with production wells screened only in the uncontaminated deep production zone, but production well 147W3 will continue to extract groundwater from the intermediate zone (see Data Review Memorandum). In March 2010, groundwater from 147W3 contained concentrations of 7 µg/L PCE, 6.6 µg/L TCE, and 9 µg/L 1,1-DCE, which exceed their respective MCLs, but subsequent sampling confirmed that concentrations are consistently below the MCLs. The March 2010 concentrations correspond to estimated risk of 7×10^{-5} which is within EPA's risk management range and similar to the results indicated in the 1994 RA.

2.0 Changes in Exposure Pathways

The human health exposure pathways evaluated in the 1994 RA (CH2M HILL, 1994) include:

- Residents exposed to VOCs in groundwater through domestic use which includes ingestion, dermal contact, and inhalation (while showering, etc.). The dermal pathway was evaluated qualitatively.
- Worker and residents inhalation exposure to VOCs in indoor air from groundwater through the foundation of a building.

There are no changes in human health exposure pathways. The receptors and pathways evaluated in the 1994 baseline RA are still appropriate for current conditions at the site.

3.0 Changes in Toxicity Values

There have been a number of changes to the toxicity values for specific COPCs in groundwater at the PVOU since the RA was submitted in 1994. For example, revisions to the oral slope factor for carbon tetrachloride indicate a lower risk from exposure than previously considered; however, revisions to the inhalation slope factor for naphthalene increased, signifying a higher risk from exposure. Table 1 provides a direct comparison between the 1994 toxicity values used in the RA, and current EPA Region 9 values.

If 1,4-dioxane and perchlorate are included in the 1994 risk calculations, the risk results would increase by 8×10^{-4} and the hazard index would increase by 0.8. These do not change the conclusions of the 1994 risk assessment. Because 1,4-dioxane and perchlorate are addressed in 2005 ESD, the remedial action is expected to be protective of human health.

4.0 Uncertainty

The greatest uncertainty with toxicological changes for Site contaminants are anticipated for TCE, one of the most prevalent contaminants of concern. In August 2001, EPA's Office of Research and Development (ORD) released *"Trichloroethylene Health Risk Assessment: Synthesis and Characterization"* (TCE Health Risk Assessment) for external peer review. The draft TCE Health Risk Assessment takes into account recent scientific studies of the health risks posed by TCE. According to the draft TCE Health Risk Assessment, for those who have increased susceptibility and/or higher background exposures, TCE could pose a higher risk through inhalation than previously considered. The draft TCE Health Risk Assessment is available online at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=23249.

The Science Advisory Board, a team of outside experts convened by EPA, reviewed the draft TCE Health Risk Assessment in 2002. The Science Advisory Board's review of the draft TCE Health Risk Assessment is available at http://www.epa.gov/sab/pdf/ehc03002.pdf.

EPA's ORD and Office of Solid Waste and Emergency Response have requested additional external peer review of the draft TCE Health Risk Assessment by the National Academy of Sciences. Consequently, review of the toxicity value for TCE may continue for a number of years. This issue will need to be updated in subsequent Five-Year Reviews.

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EPA, 2005. *Explanation of Significant Differences to the 1998 Interim Record of Decision Puente Valley Operable Unit, San Gabriel Valley, California.* June, 14.

EPA, 2010. Regional Screening Levels for Chemical Contaminants Table. May.

Table 1: Comparison Between 1994 Toxicity Values and Current Regional Screening Level (RSL) Values

