SECOND FIVE-YEAR REVIEW REPORT FOR SAN GABRIEL VALLEY AREA 1 SUPERFUND SITE LOS ANGELES COUNTY, CALIFORNIA

PREPARED BY

U.S. Army Corps of Engineers, Seattle District

FOR

U.S. Environmental Protection Agency

Region IX

Approved by:

John Lyons, Acting Assistant Division Director
California Site Cleanup and Enforcement Branch
Superfund Division
U. S. Environmental Protection Agency, Region IX

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Executive Summary

This is the second five-year review of the San Gabriel Valley Area 1 Superfund Site (Site) located in Los Angeles County, California. The purpose of this Five-Year Review is to review information to determine if the remedy is protective of human health and the environment.

The San Gabriel Valley, located in southern California approximately 25 miles east of the Pacific Ocean, covers a surface area of nearly 200 square miles. The valley is an urbanized area with high population, estimated at about 2 million people. The Site is a large area of contaminated groundwater within the San Gabriel Valley (Groundwater) Basin, with multiple contamination plumes, separate and commingled, in eastern Los Angeles County. The Site consists of five operable units (OUs): El Monte, Whittier Narrows, Richwood, Suburban, and South El Monte.

El Monte Operable Unit (EMOU)

The EMOU, or OU1, is an approximately 10 square mile groundwater area within the south-central portion of the San Gabriel Basin. The El Monte OU is bounded on the north by several streets that traverse a residential area between Lower Azusa Road and East Live Oak Avenue, on the south by Interstate 10, on the west by Rosemead Boulevard, and on the east by Santa Anita Avenue. Contaminants of concern (COCs) in this OU include volatile organic compounds (VOCs); primarily carbon tetrachloride, tetrachloroethylene (PCE), and trichloroethylene (TCE).

An interim Record of Decision (ROD) was issued in June 1999. The selected remedy in the interim ROD is shallow groundwater control in western and eastern portion of this OU and deep groundwater control. Key components include extraction, treatment, conveyance and discharge, and monitoring. In August 2002, an Explanation of Significant Differences (ESD) was issued to address the emergent contaminants perchlorate, NDMA, 1,4-dioxane, and hexavalent chromium. For administrative convenience and to expedite remedy implementation, the EMOU has been divided at Baldwin Avenue into the East Side and West Side.

Four treatment plants have been constructed. Two groundwater treatment plants treat the western portion of the OU; one to treat the shallow zone and the other to treat the northwestern deep zone. These treatment facilities have been in operation since 2012. Two treatment plants treat the eastern portion of the OU; one to treat the shallow zone and the other to treat the southern deep zone. The east side treatment plants were constructed in 2015. The shallow-zone east side treatment plant began continuous operation in January 2016. The southern deep-zone east side treatment plant is pending state drinking water permit approval and is not yet operational.

TCE and PCE concentrations continue to exceed applicable or relevant and appropriate requirements (ARARs) identified in the ROD, in the east side shallow zone and the northwest deep zone on the west side of the OU. For the west side OU treatment plants, it may be too early to assess trends in contaminant concentration and migration patterns because these plants have only been in operation for three years. The effectiveness of the east side OU treatment plants cannot be determined at this time because operation has just begun for the shallow-zone treatment plant and the deep-zone treatment plant has not yet begun

operations. Sampling results from compliance monitoring wells and other monitoring wells show that contamination remains contained within the EMOU.

Standards and toxicity values identified in the ROD remain valid except for hexavalent chromium. The State of California promulgated a state Maximum Contaminant Level (MCL) for hexavalent chromium in 2014 at a value of 10 µg/L, which is lower than the standard currently specified in the ROD. In addition, the standard in the ROD is outside the acceptable risk range and above EPA risk-screening levels. Hexavalent chromium is detected at concentrations just below the current state MCL within the deep zone, which is used for drinking water. In addition, there is a potential for an indoor air exposure from volatile contaminants in the groundwater.

A protectiveness determination of the remedy at the El Monte OU cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions: conduct an indoor air investigation at the few locations where shallow groundwater (less than 100 feet depth) and site related groundwater contamination poses a risk for the potential of vapor intrusion.

Whittier Narrows Operable Unit (WNOU)

The WNOU, or OU2, encompasses an approximately 4 square mile groundwater area within the southern portion of the San Gabriel Valley Basin and is a 1.5-mile gap in the low-lying hills that separate the San Gabriel Basin and the down-gradient Central Basin. The Whittier Narrows OU is bounded to the north by the Pomona Freeway (Highway 60) and to the south by the Montebello Forebay portion of the Central Basin near the Whittier Narrows Dam. COCs in this OU include VOCs, primarily PCE and TCE, and 1,4-dioxane.

An interim ROD was issued in March 1993 that included only monitoring. Based on continued monitoring, an interim ROD amendment was issued in November 1999. The selected remedy was groundwater containment near Whittier Narrows Dam. Key components of the remedy include containment through extraction, groundwater treatment, conveyance systems to transport extracted groundwater to the treatment plant and treated water from the plant to the designated end use, and groundwater monitoring.

Extraction wells were installed in two phases: May/June 1999 and August/September 2000. Construction of conveyance piping from the extraction wells to the treatment plant began in June 2001. Construction of the treatment facility was completed by March 2002. The interim remedy is currently in operations and maintenance (O&M) phase focusing on intermediate-zone groundwater. One significant O&M challenge during this five-year review period was not having a viable end user (e.g., drinking water customers) for the treated groundwater, which in turn led to reduced groundwater extraction well pumping rates (e.g., target pumping rates) needed to affect long term control of groundwater contamination, and the discharge of all treated groundwater to surface water.

The remedy at the WNOU currently protects human health and the environment because no one is drinking the water and all water currently discharged to surface water meets ROD requirements. However, in order for the remedy to be protective in the long term, end-use issues need to be resolved to identify and meet target extraction rates that ensure containment of the plume in the intermediate zone and 1,4-dioxane concentrations should continue to be monitored.

Richwood Operable Unit (ROU)

The ROU, or OU3, is located in the City of El Monte, California, approximately 0.5 mile west of Interstate 605 and approximately 1 mile north of Interstate 10. The ROU originally consisted of an area of contaminated groundwater impacting three mutual water companies (purveyors): the former Richwood Mutual Water Company (RMWC), Rurban Homes Mutual Water Company (RHMWC), and Hemlock Mutual Water Company (HMWC). The OU is located between the Rio Hondo river channel and the San Gabriel River and southeast of an unpopulated flood control basin. PCE is the primary COC for ROU.

In May 1984, EPA issued a ROD with requirements to develop either alternative water supplies or treatment systems that would allow local water purveyors to supply clean drinking water. In September 1987, EPA issued an amendment indicating that a granular activated carbon (GAC) treatment system was more effective than installing an air stripper. At the time of the ROD amendment, PCE detected in production wells (drinking water wells) had declined from a maximum concentration of 54 µg/L to 1.14 µg/L, below the action level. The ROU was transferred to the state in 1993, and subsequently the treatment system was dismantled after the impacted area switched to a different water company.

Exposure assumptions and standards for the ROU remain valid. The remedy at the ROU is protective of human health and the environment.

Suburban Operable Unit (SOU)

The SOU, or OU4, includes the Suburban Water System (SWS) Bartolo Well Field, a set of public water supply wells located along the east side of the San Gabriel River in the Whittier Narrows area. The Bartolo Well Field is located south of California Highway 60 and west of Interstate 605. The Suburban OU is largely undeveloped except for the production wells and facilities of the Bartolo Well Field. COCs for the SOU include VOCs, primarily PCE.

The September 1988 ROD selected a response action designed to partially control the movement and spread of contaminants in the Whittier Narrows area of the San Gabriel Valley, and address the potential public health threat posed by contamination of Bartolo Well Field. The selected remedy included extraction of contaminated groundwater and treatment using an air stripper. A ROD amendment was signed in September 1993. The amendment included a provision to delay construction for the treatment facility until the groundwater concentrations in the eastern Whittier Narrows posed a threat to public health, as determined by EPA. Prior to remedial design, contaminant concentrations in Bartolo Well Field were found to be below ROD standards. Therefore, no active remedy was ever implemented for the SOU.

Exposure assumptions, standards, and toxicity values remain valid. The remedy at SOU is protective of human health and the environment.

South El Monte Operable Unit (SEMOU)

The SEMOU, or OU5, covers an approximately 8 square mile area within the south-central portion of the San Gabriel Valley Basin and is bounded by the San Bernardino Freeway (Interstate 10) to the north, the Pomona Freeway (Highway 60) to the south, the San Gabriel River Freeway (Interstate 605) to the east, and San Gabriel Boulevard to the west. COCs for this OU include VOCs, primarily PCE and TCE, and perchlorate.

An interim ROD was signed in September 2000. Per the interim ROD, groundwater contaminant concentrations in both the shallow and intermediate zones are highest in the southern portion of the SEMOU, where contamination migrates to the south towards Whittier Narrows. The selected remedy included control of intermediate-zone groundwater contamination above chemical-specific ARARs into or beyond containment areas (e.g., Central and Western). Construction of water purveyor treatment facilities began before EPA prepared the interim ROD for South El Monte OU and continued through mid-2006. By August 2008, all primary construction activities had been completed by the three impacted water purveyors: City of Monterey Park, Golden State Water Company (GSWC), and San Gabriel Valley Water Company (SGVWC).

The City of Monterey Park facility treats water from three wells: Wells 5, 12, and 15. Well 5 treatment consists of VOC treatment using liquid GAC. Wells 12 and 15 are treated in a separate facility from Well 5 that uses an air stripper with vapor GAC off-gas treatment, acid injection to control precipitation, and liquid GAC secondary barrier. In addition, a perchlorate treatment system using ion exchange (IX) was constructed for Well 12. The perchlorate treatment system is currently off-line because concentrations have decreased to below the maximum contaminant level.

The Golden State Water Company facility treats water from two wells: San Gabriel Wells No. 1 (SG1) and No. 2 (SG2). The treatment facility consists of liquid GAC vessels. Elevated nitrate in Well SG2 affected GSWC's ability to provide potable water from this well, so it was not operated consistently for many years. Perchlorate was detected in both wells. To address perchlorate, carbon in one GAC vessel was replaced with IX resin. In early 2010, a blending plan (i.e., blending water from different sources; thereby lowering the overall nitrate level), which would allow use of Well SG2, was proposed by GSWC and was approved in 2012 with the condition that SG2 operate only when Well SG1 is in operation. The perchlorate treatment system is currently off-line because concentrations have decreased to below the maximum contaminant level.

The San Gabriel Valley Water Company facility treats water from Plant No. 8 which extracts water from five active production wells; Wells 8B, 8C, 8D, 8E, and 8F. Only Wells 8B, 8C, and 8D are part of the South El Monte OU; Wells 8E and 8F are perforated in a deeper portion of the aquifer below the vertical extent of contamination. The treatment facility initially consisted of an air stripper and off-gas vapor GAC. A liquid GAC system was installed to serve as a dual barrier for water treated by the air stripper.

The groundwater extraction systems are in general compliance with the interim remedy. There is no increase in contamination concentrations outside the OU boundary and a recent capture zone analysis indicates that the extraction systems are achieving capture of the VOC plume. An indoor air investigation was conducted within this five-year review period, collecting samples from commercial and residential buildings. The results of this investigation indicate that VOCs are present in indoor air at levels above screening levels at several commercial/industrial and residential properties. Standards and toxicity values changed for the South El Monte OU; however these changes do not affect protectiveness.

The remedy at SEMOU is not protective because of commercial building workers' and residents' exposures to VOCs in indoor air. These exposures need to be mitigated to ensure protectiveness.

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List of Abbreviations

AOP	advanced oxidation process
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CCT	chlorine contact tank
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
Cr^{+6}	hexavalent chromium
DCA	dichloroethane
DCE	dichloroethylene
DDW	California Department of Drinking Water
DTSC	California Department of Toxic Substance Control
EMOU	El Monte OU
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FBR	fluidized bed reactor
FYR	Five-Year Review
GAC	granular activated carbon
gpm	gallons per minute
GSWC	Golden State Water Company
GWTS	Groundwater treatment system
HERO	DTSC Office of Environmental Health Hazard Assessment Human Health Risk Office (HERO)
HMWC	Hemlock Mutual Water Company
IRM	interim remedial measure
IX	ion exchange
LGAC	liquid-phase granular activated carbon
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
µg/L	microgram per liter
mg/L	milligram per liter
MP	Monterey Park
NDMA	n-nitrosodimethylamine
O&M	operations and maintenance
OU	Operable Unit
ppb	parts per billion
PCE	tetrachloroethylene
PRP	potentially responsible party
RAO	remedial action objective
RMWC	Richwood Mutual Water Company
RHMWC	Rurban Homes Mutual Water Company
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SCAQMD	South Coast Air Quality Management District
SGVWC	San Gabriel Valley Water Company
SWS	Suburban Water System

TCE	trichloroethylene
THM	trihalomethanes
USACE	U.S. Army Corps of Engineers
VGAC	vapor-phase granular activated carbon
VOC	volatile organic compound

1. Introduction

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

The U.S. Environmental Protection Agency (EPA) is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, 40 Code of Federal Regulation (CFR) Section 300.430(f)(4)(ii) of the National Contingency Plan and EPA policy.

This is the second FYR for the San Gabriel Area 1 Superfund Site. The triggering action for this statutory review is the completion date of the previous FYR for the Whittier Narrows OU. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site with concentrations above levels that allow for unlimited use and unrestricted exposure.

The Site consists of the following five OUs, all of which will be reviewed in the FYR:

- El Monte Operable Unit (EMOU or OU1)
- Whittier Narrows Operable Unit (WNOU or OU2)
- Richwood Operable Unit (ROU or OU3)
- Suburban Operable Unit (SOU or OU4)
- South El Monte Operable Unit (SEMOU or OU5)

The EMOU has been subdivided as East Side and West Side for remedy implementation.

The San Gabriel Area 1 Superfund Site Five-Year Review was led by Rachelle Thompson and Bella Dizon, EPA Remedial Project Managers (RPMs), and Sue Fears, DTSC Team Leader for San Gabriel Valley. Participants included Marlowe Laubach, USACE chemical engineer; Rick Garrison, USACE geologist; and Jayson Osborne, USACE biologist. The review began on October 6, 2015.

Table 1-1. Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: San Gabriel Valley Area 1		
EPA ID: CAD980677355		
Region: 9	**State:** CA	**City/County:** South El Monte, El Monte, Temple City, and Rosemead/ Los Angeles County
SITE STATUS		
NPL Status: Final		
Multiple OUs?Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA for four of the OUs; — DTSC is lead agency for the Whittier Narrows OU		
Author name (Federal or State Project Manager): Bella Dizon & Rachelle Thompson		
Author affiliation: EPA Region 9		
Review period: 10/6/2015 - 5/13/2016		
Date of site inspection: 19-20 Jan 2016 and 16-17 Feb 2016		
Type of review: Statutory		
Review number: 2		
Triggering action date: 9/14/2011		
Due date *(five years after triggering action date)*: 9/14/2016		

1.1. Background

Volatile organic compounds (VOCs) were first detected in groundwater in the San Gabriel Valley in 1979 during environmental monitoring activities near a Potentially Responsible Party (PRP) facility in Azusa, California. By 1984, high levels of VOCs were found in 59 wells. On May 8, 1984, the Site was listed on the NPL. Additional investigations triggered by this discovery revealed the presence of VOCs, notably tetrachloroethene (PCE) and trichloroethene (TCE), throughout large areas of the basin, apparently from multiple sources. The releases are widely believed to have begun shortly after World War II when much of the San Gabriel Valley became industrialized. 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.

As of August 2004, 196 out of 275 water supply wells in the San Gabriel Valley had detectable levels of one or more of the following contaminants: VOCs, perchlorate, n-nitrosodimethylamine (NDMA), and 1,4-dioxane. The groundwater contamination is believed to result from the cumulative impact of decades of improper chemical handling and disposal practices at hundreds of industrial operations in the Valley. Although many of the laws regulating the handling and disposal of hazardous chemicals went into effect after 1970, historical documents describe local officials' concerns about the potential for groundwater

contamination by industrial activity in the San Gabriel Valley as early as the 1950s. The San Gabriel Basin aquifer continues to provide approximately 90 percent of the domestic water supply for the Valley's residents through treatment.

1.2. Physical Characteristics

The San Gabriel Valley, located in southern California approximately 25 miles east of the Pacific Ocean, covers a surface area of nearly 200 square miles. The valley is an urbanized area with high population, estimated at about 2 million people. The Site is a large area of contaminated groundwater within the San Gabriel Valley (Groundwater) Basin, with multiple contamination plumes, separate and commingled, in eastern Los Angeles County. The Site consists of five operable units (OUs): El Monte (EMOU), Whittier Narrows (WNOU), Richwood, Suburban, and South El Monte (see Figure 1-1).

The land use and cover of the valley is about 80% developed consisting of a mix of commercial, residential, and industrial development that was mostly established in the 1950s and 1960s. Groundwater at the Site is the primary source of drinking water for residents and businesses overlying the Site and in adjacent areas.

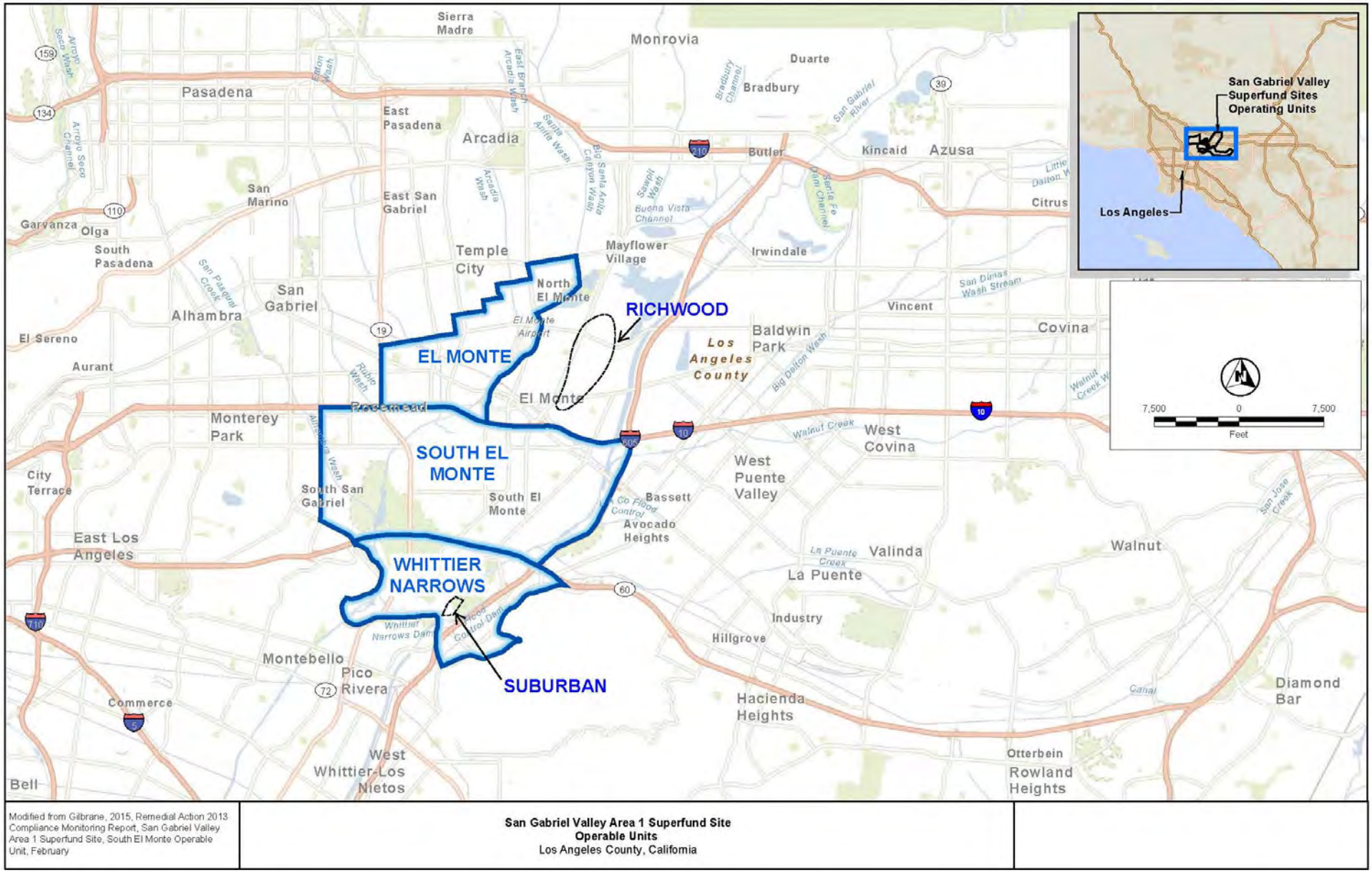
The EMOU, is an approximately 10 square mile groundwater area within the south-central portion of the San Gabriel Valley Basin (see Figure 1-1). The EMOU is bounded to the north by several streets that traverse a residential area between Lower Azusa Road and East Live Oak Avenue, on the south by Interstate 10, on the west by Rosemead Boulevard, and on the east by Santa Anita Avenue. Within the surrounding area, the land is highly developed and lies within the cities of El Monte, Rosemead, and Temple City. Most of the area is zoned for residential use and is likely to remain residential. Industrial activity in the EMOU is primarily concentrated in the central portion of the OU. To manage the remedial actions performed by different potentially responsible parties (PRPs), the El Monte OU was divided for administrative purposes into the East Side OU and the West Side OU at Baldwin Avenue, which runs north-south.

The WNOU encompasses an approximately 4 square mile area in the southern portion of the San Gabriel Basin (see Figure 1-1) and represents the primary discharge point for groundwater and surface water flow exiting the Basin. Whittier Narrows is a 1.5-mile gap in the low-lying hills that separate the San Gabriel Basin and the down-gradient Central Basin. EPA designated Whittier Narrows as an OU specifically to address groundwater contamination flowing out of the San Gabriel Basin, through Whittier Narrows, into the Montebello Forebay portion of the Central Basin. The Montebello Forebay is critical to the Central Basin groundwater aquifers because this is where the aquifers are closest to the ground surface and receive most of their recharge. The Whittier Narrows OU is bounded to the north by the Pomona Freeway (Highway 60) and to the south by the Montebello Forebay portion of the Central Basin near the Whittier Narrows Dam. Groundwater flow in the Whittier Narrows OU is principally from northeast to southwest from the San Gabriel Valley Basin into the Central Basin. There are drinking water wells located within Whittier Narrows and immediately down-gradient in the Central Basin. Most of the Whittier Narrows OU is undeveloped land dedicated to flood control and outdoor recreational uses. Densely populated residential, commercial, and light industrial areas surround the WNOU. This includes extensive industrial areas in the immediately up-gradient SEMOU. Industrial activities within the WNOU are generally limited to the far eastern portion of the Narrows.

The ROU is located in the northeastern portion of City of El Monte, California, approximately 0.5 mile west of Interstate 605 and approximately 1 mile north of Interstate 10 (see Figure 1-1). The ROU originally consisted of an area of contaminated groundwater impacting three mutual water companies (purveyors): the former Richwood Mutual Water Company (RMWC), Rurban Homes Mutual Water Company (RHMWC), and Hemlock Mutual Water Company (HMWC). The ROU is located between the Rio Hondo and the San Gabriel Rivers and is southeast of an unpopulated flood control basin. The ROU has a similar land and resource use as EMOU.

The SOU includes the Suburban Water System (SWS) Bartolo Well Field, a set of public water supply wells located along the east side of the San Gabriel River in the Whittier Narrows area (see Figure 1-1). The Bartolo Well Field is located west of Interstate 605 and south of California Highway 60. The SOU land area is largely undeveloped except for the production wells and facilities of the Bartolo Well Field.