	Ingestion Exposure						Inhalation Exposure					
	RfDo (mg/kg-day)			SFo $(mg/kg\text{-}day)^{-1}$			Reference Concentration (mg/m^3)			Unit Risk Factor $(\mu g/m^3)^{-1}$		
Chemical	Value used in 1994 Risk Assessment	2010 RSL Table	Change in Toxicity	Value used in 1994 Risk Assessment	2010 RSL Table	Change in Toxicity	Value used in 1994 Risk Assessment converted to mg/m^3	2010 RSL Table	Change in Toxicity	Value used in 1994 Risk Assessment converted to $(\mu g/m^3)^{-1}$	2010 RSL Table	Change in Toxicity
1,1-Dichloroethane	9.0E-03	2.0E-01	Less toxic	--	5.7E-03	More toxic	--	--	No change	--	1.6E-06	More toxic
1,1-Dichloroethene	9.0E-03	5.0E-02	Less toxic	--	--	No change	--	2.0E-01	More toxic	--	--	No change
1,1,1-Trichloroethane	9.0E-02	2.0E+00	Less toxic	--	--	No change	3.0E-01	5.0E+00	Less toxic	--	--	No change
1,1,2-Trichloro-1,2,2-trifluoroethane	3.0E+01	3.0E+01	No change	--	--	No change	3.0E+01	3.0E+01	No change	--	--	No change
1,1,2-Trichloroethane	4.0E-03	4.0E-03	No change	5.7E-02	5.7E-02	No change	--	--	No change	1.6E-05	1.6E-05	No change
1,1,2,2-Tetrachloroethane	--	4.0E-03	More toxic	2.0E-01	2.0E-01	No change	--	--	No change	--	5.8E-05	More toxic
1,2-Dichlorobenzene	9.0E-02	9.0E-02	No change	--	--	No change	2.1E-01	2.0E-01	Slightly more toxic	--	--	No change
1,2-Dichloroethane	--	2.0E-02	More toxic	9.1E-02	9.1E-02	No change	--	2.4E+00	More toxic	2.6E-05	2.6E-05	No change
1,2-Dichloroethene (total)	9.0E-03	9.0E-03	No change	--	--	No change	--	--	No change	--	--	No change
1,2-Dichloropropane	--	9.0E-02	More toxic	6.8E-02	3.6E-02	Less toxic	3.5E-03	4.0E-03	Less toxic	--	1.0E-05	More toxic
1,2,4-Trichlorobenzene	1.0E-02	1.0E-02	No change	--	2.9E-02	More toxic	9.1E-03	2.0E-03	More toxic	--	--	No change
1,2,4-Trimethylbenzene	--	--	No change	--	--	No change	--	7.0E-03	More toxic	--	--	No change
1,3-Dichlorobenzene	8.9E-02	--	Less toxic	--	--	No change	--	--	No change	--	--	No change
1,3-Dichloropropene	3.0E-04	3.0E-02	Less toxic	1.8E-01	1.0E-01	Less toxic	2.0E-02	2.0E-02	No change	3.7E-05	4.0E-06	Less toxic
1,3,5-Trimethylbenzene	--	1.0E-02	More toxic	--	--	No change	--	--	No change	--	--	No change
1,4-Dichlorobenzene	--	7.0E-02	More toxic	2.4E-02	5.4E-03	Less toxic	7.0E-01	8.0E-01	Less toxic	--	1.1E-05	More toxic
2-Propanone (acetone)	1.0E-01	9.0E-01	Less toxic	--	--	No change	--	--	No change	--	--	No change
Benzene	--	4.0E-03	More toxic	2.9E-02	5.5E-02	More toxic	--	3.0E-02	More toxic	8.3E-06	7.8E-06	Less toxic
bis(2-Ethylhexyl)phthalate	2.0E-02	2.0E-02	No change	1.4E-02	1.4E-02	No change	--	--	No change	--	2.4E-06	More toxic
Bromochloromethane	--	--	No change	--	--	No change	--	--	No change	--	--	No change
Bromodichloromethane	2.0E-02	2.0E-02	No change	6.2E-02	6.2E-02	No change	--	--	No change	--	3.7E-05	More toxic
Bromoform	2.0E-02	2.0E-02	No change	7.9E-03	7.9E-03	No change	--	--	No change	1.1E-06	1.1E-06	No change
Bromomethane	1.4E-03	1.4E-03	No change	--	--	No change	4.9E-03	5.0E-03	Slightly less toxic	--	--	No change
n-Butylbenzene	--	--	No change	--	--	No change	--	--	No change	--	--	No change
sec-Butylbenzene	--	--	No change	--	--	No change	--	--	No change	--	--	No change
tert-Butylbenzene	--	--	No change	--	--	No change	--	--	No change	--	--	No change
Carbon Tetrachloride	7.0E-04	4.0E-03	Less toxic	1.3E-01	7.0E-02	Less toxic	--	1.0E-01	More toxic	1.5E-05	6.0E-06	Less toxic
Chlorobenzene	2.0E-02	2.0E-02	No change	--	--	No change	2.0E-02	5.0E-02	Less toxic	--	--	No change
Chloroethane	2.0E-02	--	Less toxic	--	--	No change	1.0E+01	1.0E+01	No change	--	--	No change
Chloroform	1.0E-02	1.0E-02	No change	6.1E-03	3.1E-02	More toxic	--	9.8E-02	More toxic	2.3E-05	2.3E-05	No change
cis-1,2-Dichloroethene	1.0E-02	1.0E-02	No change	--	--	No change	--	--	No change	--	--	No change
Dibromochloromethane	2.0E-02	2.0E-02	No change	8.4E-02	8.4E-02	No change	--	--	No change	--	2.7E-05	More toxic
Dibromochloropropane	--	--	No change	1.4E+00	--	No change	2.0E-04	--	Less toxic	6.9E-07	--	Less toxic
Di-n-butylphthalate	1.0E-01	1.0E-01	No change	--	--	No change	--	--	No change	--	--	No change
Dichlorofluoromethane	2.0E-01	--	Less toxic	--	--	No change	2.1E-01	--	Less toxic	--	--	No change
Ethylbenzene	1.0E-01	1.0E-01	No change	--	1.1E-02	More toxic	1.1E+00	1.0E+00	Slightly less toxic	--	2.5E-06	More toxic
Isopropyl alcohol	--	--	No change	--	--	No change	--	7.0E+00	More toxic	--	--	No change
Isopropyl benzene	4.0E-02	1.0E-01	Less toxic	--	--	No change	8.8E-03	4.0E-01	Less toxic	--	--	No change
Methylene Chloride	6.0E-02	6.0E-02	No change	7.5E-03	7.5E-03	No change	--	1.0E+00	More toxic	5.7E-07	4.7E-07	Less toxic
Naphthalene	4.0E-03	2.0E-02	Less toxic	--	--	No change	--	3.0E-03	More toxic	--	3.4E-05	More toxic
Styrene	2.0E-01	2.0E-01	No change	2.5E+00	--	Less toxic	--	1.0E+00	More toxic	--	--	No change
Tetrachloroethene	1.0E-02	1.0E-02	No change	5.1E-01	5.4E-01	More toxic	--	2.7E-01	More toxic	5.7E-07	5.9E-06	More toxic
Total petroleum hydrocarbons	--	--	No change	--	--	No change	--	--	No change	--	--	No change
Total petroleum hydrocarbons-volatile	--	--	No change	--	--	No change	--	--	No change	--	--	No change
trans-1,2-Dichloroethene	2.0E-02	2.0E-02	No change	--	--	No change	--	6.0E-02	More toxic	--	--	No change
Trichloroethylene	6.0E-03	--	Less toxic	1.1E-02	5.9E-03	Less toxic	--	--	No change	1.7E-06	2.0E-06	More toxic
Trichlorofluoromethane	3.0E-01	3.0E-01	No change	--	--	No change	7.0E-01	7.0E-01	No change	--	--	No change
Toluene	2.0E-01	8.0E-02	More toxic	--	--	No change	3.5E-01	5.0E+00	Less toxic	--	--	No change
Vinyl Chloride	--	3.0E-03	More toxic	1.9E+00	7.2E-01	Less toxic	--	1.0E-01	More toxic	8.6E-05	4.4E-06	Less toxic
Xylenes, total	2.0E+00	2.0E-01	No change	--	--	No change	3.2E-01	1.0E-01	More toxic	--	--	No change

Notes:
-- Toxicity value not available
RfC = Reference Concentration
URF = Unit Risk Factor
RfDo = Oral Reference Dose
SFo = Oral Slop Factor
NE - Not evaluated in 1994 risk assessment
2010 RSL Table = USEPA Regional Screening Levels Table (updated May 2010)
(a)Toxicity values are presented from Table 20, Baseline Risk Assessment 1994 for COPCs that were evaluated for exposure pathways in the risk assessment.

Appendix G
Ecological Risk Assessment Problem Formulation

San Gabriel Valley Superfund Site
Puente Valley Operable Unit Five Year Review

Ecological Risk Assessment Problem Formulation

PREPARED FOR: United States Environmental Protection Agency, Region 9

PREPARED BY: CH2M HILL

DATE: November 16, 2010

This technical memorandum describes the major components of a Conceptual Site Model (CSM) and probably assessment endpoints, which constitute the initial Problem Formulation step of an ecological risk assessment (EPA, 1998). Key information was taken from the 1994 Preliminary Baseline Risk Assessment (RA) (CH2M HILL, 1994) and observations from a site visit in March 2009. In addition, comparisons were made to nearby San Diego Creek watershed in Orange County, where site-specific, tissue-based selenium objectives have been developed as part of TMDL implementation (CH2M HILL, 2009).