The SEMOU covers approximately 8 square mile groundwater area in the south-central portion of the San Gabriel Valley Basin and is bounded by the San Bernardino Freeway (Interstate 10) to the north, the Pomona Freeway (Highway 60) to the south, the San Gabriel River Freeway (Interstate 605) to the east, and San Gabriel Boulevard to the west (see Figure 1-1). Most of the SEMOU is highly developed, except for the large area of land within the Whittier Narrows flood control basin (ITSI Gilbane Company [ITSI], 2013). The SEMOU encompasses the entire City of South El Monte, parts of the City of El Monte, and the City of Rosemead. A majority of the OU area is zoned for residential use, particularly the eastern and western portions of the OU, and these areas are likely to remain residential. However, industrial activity, primarily in small to medium-sized businesses, does occur across a significant section of the central portion of the SEMOU. Residential and industrial buildings overlie the contaminated groundwater plume.



Modified from Gilbrane, 2015, Remedial Action 2013 Compliance Monitoring Report, San Gabriel Valley Area 1 Superfund Site, South El Monte Operable Unit, February

San Gabriel Valley Area 1 Superfund Site
Operable Units
Los Angeles County, California

Figure 1-1. Location Map of the San Gabriel Area 1 Superfund Site

1.3. Hydrology

The San Gabriel Valley Groundwater Basin is a piedmont plain located in eastern Los Angeles County and includes a portion of upper Santa Ana Valley. The northern border of the Basin is defined by the Raymond fault, San Gabriel Mountains, and the contact between Quaternary sediments and consolidated basement rocks of the San Gabriel Mountains. The Chino fault and the San Jose fault form the eastern border of the Basin. The southern border of the Basin is a crescent shaped formation of low hills around the south, southwest, and southeast. Surface water flows out of the Basin through both the San Gabriel River and the Rio Hondo River. The Basin slopes to the southwest at a low gradient of about 65 feet per mile.

The alluvium is formed by alluvial fans from the San Gabriel Mountains and follows the waterways in the valley. The aquifer has an estimated storage of 3 trillion gallons of water and is the primary source of water for the estimated 2 million residents of the basin.

Groundwater in the South El Monte, Whittier Narrows, and Suburban OUs in the southern portion of the San Gabriel Valley Basin occurs at depths ranging from approximately 15 to 50 feet below ground surface (bgs). In the SEMOU, EPA's analysis of the soil lithologic data indicates that a fairly extensive fine-grained sequence of sediments that separates the shallow aquifer from the intermediate aquifer. This fine-grained sequence, termed the Separating Sequence, generally is found in the interval between 100 and 200 feet bgs, although its depth and thickness vary. The Separating Sequence tends to become less apparent to the south, toward the WNOU. Lithologic data collected during installation of new wells in 2011 generally support the presence of a fine-grained unit (Separating Sequence) in the northern portion of the SEMOU and the presence of mostly medium- to coarse-grained material to the south (ITSI, 2013).

Groundwater flow in the shallow zone aquifer is principally to the south and southwest, toward the Whittier Narrows. Groundwater flow conditions in the intermediate zone aquifer are affected by a flow divide that separates westward flow from southward flow through the Whittier Narrows. The 2011 Whittier Narrows OU Five-Year Review (EPA, 2011) reports that the flow divide is approximately south of Rush Street and east of Rosemead Boulevard. This would place the divide or split roughly beneath the middle of the primary industrial contaminant source areas in the central portion of the SEMOU. The location of the flow divide is transient, and it generally moves to the south in the vicinity of Highway 60 during low-water level conditions (EPA 2011). In this area of the SEMOU, the bottom of the intermediate aquifer is approximately 600 feet bgs. The intermediate zone aquifer is underlain by the deep zone aquifer, which extends to bedrock. Groundwater in the EMOU flows generally in a west to southwest direction, although flow fields in the shallow aquifer may be variable (Geosyntec, 2009) and includes a southerly flow direction during prolonged drought conditions. The depth to groundwater is approximately 65 to 100 feet bgs. Recent groundwater conditions in the nearby ROU are not documented, but expected to be similar to those in the EMOU.

2. Remedial Actions Summary

2.1. Basis for Taking Action

In 1980, the State of California began extensive well water testing in the San Gabriel Valley Groundwater Basin. Sampling results revealed that many drinking water supply wells were contaminated with volatile organic compounds (VOCs); primarily trichloroethylene (TCE), tetrachloroethylene (PCE), 1,1-dichloroethane (DCA), *cis*-1,2-dichloroethylene (DCE), and 1,1-DCE at levels above drinking water standards. 1,4-Dioxane, hexavalent chromium, *n*-nitrosodimethylamine (NDMA), and perchlorate have also been detected in the El Monte and South El Monte OUs. 1,4-Dioxane has also been detected in the Whittier Narrows OU. The presence of these contaminants in groundwater used as drinking water is the basis for taking action.

2.2. Remedy Selection

Table 2-1summarizes the remedy selected for each OU in the San Gabriel Area 1 Superfund Site.

Table 2-1. Selected Remedy for Five OUs in San Gabriel Area 1 Superfund Site

OU	Selected Remedy
El Monte (OU1)	Groundwater containment, treatment of extracted water, and monitoring[1]
Whittier Narrows (OU2)	Groundwater containment, treatment of extracted water, and monitoring[2]
Richwood (OU3)	Water treatment system using carbon adsorption[3]
Suburban (OU4)	Partial groundwater containment, treatment of extracted water, and monitoring[4]
South El Monte (OU5)	Groundwater containment, treatment of extracted water, and monitoring[5]

1 – The remedy was modified in the 2002 ESD to include emerging contaminants.
2 – The selected remedy is the modified remedy described in the 1999 interim ROD amendment.
3 – The selected remedy is the modified remedy described in the 1984 ROD amendment.
4 – The selected remedy is the remedy described in the 1988 ROD.
5 – The remedy was modified in the 2005 ESD to include perchlorate treatment.

2.2.1. El Monte OU (EMOU)

An interim record of decision (ROD) was signed in June 1999. The remedial action objectives (RAOs) presented in the 1999 interim ROD are:

- Prevent exposure of the public to contaminated groundwater with concentrations above maximum contaminant levels (MCLs)
- Inhibit contaminant migration from more highly contaminated portions of the aquifer to less contaminated areas or depths
- Reduce the impact of continued contaminant migration on down-gradient water supply wells, and
- Protect future uses of less contaminated and uncontaminated areas.

The selected remedy in the 1999 interim ROD is shallow groundwater control in western and eastern El Monte OU plus deep groundwater control. The shallow groundwater control is achieved by shallow zone

groundwater extraction in the western and eastern portions of the El Monte OU. The deep ground water control is achieved by the deep zone groundwater extraction in the northern portion of the OU at or in the vicinity of the Encinitas wellfield and deep zone groundwater extraction in the southern portion of the OU near the down-gradient extent of contamination. The extracted water is treated for VOC removal by liquid-phase carbon adsorption.

The end use option for the treated deep groundwater is delivery to a municipal water supply system. Treated shallow groundwater in the western portion of the OU is discharged to Eaton Wash, a local surface water body. Treated shallow groundwater in the eastern portion of the OU is re-injected back into the shallow aquifer.

The selected remedy includes a monitoring system to ensure compliance with RAOs and performance criteria in the shallow and deep zones in the EMOU. In addition, selected monitoring wells may be used to provide an early warning system that would provide sufficient time to prevent noncompliance. Less contaminated groundwater not contained by the remedial action would be subject to natural attenuation processes as it migrates down-gradient. The effectiveness of natural attenuation would be determined by groundwater sampling.

Compliance with the RAOs is to be assessed using the following performance criteria:

- Shallow Zone. VOC contamination at levels above 10 times the standards listed in Table 2-2 cannot migrate beyond its current lateral and vertical extent.

- Deep Zone, Northwestern Area. VOC contamination at levels above standards listed in Table 2-2 cannot migrate into or beyond the Encinitas Well Field Area in the northwestern portion of the OU.

- Deep Zone, Southern Area. VOC contamination at levels above standards listed in Table 2-2 cannot migrate beyond its current lateral and vertical extent.

On August 22, 2002, EPA issued an ESD to address the following emergent chemicals: 1,4-dioxane, hexavalent chromium, NDMA, and perchlorate. The ESD modifies the cleanup decision in the interim ROD to address these emergent chemicals.

2.2.2. Whittier Narrows OU (WNOU)

The WNOU ROD was signed on March 31, 1993. Based on the risk assessment performed, EPA determined that no remedial action was necessary at that time. The selected monitoring program included the existing groundwater monitoring network and supplementing this network with the installation of up to nine additional multiport or cluster groundwater monitoring wells, plus approximately eight single-point wells to gather groundwater data where none existed.

An interim ROD amendment was signed in November 1999. The ROD amendment included the following RAO:

- To the extent technically and economically feasible, EPA intends to control contaminant migration in Whittier Narrows so that contamination originating from industrial activities in the

San Gabriel Basin will not cause production wells in Whittier Narrows and the Central Basin to exceed drinking water standards.

The selected remedy in the 1999 interim ROD amendment was groundwater containment near Whittier Narrows Dam. The major components of the remedy include:

- Groundwater containment through extraction at or near the down-gradient limit of contaminant concentrations exceeding MCLs or other relevant Superfund evaluation criteria. This location is near Whittier Narrows Dam.
- Groundwater treatment at a treatment facility (or facilities), using air stripping with vapor-phase granular activated carbon adsorption (VGAC) for off-gas treatment and, potentially, liquid-phase granular activated carbon treatment (LGAC).
- If 1,4-dioxane concentrations in the extracted groundwater exceed the state action level, additional or alternative treatment facilities using technologies such as ultraviolet oxidation may be required.
- Conveyance systems (i.e. pipelines, booster pumps) to transport contaminated groundwater from the wells to the treatment plant and treated water from the plant to the designated end use.
- Treated water end-use by local water purveyors or, as a secondary option, recharge of the treated water back to the aquifer using existing Montebello Forebay or other spreading facilities (groundwater replenishment facilities).
- Groundwater monitoring to help optimize system design, measure the performance of the containment system, and provide early warning of up-gradient conditions that could affect the system.

2.2.3. Richwood OU (ROU)

In May 1984, EPA issued a ROD with a requirement to develop either alternative water supplies or treatment systems that would allow three local water purveyors to supply clean drinking water to their customers. In September 1987, EPA issued an amendment to the 1984 ROD (EPA, 1987) indicating that installation of a carbon adsorption or GAC treatment system was more effective than the installation of an air stripper treatment system. At the time of the ROD Amendment, PCE detected in production wells had declined from a maximum concentration of 54 µg/L to 1.14 µg/L, below the action level. Based on the reduced concentrations, EPA stated in the ROD Amendment that implementation of the remedy selected for one of the local purveyors may not be not necessary. A second water purveyor had already declined EPA assistance and installed a GAC treatment system that became operational in 1986.

The Richwood OU remedy was transferred to the state in 1993, and subsequently the treatment system was dismantled. The assets of Richwood Mutual Water Company (RMWC) were acquired by San Gabriel Valley Water Company (SGVWC) in 1999. All RMWC customers were integrated into the SGVWC distribution system and have since become customers of SGVWC. RMWC production wells, 1 South and 2 North, were destroyed pursuant to a permit issued by the Main San Gabriel Basin Watermaster.

2.2.4. Suburban OU (SOU)

The response action selected in the SOU September 26, 1988 ROD was designed to partially control the movement and spread of contaminants in the Whittier Narrows area of the San Gabriel Valley, and

address the potential public health threat posed by contamination of Bartolo Well Field. The selected remedy in the 1988 ROD included extraction of contaminated groundwater and treatment using a packed tower air stripping system. A ROD amendment was signed for the Suburban OU on September 22, 1993. The amendment included a provision to delay construction of the treatment facility until such time as groundwater contamination in the eastern Whittier Narrows area is believed by EPA to pose a threat to public health. Contaminant concentrations in Bartolo Well Field have remained low and, therefore, no active remedy was ever implemented for the Suburban OU.

2.2.5. South El Monte OU (SEMOU)

An interim ROD for the South El Monte OU was signed on September 29, 2000. The interim ROD presented EPA's RAOs as:

- Prevent exposure of the public to contaminated groundwater.
- Contain further migration of contaminated groundwater from more highly contaminated portions of the aquifer to less contaminated areas or depths.
- Reduce the impact of continued contaminant migration on down-gradient water supply wells.
- Protect future uses of less contaminated and uncontaminated groundwater.

To meet RAOs, migration control was required in the SEMOU as long as VOC concentrations in migrating groundwater exceed state or federal drinking water standards. The interim ROD selected intermediate-zone control in western SEMOU and performance criteria that must be met while allowing flexibility in implementation. The performance criteria described below are designed to attain the RAOs for the SEMOU. The selected remedy addresses the intermediate-zone groundwater contamination in the northwestern portion of the SEMOU.

As stated in the interim ROD, the performance criterion for the intermediate zone is:

> The remedial action shall provide sufficient hydraulic control to prevent migration of intermediate zone groundwater contamination above chemical-specific ARARs into or beyond the Central Containment Area and into or beyond the Western Containment Area.

Compliance with this criterion will be verified through monitoring of compliance wells for two parameters: hydraulic control and chemical-specific ARARs. The remedial action must create inward hydraulic gradients at each of the containment areas: Central and Western Containment Areas. These hydraulic gradients must be sufficient to demonstrate that contaminated groundwater is captured by the extraction wells under all flow conditions (e.g., during both wet and dry periods in the hydrologic cycle). Compliance with the performance criteria will be confirmed by quarterly sampling and water level monitoring at compliance wells.

The Central Containment Area is defined as 1) the area encompassed by five Monterey Park wells (wells 7, 8, 9, 12, and 15) and six San Gabriel Valley Water Company (SGVWC) Plant 8 wells (wells 8A, 8B, 8C, 8D, 8E, and 8F) and 2) the intermediate-zone groundwater contaminated at levels above ARARs present within 1,500 feet down-gradient of these wells. The remedial action must contain all intermediate-zone groundwater contamination that is migrating into the Central Containment Area.

The Western Containment Area is defined as: (1) the area encompassed by the five Southern California Water Company Wells (wells San Gabriel 1 and 2, Garvey 1 and 2, and Earle 1) and six Monterey Park wells (wells 1, 3, 5, 6, 10, and Fern) and (2) the extent of intermediate-zone groundwater contaminated at levels above ARARs in the vicinity of these wells. The remedial action must not allow intermediate-zone groundwater contamination to spread beyond its current extent.

Extracted intermediate-zone groundwater will be treated by air stripping (with off-gas controls) or liquid-phase carbon adsorption. If alternative treatment technologies are identified, EPA will evaluate the alternative in accordance with criteria specified in 40 CFR Section 300.430 during remedial design.

An ESD was signed on November 10, 2005. The ESD addresses "the potential impacts of adding perchlorate treatment to the existing treatment systems of the remedy components in the interim ROD that are intended to capture that portion of the VOC-contaminated groundwater in the intermediate zone that is flowing to the west." The ESD does not address, and specifically reserves for future determination in a subsequent decision document, how to contain or treat perchlorate in the shallow zone and those portions of the intermediate zone that flow south toward Whittier Narrows. Containment or treatment of contaminants in the shallow zone and 1,4-dioxane in the intermediate zone is reserved for a future determination in subsequent decision document.

Table 2-2 presents the COCs for each OU and their respective chemical-specific ARARs. These ARARs were primarily used as performance standards.

Table 2-2. San Gabriel Valley Area 1 OUs, COCs, and ROD Standards

Contaminant of Concern	ROD Standard[1] (µg/L)				
	El Monte	Whittier Narrows	Richwood	Suburban	South El Monte
1,1-Dichloroethane (1,1-DCA)	-	5[5]	-	-	-
1,1-Dichlorethylene (1,1,-DCE)	-	6[5]	-	6	-
1,1,1-Trichloroethane	-	200[5]	-	-	-
1,2-Dichloroethane	-	0.5[5]	-	-	0.5[7]
Benzene	-	-	-	-	1[7]
Carbon tetrachloride	0.5[3]	-	-	0.5	-
Chloroform[2]	-	100[5]	-	-	-
cis-1,2-Dichloroethylene (*cis*-1,2-DCE)	-	6[5]	-	-	6[7]
1,2-DCE	-	-	-	6	6[7]
1,2-Dichloropropane	-	-	-	-	5[7]
Methylene chloride	-	-	-	5	-
Tetrachloroethylene (PCE)	5[3]	5[5]	5[6]	5	5[7]
Trichloroethylene (TCE)	5[3]	5[5]	-	5	5[7]
Toluene	-	150[5]	-	-	-
Ethylbenzene	-	700[5]	-	-	-
Xylenes, total	-	1,750[5]	-	-	-
Vinyl chloride	-	-	-	-	0.5[7]
Styrene	-	100[4]	-	-	-
Perchlorate	4[4]	-	-	-	6[7]
NDMA	0.01[4]	-	-	-	-
1,4-Dioxane	3[4]	3[5]	-	-	-
Hexavalent chromium	11[4]	-	-	-	-

1 – ROD standards are used as performance criteria for all OUs

2 – This chemical is one of the four trihalomethanes (THMs); the MCL listed is for all four THMs combined: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

3 – From El Monte OU 1999 IROD; 4 – From El Monte OU 2002 ESD; 5 – From Whittier Narrows OU 1999 ROD Amendment

6 - Richwood ROD Amendment lowered the treatment standard to 1 µg/L.

7 – From South El Monte OU 2000 IROD; 8 – From South El Monte OU 2005 ESD

2.3. Remedy Implementation

2.3.1. El Monte OU

Four water treatment systems are used as part of the cleanup. The first two systems are known as the West Side OU treatment systems. One system extracts contaminated groundwater from the northwestern deep zone. The treatment system makes use of Golden State Water Company's (GSWC's) Encinitas Well Field since 2002. Extracted groundwater is treated through a LGAC treatment system to remove VOCs and is then distributed by GSWC as drinking water supply. The other system, which began operation in 2012, extracts and treats (VOCs by LGAC and fluidized bed reactor (FBR) system for nitrates and perchlorate) contaminated groundwater from the western shallow zone. The treated water is then discharged into the Eaton Wash. The construction of a 1,4-dioxane advanced oxidation process treatment system began in December 2014 and was completed in February 2015. However, well ERP15 for which this system was built, is "dry" and the system is currently off-line.

The third and fourth treatment systems are known as the East Side OU treatment systems. These systems were constructed in 2015. One system extracts contaminated groundwater from the southern deep zone and the other system extracts contaminated groundwater from the eastern shallow zone. Both these systems use LGAC to treat VOCs. The treated water from the east shallow zone system, which began continuous operations in January 2016, is re-injected. Treated water from the southern deep zone will be delivered by the City of El Monte into its existing distribution system once the California Department of Drinking Water (DDW) issues a drinking water permit.

2.3.2. Whittier Narrows OU

EPA installed groundwater extraction wells in the shallow aquifer and the intermediate aquifer during two phases of well drilling in May/June 1999 and August/September 2000. Four wells, designed for a combined average flow rate of 5,000 gpm, were installed in the shallow aquifer, and three wells, designed for a combined average flow rate of 6,000 gpm, were installed in the intermediate aquifer. Installation of the conveyance pipelines from the extraction wells to the treatment plant and from the treatment plant to the initial surface water discharge points (Legg Lakes, Nature Center Lake, and the Zone 1 Ditch) began on June 11, 2001. Construction of the treatment plant began in July 2001. EPA completed construction in March 2002. The interim remedy is now in the operations and maintenance (O&M) phase. Starting in 2005, the interim remedy was operated by the City of Whittier on behalf of EPA. EPA funded operation of the remedy through a Cooperative Agreement between the City of Whittier and EPA. The City of Whittier incorporated the intermediate-zone treated groundwater, which was permitted for potable use, into its drinking water supply. The treated shallow zone groundwater was discharged to Legg Lakes under a three-party water production agreement between EPA, the Main San Gabriel Basin Watermaster, and Los Angeles County.

The target flow rates were re-evaluated in 2011-2012 for the shallow and intermediate groundwater zones. The analysis concluded that operation of the shallow extraction wells should be indefinitely halted. During the halt, if increasing trends are observed in monitoring wells, the shallow zone extraction system should be re-evaluated for resumed operation. Modeling results for the intermediate zone indicated that extraction rates in the 3,500 to 4,500 gallons per minute (gpm) range, specifically at extraction wells EW4-5 and EW4-6, will provide effective containment.

EPA determined that no ESD is needed to modify the interim ROD with the revised extraction rates in the shallow and intermediate zones. In late 2012, EPA shut down the shallow zone remedy and intermediate zone pumping rates were lowered to the new target rate range. The City of Whittier terminated their Cooperative Agreement with EPA in May 2013.

On May 17, 2013, the State of California assumed responsibility for O&M of the Whittier Narrows OU interim remedy. At this time, the treated water was discharged to Legg Lakes. The California Department of Toxic Substance Control (DTSC) was assigned as the agent of the State of California and contracted SGVWC as the new operator of the treatment facility.

In September 2013, EPA awarded and funded a contract to modify the treatment facility, to include a new chlorine contact tank (CCT), a new treated water pump station, a new pipeline from the CCT to SGVWC distribution line, and a new sodium hypochlorite tank. These modifications were needed to be able to deliver the Whittier Narrows OU treated intermediate zone water into SGVWC's system for use as drinking water, after SGVWC is granted a drinking water permit by the DDW. In February 2014, soon after the start of construction of the modifications, the DDW stated that the treated water from the Whittier Narrows OU treatment plant would need to have a total dissolved solids (TDS) concentration of less than 500 milligrams per liter (mg/L) before it could be delivered into SGVWC's system. The Whittier Narrows OU extraction wells produce water with a TDS concentration of approximately 600 mg/L. EPA and DTSC prepared and evaluated several blending scenarios (i.e., blending water from a different source that has lower TDS into the Whittier Narrows OU water) to decrease Whittier Narrows OU treated water TDS to below 500 mg/L. In a July 2015 meeting between SGVWC, DTSC, and EPA, SGVWC took the position that blending is not a feasible option and that EPA and DTSC should evaluate two options: 1) reverse osmosis treatment for TDS resulting in a potable water source and 2) reinjection with treatment to be determined. As of April 2016, construction of treatment facility modifications is complete and the new equipment is on standby. EPA is planning to prepare a discharge option study to evaluate the cost and feasibility of various options to facilitate potable water discharge with reverse osmosis treatment, as well as re-injection of the treated water into the shallow or intermediate aquifers. In the interim, groundwater from the intermediate zone is being extracted at a rate of 2,000 gpm and all of the treated water is being discharged to Legg Lakes. DTSC researched other temporary discharge options. However, the 2,000 gpm extraction rate cannot be increased without a viable discharge option.

2.3.3. Richwood OU

On January 15, 1992, EPA completed construction of the Richwood Treatment Plant, located at 4155 Richwood Avenue in El Monte, California. EPA transferred responsibility for the O&M of the treatment plant to the DTSC on March 15, 1994. DTSC entered into an agreement with SGVWC in which SGVWC would provide water to approximately 200 residences served by RMWC. SGVWC purchased RMWC's assets and water rights in March 1990. As part of the purchase agreement, SGVWS installed a new distribution system for the former RMWC customers, and DTSC contributed funds to facilitate the transfer of assets. The distribution system upgrades and transition to SGVWC's system were complete and operational in December 1999. The former RMWC customers are primarily supplied water from SGVWC Plants 1 and 2; however, because SGVWC's water distribution system is interconnected, the water could potentially come from any of the company's wells. This operation has not changed since the RMWC customers were originally integrated. RMWC continues to supply water to its customers.

HMWC's wells are sampled annually and no contaminants have been detected in recent years. Figure 2-2 presents the historical extent of contamination at the Richwood OU.