In the 1994 RA, ecological risks were evaluated qualitatively from exposure to detected volatile organic compounds (VOCs) present in the surface water at San Jose Creek. The detected VOCs were expected to be removed from water primarily by volatilization to the atmosphere. These VOCs were not expected to significantly bioconcentrate in aquatic organisms or adsorb to sediment. A comparison of concentrations detected in surface water to the corresponding chemical-specific acute and chronic Ambient Water Quality Criteria showed that the criteria were considerably higher than the detected concentrations. Therefore, no adverse impact to aquatic organisms was identified at that time.

Since the completion of the 1994 RA, 1,4-dioxane and perchlorate have been detected in groundwater which could be potential source of contamination to surface water (CH2M HILL, 1994). However, because EPA does not recommend ambient water quality standards for 1,4-dioxane and perchlorate, the presence of these chemicals do not influence the conclusions of the RA.

Constituent of Ecological Concern

For the purposes of this CSM, selenium is identified as the only constituent of ecological concern. The 1994 RA did not evaluate selenium as a chemical of potential concern. However, the 1998 Interim ROD selected a remedy that is an interim measure to contain contaminant migration at the mouth of the Puente Valley with discharge to surface water as the preferred discharge option. In September 2009, Los Angeles County Department of Public Works, Flood Control Division (LA County) and the Los Angeles Regional Water Quality Control Board (RWQCB) objected to the plans to discharge the treated groundwater from the PVOU shallow zone and intermediate zone remedies to San Jose Creek, because the treated groundwater is estimated to contain selenium concentrations exceeding the

California Toxics Rule (CTR) criterion of 5 micrograms per liter (µg/L). Selenium is naturally-occurring in the groundwater of the PVOU. The selenium concentration in the remedy treatment system effluent is anticipated to be 12 µg/L, well below the drinking water standard of 50 µg/L for potable use, but it is considered a constituent of ecological concern because of its bioaccumulative properties (Ohlendorf, 2003). It is assumed that surface water discharges from the PVOU remedy will be treated to safe levels of VOCs and any other organic contaminants and that other metals or metalloids will be less than concentrations of ecological concern.

Environmental Setting

The potential sites for ecological exposure include the lined channels of Puente Creek and San Jose Creek, the unlined, more downstream portion of San Jose Creek, and the San Gabriel River. The unlined channels include riparian shrubs and trees and submerged and emergent aquatic plants along the channel edges. The concrete-lined channels are almost completely devoid of vegetation except those associated with isolated clumps of debris. In addition, the concrete channels are covered in an algal mat for most of the year.

As observed during the March 2009 site visit, the general habitat areas are:

- Puente Creek upstream and downstream of potential discharge sites is concrete lined, with a shallow sheetflow and algal mat coating.
- San Jose Creek is much wider in the concrete-lined section at the confluence with Puente Creek, but also with a shallow sheetflow over algal mats.
- Lower San Jose Creek, as it becomes unlined, is channelized but possesses riparian trees and shrubs as well as aquatic vegetation and relatively deep water. There is no shallow sheetflow in this area. This area receives the surface water discharge from the East SJC WRP and is approximately 1.5 miles of unlined creek before it merges with the San Gabriel River.
- The San Gabriel River is wider, with much more developed riparian and in-channel habitat than San Jose Creek. The surveyed reach included through the area of Whittier Narrows to the dam.

Observed Species and Species Likely to be Present

The aquatic habitats can be characterized as highly disturbed, but on the basis of direct observation, comparison to San Diego Creek, and information from the 1994 RA, they likely support warm water invertebrate and fish in the lower unlined channels. Those areas also provide feeding and possible nesting areas for shorebirds and waterfowl. In addition, as noted in the 1994 RA, there is the possibility of occurrence of Western Pond Turtle (a CDFG species of Special Concern and federal C2 candidate species) in the unlined section of San Jose Creek and the San Gabriel River down to Whittier Narrows Dam.

Likely ecological receptors identified for ecological risk assessment include:

- Warmwater nonnative fish such as largemouth bass, bluegill, or carp and Western Pond Turtle (aquatic organisms)

- Shorebirds such as black-necked stilt or American avocets (invertivorous bird)
- Waterfowl such as mallards or American coots (invertivorous bird)
- Riparian foraging mammals such as raccoon (omnivorous mammal)

Toxicity from excessive selenium is usually expressed through the food web and the most likely routes of exposure would be from direct consumption of aquatic invertebrates and the fish that eat them. All of the above receptors consume both of these categories of food.