2.3.4. Suburban OU

As described above, contaminant concentrations in SWS's Bartolo Well Field have remained low since the early 1990s. In accordance with the September 1993 ROD Amendment, no active remedy was ever implemented for the Suburban OU. SWS destroyed Wells 201W1 and 201W3 in 2005, 201W2 and 201W6 in 2008, and 201W5 in 2011. These wells were replaced with four new wells (Wells 201W7, 201W8, 201W9, and 201W10) that together with Well 201W4, make up the active wells in the Bartolo Well Field also known as Plant 201 (see Figure 2-3). The SWS Bartolo Well Field continues to extract water at high rates and represents a key component of the SWS water supply system.

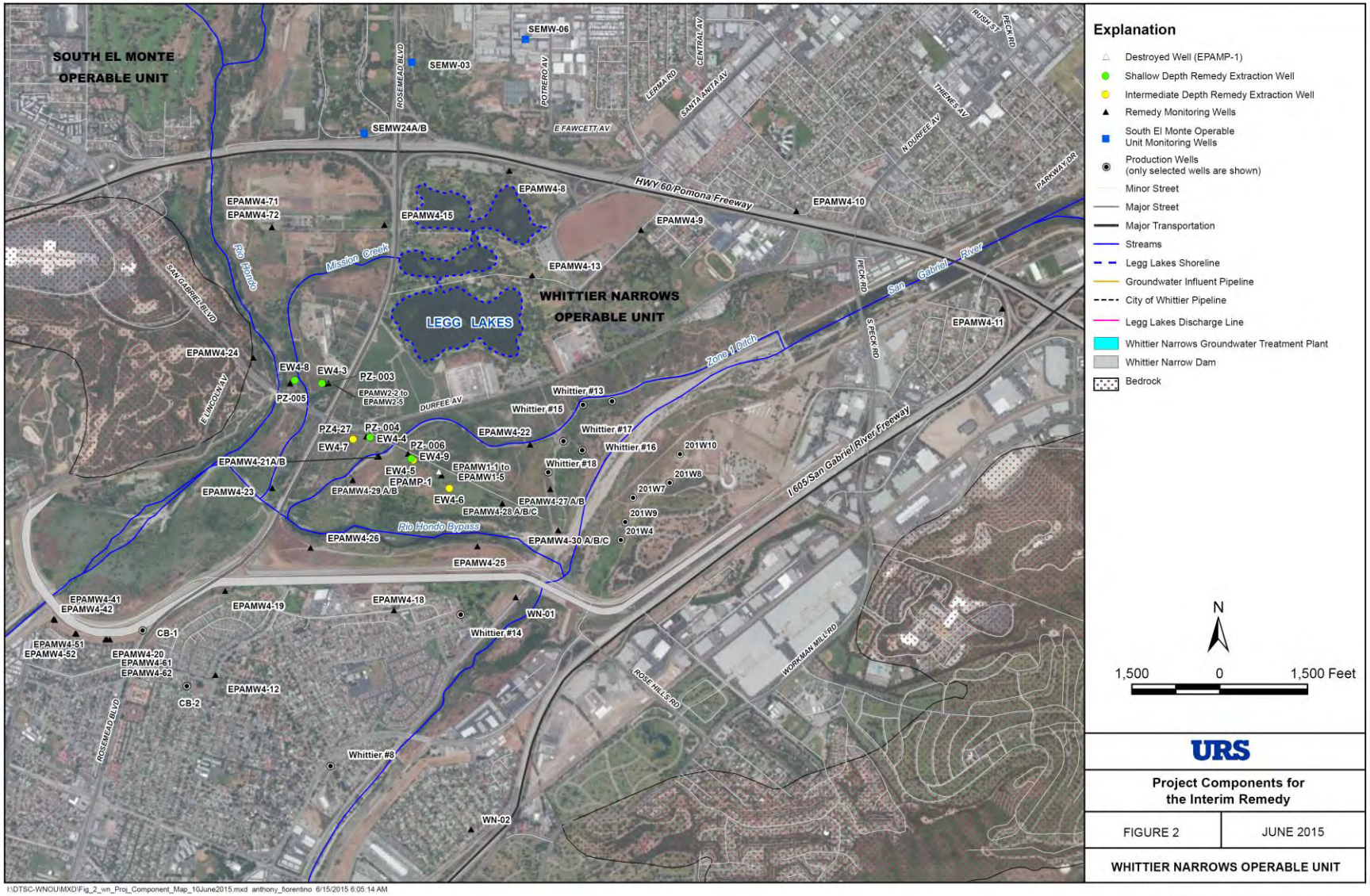


Figure 2-1. Whittier Narrows OU Site Map

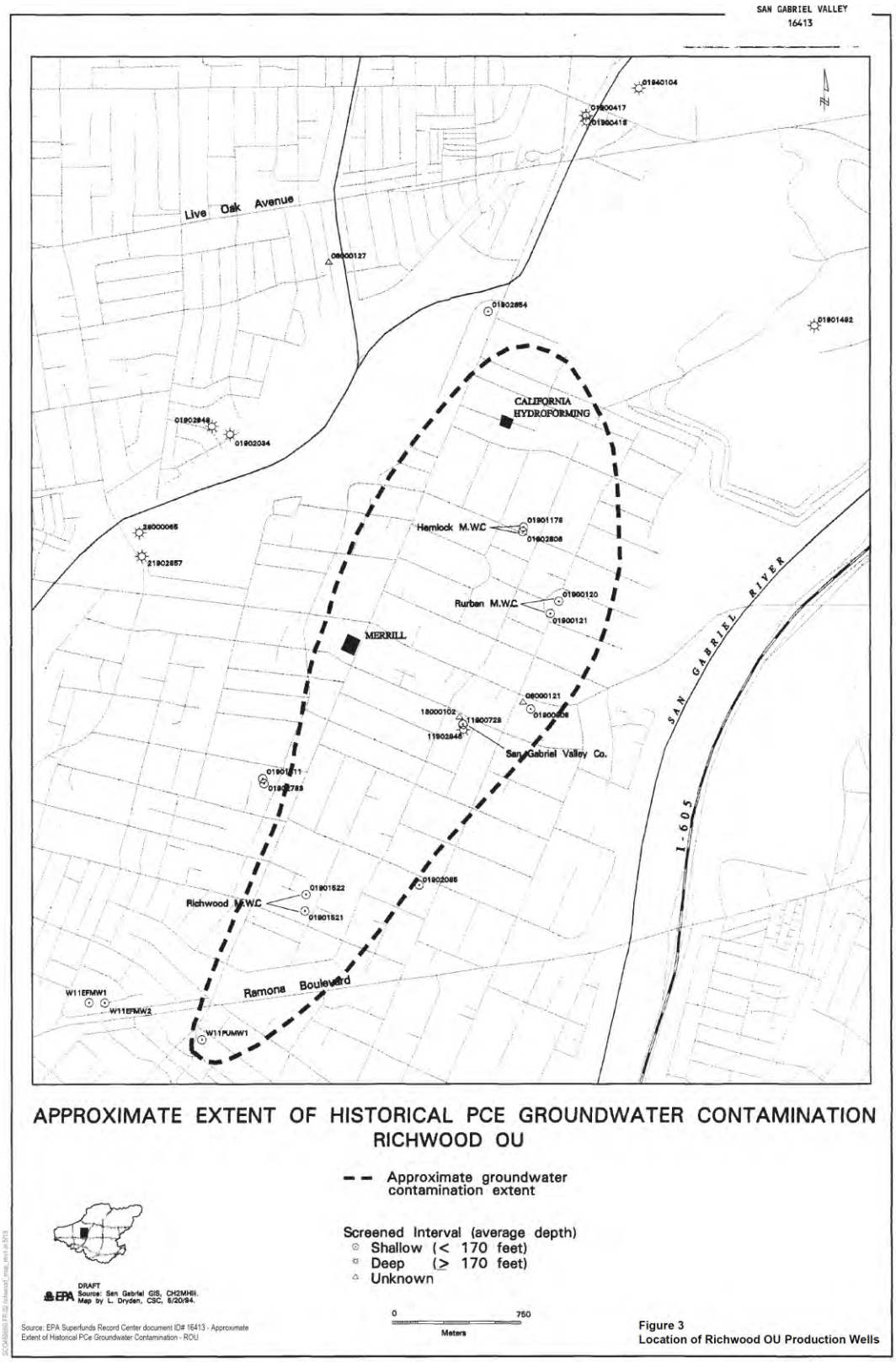


Figure 2-2. Richwood OU site map

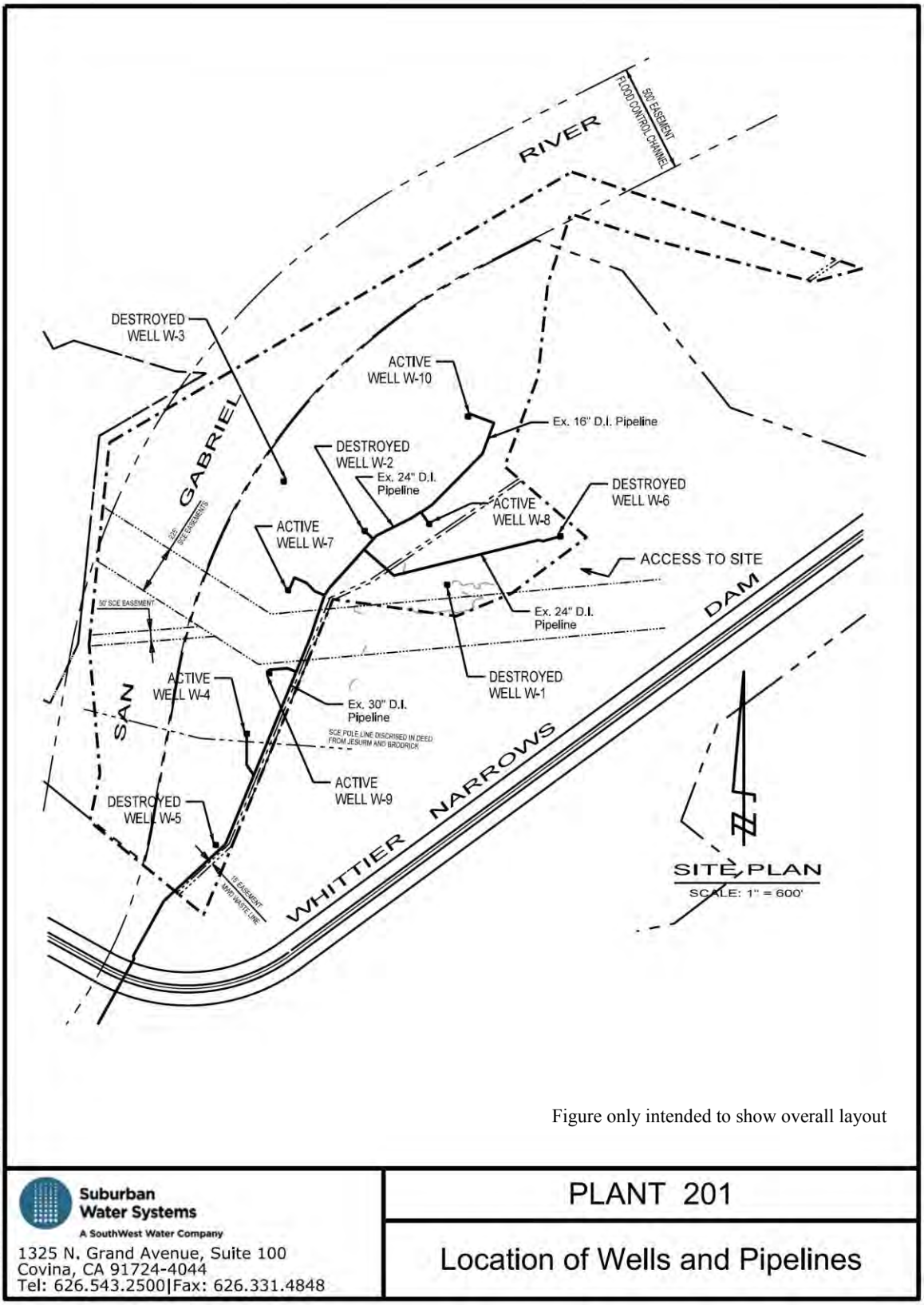


Figure 2-3. Suburban OU Site Map

2.3.5. South El Monte OU

Construction of the water purveyors' (City of Monterey Park, GSWC, and SGVWC) treatment facilities began before EPA prepared the SEMOU interim ROD and continued in various states through mid-2006. By the time remedy implementation began under the Cooperative Agreement between EPA and the water purveyors in August 2008, all of the primary construction activities had been completed by the water purveyors. The specific water purveyor facilities in the Cooperative Agreement for use in the SEMOU are described in the following sections. EPA has negotiated nine Consent Decrees with industrial facility PRPs (potentially responsible parties) to partially fund implementation of the interim ROD remedy.

City of Monterey Park

Three of the Monterey Park (MP) wells have been incorporated into the SEMOU remedy: Well 5, Well 12, and Well 15. Water pumped from Well 5 is treated separately at its own facility. Water pumped from Wells 12 and 15 is combined and treated at a separate treatment facility.

The VOC treatment facility for MP Wells 12 and 15 consists of an air stripper system with VGAC off-gas treatment, acid injection to control precipitation, a LGAC secondary barrier, and caustic addition, if necessary, to raise pH levels. The combined treatment system is limited to a maximum combined flow of 4,500 gpm because of the air stripper system capacity. The air stripper was constructed in 1999.

The MP Well 12 perchlorate treatment system was constructed in 2003 at MP's Delta Plant. It was built to remove perchlorate using ion exchange (IX) technology and disposable IX resins. The perchlorate system was permitted for active use by California Department of Public Health (CDPH) in May 2005. The perchlorate treatment system had a design capacity of 4,500 gpm and was intended to treat the effluent water from the Well 12 air stripper. The perchlorate treatment system was taken offline in August 2011 because the perchlorate concentrations are low enough that CDPH no longer requires treatment. The plant piping has been reconfigured to bypass the IX vessels.

Because MP Wells 12 and 15 were being considered for use in the Superfund remedy and VOC concentrations were increasing, CDPH required that a secondary "dual-barrier" VOC treatment process be added to the treatment facility. MP installed an LGAC treatment system to serve as the dual barrier. The LGAC system was constructed in 2004 at MP's Delta plant. The LGAC system has a design capacity of 4,500 gpm (750 gpm through each of six carbon vessels) and treats water that has already passed through the air stripper (and, when active, the IX vessels). CDPH permitted operation of the LGAC system in May 2005.

MP Well 15 is located on the Whittier Narrows golf course, which is part of the Whittier Narrows Recreation Area. Well 15 was installed in 2004 specifically to serve as a key component of the South El Monte OU interim remedy and is located directly down-gradient of elevated intermediate-zone VOC contamination. Well 15 is connected by pipeline to the air stripper located adjacent to Well 12. Well 15 was permitted for use by CDPH in 2006.

The MP Well 5 LGAC treatment system for VOC removal was constructed and began operation in 1999. The treatment system consists of five carbon vessels. In the original parallel configuration, the system had a design capacity of 2,500 gpm for the removal of VOCs. The system was modified in 2003 to a lead-lag series configuration using four of the carbon vessels. This reduced the capacity to approximately 1,600 gpm. The carbon was removed from the fifth vessel and it is inactive. Perchlorate has also been detected

in MP Well 5. However, the levels have been low enough that CDPH does not require treatment. A perchlorate blending plan was approved by CDPH as part of a 2006 permit amendment for the Well 5 treatment system.

Golden State Water Company

There are two production wells located at Golden State Water Company's (GSWC's) San Gabriel Plant: San Gabriel Well No. 1 (SG1) and San Gabriel Well No. 2 (SG2). In 2001, GSWC installed a VOC treatment facility. The treatment facility included three lead-lag pairs of LGAC vessels intended to remove the VOC contamination in Wells SG1 and SG2. The treatment system originally had a capacity of 2,250 gpm (750 gpm per vessel pair), which was adequate to accommodate the combined flow from Wells SG1 and SG2. However, elevated concentrations of nitrate in Well SG2 have affected GSWC's ability to produce potable water from this well, so it was not operated on a consistent basis for many years. The original permit for treatment facility operations was issued October 24, 2001. In July 2002, perchlorate was detected in Well SG1 and shortly thereafter in Well SG2. To address perchlorate, the carbon was removed from one of the LGAC vessel pairs and replaced with an IX resin specifically intended for perchlorate removal. The plant piping was modified so that water from the wells first flowed through the remaining two pairs of LGAC vessels for VOC removal, then flowed through the single vessel pair with IX resin for perchlorate removal. The permitted system capacity under the new configuration was reduced to 1,100 gpm, the peak flow allowed through the IX vessel pair. However, the actual capacity was closer to 1,000 gpm. CDPH issued the revised permit incorporating the IX vessels for perchlorate treatment on November 14, 2003. In early 2010, GSWC began working with CDPH on a potential nitrate blending plan that would allow Well SG2 to return to service. CDPH approved the blending plan and issued an updated permit amendment in July 2012. Changes made at the San Gabriel treatment facility as part of returning Well SG2 to service included refilling two of the LGAC vessels with carbon such that all three pairs of vessels were once again arranged in a lead-lag configuration for the removal of VOCs, and installing two in-line nitrate analyzers. In accordance with the CDPH-approved nitrate blending plan, Well SG2 has a maximum flow rate of 300 gpm and cannot run unless Well SG1 is also operating. Under the blending plan, the maximum flow rate from Well SG1 will be approximately 1,200 gpm, and the maximum flow rate from the treatment plant 1,500 gpm.

San Gabriel Valley Water Company

San Gabriel Valley Water Company's (SGVWC's) Plant No. 8 is located along the Rio Hondo Channel in the City of South El Monte. There are five active water production wells at the Plant 8 facility: Wells 8B, 8C, 8D, 8E, and 8F. However, only Wells 8B, 8C, and 8D are part of the South El Monte OU interim remedy. Wells 8E and 8F are perforated in a deeper portion of the aquifer, below the vertical extent of contamination.

In December 2001, SGVWC completed construction of the VOC treatment facility at Plant No. 8. The treatment facility consisted of a 5,000-gpm air stripper and an off-gas VGAC treatment system approved by the South Coast Air Quality Management District (SCAQMD). After complying with the CDPH procedures for permitting the air stripper, SGVWC placed the treatment facility online in July 2002. The current SCAQMD permit for the air stripper includes an influent VOC concentration limit of 100 parts per billion (ppb). In March 2003, CDPH required SGVWC to add a second "dual-barrier" VOC treatment system to the existing treatment facility at Plant 8 because of concerns about the sharply rising VOC

concentrations. In December 2004, SGVWC completed construction of an LGAC treatment system to serve as the dual barrier for water treated by the air stripper. CDPH approved SGVWC's amended permit in September 2006 allowing operation of the LGAC treatment system. The LGAC treatment system consists of six pairs of vessels. Each pair of vessels operates in a lead-lag configuration.

2.4. Operation and Maintenance (O&M)

The Richwood and Suburban OUs have no active treatment systems for which O&M would occur.

El Monte OU

Operation of the West Side El Monte OU (EMOU) treatment plants has continued. The East Side EMOU treatment plants have been constructed with the shallow zone treatment plant beginning operation in January 2016. The deep zone treatment plant is not currently operating pending approval of a drinking water permit.

Whittier Narrows OU

The operations and maintenance of the treatment plant within this five-year review period is described in Section 2.3.2. An evaluation of the hydraulic control was performed in 2014. Results of this evaluation recommended a minimum target extraction rate of 3,500 gpm. Current groundwater extraction is limited to approximately 2,000 gpm. The limitation of the extraction rate was based on an agreement between the Main San Gabriel Basin Watermaster, DTSC, and Los Angeles County, related to water production in the area and the fact there is currently no end user of the treated water outside of Legg Lakes. Performance of the remedy is discussed in Section 4.2.1.

South El Monte OU

The treatment systems continue to operate. Annual reports produced in 2014 and 2015 cover the period from July 2013 through June 2014 and July 2014 through June 2015, respectively. Table 2-3 presents the contaminant mass removal and well production (volume of water treated) for each of these reporting periods.

Table 2-3. Contaminant Mass Removed – South El Monte OU – 2013-2015

Reporting period	Well production (million gal)	Mass of contaminants removed (lbs)
July 2013 – June 2014	17,800	1,622
July 2014 – June 2015	17,700	1,883

NOTE: Only the period from 2013 to 2015 is included. The 2013 FYR included the period from 2011 to 2013.

Performance of the remedy is discussed in Section 4.2.1.

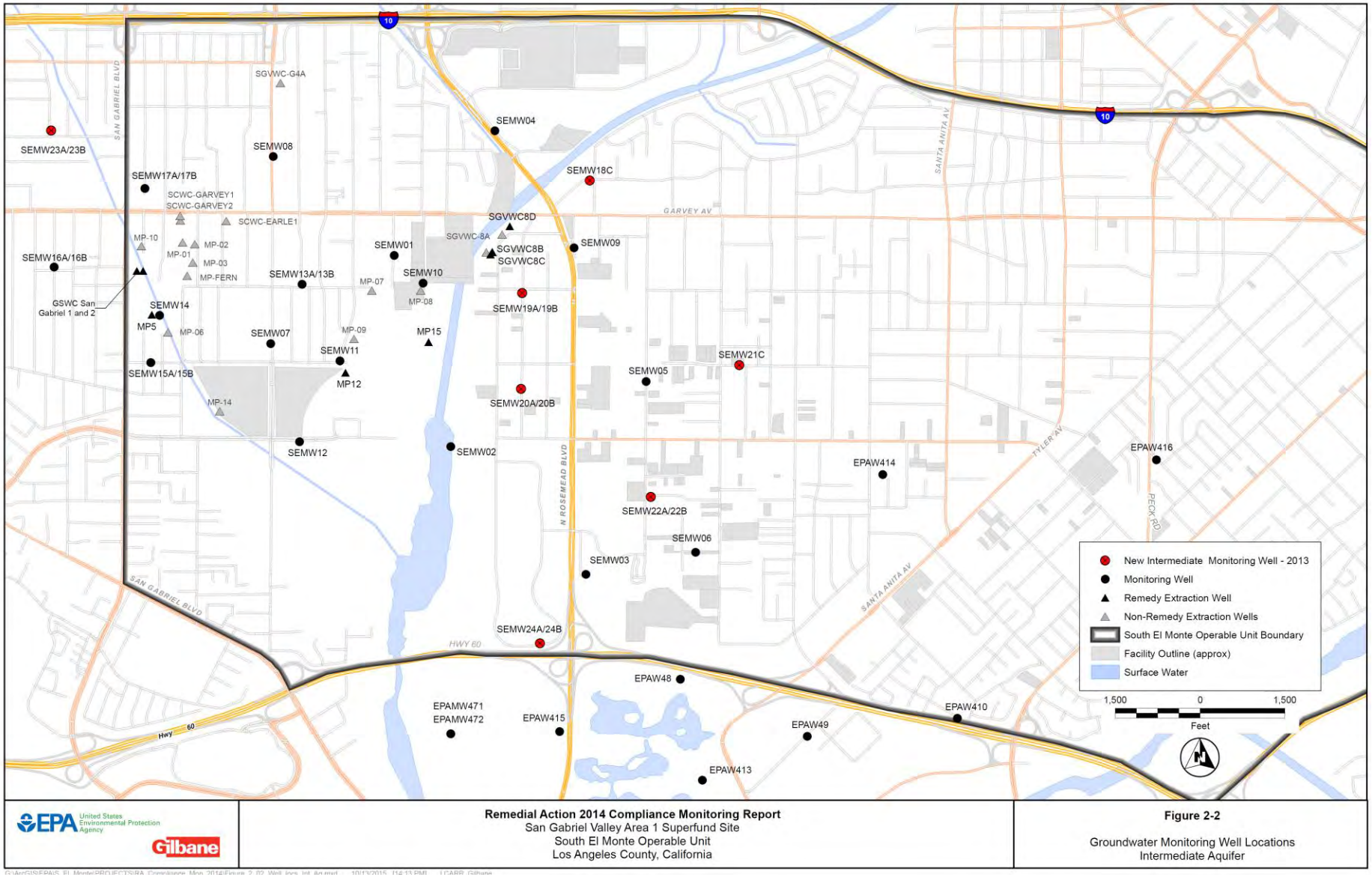


Figure 2-4. South El Monte OU Site Map

3. Progress Since the Last Five-Year Review

3.1. Previous Five-Year Review Protectiveness Statement and Issues

Following is the protectiveness statement from the 2011 FYR for the Whittier Narrows OU:

> The Whittier Narrows OU currently protects human health and the environment because there is no exposure to contaminated groundwater and groundwater containment is occurring. The additional monitoring described above will help determine whether adjustments to the groundwater extraction systems are warranted to optimize groundwater containment.

Following are the protectiveness statement from the 2013 FYR for the Richwood, Suburban, and South El Monte OUs:

> The interim remedy for the Richwood OU (OU 3) is protective of human health and the environment.
>
> The interim remedy for the Suburban OU (OU 4) is protective of human health and the environment.
>
> A protectiveness determination for the South El Monte OU (OU 5) interim remedy cannot be made until further information is obtained. EPA is currently conducting a vapor intrusion investigation, including soil vapor sampling and indoor air sampling at and near source facilities throughout the South El Monte OU. It is expected that the investigation will take approximately 3 years to complete, at which time a protectiveness determination will be made.

The previous FYRs included issues and recommendations. Each recommendation and its current status is presented in Table 3-1 below.

Table 3-1: Status of Recommendations from the Previous FYR

OU	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date
Whittier Narrows	Potential need for additional/ new pumping to address deeper contamination. Additional monitoring is needed first.	1. Review monitoring well program and determine the number and location of additional monitoring wells needed. 2. Evaluate whether additional pumping or new extraction wells are needed to address the deeper (>400 feet bgs) intermediate zone contamination; if necessary, install wells and pipelines.	Completed	A review of the monitoring well program was conducted. In addition, additional down-gradient monitoring wells were installed to determine if contamination had reached the deeper intermediate zone. Sample results from these new monitoring wells indicated that no contamination was present in the deeper intermediate wells and no additional pumping or extraction was needed.	10/1/2012
South El Monte	Vapor intrusion was not considered as an exposure pathway in the interim ROD.	Continue the ongoing vapor intrusion investigation and implement removal and remedial actions at selected facilities as appropriate.	Ongoing	Vapor intrusion investigations continue at this site. Data from the investigations is presented in Section 4.2.2	

The previous FYR for the Whittier Narrows OU was published in 2011. The previous FYR for South El Monte OU was published in 2013.

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

No active work has been conducted at the Richwood and Suburban OUs during this review period.

El Monte OU

The construction of the East Side EMOU treatment plants was completed in January 2015. The Eastside shallow zone treatment plant began continuous operation in January 2016. The Eastside deep zone treatment plant is not yet operational. Prior to the Eastside treatment plants going on-line, quarterly monitoring was conducted in 2013 and 2014. Modification of the West Side EMOU treatment system to treat 1,4-dioxane was completed in February 2015.

Whittier Narrows OU

Work completed during this five-year review period was discussed in Section 2.3.2.

South El Monte OU

Additional monitoring wells were installed in 2013. A modeling effort was conducted in 2015 to assess the hydraulic control at this site. Vapor intrusion investigations are on-going. Results of the vapor intrusion investigations and groundwater modeling are discussed in the Section 4.2.

4. Five-Year Review Process

4.1. Community Notification and Involvement

EPA placed a public notice in the *San Gabriel Valley Tribune* on March 4, 2016, stating that there was a Five-Year review and inviting the public to submit any comments to the U.S. EPA. There were no comments. The results of the review and the report will be made available at the Site information repository located at the following locations:

Rosemead Public Library
8800 Valley Boulevard
Rosemead, CA 91770-1788

West Covina Public Library
1601 West Covina Parkway
West Covina, CA 91790-2786

Alhambra Public Library
101 South First Street
Alhambra, CA 91801

In addition, the final report will be available on-line at:

San Gabriel Valley Superfund Site (All Areas):
http://www.epa.gov/region9/SanGabrielAll
El Monte, South El Monte, Whittier Narrows (Area 1):
http://www.epa.gov/region9/SanGabrielElMonte

4.2. Data Review

4.2.1. Ground Water

This section presents a summary of groundwater data as provided in the monitoring and treatment system reports. A detailed discussion of the data review is provided in Appendix B.

EMOU

In the analysis of the eastern shallow and southern deep portions of the EMOU, data from quarterly compliance monitoring reports and data submittals (2013 to 2014) prepared by Geosyntec Consultants were used. For the analysis of the western shallow and deep aquifers of the El Monte OU, data from quarterly compliance monitoring reports (2013 to 2015) prepared by CDM Smith were used.

Shallow Zone Groundwater Contamination

Primary contaminants of concern (COCs) in the shallow groundwater are TCE and PCE. Wells with concentrations that have exceeded the performance criteria of 50 µg/L, which is 10 times the IROD standard for PCE or TCE, are predominantly located in the East Side of the El Monte OU [1]. The highest levels of groundwater contamination detected in analytical sampling results occur on the East Side of the EMOU, in BH-27 (TCE to 2,200 µg/L; PCE to 760 µg/L*)*. Nearby wells (BH-28, BH-10, BH-11, and BH-12) also show high levels of TCE contamination, in the range of 280 µg/L to 630 µg/L, and PCE contamination in the range of 210 µg/L to 430 µg/L.

On the West Side of the El Monte OU, TCE consistently exceeded the shallow zone performance criteria with analytical sampling result concentrations ranging from 53 µg/L to 68 µg/L. Analytical sampling result concentrations for 1,2-dichloroethane (DCA) have consistently been within the shallow zone performance criteria.

The exceedance of contamination criteria in all wells during this review period is within historical range with no significant trend. The contaminant plume is generally well defined; therefore, the contaminated groundwater appears to be contained within the El Monte OU boundary. With the West Side groundwater treatment system (GWTS) in operation for only three years, it is too early to assess trends in contaminant concentrations and migration patterns

Deep Zone Groundwater Contamination

On the West Side of the EMOU, IROD standards were exceeded for two chemicals: TCE and PCE. Areas of exceedance appear to be widely and discontinuously located over the site. The highest result has been 15 µg/L TCE in well DCMW-2B. Hexavalent chromium (Cr^{+6}) has been detected in many deep-zone wells on the both the West Side and the East Side of the El Monte OU, though at concentrations slightly below the ESD standard of 11 µg/L with two exceptions. Sampling results from monitoring events in September and December 2014 for the East Side of the El Monte OU showed Cr^{+6} concentrations in well MW2-07 of 16 and 18 µg/L, respectively.

In the northwest corner of the EMOU, well ERP-13 shows exceedances of TCE and PCE criteria. Although there are not sufficient groundwater elevation data to prepare groundwater elevation contour maps for the northern part of the EMOU to confirm the groundwater flow direction and gradient in the area of well ERP-13, historical data and gradient maps indicate that regional groundwater flow in the deep zone throughout the EMOU is predominantly westerly with minor fluctuations to the northwest and southwest due in large part to pumping from water supply wells (Geosyntec, 2009). Compliance and other monitoring wells show that all other contaminated wells are below TCE and PCE criteria demonstrating containment within the EMOU.

Of the vertical compliance wells (i.e. wells that determine whether contamination is moving upward or downward), only ERP-13 contained groundwater concentrations exceeding the interim ROD standard. In 2014, the maximum concentrations of TCE and PCE detected in analytical sampling results were 17 µg/L and 8.4 µg/L, respectively, in the deep zone. The deep zone is evaluated as three zones; zone 1, (492 to 502 feet bgs), zone 2 (395-405 feet bgs), and zone 3 (340 to 350 feet bgs). Concentrations of VOCs in analytical sampling results from the deepest zone (zone 1) had been below their respective MCLs, but in the December 2014 sampling event TCE was detected in analytical sampling results at a concentration of 6.6 µg/L (TCE MCL is 5 µg/L).

Treatment Systems

A groundwater treatment system for the shallow zone in the West Side of the EMOU has been in operation since May 2012. The GWTS is comprised of six shallow zone extraction wells and a treatment plant consisting of a LGAC unit for removal of VOCs and a FBR to reduce the concentrations of nitrate, hexavalent chromium, and perchlorate to regulatory standards. In 2015, an advanced oxidation process (AOP) treatment unit, for treatment of 1,4-dioxane, was added to the GWTS. Treated water from the system is discharged to Eaton Wash. As of October 1, 2014, approximately 54,674,861 total gallons of shallow zone groundwater have been treated and discharged since startup. As a result of the ongoing California drought, shallow-zone water levels are declining an average of 1 foot per quarter; hence, the shallow-zone extraction wells are operating at reduced rates. The AOP has been taken off-line because well ERP-15 this system was to address no longer has any water. The cumulative VOCs mass removal is 29.6 pounds (lbs.), along with 5.1 lbs. of hexavalent chromium, and 3.5 lbs. of perchlorate, as of June 2015. Treated water is discharged into the Eaton Wash and meets National Pollution Discharge Elimination System permit requirements.

For the northwestern deep-zone groundwater, the Encinitas Well Field Treatment System (Encinitas System), consisting of wellhead-treatment at water supply wells ENC1, ENC2, and ENC3, is used as the GWTS. The Encinitas System is owned and operated by Golden State Water Company. Modeling performed by CDM Smith determined that an overall pumping rate of 950 gpm was needed from the three Encinitas well field extraction wells for effective capture. All deep zone groundwater is treated to meet drinking water requirements. Average production during 2014 was 1,147 gpm, and average production in the first two quarters of 2015 was 1,092 gpm. However, given that compliance monitoring well ERP-13 (zones 2 and 3) shows VOC contamination exceeding ARAR standards at this depth interval, there is reason to believe that the Encinitas wells have not been able to contain the contamination migration in the 300 to 400 feet bgs depth interval.

A GWTS for the shallow-zone groundwater in the East Side of the EMOU has been in operation since January 2016. The GWTS consists of five shallow extraction wells and a LGAC unit to remove VOCs. As a result of the ongoing California drought, the extraction wells are operating at reduced rates. The treated water is re-injected into the shallow aquifer. A GWTS for the deep-zone groundwater was constructed in January 2016. The GWTS consists of three deep-zone extraction wells and a LGAC unit to remove VOCs. The GWTS is currently not in operation pending issuance of a drinking water permit by the DDW. The treated deep-zone water will be delivered to the City of El Monte and used as part of the city's drinking water supply.

WNOU

Data from annual (2012 to 2015) performance evaluation reports prepared by URS for the DTSC were used in this data review for the Whittier Narrows OU.

The overall groundwater flow direction in the WNOU is generally from the northeast, from the SEMOU, toward the southwest with no indication of significant deflections within the shallow zone or the intermediate zone while the groundwater extraction wells were operating.

PCE is both the most widely detected VOC chemical contaminant in analytical sampling results and is the only VOC that is regularly detected at concentrations which exceed its MCL in the WNOU. Of the remaining COCs, only TCE and 1,4-dioxane are regularly detected; however, these detected concentrations are generally below the MCL or notification level, respectively. In several intermediate zone wells in the northern portion of WNOU, 1,4-dioxane levels exceeding notification level were detected in analytical sampling results from June 2016, and may indicate transport of 1,4-dioxane from the SEMOU into the WNOU.

Shallow groundwater impacts are relatively low throughout the WNOU with the exception of a groundwater area in the north-central area of the Site, north of Legg Lakes. Extraction from the shallow zone has been terminated except for groundwater sampling events.

In the lower intermediate-zone aquifer, PCE concentrations continue to decline throughout much of the WNOU and the only area of significantly elevated concentrations continues to be present in the southern portion of the SEMOU, upgradient of the WNOU. The average intermediate-zone annual extraction rate in 2015 was 1,019 gpm, approximately 71% less than to the recommended minimum target rate of 3,500 gpm. The pumping rate was increased to 2,000 gpm in February 2016, but cannot be increased further due to a water production agreement which requires that water overflowing Legg Lakes be conserved in the basin.

URS (URS, 2016) performed an evaluation of hydraulic control using a particle-tracking flow model. Simulation results using the 2015 average pumping rate of 1,019 gpm indicate that the interim remedy wells would not capture impacted groundwater in the intermediate zone that exceeds the PCE MCL (i.e., 32%, 0%, and 14% for the upper intermediate zone, intermediate zone, and lower intermediate zone). Simulations run using the recommended minimum target rate (3,500 gpm) show that pumping would contain a majority of the impacted groundwater in the intermediate zone with PCE concentrations above the MCL (i.e., 96% for the upper intermediate zone, 92% for the intermediate zone and 78% for the lower intermediate zone). Neither scenario represents complete capture, and contaminated groundwater that is

not captured is predicted to bypass the extraction well network and travel into the Montebello Forebay. However, these model predictions have not yet been observed in groundwater monitoring. PCE concentrations in performance wells are declining or stable, and do not indicate transport of impacted water into the Montebello Forebay. Without observational data to confirm model results, the current and future effectiveness of containment is uncertain.

ROU

Data for the ROU after the acquisition of Richwood Mutual Water Company (RMWC) by San Gabriel Valley Water Company (SGVWC) are limited. The Main San Gabriel Basin Watermaster's *Draft Five-Year Water Quality and Supply Plan* (Main San Gabriel Watermaster, 2015) includes pumping and water quality data for the Hemlock Mutual Water Company (HMWC), and Rurban Homes Mutual Water Company (RHMWC) production wells for the 2014-2015 water year. These wells are sampled annually and no contaminants have been detected in recent years.

SOU

The SOU, also referred to as SWS Bartolo Well Field, consists of four water supply wells. In 1993, EPA amended the remedy by changing the treatment level from 1 µg/L to the newly established primary drinking water MCL of 5 µg/L for PCE, and delaying construction of a treatment system because contaminant concentrations remained below MCLs. PCE concentrations in the Bartolo Well Field have continued to be well below the MCL since that time so a treatment system was never constructed.

Based on recent data for the SWS Bartolo Well Field production wells, water quality in the Suburban OU continues to meet drinking water standards.

SEMOU

For the SEMOU, data from semiannual compliance monitoring reports prepared by Gilbane (2016) on behalf of EPA were used for this data review.

Groundwater flow conditions in the intermediate aquifer are toward the west in the central and western areas of the SEMOU, and toward the south to southwest in the southern portion of the SEMOU, except where gradients are inward toward extraction wells. Groundwater flow conditions in the shallow aquifer are toward the south and southwest. Downward vertical flow gradients were observed in all wells within the shallow aquifer, between the shallow aquifer and the upper intermediate aquifer, and a significant downward gradient was measured between the shallow and upper intermediate aquifers at SEMW05. Contamination present in the upper intermediate aquifer could be induced to flow downward due to the vertical gradients caused by groundwater extraction from deeper portions of the aquifer.

Primary COCs in the shallow and intermediate aquifers are TCE and PCE. One other VOC—1,2,3-trichloropropane—has been detected in the groundwater at some locations at concentrations slightly above its notification level of 0.005 microgram per liter (µg/L); however, 1,2,3-trichloropropane is not a SEMOU COC.

The emergent contaminant NDMA has also been detected in SEMOU groundwater. This chemical has been detected sporadically in analytical sampling results at concentrations above and below the notification level of 0.01 µg/L. Other emerging contaminants detected include perchlorate, 1,4-dioxane,

and hexavalent chromium. Perchlorate has been detected at concentrations slightly above and below the MCL of 6 µg, with 6.3 µg/L detected in well SEWW11 in 2011 and 2012; however, concentrations have now decreased to below the MCL. Hexavalent chromium has been below the new MCL of 10 µg/L in the past several years, based on analytical sampling results collected from all monitoring locations. Concentrations of 1,4-dioxane has been below the notification level of 1 µg/L with the exception of concentrations in wells SEMW02_02 (2.3 µg/L), SEMW03_03 (1.6 µg/L), and SEMW24A (1.4 µg/L). In addition, the July 2015 Annual Performance Report (WQA, 2015) shows that City of Monterey wells 12 and 15 have 1,4-dioxane concentrations that exceed the current notification level of 1 µg/L (1.8 µg/L in Well 12 and 1.3 µg/L in Well 15).

Groundwater Contamination Distribution in the Shallow Aquifer

While the most widespread contamination in the SEMOU is within the intermediate aquifer, elevated contaminant levels are detected in some portions of the shallow aquifer. Groundwater flow conditions in the shallow aquifer of the SEMOU are toward the WNOU, and it is possible that transport of remaining contamination toward and into the WNOU will occur. Data presented in the 2005 SEMOU ESD shows that at that time a continuous shallow aquifer plume stretched from the SEMOU into the WNOU. More recent monitoring performed under the Supplemental RI/FS has shown decreasing concentrations and reduced lateral extent of the shallow aquifer plume. VOC contamination is currently not detected above MCLs in the shallow aquifer in the WNOU, and as a result operation of the WNOU shallow extraction and treatment system has been terminated. However, PCE exceeding MCL is detected in the SEMOU adjacent to the OU boundary, at MW-24A, and it is likely that some SEMOU contamination above MCL crosses into the northern edge of the WNOU in an area not covered by WNOU monitoring wells. The extent of this contaminated area in WNOU is likely quite small, and nearby downgradient monitoring wells showed PCE levels below 2 µg/L in 2015. 1,4-dioxane levels exceeding the current notification level of 1 µg/L are also reported in the SEMOU shallow zone near the boundary with the WNOU. WNOU shallow zone 1,4-dioxane levels range from non-detect to just below the notification level.

The remedy for the SEMOU does not address shallow zone contamination, and with the cessation of WNOU groundwater extraction there is no barrier to the migration of SEMOU shallow zone contamination into WNOU. Evaluation of monitoring well data at this time do not indicate that significant migration of shallow zone contamination is occurring, but additional monitoring is required to define its extent and magnitude. Contamination that migrates vertically into the intermediate zone is addressed by the SEMOU and WNOU interim remedies. The Supplemental RI/FS will evaluate how shallow aquifer groundwater contamination affects the interim ROD intermediate zone remedy.

Groundwater Contamination Distribution in the Intermediate Aquifer

The extent of contamination in the intermediate aquifer is defined laterally and vertically. The only uncertainty is in the northwestern portion of the SEMOU where contamination concentrations fluctuate slightly above and below MCLs. The contamination in this northwestern portion is limited to the upper intermediate aquifer, and gradients are inward toward the extraction system in the upper and middle intermediate aquifers.

The groundwater extraction systems are in general compliance with the interim remedy. The SEMOU remedy wells are providing potable water, there is a sustained reduction in contaminant concentration

levels, and there is no increase in contamination in areas outside the OU boundary. Evaluation of the capture zone analysis, using a recently updated (Gilbane, 2016) SEMOU groundwater model, indicates that the extraction systems are likely achieving complete or nearly complete capture of the VOC plume.

4.2.2. Indoor Air/Vapor Intrusion

An indoor air investigation was performed for the SEMOU during this five-year review period. The other OUs either do not have an indoor air exposure issue or an investigation has not yet been conducted. Vapor intrusion was not considered in the baseline risk assessments used as a basis for action in the interim RODs for El Monte, Whittier Narrows, and South El Monte OUs. Since then, EPA's understanding of contaminant migration from soil gas and/or groundwater into buildings has evolved, leading to the conclusion that vapor intrusion may have a greater potential risk to human health than assumed when the interim RODs were published.

The following paragraphs summarize the vapor intrusion pathway evaluations for EMOU and WNOU and the results of the indoor air investigation for the SEMOU. Specific details on the vapor intrusion pathway evaluation are presented in Appendix D.

EMOU

The shallow groundwater contamination is generally deeper than 100 feet bgs[2] at EMOU, which indicates that vapor intrusion from this contamination would not be a risk in the area. However, there are a few locations where the depth to groundwater contamination is less than 100 feet. At these locations, there is a potential for vapor intrusion at the EMOU due to the elevated concentrations of TCE and PCE in shallow groundwater. The EPA vapor intrusion screening level (VISL) calculator was used to determine the potential risks to vapor intrusion from contaminated groundwater for both residential and industrial receptors. Table 4-1 and Table 4-2 present these calculated potential risks for the east and west sides of the EMOU.

For the eastside of the OU, in the northeast area of the eastside plume, elevated concentrations of PCE and TCE above the Vapor Intrusion Screening Levels (VISLs) in groundwater from four[3] wells which are within 100 feet of a building, and have a depth to groundwater is less than 100 feet bgs. For residential receptors, the calculated vapor intrusion risks for TCE were greater than the EPA acceptable risk range of 10^{-6} to 10^{-4} and greater than the non-cancer hazard index of 1 for both PCE and TCE. For industrial receptors, the calculated vapor intrusion risks for PCE and TCE were within the EPA acceptable risk range and greater than the non-cancer hazard index for PCE and TCE in two wells (BH-27 and BH-10) and for TCE in the remaining two wells (SEPZ-3 and SEPZ-4).

For the westside of the OU, in the center area of the eastside plume, elevated concentrations of PCE and TCE above the Vapor Intrusion Screening Levels (VISLs) in groundwater from three[4] wells which are within 100 feet of a building, and have a depth to groundwater is less than 100 feet bgs. These wells were within 100 feet of a building and have a depth to groundwater of less than 100 feet. For residential receptors, calculated vapor intrusion risks were outside of the EPA acceptable risk range of 10^{-6} and 10^{-4}

[2] EPA's vapor intrusion guidance recommended distance is 100 feet vertically and laterally for an initial evaluation.
[3] There are 36 shallow wells in the eastside plume
[4] There are 41 shallow wells in the westside plume

for TCE in two wells (ERP-15 and MCMW1). The calculated non-cancer hazard is greater than the non-cancer hazard index of 1 for PCE and TCE in ERP-15 and only for TCE in two wells (ERP-17 and MCMW1). For industrial receptors, calculated vapor intrusion risks were within the EPA acceptable risk range for both PCE and TCE in all three wells. The calculated non-cancer hazard is greater than the non-cancer hazard index for TCE in all three wells. In 2016, groundwater in ERP-15 was not present.

WNOU

This OU area is predominantly open space with a few administrative or maintenance buildings. The shallow water zone, which would impact indoor air more than the deeper water zones, had a maximum concentration of 0.82 μg/L PCE in 2014. This concentration was input into the VISL calculator to determine whether there was a potential VI risk or hazard under residential and commercial exposure scenarios. The VISL calculated a 5.5×10^{-8} cancer risk and 1.4×10^{-2} non-cancer hazard under a residential scenario and 1.8×10^{-8} cancer risk and 3.4×10^{-3} non-cancer hazard for a commercial scenario. In both cases, the cancer risks and non-cancer hazards were well below the EPA acceptable cancer risk range of 10^{-6} and 10^{-4} and hazard index of 1 indicating that VI is not an issue at this time.