Conceptual Site Model and Assessment Endpoints

The CSM diagram is presented in Figure 1, with exposure categories for the potential receptors listed above. Potential assessment endpoints for the risk assessment for these categories of receptors are listed in Table 1. Exposure point estimates for the risk assessment would include measured selenium concentrations in surface water, sediment, aquatic invertebrates, and whole-body fish as well as estimates of dietary dose for mammals and birds (Table 1).

As summarized in the CSM diagram (Figure 1), the ultimate source of elevated concentrations of selenium in surface water would be from discharged groundwater. Routes of exposure to ecological receptors include dermal, ingestion, and bioaccumulation into plant and animal tissues that may then serve as food items. Fish, aquatic invertebrates, and semi-aquatic birds or mammals may all be exposed through different routes and to different degrees. Incidental ingestion of water and uptake into various aquatic organisms are considered the most likely complete exposure pathways (Figure 1).

Conclusions and Recommendations

Selenium is identified as the only constituent of potential ecological concern. If discharge to surface water is to be implemented as part of the interim remedy at PVOU, there would be a potentially complete pathway for selenium to reach ecological receptors, and a full-scale ecological risk assessment would be recommended.

References

CH2M HILL, 1994. Puente Valley Operable Unit Preliminary Baseline Risk Assessment. San Gabriel Valley, California. Prepared for USEPA Region IX, San Francisco, CA. March 1, 1994.

CH2M HILL, 2009. Sources and Loads for Selenium in the Newport Bay Watershed. Prepared for the Nitrogen Selenium Management Program. Final Report, June 12, 2009.

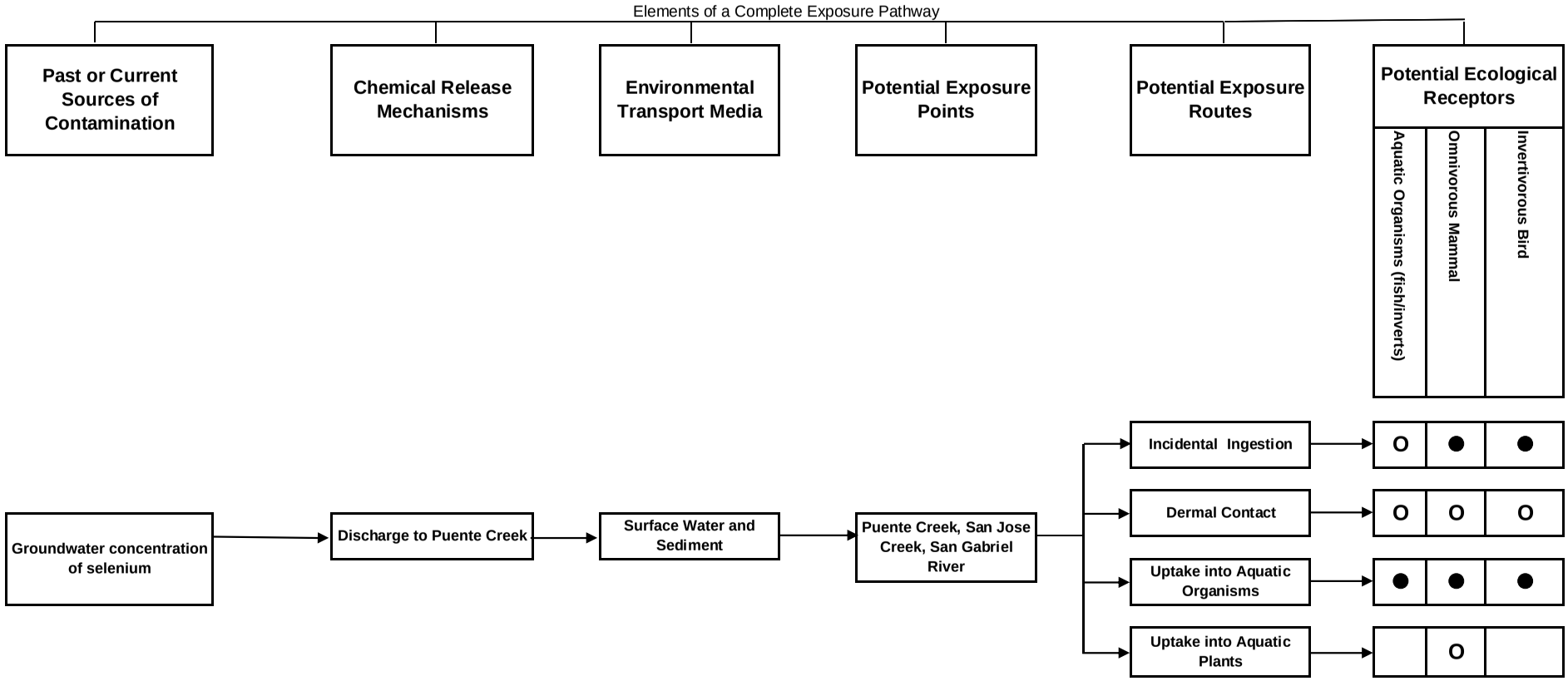
Ohlendorf, 2003. Ecotoxicology of Selenium. In : Hoffman, D. J., B.A. Rattner, G.A. Burton, and J.C. Cairns, Jr., Eds. Handbook of Ecotoxicology, 2nd Edition. Boca Raton, FL, USA. P 465 – 500.