Table 4-1. Potential Vapor Intrusion Risks for El Monte East Side OU

Chemical Name	Groundwater concentration (µg/L)	VI Carcinogenic Risk (residential)	VI Hazard (residential)	VI Carcinogenic Risk (industrial)	VI Hazard (industrial)	Depth to groundwater (ft BTOC)	Buildings within 100 feet of well? (Y/N)	If yes, what type? (Residential or Industrial
Well BH-27[1]								
PCE	760	5.1×10^{-5}	13	1.2×10^{-5}	3.1	85.15	Y	Industrial
TCE	2,200	3.6×10^{-3}	420	3.4×10^{-4}	100			
Well BH-10[1]								
PCE	430	2.9×10^{-5}	7.5	6.6×10^{-6}	1.8	73.89	Y	Industrial
TCE	280	4.6×10^{-4}	54	3.8×10^{-5}	13			
Well SEPZ-3[2]								
PCE	93	6.2×10^{-6}	1.6	1.4×10^{-6}	0.38	86.10	Y	Residential
TCE	100	1.6×10^{-4}	20	1.3×10^{-5}	4.6			
Well SEPZ-4[2]								
PCE	110	7.4×10^{-6}	1.9	1.7×10^{-6}	0.45	92.68	Y	Industrial
TCE	200	3.3×10^{-4}	39	2.7×10^{-5}	9.2			

µg/L – microgram per liter; ft BTOC – feet below top of casing

1 – Wells BH-27 and BH-10 were sampled in June 2014. These were not sampled in December 2014; 2 – Wells SEPZ-3 and Wells SEPZ-4 were sampled in December 2014.

Table 4-2. Potential Vapor Intrusion Risks for El Monte East Side OU

Chemical Name	Groundwater concentration (µg/L)	VI Carcinogenic Risk (residential)	VI Hazard (residential)	VI Carcinogenic Risk (industrial)	VI Hazard (industrial)	Depth to groundwater (ft BTOC)	Buildings within 100 feet of well? (Y/N)	If yes, what type? (Residential or Industrial
Well ERP-15								
PCE	94	6.3×10^{-6}	1.6	2.9×10^{-6}	0.78	- [1]	Y	Residential
TCE	110	1.8×10^{-4}	21	1.9×10^{-5}	6.4			
Well ERP-17								
PCE	20	1.3×10^{-6}	0.35	3.1×10^{-7}	0.083	77.36	Y	Industrial/ Residential
TCE	22	3.5×10^{-5}	4.2	$3.0\ 10^{-6}$	1			
MCMW1								
PCE	3.8	2.5×10^{-7}	0.066	5.8×10^{-8}	0.016	94.86	Y	Industrial
TCE	130	2.1×10^{-4}	25	1.8×10^{-5}	6			

µg/L – microgram per liter; ft BTOC – feet below top of casing; Groundwater concentrations and depth to groundwater were from the March 2015 monitoring event.
1 – No depth of groundwater reported. Well ERP-15 is screened between 69-89 ft bgs. As of summer 2016, no water was detected in this well.

SEMOU

The 2013 FYR summarizes the vapor intrusion investigation as part of a supplemental remedial investigation/feasibility study, which occurred in 2011 and 2012. That vapor intrusion investigation included soil gas and indoor air sampling. The results from the investigations from 2011 through 2012 are not included in this FYR.

In response to elevated levels of PCE detected during the 2012 investigations, EPA conducted a Time-Critical Removal Action in 2013 and 2014 to install vapor intrusion mitigation systems to decrease the levels of PCE in the indoor air at five residential properties around the former Hytone Cleaners.

From November to December 2013, EPA continued its investigation, collecting indoor air samples at 14 commercial/industrial facilities, and from March to June 2015, at 19 commercial/industrial facilities and ten residential locations. In March 2015, EPA mobilized the TAGA (Trace Atmospheric Gas Analyzer) mobile laboratory to perform real time indoor air monitoring at 49 residential, recreational and commercial/industrial buildings. Two sub-slab soil gas samples and 31 sewer gas samples were also collected and analyzed in March 2015.

All samples were analyzed for VOCs and compared to the lower of the EPA Regional Screening Levels (RSLs), the DTSC Office of Environmental Health Hazard Assessment Human Health Risk Office (HERO) Note 3 screening levels for indoor air, and the EPA Region 9 Response Action Levels for commercial/industrial facilities.

Nearly all of the buildings sampled in 2013-2015 had detectable concentrations of PCE. Six residential and one commercial/industrial property had levels of vapor intrusion unacceptable for long-term exposures that warrant mitigation systems to reduce vapor intrusion levels. TCE was detected around specific source areas, but only exceeded screening levels at one commercial/industrial building where EPA also plans to implement measures to reduce vapor intrusion levels. The maximum indoor air concentrations of PCE and TCE were from this same commercial/industrial building with concentrations of 500 $\mu g/m^3$ and 5.5 $\mu g/m^3$, respectively. The maximum indoor air concentrations of PCE in an occupied residential building was 50 $\mu g/m^3$. TCE was not detected above screening levels in any residential buildings.

EPA is currently developing plans to conduct a series of treatability studies to reduce the vapor intrusion levels at these six residential and two commercial/industrial properties by the end of 2017 as part of a vapor intrusion remedial investigation/feasibility study. By 2018, EPA intends to have an interim Record of Decision for vapor intrusion which will allow for the continuation of the vapor intrusion investigation and implementation of mitigation measures, as needed. EPA plans to identify any additional source areas that may require vapor intrusion investigations, continue indoor air sampling in and around new and existing buildings with potential for vapor intrusion, and resample buildings previously sampled with detected levels of vapor intrusion but within the protective exposure range.

4.3. Site Inspection

The purpose of the inspections was to assess the protectiveness of the remedy. The inspections were conducted from January 19-20 2016, and February 16-17, 2016. The site inspection checklists and trip reports with photographs are included in Appendix F and Appendix G, respectively.

The inspection of the Richwood, Suburban, and South El Monte OUs was conducted 19-20 January 2016. In attendance at various points of the inspection were Rachelle Thompson, EPA Remedial Project Manater (RPM); Jayson Osborne, USACE, Seattle District; Christine Bucklin, DTSC; and the water purveyor operators for the City of Monterey Park, Golden State Water Company, and the San Gabriel Valley Water Company.

On January 19, 2016, the Richwood and Suburban OUs were visited as well as the SGVWC facility associated with SEMOU. The water well associated with the ROU has been dismantled. Residents in the area are serviced by the SGVWC. The water wells in the Bartolo Well Field associated with SOU are installed above flood level and VOCs samples are collected quarterly. There are no issues with the wells. Trespassing occurs occasionally but it does not impact well operations. At the SGVWC facility (Plant 8), the treatment facility was inspected. Overall, the facility appears to be in good condition. SGVWC is attempting to purchase adjacent property on which an ultraviolet treatment facility will be constructed to address 1,4-dioxane.

On January 20, 2016, the remainder of the SEMOU facilities were visited: GSWC and Monterey Park. Overall, the treatment facility at GSWC is in good condition. Recent drought conditions have noticeably reduced water demand over the past year as water levels gradually drop over time. The Monterey Park facility consists of treatment, using GAC, for production well 5 and air stripper and GAC for production wells 12 and 15. Biofouling was impacting GAC media and vessels a year and a half ago (mid-2014). This was remedied by a thorough cleaning of the GAC vessel during change-outs. Monterey Park is actively looking into constructing an oxidation system to replace the GAC treatment system. In addition an air stripper to treat VOCs is used at Well 12. Acid is used to reduce biofouling and mineral build-up in the air stripper. GSWC found that the fiberglass air stripper was translucent allowing bacteria to grow. Coating the air stripper with an opaque epoxy helped reduce biofouling. Well 5 may need to be redeveloped in the future because of drawdown issues. Well 5 operates in the summer during peak demand and less in the winter. Overall, the treatment facility at Monterey Park appeared to be in good condition, except for the acid box and acid tank at Well 12 that are having corrosion issues.

The EMOU site inspection was conducted on February 16, 2016. In attendance were Bella Dizon, EPA RPM; Marlowe Laubach, USACE; Sue Fears and Christine Bucklin, DTSC; Alan Bradford, CH2M Hill; and the operators for the El Monte OU treatment plants.

The EMOU West Side treatment facilities appeared to be in good condition. One water well (ENC 1) in the Encinitas Well field, which is included in the deep-zone remedy, was taken off-line at the time of the Site inspection because the pump needed repair/replacement with an expected downtime of one month. A pump for another water well (ENC 3) needed a new motor which was to be installed later in the week. At the West Side shallow-zone treatment facility the advanced oxidation system to treat 1,4-dioxane was not on-line because the well for which this treatment was targeted (Well ERP15) had run dry. According to

the West Side's consultant present at the site visit, the shallow zone has been experiencing dropping water levels. No other operational issues were observed during the Site visit.

The El Monte East Side treatment facilities completed construction in 2015. The shallow-zone treatment facility is separate from the intermediate-zone treatment facility because there will be different end use for each water zone. The shallow-zone treatment facility began continuous operation in January 2016. The shallow-zone treatment is currently operated in cycles[5] because of the lower extraction rates due to dropping water levels and over-sizing of GAC vessels. Additional data from continued operation will help determine whether the contaminant plume containment is occurring with the cyclical operation and lower extraction rates and whether dropping water levels will affect the effectiveness of the treatment. The deep zone treatment facility was not yet operational pending the approval of the drinking water permit. Treated water will be used in the City of El Monte's water distribution system.

The WNOU Site inspection was conducted on February 17, 2016. In attendance were Bella Dizon, EPA RPM; Marlowe Laubach, USACE; Sue Fears and Christin Bucklin, DTSC; Dave Towell, CH2M Hill; and Paul Smit, SGVWC. The treatment facility appeared to be in good condition. The shallow-zone extraction wells were shut-off because that water zone had met ROD requirements. However, the shallow zone was still being monitored to ensure that ROD requirements continue to be met. The shallow-zone extraction wells are brought on-line for sampling events. Improvements were made to the intermediate-zone treatment to allow treated water to be used by the SGVWC. However, the SGVWC cannot currently use this water because of unmet Division of Drinking Water requirements for total dissolved solids. Specific details related to the total dissolved solids are discussed in section 2.3.2. Currently, all intermediate-zone treated water is being discharged to Legg Lake in the adjacent Whittier Narrows Recreation Area.

5. Technical Assessment

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

Yes.

EMOU

Primary COCs in the shallow groundwater have been TCE and PCE. Wells that exceeded the performance criteria of 10 times IROD standards for PCE or TCE are predominantly located in the East Side of the EMOU, along with two wells located in the West Side. The exceedance of contaminant criteria in all wells is within historical range with no significant trend. The contaminant plume is generally well defined; therefore the contaminated groundwater appears to be contained within the EMOU boundary.

[5] Per the operator, the extraction pumps turn on and fill the equalization tank. When the tank is full, the extraction pumps turn off and the water in the equalization tank is pumped through the GAC vessels for treatment and then injected into the ground. Once the tank is empty, the extraction pumps turn on to fill the equalization tank. The extraction pumps turn on approximately every 45 minutes.

Given the West Side GWTS has been in operation for only three years, it may be too early to assess trends in contaminant concentrations and migration patterns in the shallow zone.

In the deep-zone aquifer, the ROD standards for the West Side of the EMOU were exceeded for two chemicals: TCE and PCE. Areas of exceedance appear to be widely and discontinuously located over the site. Hexavalent chromium has been detected in many deep-zone wells on the West Side and the East Side of the EMOU, though at concentrations often slightly below the ESD standard of 11 µg/L. Compliance and other monitoring wells show that all other contaminated wells are contained within the site.

A groundwater treatment system for the shallow zone in the West Side of the EMOU has been in operation since May 2012. The GWTS is comprised of six shallow-zone extraction wells and a treatment plant. Based on quarterly discharge monitoring reports by CDM Smith, contaminant levels in the effluent have been consistently below or close to the reporting limits. The Encinitas well field treatment system is achieving the necessary pumping rates for effective capture. However, given that compliance monitoring well ERP-13 show VOC contamination exceeding ARARs at this depth interval, there is reason to believe that the Encinitas wells have not been able to contain the contamination migration in the 300 to 400 feet bgs depth interval.

WNOU

Shallow groundwater impacts are relatively low throughout the Whittier Narrows OU with the exception of an area of elevated constituent concentrations present in the north-central area of the Site, north of Legg Lakes. Extraction from the shallow zone has been terminated except during groundwater sampling events.

In the lower intermediate-zone aquifer, PCE concentrations continue to decline throughout much of the WNOU and the only area of significantly elevated concentrations continues to be present in the southern portion of the SEMOU.

A 2015 evaluation of hydraulic control using a particle-tracking flow model by URS predicts that the target pumping rate would contain 96% of the upper intermediate zone, 92% of the intermediate zone, and 78% of the lower intermediate zone. Lower pumping rates are predicted to result in reduced capture. However, these model predictions have not yet been observed in groundwater monitoring. PCE concentrations in performance wells are declining or stable, and do not indicate transport of impacted water into the Montebello Forebay. Continued reduction of the pumping rates merits attention, particularly for its possible impact on plume containment.

ROU

The Richwood OU remedy is functioning as intended. The intent of the remedy to supply clean water that meets CDPH drinking water requirements to RMWC's customers (now SGVWC) has been met continuously since 1994. HMWC and RHMWC have also operated their respective water systems consistent with the intent of the remedy and have consistently supplied clean water to their customers that meets CDPH drinking water requirements. The water supply wells from each of these systems are sampled annually and no contaminants have been detected in recent years.

SOU

An active remedy was never implemented in the Suburban OU because VOC contamination levels were not high enough to trigger action. However, SWS has satisfied the intent of the remedy by operating the Bartolo Well Field to supply clean water to its customers in accordance with DDW drinking water requirements.

SEMOU

The remedy is working as intended in the intermediate zone. Based on a review of documents from the past five years, the extent of contamination in the intermediate aquifer is defined laterally and vertically. The only uncertainty is in the northwestern portion of the SEMOU, where concentrations fluctuate from levels slightly above to below the MCLs. The contamination in this northwestern portion is limited to the upper intermediate aquifer, and gradients are inward toward the extraction system in the upper and middle intermediate aquifers. The project extraction wells are limiting the migration of COCs in groundwater, and the SEMOU contamination has not migrated beyond the capture zone of the down-gradient extraction wells located in the western portion of the South El Monte area.

The selected remedy does not address shallow zone contamination, which remains above MCL and is not prevented migrating horizontally into WNOU and vertically into the intermediate zone. The possibility of shallow zone contamination migration into WNOU requires future monitoring. However, there is not currently any evidence of increasing plume concentrations or extent in the WNOU, and contamination that migrates vertically into the intermediate zone is addressed by the SEMOU and WNOU intermediate zone remedies.

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

Yes. Standards in the ROD, ROD amendments, and ESDs for the OUs have changed. Toxicity values have changed for COCs. Changes in standards and toxicity values do not affect the protectiveness of the remedy. The State of California has recently promulgated an MCL for hexavalent chromium; however, there is no exposure to hexavalent chromium. Exposure assumptions presented in the ROD, ROD amendments, and ESDs for each of the OUs remain valid. The vapor intrusion pathway was not evaluated in any of the RODs, ROD amendments or ESDs for the El Monte, Whittier Narrows, and South El Monte OUs. Based on an evaluation conducted in this FYR for the El Monte and Whittier Narrows OUs, there is a potential for vapor intrusion exposure at the EMOU. The SEMOU conducted an indoor air investigation in this five-year review period and there is evidence of vapor intrusion. The RAOs are currently being met for each of the OUs. Additional discussion is presented below.

A detailed analysis of ARARs is presented in Appendix C. A detailed analysis of exposure pathways and toxicity values is presented in Appendix D.

Changes in Standards and TBCs

The state MCL for hexavalent chromium, a COC for the EMOU, was promulgated in 2014 as a value of 10 µg/L. This is less than the ROD standard of 11 µg/L, which is a performance standard. Concentrations

of hexavalent chromium in the shallow zone have been within the performance criteria of 10 times the ROD standard. The deep zone is used as drinking water supply. Detections of hexavalent chromium from the fourth quarter 2014 sampling event in monitoring well, MW2-07, in the East Side EMOU are greater than the current state MCL and the ESD standard for hexavalent chromium (16 µg/L in September 2014, 18 µg/L in December 2014) The East Side EMOU deep-zone treatment plant was not operating during preparation of this FYR and therefore there are no current exposures. Continued monitoring of hexavalent chromium is required prior to use as a drinking water supply.

The state notification level for 1,4-dioxane was revised in 2010 from 3 µg/L to 1 µg/L. This could potentially affect the treatment where 1,4-dioxane is detected, primarily at EMOU, SEMOU and WNOU. No detections of 1,4-dioxane were observed in the 2014 3rd quarter discharge report for West Side EMNOU. At the Whittier Narrows OU, all detections of 1,4-dioxane in the intermediate zone in the most recent performance monitoring report (June 2016) are at or slightly above 1 µg/L. The 2015 performance monitoring report for SEMOU presents levels of 1,4-dioxane greater than 1 µg/L in two production wells; one of which has since been taken off-line. However, this treatment for this chemical is not currently part of the remedy at SEMOU.

All other ARARs either have not changed or changes have occurred but do not affect the protectiveness of the remedy.

Changes in Toxicity and Other Contaminant Characteristics

Toxicity values have changed in this review period. However, these changes do no impact protectiveness with the exception of hexavalent chromium. The hexavalent chromium ROD standard for EMOU is outside of the acceptable cancer risk range and concentrations in groundwater exceed both the ROD standard and cancer RSL. However, there is no current exposure to groundwater containing hexavalent chromium above unacceptable risks.

Changes in Exposure Pathways

Vapor intrusion was not evaluated in the decision documents for EMOU, SEMOU and WNOU. A vapor intrusion evaluation was performed in this FYR for WNOU and EMOU using current groundwater data and the EPA Vapor Intrusion Screening Level calculator. Based on this evaluation, WNOU does not have a potential for vapor intrusion. Depth to groundwater at EMOU is generally deeper than 100 feet bgs, the depth at which vapor intrusion is not concern. However, there are a few locations in the eastern and western EMOU where groundwater contamination levels, reported in sampling results, are elevated and depth to groundwater are less than the 100 feet bgs and a vapor intrusion assessment is recommended. EPA indoor air investigations performed within the SEMOU determined that vapor intrusion is occurring.

Changes in Risk Assessment Methods

In February 2014, the EPA provided supplemental guidance that updated the standard default exposure factors (OSWER Directive 9200.1-120). However, the changes in the recommended default exposure factors do not affect the risk estimates in a way that could affect the protectiveness of the remedy.

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

No. Continued drought conditions may continue to impact shallow-zone treatment. No other information has come to light that could call into question the protectiveness of the remedy.

6. Issues/Recommendations

Table 6-1: OUs without Issues or recommendations

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
Richwood, Suburban

Table 6-2 Issues and Recommendations Identified in the Five-Year Review

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): El Monte	**Issue Category:** Remedy Performance			
	Issue: Concentration of hexavalent chromium in MW2-07 is greater than the ROD standard and current state MCL.			
	Recommendation: Continue monitoring for hexavalent chromium in extraction wells. If concentrations increase above the current MCL, additional treatment is required prior to use as drinking water supply.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/1/2021
OU(s): El Monte	Issue Category: Remedy Performance			
	Issue: Vapor intrusion was not evaluated in the ROD. However, there have been a few locations (i.e. shallow groundwater less than 100 feet deep) have been identified where there is a potential for vapor intrusion.			
	Recommendation: Perform an indoor air assessment to determine whether this is a valid pathway.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes*	Yes	PRP	EPA	10/31/2017
OU(s): **El Monte**	**Issue Category: Remedy Performance**			
	Issue: The hexavalent chromium ROD standard is outside of the acceptable cancer risk range and concentrations exceed the ROD standard and cancer RSL.			
	Recommendation: Continue monitoring of hexavalent chromium especially in the deep zone which is used as drinking water supply.			

Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	EPA	9/30/2019
OU(s): **El Monte**	Issue Category: Remedy Performance			
	Issue: Compliance well ERP-13 exceeds MCL for VOCs. The Encinitas wells may not be containing the contaminant migration in the 300 to 400 ft bgs depth interval.			
	Recommendation: Assess if contaminant is contained in this area.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	9/30/2018
OU(s): Whittier Narrows	Issue Category: Changed Site Conditions			
	Issue: 1,4-dioxane concentrations in a few intermediate zone monitoring wells located in the northern area of the site exceed the current notification level of 1 μg/L.			
	Recommendation: Continue monitoring 1,4-dioxane and finalize contingency planning for treatment system design and implementation per EPA/DTSC Site Transfer agreement.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	9/30/2020
OU(s): Whittier Narrows	Issue Category: Changed Site Conditions			
	Issue: Pumping rates have not met a calculated pumping rate of 3,500 gpm due to end use issues.			
	Recommendation: Continue to work with local purveyors to re-establish discharge option and complete the current end-use options study. Any change in discharge, not allowed under the current remedy, may require a decision document by EPA.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	9/30/2018
OU(s): South El Monte	Issue Category: Changed Site Conditions			
	Issue: Recent indoor air investigations indicate that vapor intrusion is occurring.			
	Recommendation: Evaluate alternatives to mitigate vapor intrusion exposures.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	3/31/2018
OU(s): South El Monte	Issue Category: Changed Site Conditions			
	Issue: 1,4-dioxane concentrations in City of Monterey wells 12 and 15 exceed the current notification level of 1 μg/L.			
	Recommendation: Evaluate alternatives to mitigate 1,4-dioxane exposures.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	6/30/2020

* - There is a potential for vapor intrusion exposure. However, it is uncertain if there is current exposure.

6.1. *Other Findings*

In addition, the following recommendations will improve performance of the remedy but do not affect current and/or future protectiveness and were identified during the FYR:

- EMOU: The East Side shallow-zone treatment facility is currently operated in cycles due to lower than anticipated flow rates. Continue to collect additional data from continued operation to determine whether containment is occurring with the cyclical operation.
- WNOU: Pumping rates have not met a calculated pumping rate of 3,500 gpm due to end use issues. Continue to evaluate decreased pumping rates effect on containment.
- SEMOU: Compliance well SEMW23A is located outside the northwest border of the South El Monte OU border. Analytical results for PCE have fallen modestly below MCL since 2013, but monitoring should continue, as there is no other compliance well further down-gradient of this location.

7. Protectiveness Statement

Table 7-1 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: El Monte	*Protectiveness Determination:* Protectiveness Deferred	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: A protectiveness determination of the remedy at the El Monte OU cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions: conduct an indoor air investigation at the few locations where shallow groundwater (less than 100 feet depth) and site related groundwater contamination poses a risk for the potential of vapor intrusion.		
Operable Unit: Whittier Narrows	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: The remedy at Whittier Narrows currently protects human health and the environment because no one is drinking the water and all water currently being discharged to surface water meets ROD requirements. However, in order for the remedy to be protective in the long-term, end use issues need to be resolved to meet target extraction rates to ensure containment of the plume in the intermediate zone and, 1,4-dioxane concentrations should continue to be monitored and contingency planning for treatment system design and implementation should be finalized per the EPA/DTSC Site Transfer agreement.		
Operable Unit: Richwood	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: The remedy at Richwood OU is protective of human health and the environment.		
Operable Unit: Suburban	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Click here to enter a date

Protectiveness Statement: The remedy at Suburban OU is protective of human health and the environment.		
Operable Unit: South El Monte	*Protectiveness Determination:* Not Protective	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: The remedy at South El Monte OU is not protective because of indoor air exposures to commercial users and residents. These exposures need to be mitigated to ensure protectiveness.		

8. Next Review

The next five-year review report for the San Gabriel Valley Area 1 Superfund Site is required five years from the completion date of this review.

Appendix A: List of Documents Reviewed

List of Documents Reviewed

SAN GABRIEL VALLEY AREA 1

San Gabriel Basin Water Quality Authority (WQA). September 16, 2015. *Semi-Annual Status Report*

San Gabriel Basin Water Quality Authority (WQA). March 21, 2012. *Semi-Annual Status Report*

Main San Gabriel Basin Watermaster. November 2015. *Five-Year Water Quality and Supply Plan, 2015 to 2020.*

United States Environmental Protection Agency (EPA). September 2013. *First Five-Year Review Report for San Gabriel Valley Area 1 Superfund Site, South El Monte Operable Unit, Richwood Operable Unit, Suburban Operable Unit, Whittier Narrows Operable Unit, El Monte Operable Unit (EMOU, OU1, OU08, and OU09).*

EL MONTE

United States Environmental Protection Agency (EPA). 2004. *El Monte OU Consent Decree.*

_____. 2008 *Explanation of Significant Differences to the 1999 Record of Decision El Monte Operable Unit San Gabriel Valley Superfund Sites, Area 1.*

CDM Smith. February 10, 2015. 3Q2014 *Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action.* Prepared for USEPA.

_____. March 30, 2012. *Final General Monitoring Plan, El Monte Operable Unit Western Shallow and Northwestern Deep Portions of the Interim Remedial Action*.

_____. January 3, 2008. *Compliance Monitoring Plan, El Monte Operable Unit Western Shallow and Northwestern Deep Portions of the Interim Remedial Action*.

_____. July 29, 2015. *Remedial Action Construction Report Completion of the Groundwater Treatment System. West Side El Monte Operable Unit Western Shallow Groundwater Remedy.*

_____. September 10, 2012. *Compliance Monitoring Plan Addendum, El Monte Operable Unit Western Portion of the El Monte OU*.

_____. July 29, 2015. *Remedial Action Construction Report Completion of the Groundwater Treatment System. West Side El Monte Operable Unit Western Shallow Groundwater Remedy.*

_____. December 17, 2015. *2Q2015 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action*.

_____. August 17, 2015. *1Q2015 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action*.

_____. March 30, 2015. *4Q2014 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action.*

_____. November 18, 2014. *2Q2014 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action.*

_____. July 15, 2014. *1Q2014 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action.*

_____. June 5, 2014. *4Q2013 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action.*

_____. November 4, 2013. *3Q2013 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action.*

_____. November 14, 2014. *Third Quarter 2014 NPDES Monitoring Report West El Monte Operable Unit, Groundwater Treat Plant.* Submitted to California Regional Water Quality Control Board.

Geosyntec Consultants. April 30, 2015. *Second Quarter through Fourth Quarter 2014 Groundwater Monitoring Data, Eastern Shallow and Southern Deep Portions of the Interim Remedial Action, El Monte Operable Unit.*

_____. February 7, 2014. *Fourth Quarter 2013 Groundwater Monitoring Data, Eastern Shallow and Southern Deep Portions of the Interim Remedial Action, El Monte Operable Unit.*

_____. March 21, 2013. *2013 Quarterly Compliance Monitoring Report, Eastern Shallow and Southern Deep Portions of the Interim Remedial Action, El Monte Operable Unit.*

_____. January 30, 2009. *General Monitoring Plan, Eastern Shallow and Southern Deep Portions of the Interim Remedial Action, El Monte Operable Unit.*

_____. July 24, 2015. *Technical Memorandum 2015-03 Evaluation of Non-Representative Hexavalent Chromium Detections, Southern Deep Zone of the El Monte Operable Unit*.

WHITTIER NARROWS

United States Environmental Protection Agency (EPA). September 2011. *Second Five-Year Review Report for San Gabriel Valley Area 1 Superfund Site, Whittier Narrows Operable Unit*.

_____. September 2006. *First Five-Year Review Report, Whittier Narrows Operable Unit*.

_____. November 1999. *Interim Record of Decision Amendment, Whittier Narrows Operable Unit.*

_____. 1989 *Record of Decision "Monitoring Only" (No Action) Alternative Selection Declaration, Whittier Narrows OU, San Gabriel Valley Superfund Sites, Area 1.*

URS. February 12, 2016. *Technical Memorandum Groundwater Monitoring Event (November 2015), San Gabriel Valley Area 1 Superfund Site – Whittier Narrows Operable Unit*

_____. July 20, 2015. *Technical Memorandum Groundwater Monitoring Event (May 2015), San Gabriel Valley Area 1 Superfund Site – Whittier Narrows Operable Unit*

_____. July 31, 2015. *Performance Evaluation Report for 2014, San Gabriel Valley area 1 Superfund Site – Whittier Narrows Operable Unit.*

_____. June 23, 2014. *Performance Evaluation Report for 2013, San Gabriel Valley area 1 Superfund Site – Whittier Narrows Operable Unit.*

CH2M Hill. July 2013. *Performance Evaluation Report, San Gabriel Valley area 1 Superfund Site – Whittier Narrows Operable Unit.*

_____. January 17, 2014. *Technical Memorandum Target Pumping Rate of Whittier Narrows Operable Unit Remedy and Model Sensitivity.*

RICHWOOD

United States Environmental Protection Agency (EPA). 1987 *Record of Decision, Richwood OU, San Gabriel Valley Superfund Sites, Area 1.*

_____. 1987 *Record of Decision Amendment, Richwood OU, San Gabriel Valley Superfund Sites, Area 1.*

SUBURBAN

United States Environmental Protection Agency (EPA). 1988 *Record of Decision, Suburban Water Systems/Bartolo Well Field OU, San Gabriel Valley Superfund Sites, Area 1, 2, and 4.*

_____. 1993 *Record of Decision Amendment, Suburban Water Systems/Bartolo Well Field OU, San Gabriel Valley Superfund Sites, Area 1, 2, and 4.*

SOUTH EL MONTE

United States Environmental Protection Agency (EPA). 2005 *Explanation of Significant Differences to the 2000 Interim Record of Decision South El Monte Operable Unit San Gabriel Valley Superfund Sites, Area 1.*

_____. 2000 *Interim Record of Decision South El Monte Operable Unit San Gabriel Valley Superfund Sites, Area 1.* September.

San Gabriel Basin Water Quality Authority (WQA). 2015. *Annual Performance Report (July 1, 2014 thru June 30, 2015), South El Monte Operable Unit.* July 30.

_____. 2014. *Annual Performance Report (July 1, 2013 thru June 30, 2014), South El Monte Operable Unit.* July 30.

Gilbane. 2015. *Remedial Action 2013 Compliance Monitoring Report, South El Monte Operable Unit, San Gabriel Valley Area 1 Superfund Site*. Prepared for USEPA.

_____. 2016. *Draft Technical Memorandum, Human Health Risk Evaluation of Vapor Intrusion. South El Monte Operable Unit, San Gabriel Valley Area 1 Superfund Site*. Prepared for USEPA.

_____. 2016. *Remedial Action 2014 Compliance Monitoring Report, South El Monte Operable Unit, San Gabriel Valley Area 1 Superfund Site*. Prepared for USEPA.

ITSI Gilbane. 2013. *Remedial Action 2012 Compliance Monitoring Report, South El Monte Operable Unit, San Gabriel Valley Area 1 Superfund Site*. Prepared for USEPA.

Appendix B: Data Review

This appendix focuses on an assessment of the effectiveness of the remedies for five OUs: El Monte, South El Monte, Whittier Narrows, Richwood, and Suburban (see Figure 1). The Whittier Narrows OU boundary has been uncertain. Other sources has the eastern boundary along the 605 freeway. The differences represent the actual versus intended range of influence. No remedial action is occurring at Richwood and Suburban OUs and are therefore not discussed here.

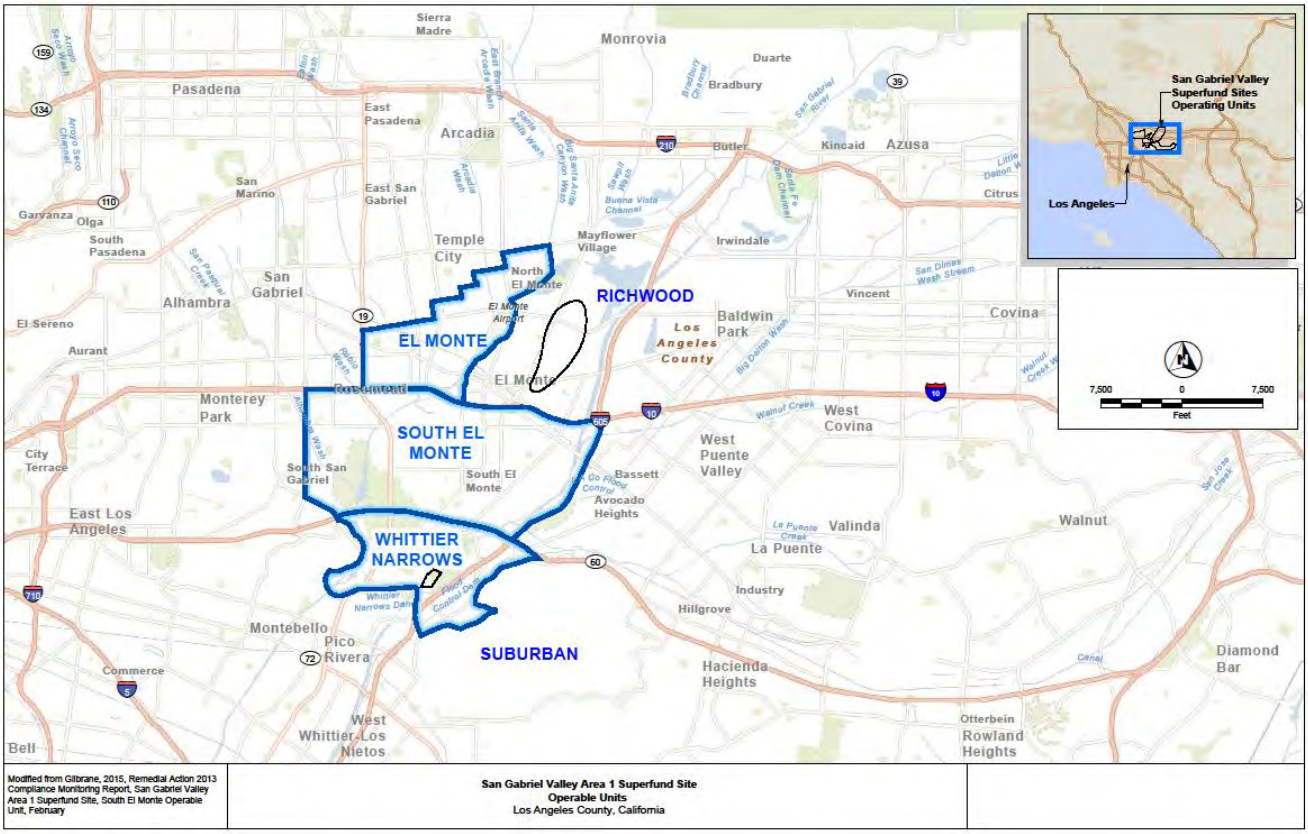


Figure 5. Location Map of the San Gabriel Area 1 Superfund Site.

El Monte OU 1

Data from quarterly performance reports prepared by Geosyntec Consultants were used in this analysis of the remedy of the eastern shallow and southern deep groundwater portions of the El Monte Operable Unit (EMOU) as presented in the following reports: 2013, first quarter and fourth quarter; 2014, second through fourth quarter. Data from quarterly compliance reports (2013 to 2015) prepared by CDM Smith were used in this analysis of the remedy of the western shallow and northwestern deep groundwater portions of the EMOU.

The selected remedy in the 1999 EMOU Record of Decision (ROD) is shallow groundwater control in East Side (OU 8) and West Side (OU 9) EMOU plus deep groundwater control in two areas of deep zone contamination. Balwin Avenue divides EMOU into East Side and West Side. One area of deep zone control is in the northwestern portion of the EMOU in the vicinity of the active Encinitas wellfield. The second area is in the southern portion of the EMOU. Components of the remedy in the ROD include extraction, treatment, and monitoring of contaminants of concern (COCs), primarily volatile organic compounds (VOCs) and disposal of the treated water.

The remedial action is intended to:

- Prevent groundwater in the shallow zone with VOC contamination above 10 times the ROD standards from migrating beyond its current lateral and vertical extent,
- Prevent deep zone groundwater VOCs above the ROD standards from migrating beyond its current lateral and vertical extent, in the southern portion of the OU, and from migrating into or beyond the Encinitas Well Field Area in the northwestern portion of the EMOU.

Compliance in shallow and deep aquifers is monitored in wells:

- Located laterally and vertically downgradient of shallow groundwater contamination exceeding 10 times the relevant ROD standards,
- Located within 2,000 feet of a production well in the Encinitas Well Field, and
- Located generally west to northwest of the current extent of deep zone groundwater contamination.

Compliance with the shallow and deep zone performance criteria is monitored by quarterly sampling at compliance wells.

In 2002, an Explanation of Significant Differences was issued by U.S. EPA to include, as part of the EMOU remedy, treatment of groundwater for emerging chemicals, including perchlorate, 1,4-dioxane, hexavalent chromium, and NDMA.

Groundwater Flow

Shallow zone groundwater elevation contours for June 2015 are illustrated on Figure 2. The figure illustrates contours for both East and West Side wells.

The direction of groundwater flow in the West Side EMOU to the west of Baldwin Avenue is variable. In the northern portion of the West Side EMOU, the general direction of groundwater flow is towards the southwest. In the southern portion of the West Side EMOU, the direction is generally to the south, with a southeasterly component in the eastern portion of the West Side EMOU near Baldwin Avenue. In response to the ongoing drought in southern California over the past several years, groundwater levels in the EMOU continue~~d~~ to decline.

Groundwater flow in the East side EMOU is driven by annual recharge in the coarse river sediments east of the East Side EMOU between the Rio Hondo and the San Gabriel River and can vary in direction from easterly to southerly during low water level conditions to westerly during high water level conditions (Geosyntec Consultants, 2015, Final Technical Memorandum 2015-08, Sentinel Well Installation Report, December 8). Under the current low water level conditions shown in Figure 2, groundwater flows into the East Side EMOU from the northwest and then encounters a groundwater high located near well~~s~~ BH-11. As a result, groundwater flow is variable locally but is generally to the south and southeast.

In the southern deep zone (the lower deep zone) groundwater flows to the west-northwest. Due to the limited number and distribution of northwestern deep zone compliance monitoring wells (ERP13 and ERP16) groundwater elevation data for the north half of the West Side EMOU are not contoured and thus groundwater contour maps of the northwestern deep zone are not provided for this Five Year Review. According to a representative of CDM Smith, the contractor for West Side Performing Settling Defendant responsible for the West Side EMOU remedy, deep zone groundwater in the northern portion of the West Side EMOU flows to the west and northwest.

Shallow Zone Groundwater Contamination

Primary contaminants of concern (COCs) in the shallow groundwater have been TCE and PCE. Compliance and general monitoring wells that have exceeded the 10 times MCL Performance Criteria for PCE or TCE, based on the 2014 sampling event. Most of these wells are primarily located east of Baldwin Avenue, and two wells are located within the West Side EMOU (see Figure 3).

The higher levels of groundwater contamination occur on the East Side EMOU, in BH-27 (TCE = 2200 µg/L; PCE = 760 µg/L in June 2014). Nearby wells (BH-28, BH-10, BH-11, and BH-12) also show levels of TCE contamination in the range of 280 µg/L to 630 µg/L, and PCE contamination in the range of 210 µg/L to 430 µg/L. 1,2-dichloroethane results have been within the shallow zone performance criteria. The exceedance of contamination in all wells is within historical range with no significant trend. The contaminant plume is generally well defined; therefore the contaminated groundwater appears to be contained within the EMOU boundary. With the West Side GWTS in only operation for three years, it may be too early to assess trends in contaminant concentrations and migration patterns.

Deep Zone Groundwater Contamination

On the West Side EMOU, groundwater samples in the deep wells were analyzed for VOCs only. ROD standards were exceeded for two chemicals: TCE and PCE as shown in Figure 4. Areas of exceedance appear to be widely and discontinuously located over the site. The higher result has been 15 µg/L in DCMW-2B for TCE.

In the northwest corner of the site, well ERP-13 shows exceedances of TCE and PCE. However, there is no groundwater elevation data in the northern part of EMOU to help determine groundwater flow direction and gradient in the area of well ERP-13. Compliance and other monitoring wells show that all other contaminated wells are contained within the site.

Of the vertical compliance wells, only ERP-13 shows contamination exceeding MCL. In 2014, maximum result for TCE was 17 µg/L and for PCE was 8.4 µg/L in the deep zone. The deep zone is evaluated as three zones; zone 1, 492 to 502 feet bgs), zone 2 (395-405 feet below ground surface (bgs)), and zone 3 (340 to 350 feet bgs). Concentrations of VOCs in the deepest zone had been below MCL, but, in the 2014 sampling event, TCE was detected at 6.6 µg/L, which is greater than the TCE MCL of 5 µg/L.

Hexavalent chromium (Cr^{+6}) has been detected in many deep zone wells on the West Side and the East Side, though at concentrations often slightly below the ROD standard of 11 µg/L. Elevated concentrations of Cr^{+6} in well samples were noted in the fourth quarter 2013 monitoring event when groundwater samples collected from extraction wells DEW-2 and DEW-3 exhibited a 2 to nearly 3-fold increase in Cr^{+6} concentrations from the third quarter 2013 sampling event. The Cr^{+6} concentrations increased from 3.4 µg/L to 9.4 µg/L in DEW-2 and from 4.8 µg/L to 10 µg/L in DEW-3. During the first quarter 2014 monitoring period, the recorded Cr^{+6} concentrations were 73 µg/L g/L in well DEPZ-2 and 55 µg/L in well DEPZ-3 in samples collected using the low-flow sampling technique, both deep wells closely located to the extraction wells and screened in the same stratigraphic interval. The PRP's contractor (Geosyntec, 2015) was directed to evaluate whether chemical interactions within the aqueous environment surrounding the stainless steel well screens were the sole contributing factor to the elevated Cr^{+6} concentrations. They concluded that the Cr^{+6} data were biased high due to the chemical effects of high alkalinity and oxidizing conditions on the stainless steel well construction materials under static, or low flow pumping conditions. They recommended discontinuing use of low-flow/grab sampling methods for collection groundwater samples from the East Side EMOU wells and develop a protocol for operational and maintenance procedures to avoid introduction of elevated Cr^{+6} concentrations into the municipal water supply. Wells DEW-2, DEW-3, and DEPZ-2 were not sampled in 2014. Well DEPZ-3 was sampled in 2014 with Cr^{+6} concentrations below the MCL (10 µg/L) and ROD standard (11 µg/L). Sampling results from monitoring events in September and December 2014 showed Cr^{+6} concentrations in well MW2-07 of 16 and 18 µg/L, respectively.

West Side El Monte OU Treatment System

A groundwater treatment system (GWTS) for the shallow zone groundwater in the West Side EMOU has been in operation since May 2012. The GWTS is comprised of six shallow zone extraction wells and a treatment plant consisting of liquid granular activated carbon (LGAC) unit for removal of VOCs and a fluidized bed reactor (FBR) unit to reduce the concentrations of nitrate, hexavalent chromium, and perchlorate to regulatory standards. In 2015, an advanced oxidation process (AOP) treatment unit, for treatment of 1,4-dioxane, was added to the GWTS. Treated water from the system is discharged to Eaton Wash.

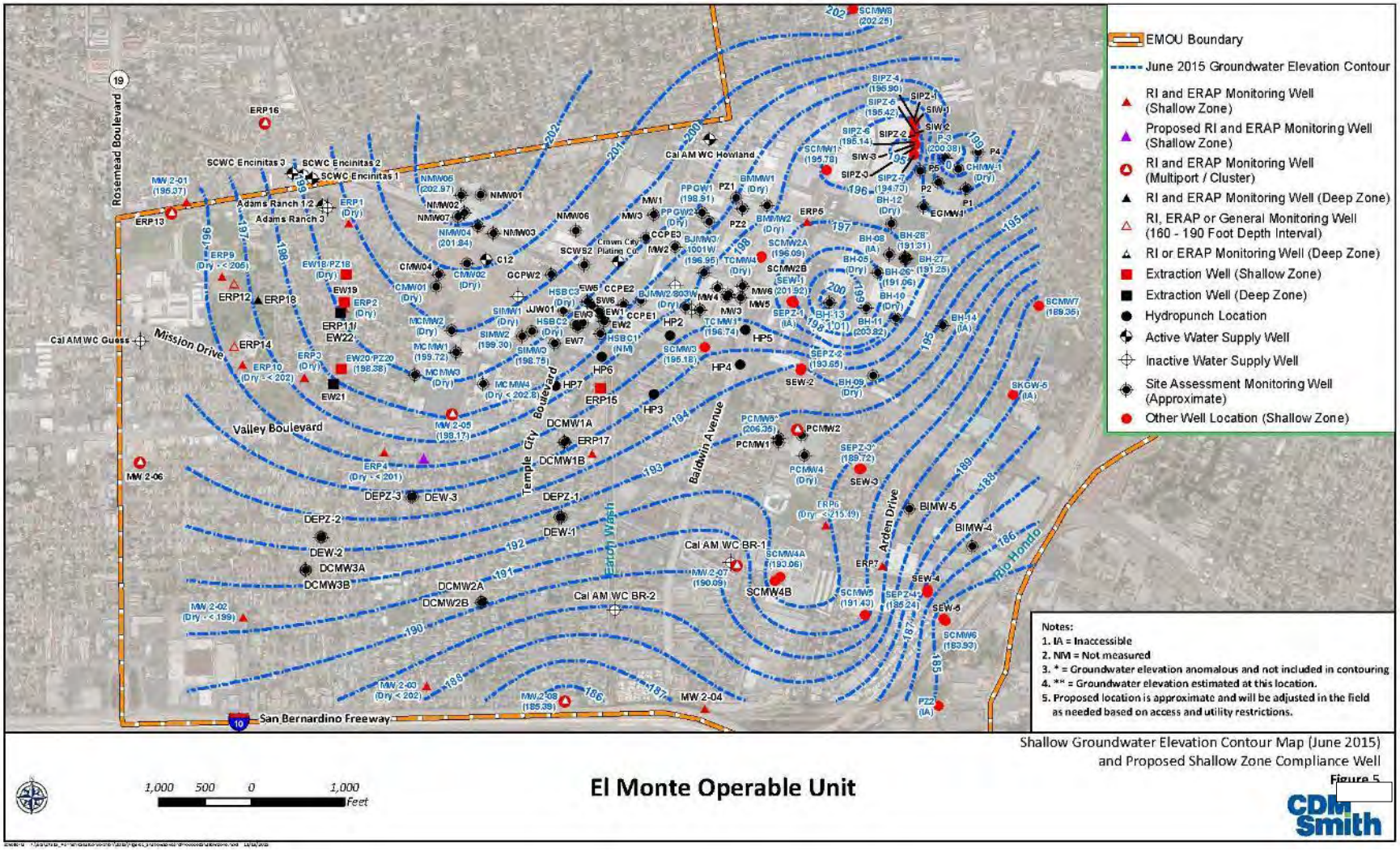
As of October 1, 2014, approximately 54,674,861 total gallons of shallow zone groundwater have been treated and discharged since startup. As a result of the ongoing California drought, shallow zone water levels are declining an average of one foot per quarter, hence the shallow zone extraction wells are operating at reduced rates. Contaminant mass removal is estimated annually based on flow rates from groundwater extraction wells and water quality results for these same extraction wells. Cumulative mass removal of VOCs is 29.6 pounds (lbs.), 5.1 lbs. of hexavalent chromium, and 3.5 lbs. of perchlorate, as of June 2015. Treated water is discharged into the Eaton Wash and meets National Pollution Discharge Elimination System permit requirements.

For the deep zone groundwater, the Encinitas Well Field Treatment System (Encinita System), consisting of wellhead-treatment of water supply wells ENC1, ENC2, and ENC3, is used as the GWTS. The Encinitas System is owned and operated by Golden State Water Company. Modeling performed by CDM Smith determined that an overall pumping rate of 950 gpm was needed from the three ENC well field wells for effective capture. All deep zone groundwater is treated to meet drinking water requirements. Average production during 2014 was 1,147 gpm, and average production in the first two quarters of 2015

was 1,092 gpm. However, given that compliance monitoring well ERP-13 (zones 2 and 3) show VOC contamination exceeding ARAR at this depth interval, there is reason to believe that the ENC wells have not been able to contain the contamination migration in the 300 to 400 feet, bgs depth interval.