U.S. Environmental Protection Agency (EPA), 1998. Guidelines for Ecological Risk Assessment. Washington D.C: Risk Assessment Forum. EPA/630/R-95/002F.

Figure 1

Conceptual Site Model for Puente Valley OU, Exposure from Selenium

Puente Creek, San Jose Creek, San Gabriel River



● = Potentially complete pathway; 'O = Possible but likely insignificant pathway; 'blank = Incomplete pathway

TABLE 1
Measures of Exposure and Effects for Puente Valley OU
Ecological Risk Assessment for Selenium for Puente and San Jose Creeks and the San Gabriel River.
Puente Valley OU Five Year Review

Assessment Endpoint					
Entity	**Attribute**	**Effect Level**	**Representative Receptor**	**Measure of Exposure**	**Measure of Effect**
Fish, Other Aquatic Organisms, and Amphibian Communities	Growth, reproduction, or survival	Chronic and acute aquatic or tissue benchmarks (low and high TRV)	Bluegill, largemouth bass	Measured concentrations of COPECs in surface water; measured concentrations of COPECs in tissue	Benchmark values for effects on growth, reproduction, or survival (low TRV in initial screen; low and high TRV in refined screen).
Benthic Invertebrate Communities	Growth, reproduction, or survival	TECs, PECs, and others or tissue benchmarks (low and high TRVs)	Stream invertebrate community	Measured concentrations of COPECs in sediment; measured concentrations of COPECs in tissue	Benchmark values for effects on growth, reproduction, or survival (low TRV in initial screen; high TRV in refined screen).
Semi-aquatic Avian Populations	Growth, reproduction, or survival	Low and high TRVs	American coot, Black-necked stilt	Average daily dose from dietary ingestion, water intake, and incidental sediment ingestion	Benchmark values for adverse effects on growth, reproduction, or survival (low TRV in initial screen; low and high TRVs in refined screen).
Semi-aquatic Mammalian Populations	Growth, reproduction, or survival	Low and high TRVs	Raccoon	Average daily dose from dietary ingestion, water intake, and incidental sediment ingestion	Benchmark values for adverse effects on growth, reproduction, or survival (low TRV in initial screen; low and high TRVs in refined screen).

Notes:

NA = not applicable
PEC = probable effects concentration (MacDonald, et al., 2000)
TEC = threshold effects concentration (MacDonald et al., 2000)

Erratum for *First Five-Year Review Report for San Gabriel Valley Superfund Site (Area 4), Puente Valley Operable Unit*, March 2011

PREPARED FOR: United States Environmental Protection Agency, Region 9

PREPARED BY: CH2M HILL

DATE: March 16, 2011

This erratum memorandum addresses a minor correction to the first printing of the *First Five-Year Review Report for San Gabriel Valley Superfund Site (Area 4), Puente Valley Operable Unit*, dated March 2011. The correction is shown in Table 1 below.

This correction will be incorporated into later printings of the report.

TABLE 1. ERRATUM FOR FIRST FIVE-YEAR REVIEW REPORT FOR SAN GABRIEL VALLEY SUPERFUND SITE (AREA 4), PUENTE VALLEY OPERABLE UNIT
March 2011

Reference	Citation	Corrected Citation
Section 3.5 Initial Responses, page 3-5, third paragraph	"LARWQCB issued CAO #89-034 to TRW in April 1989. In response, TRW removed underground storage tanks (USTs) and contaminated soil at the former Benchmark Technology facility."	"LARWQCB issued CAO #89-034 to TRW in April 1989. In response, TRW removed aboveground storage tanks (ASTs) and contaminated soil at the former Benchmark Technology facility."

No other changes were made between the first and subsequent printings of the report.