East Side El Monte OU Treatment Systems

A GWTS for the shallow zone groundwater in the East Side EMOU has been in operation since January 2016. The GWTS consists of five shallow extraction wells and a LGAC unit to remove VOCs. As a result of the ongoing California drought, the extraction wells are operating at reduced rates. The treated water is re-injected into the shallow aquifer. A GWTS for the deep zone groundwater was constructed in January 2016. The GWTS consists of three deep zone extraction wells and a LGAC unit to remove VOCs. The GWTS is currently not in operation pending issuance of a drinking water permit by the California Division of Drinking Water. The treated deep zone water will be delivered to the City of El Monte (City) and will be used as part of the City's drinking water supply.



Source: 2Q2015 Compliance Monitoring Report West Side El Monte Operable Unit Remedial Design/Remedial Action, CDM Smith, December 17, 2015

Figure 2. El Monte OU Shallow Groundwater Elevation Contour Map, June 2015 Data

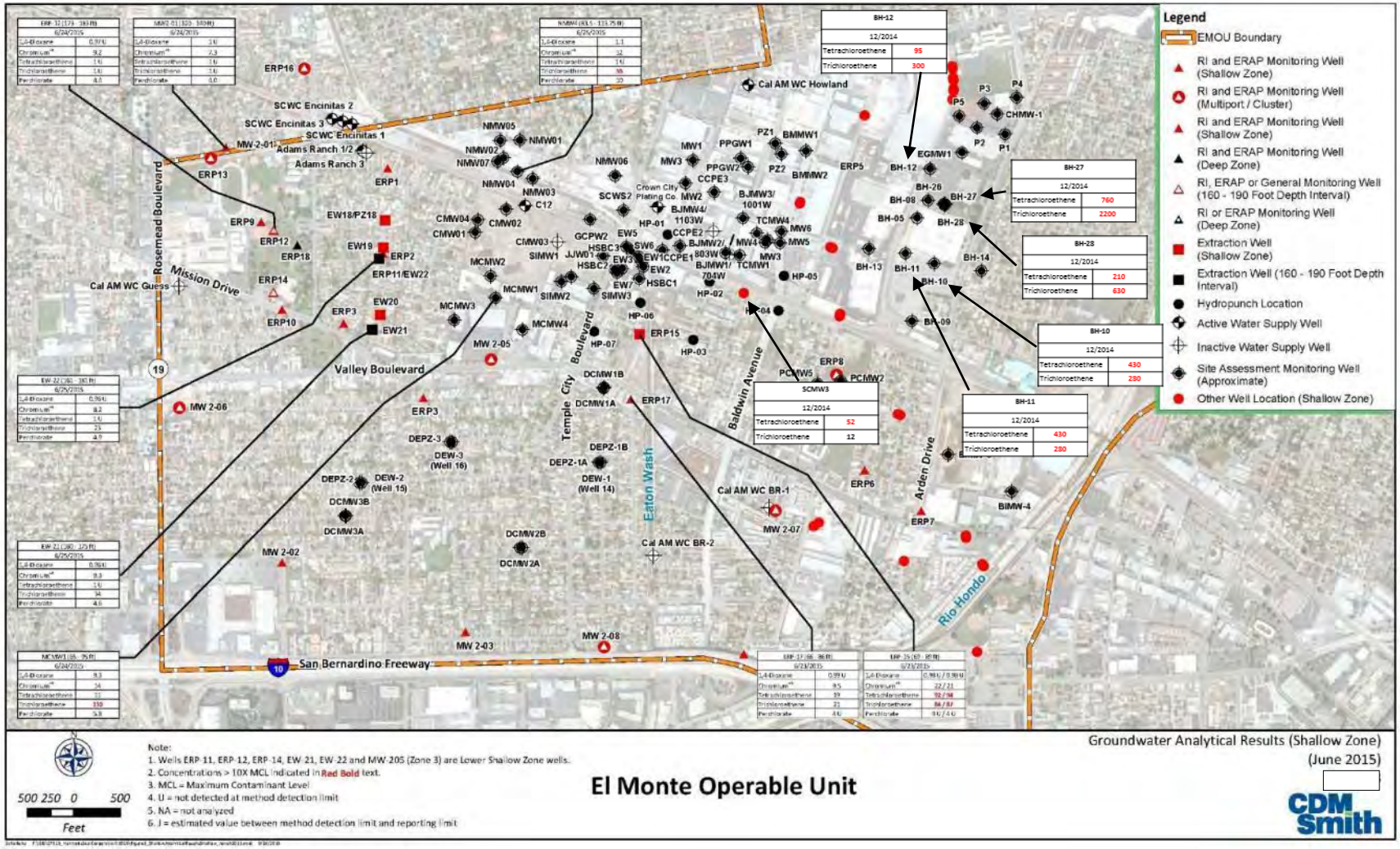


Figure 3. Selected Groundwater Analytical Results, Shallow Zone. Results highlighting wells with results that exceed the 10 times MCL Performance Criteria.

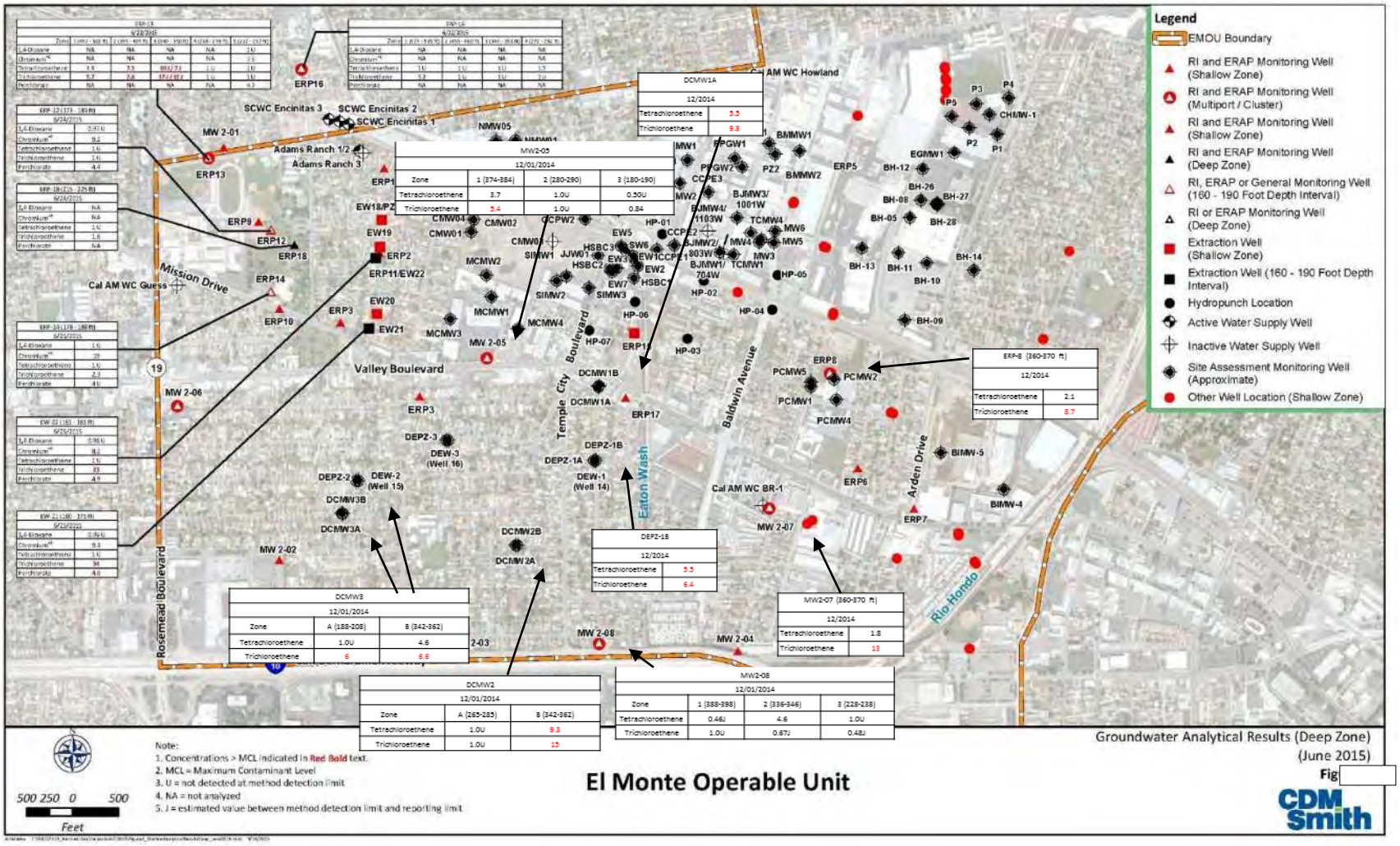


Figure 4. Selected Groundwater Analytical Results, Deep Zone. Results highlighting wells with results that exceed the 10 times MCL Performance Criteria

Whittier Narrows OU

Data from annual (2012 to 2015) performance evaluation reports (PER) prepared by CH2MHill (2013), and URS (2014, 2015, 2016) for the California Department of Toxic Substances Control were used in this data review for the Whittier Narrows OU (WNOU).

The selected remedy in the 1999 interim ROD amendment was groundwater containment near Whittier Narrows Dam. The major components of the remedy include:

- Groundwater containment through extraction at or near the downgradient limit of contaminant concentrations exceeding MCLs or other relevant Superfund evaluation criteria. This location is near Whittier Narrows Dam.
- Groundwater treatment at a treatment facility using liquid phase granular activated carbon adsorption

The Whittier Narrows OU interim remedy should create inward hydraulic gradients (capture zones) toward the remedy extraction wells such that groundwater impacts exceeding chemical-specific ARARs do not migrate into the Central Basin or into Whittier Narrows production (water supply) wells. This does not require that 100 percent of the contaminated area be contained; however, the majority of the plume exceeding MCLs must be contained to ensure protection of production wells and down-gradient areas and to account for variable hydrologic conditions affecting groundwater flow through Whittier Narrows. Compliance with the performance criteria is evaluated each year based on routine water quality sampling and potentiometric monitoring at monitoring wells identified as performance evaluation wells.

Groundwater Elevation and Flows

Groundwater elevation contours did not indicate any significant deflections within the shallow zone and/or the intermediate zone even though the groundwater extraction wells were operating during the gauging events in 2014. The overall groundwater flow direction in the WNOU generally flows from the northeast from the South El Monte OU (SEMOU) site towards the southwest (Montebello Forebay). The gradient is relatively flat across each aquifer with an average gradient of 0.003 ft/ft.

Vertical gradients are generally downward (mostly negative values) throughout the WNOU. The overall downward vertical gradients are likely the result of groundwater extraction (pumping) associated with the interim remedy Intermediate Zone extraction wells and municipal extraction wells located along the eastern portion of Whittier Narrows.

Groundwater elevations throughout much of the basin have been declining since April/May 2012. However, since the remedy wells are all screened in the confined upper intermediate zone and intermediate zone where the transmissivity does not change with groundwater levels fluctuations, the remedy performance is not affected by groundwater levels fluctuations.

Groundwater Contamination Distribution

PCE is both the most widely detected VOC chemical contaminant and is the only VOC that regularly exceeds its MCL in the Whittier Narrows OU. Of the remaining COCs only TCE and 1,4-dioxane are regularly detected; however, these detections are generally below the MCL or notification level, respectively.

Shallow Zone Aquifer

Groundwater impacts are relatively low throughout the WNOU with the exception of an area of elevated constituent concentrations present at MW-24A and SEMW-03, located in the north-central area of the site (north of Legg Lakes), and as shown in the table below. The source of these constituents is consistent with past interpretations as originating from the SEMOU. Emergent chemicals are present within the WNOU at very low concentrations (predominately 1,4-Dioxane and NDMA).

Well ID	Station ID	Screen Interval (ft bgs)	Monitoring Zone	Sample Date	PCE µg/L	TCE µg/L
MW24A	SEMW24A	150-160	Shallow	02/22/13	19	1.1
				05/30/13	22	1.1
				10/31/13	22	1.5
				05/27/14	23	1.5
				11/06/14	27	1.9
				2015	ns	ns
MW3	SEMW03_04	62-72	Shallow	04/01/11	130	--
				10/01/11	37	--
				04/01/12	62	--
				06/07/13	60	5.3
				10/21/13	78	6.8
				06/02/14	65	7.3
				10/15/14	49	9.2
				11/13/15	48	12
Note: MW24A was not sampled in May or November 2015.						

Intermediate Zone Aquifer

The intermediate zone is further evaluated in three sub-zones; upper intermediate zone (approximately 150 to 300 ft bgs), intermediate zone (approximately 300 to 450 ft bgs), and lower intermediate zone (approximately 450 ft to 600 ft bgs). The PCE concentrations are highest within the upper intermediate zone. The highest concentrations continue to be located in the southern portion of the SEMOU and northern WNOU as indicated by the concentrations detected between SEMW-03 (80 µg/L) and MW4-15 (110 µg/L).

The PCE concentrations are substantially less in the intermediate sub-zone. The highest concentration continues to be present in the southern portion of the SEMOU as indicated by concentrations detected in SEMW-03 (58 µg/L). The distal end of the groundwater plume is of similar areal extent as the upper intermediate zone. The intermediate zone PCE concentration contours are shown on Figure 9. The PCE concentrations are the lowest in the lower intermediate zone. The MCL goal was exceeded in one groundwater monitoring well during the 2014 reporting period (MW4-28A at 11 µg/L).

The constituent concentrations are greatly reduced in the lower portions of the site's aquifer (i.e., lower intermediate zone). The deeper impacts were evaluated in the vicinity of MW1-1 (700 ft bgs). The PCE concentration at this depth is currently 8.7 µg/L (similar to that reported in 2013). It is noted in the 2014 Performance Evaluation Report that (1) it is unlikely the existing extraction system would capture these impacts, (2) the amount of mass appears to be small with limited volume, and (3) the mass is not significant enough to currently warrant deeper extraction wells.

Overall, PCE concentrations continue to decline throughout much of the WNOU and the only area of significantly elevated concentrations continues to be present in the southern portion of the SEMOU as indicated by concentrations detected in SEMW-03 and SEMW-06. A lobe of impacted groundwater, originating from source areas in the SEMOU, is present up-gradient of the interim remedy extraction well network in the upper intermediate zone at MW4-15 (110 µg/L). The migration of this plume under current conditions is expected to be captured by the interim remedy network currently being operated within the WNOU.

In several intermediate zone wells in the northern portion of WNOU, 1,4-dioxane levels exceeding notification level were detected in June 2016, and may indicate transport of 1,4-dioxane from the SEMOU into the WNOU.

Extraction Wells Performance

Extraction from the shallow zone was essentially terminated, except for groundwater sampling events. There are sources of VOCs and possibly other emerging COCs in the SEMOU shallow zone that will likely bypass the SEMOU groundwater extraction system and migrate into the WNOU. This SEMOU shallow groundwater plum will likely need to be captured at a later date in the WNOU shallow zone extraction system. The EPA and DTSC agreed, as part of the transfer negotiations for WNOU to the State and the SEMOU State Superfund Contract (SSC) that if shallow contamination is detected in the WNOU, then the SEMOU pumping strategy will be modified to capture the contamination in the SEMOU rather than allowing it to migrate into the WNOU. Also, the agencies (EPA and DTCS) agreed to issue and prepare a final combined SEMOU/WNOU feasibility study, ROD, remedial design/remedial action documents to address hydraulic capture for all groundwater plumes before they migrate south into WNOU.

The intermediate zone annual extraction rate in 2015 was 1,019 gpm, approximately 71% less than the minimum target rate of 3,500 gpm. This is also a significant reduction from than the average annual extraction rates reported for 2014 (1,955), 2013 (2,237 gpm), 2012 (3,031 gpm), 2011 (3,367 gpm), and 2010 (3,622 gpm). The pumping rate has been decreased due to 1) a lack of end use discharge options and 2) compliance with with the water production agreement with requires that water overflowing Legg Lakes is conserved in the Main San Gabriel Groundwater Basin (i.e. not allowed to flow out of the Main San Gabriel Groundwater Basin.)

Hydraulic Control Evaluation

URS (PER, 2015) performed an evaluation of hydraulic control, based on review of potentiometric surface maps and capture zone analysis.

Capture zone analysis results for 2015 are signficiantly less favorable than those reported for 2014. The main driver appears to be the reduction in groundwater extraction rates due to the withdrawal of the City

of Whittier from the project and pending the ability of SGVWC to able to purvey treated water through their distribution system. Although EPA has mostly completed construction of a chlorinated tank and equipment needed to connect to the SGVWC potable water distribution system, the DDW denied SGVWC's verbal request for a drinking water permit due to elevated total dissolved solids in the effluent (treated water). EPA plans to research various alternative water discharge or end use options and will submit a Discharge Options Study in late 2016.

The calculated capture zone width in this area is affected by the reduced average extraction rate of 1,095 gpm, initiated in December 2014 and continued until February 16, 2016.s. On February 17, 2016, the extraction rate was increased to 2,000 gpm, thus eventually increasing the capture zone. The extraction rate cannot be increased until the Discharge Options Study is complete, another discharge option such as reverse osmosis or injections wells is designed, installed, and permitted, an ESD is approved, and an enhanced interim remedy is constructed. DTSC is only responsible for operation and maintenance of the existing GWTS.

Particle tracking simulation results for both the actual pumping rates and minimum target rates indicate the interim remedy wells may not completely capture impacted groundwater within the PCE plume above the MCL (5µg/L). Simulation results using the 2015 average pumping rate of 1,019 gpm indicate that the interim remedy wells would fail to capture the majority of the impacted groundwater in the intermediate zone that exceeds the PCE MCL (i.e., 32%, 0%, and 14% for the upper intermediate zone, intermediate zone, and lower intermediate zone). In particular, the model predicts impacted groundwater in the eastern portion of the site may not be contained, and some particles may be bypassing the interim remedy wells. This is a significant reduction in capture rates from those calculated based on the 2014 average pumping rate of 1,955 gpm (i.e 58%, 24%, and 46% for the upper intermediate zone, intermediate zone, and lower intermediate zone). These percentages also approximately represent the level of capture that may be expected at the 2,000 gpm pumping rate initiated in February 2016. At the recommended minimum target rate (3,500 gpm), the particle tracking analysis results indicate that the interim remedy wells would contain a majority of the impacted groundwater in the intermediate zone with PCE concentrations above the MCL (i.e., 96% for the upper intermediate zone, 92% for the intermediate zone and 78% for the lower intermediate zone). However, the model also indicates that some impacts within the eastern portion of the groundwater plume the intermediate zone and the lower intermediate zone may not be fully contained by the target pumping rate, and some particles may bypass the extraction well network and migrate towards water supply wells.

References

URS, 2016a. *Groundwater Monitoring Event (November 2015), San Gabriel Valley Area 1 Superfund Site - Whittier Narrows Operable Unit.* Technical Memorandum, February 12, 2016.

URS, 2016b. *Groundwater Monitoring Event (May 2015), San Gabriel Valley Area 1 Superfund Site - Whittier Narrows Operable Unit.* Technical Memorandum, July 20, 2015.

URS, 2015. *Performance Evaluation Report for 2014, San Gabriel Valley Area 1 Superfund Site - Whittier Narrows Operable Unit*. Technical Memorandum, July 31, 2015.

URS, 2014. *Performance Evaluation Report for 2013, San Gabriel Valley Area 1 Superfund Site - Whittier Narrows Operable Unit*. Technical Memorandum, June 23, 2014.

CH2MHill, 2013. *Performance Evaluation Report, Whittier Narrows Operable Unit*, *San Gabriel Valley Superfund Sites.* July 2013.

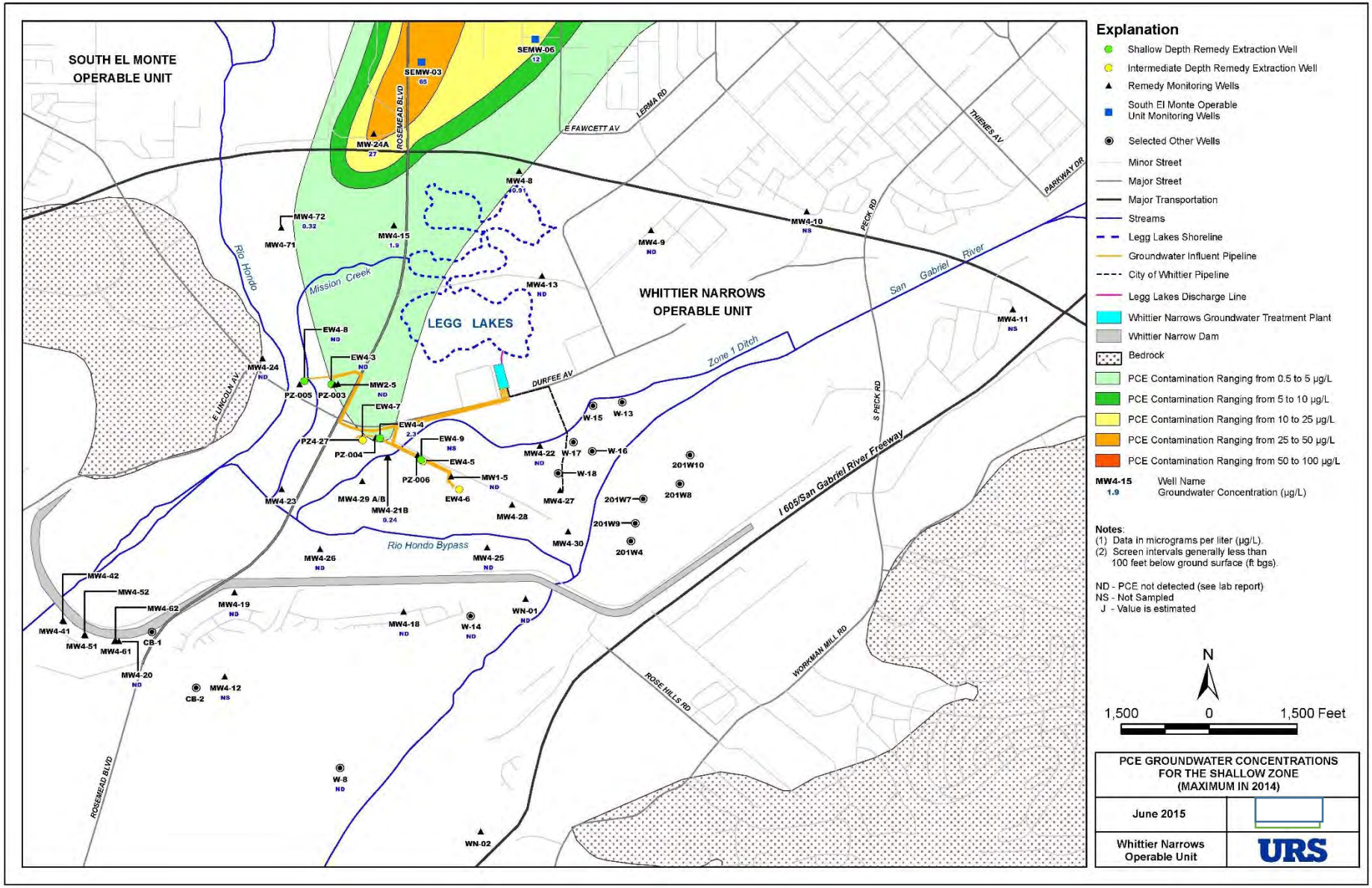


Figure 6. PCE Groundwater Concentrations for the Shallow Zone using 2014 data. From URS, Performance Evaluation Report, 2015.

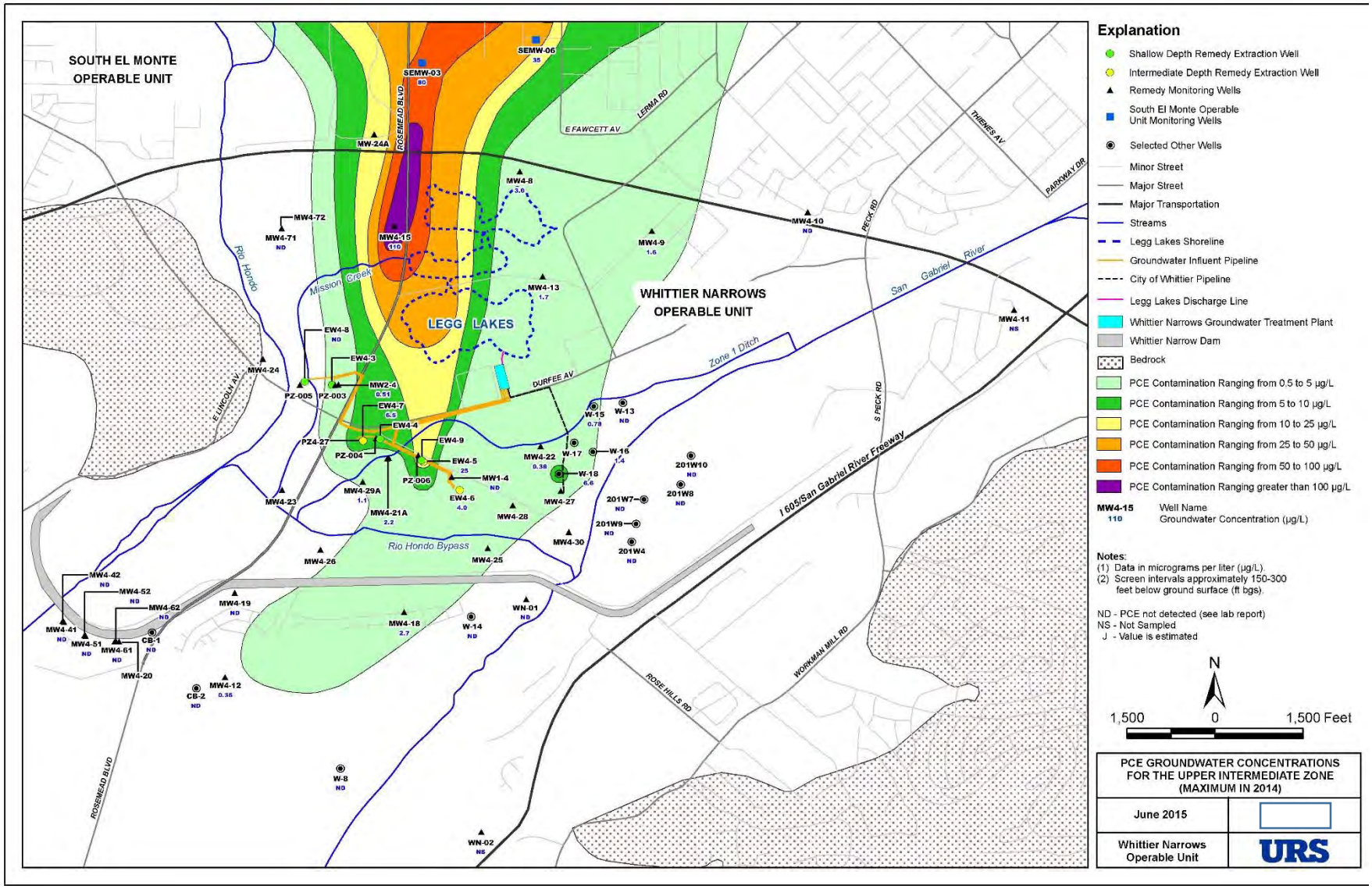


Figure 7. PCE Groundwater Concentrations for the Upper Intermediate Zone using 2014 data. From URS, Performance Evaluation Report, 2015.

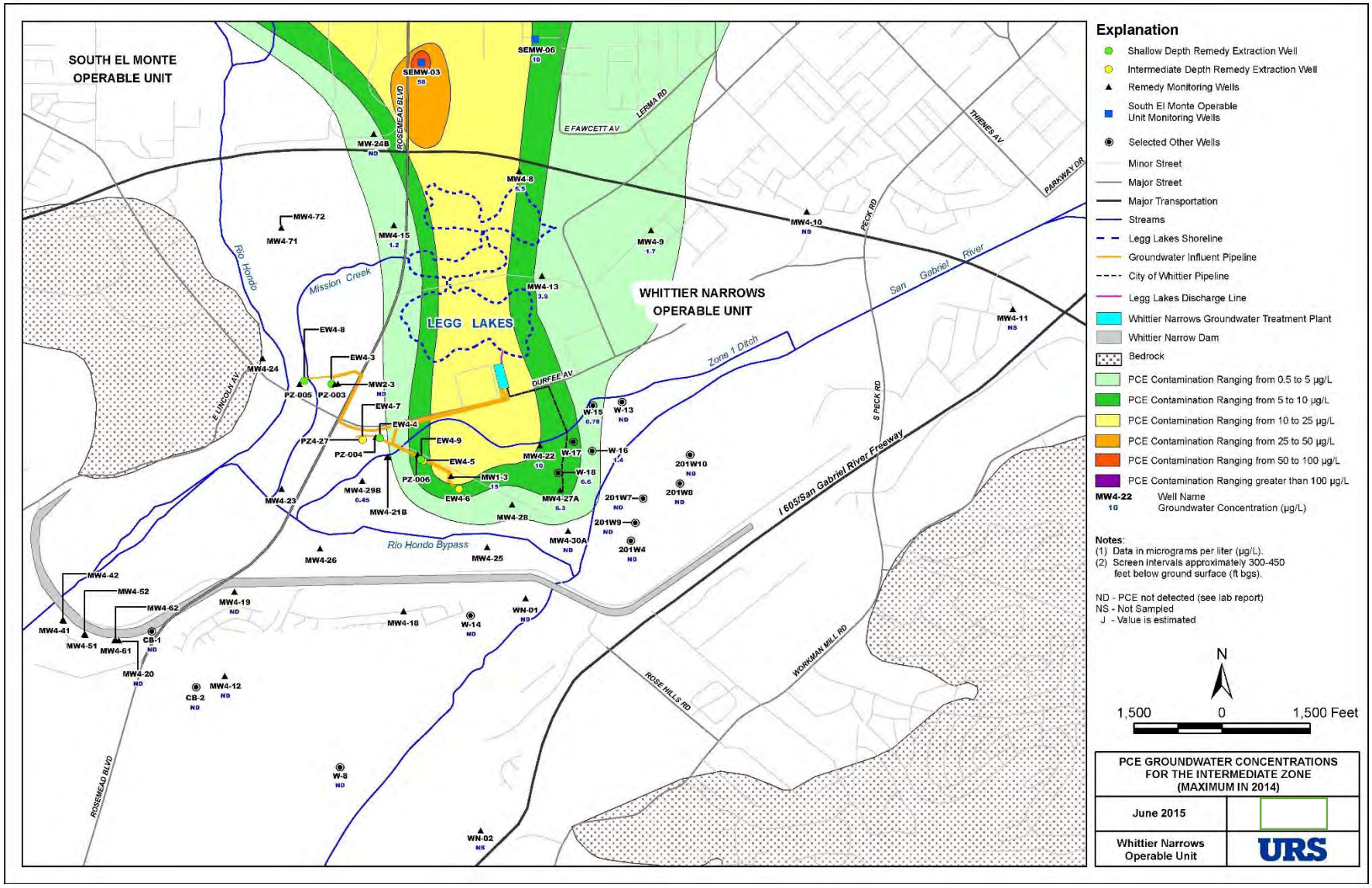


Figure 8. PCE Groundwater Concentrations for the Intermediate Zone using 2014 data. From URS, Performance Evaluation Report, 2015.

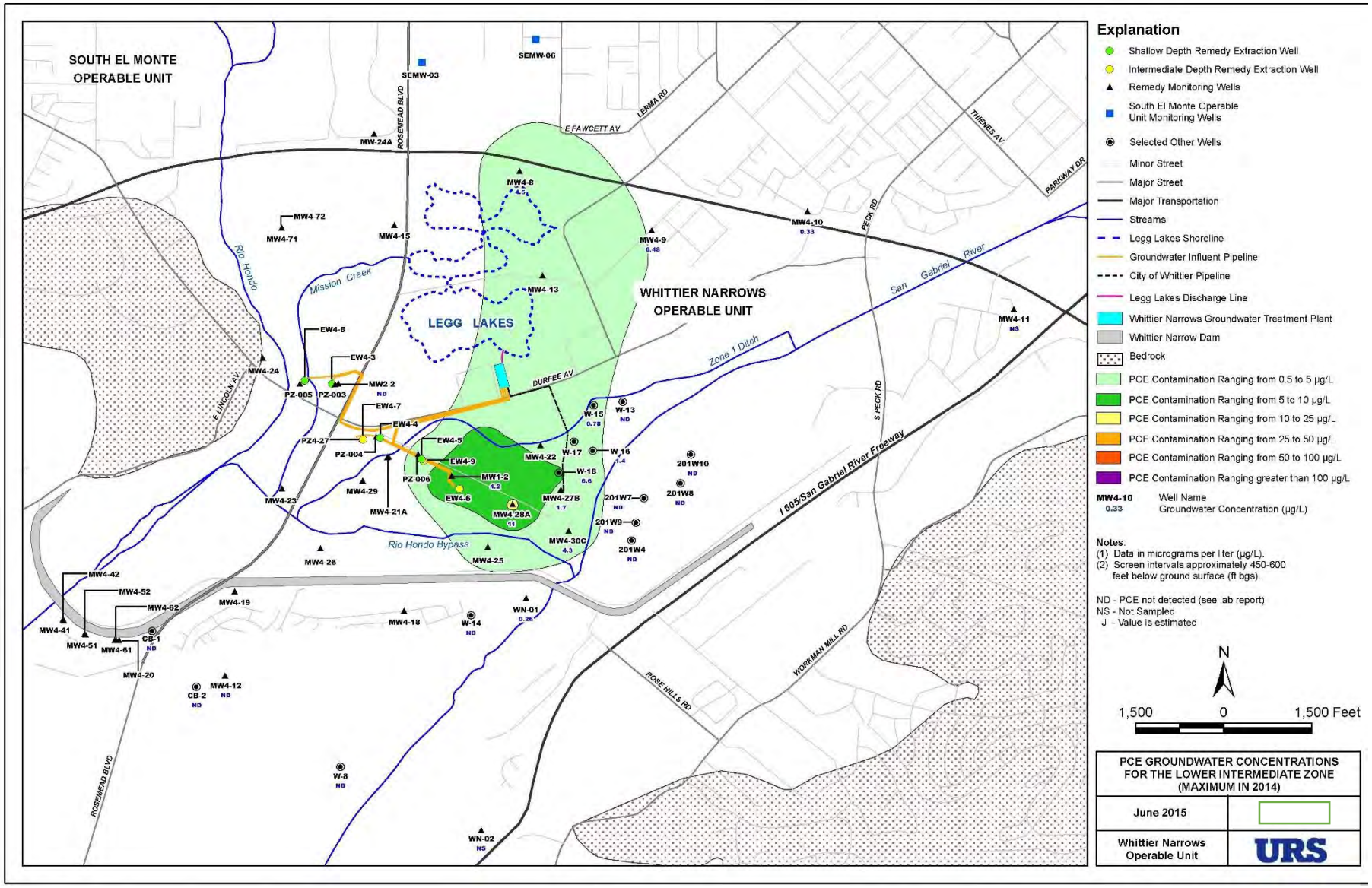


Figure 9. PCE Groundwater Concentrations for the Lower Intermediate Zone using 2014 data. From URS, Performance Evaluation Report, 2015.

South El Monte OU

For the South El Monte OU (SEMOU), data from semiannual compliance monitoring reports from 2012 through 2014 as prepared by ITSE Gilbane (2012, 2013), Gilbane (2015, 2016), and preliminary 2015 sampling results provided to USACE by USEPA. This data review also evaluated performance of the extraction wells (WQA, 2014, WQA, 2015).

Background

The interim ROD presented EPA's Remedial Objectives (RAOs) as:

- Prevent exposure of the public to contaminated groundwater
- Contain further migration of contaminated groundwater from more highly contaminated portions of the aquifer to 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 groundwater.

Containment of contaminated groundwater is focused on two areas in the intermediate groundwater zone:

- The Central Containment Area of groundwater contamination is located in the vicinity of Monterey Park production wells (CMP) MP-12 and MP-15 and the San Gabriel Valley Water Company (SGVWC) Plant 8 wells 8A through 8F(well locations are shown in Figure 1).

- The Western Containment Area is the intermediate zone groundwater contamination downgradient (west) of MP Well No. 12 in the vicinity of the Golden State Water Company wells San Gabriel (SGVWC) SG 1 and 2, Garvey 1 and 2, and Earle 1 and additional MP Wells 1, 3, 5, 6, 10 and Fern (see Figure 1).

The remedial action must create inward hydraulic gradients at each of the containment areas to prevent migration of intermediate zone groundwater contamination above chemical-specific ARARs beyond the Central Containment Area and beyond the Western Containment Area. These hydraulic gradients must be sufficient to demonstrate that contaminated groundwater is captured by the extraction wells under all flow conditions (e.g. during both wet and dry periods in the hydrologic cycle.) Compliance with the performance criteria is confirmed by quarterly sampling and water level monitoring at compliance wells. VOC-contaminated groundwater in the shallow and intermediate aquifers of the South El Monte OU that migrate to the south towards Whittier Narrows are addressed in a separate cleanup plan identified in the Whittier Narrows OU Interim Record of Decision Amendment.

The monitoring program, described in the First *Five Year Review (2013),* includes seven multi-port wells (SEMW01 through SEMW05, SEMW07 and SEMW08), each with three discrete-depth sample intervals representing various intermediate zone intervals; multi-port well SEMW06 with two intermediate zone sample intervals; multi-port EPAW414, with four intermediate zone sample intervals; conventional well SEMW09 (which is not a multi-port well and has one interval); and the following conventional compliance monitoring wells or well pairs.

- SEMW09
- SEMW10
- SEMW11
- SEMW12
- SEMW13A/13B
- SEMW14
- SEMW15A/15B
- SEMW16A/16B
- SEMW17A/17B
- SEMW18A/18B/18C
- SEMW19A/19B
- SEMW20A/20B
- SEMW21A/21B/21C
- SEMW22A/22B
- SEMW23A/23B
- SEMW24A/24B
- SEMW26
- SEMW27
- SEMW28

The wells on this list were installed between 2011 and 2014, except for well SEMW09 which was installed earlier. Locations of the monitoring wells that are included in the compliance monitoring program are shown on Figure 1.

Aquifers

The aquifer in much of the South El Monte OU has been divided into: a shallow zone (representing approximately the upper 50 to 100 feet of the aquifer); overlying an aquitards of finer-grained sediments of varying thickness; and an intermediate zone that is found beneath the separating sequence and extends to a depth of approximately 400 feet (EPA, 2000). The aquifer in the South El Monte OU extends much deeper than 400 feet (perhaps to as deep as 4,000 feet), however significant contamination is not expected at depths of greater than 400 feet. The unconsolidated deposits in the South El Monte OU are of fluvial origin and consist of interbedded sediments comprised of gravel, sand, silt, and clay and mixtures of these materials.

Depth-to-water in the western half of the South El Monte OU ranges from approximately 40 feet bgs in the northern portion of the OU to less than 25 feet bgs along the southern boundary of the OU (EPA, 2000).

The sedimentary deposits in the South El Monte OU vary from clay to gravel over short distances, thus estimates of hydraulic conductivity in the area can vary considerably. On average, the hydraulic conductivity of the shallow zone is expected to be in the 200 to 300 feet/day range and the intermediate zone in the 50 to 100 feet/day range (EPA, 2000).

Groundwater Flow Directions

Groundwater flow conditions in the intermediate aquifer are westerly in the central and western areas of the SEMOU, and south to southwest in the southern portion of the SEMOU, except where gradients are inward toward extraction wells (see Figures 2 and 3). The operation of these extraction wells also creates a flow divide in the southern portion of the SEMOU, south of which the flow is south to southwest into the WNOU. There appears to be a presence of a strong northwesterly flow direction downgradient and northwest of the Western Containment Area. The northwesterly flow direction is created by pumping in the area of the city of Alhambra.

Based on groundwater elevation data presented in the 2014 compliance report (Gilbane, 2016), downward vertical flow gradients were observed in all wells within the shallow aquifer, between the shallow aquifer and the upper intermediate aquifer, and a significant downward gradient was measured between the shallow and upper intermediate aquifers at SEMW05. The lithologic and geophysical data indicate that the intermediate aquifer is composed largely of coarse-grained sediments (interpreted as having moderate

to high permeability). Therefore, contamination present in the upper intermediate aquifer could be induced to flow downward due to the vertical gradients caused by groundwater extraction from deeper portions of the aquifer.

Groundwater Contamination Distribution in the Shallow Aquifer

While the majority of contaminant mass in the SEMOU is within the intermediate aquifer, PCE levels significantly above MCL are detected in some portions of the shallow aquifer. Groundwater flow conditions in the shallow aquifer of the SEMOU are toward the WNOU, and it is possible that transport of remaining contamination toward and into the WNOU will occur. Data presented in the 2005 SEMOU ESD shows that at that time a continuous shallow aquifer plume stretched from the SEMOU into the WNOU. More recent monitoring performed under the Supplemental RI/FS has shown decreasing concentrations and reduced lateral extent of the shallow aquifer plume. Contamination is currently not detected above MCLs in the shallow aquifer in the WNOU, and as a result operation of the WNOU shallow extraction and treatment system has been terminated. However, shallow zone contamination exceeding MCL is detected in the SEMOU adjacent to the OU boundary, at MW-24A, and it is likely that some SEMOU contamination above MCL crosses into the northern edge of the WNOU in an area not covered by WNOU monitoring wells. The extent of this contaminated area is likely quite small, and nearby downgradient WNOU monitoring wells showed PCE levels below 2 µg/L in 2014. 1,4-dioxane levels exceeding the current notification level of 1 µg/L are also reported in the SEMOU shallow zone near the boundary with the WNOU. WNOU shallow zone 1,4-dioxane levels range from non-detect to just below the notification level.

The remedy for the SEMOU does not address shallow zone contamination, and with the cessation of WNOU groundwater extraction there is no barrier to the migration of SEMOU shallow zone contamination into WNOU. This is not interpreted to represent a significant failure of containment at this time; the area of WNOU interpreted to be affected by PCE levels above MCL is quite small, and there is not currently any evidence that it is expanding. So long as increasing contaminant levels are not observed in WNOU monitoring wells, particularly MW4-8, MW4-15, and MW4-72, the plume is interpreted to be stable and adequately contained. Contamination that migrates vertically into the intermediate zone is addressed by the SEMOU and WNOU interim remedies. The Supplemental RI/FS will evaluate additional potential remedial methods/removal actions that may accelerate contaminant cleanup in the shallow aquifer.

Groundwater Contamination Distribution in the Intermediate Aquifer

Historical sampling results have shown that the most widely distributed chlorinated VOCs in the shallow and intermediate aquifers are PCE and TCE. Other constituents, such as 1,1-dichloroethane; 1,1-dichloroethene; and cis-1,2-DCE are not distributed as widely as PCE and TCE. Since completion of the intermediate Record of Decision, one other VOC—1,2,3-TCP—has been detected in the groundwater at some locations at concentrations slightly above the notification level of 0.005 microgram per liter (µg/L).

The emergent contaminant (EC) NDMA also has been detected in groundwater in the SEMOU. This compound has been detected sporadically at concentrations above and below the notification level of 0.01 µg/L. Other ECs detected include perchlorate; 1,4-dioxane; and hexavalent chromium. Perchlorate has been detected slightly above and below the MCL (6 µg/L) over the past five years. A MCL of 10 µg/L

was established in 2014 for hexavalent chromium, which should continue to be monitored in future groundwater sampling events.

In the upper intermediate aquifer, the lateral extent of the VOC plume, as represented by PCE concentrations greater than MCL (5 µg/L), is contained within the central containment area and the western containment area by the extraction systems. However, there is some uncertainty associated with the lateral extent of VOCs in the northwestern area of the plume (see Figure 4). SEMW23A is the well located furthest to the northwest which has been closely below MCL in 2014 and 2015 (3.8 µg/L to 4.9 µg/L). SEMW17A is inbound of SEMW23A and located just within the site boundary. SEMW17A has been closely above and below MCL in 2014 and 2015 (5.4 µg/L to 4.1 µg/L). PCE has been reported at concentrations above and below the MCL in SEMW23A, SEMW17A, and SEMW08_04 during several events over the last 5 years of monitoring. As reported in the 2014 Compliance Monitoring Report (Gilbane, 2016), the statistical analysis for these three wells indicates concentration trends are not evident at SEMW23A, are decreasing at SEMW17A, and stable at SEMW08_04. The decreasing trend is likely the result of the operation of the extraction wells changing groundwater flow from cross-gradient areas toward the extraction wells. Therefore, the change in flow direction combined with the decreasing VOC trend may suggest concentrations of VOCs are low to the north of these wells.

In the upper intermediate aquifer, lateral extent of the VOC plume above MCL, is noticeably smaller than the lateral extent of PCE in the upper intermediate aquifer.

High concentrations of PCE (greater than 100 µg/L) are present in the upper and middle intermediate aquifers in the central area of the SEMOU east of the Rio Hondo River (Figures 3 and 4). This contamination is being contained by the central extraction system based on the following evidence:

- as noted by the high concentrations in MP12, MP15, and the Plant 8 extraction wells.
- The COCs above MCLs in the upper, middle, and lower zones of the intermediate aquifer are within the interpreted capture zone and appear to be contained by the extraction system.
- capture zone analysis demonstrate that the remedy wells can meet the objective of the interim remedy by containing the intermediate zone contamination within the Central and Western Containment Areas (CH2MHill, 2015).
- Trend analysis indicating decreasing or stable trends along the periphery of the intermediate zone plumes.

The contaminant distribution described above for the upper and middle intermediate aquifer is generally consistent with results presented in the 2012 and 2013 Compliance Monitoring Reports (ITSI Gilbane Company, 2013 and Gilbane, 2014, respectively).

The vertical extent of the VOC plume is generally defined by PCE concentrations below the MCL in the lower intermediate aquifer in the Western Containment Area at SEMW08_01, SEMW13B, SEMW07_01, and SEMW12 (Figure 6). Note that concentrations of PCE at SEMW07_01 were slightly above the MCL during both 2014 sampling events. The statistical analysis indicates a decreasing concentration trend at this well (Gilbane, 2016).

The lateral and vertical extent of ECs with concentrations less than MCLs and drinking water notification levels, is considered adequately characterized. Perchlorate; 1,4-dioxane; NDMA; and hexavalent chromium were below the MCLs or notification levels in 2014 at all monitoring locations, with the

exception of 1,4-dioxane concentrations in wells SEMW02_02 (2.3 µg/L), SEMW03_03 (1.6 µg/L), and SEMW24A (1.4 µg/L).

In addition, the July 2015 Annual Performance Report (SGBWQA, 2015) shows that City of Monterey wells 12 and 15 have 1,4-dioxane concentrations that exceed the notification level of 1 µg/L.

Extraction System

The IROD specified groundwater extraction for hydraulic containment and treatment, and provided target flow rates for the water purveyors' wells, referred to as remedy wells. Average target flow rates, totaled for each group, are presented in Table 1, for the annual period of 3rd quarter 2014 to 2nd quarter 2015 (WQA, 2015). For this annual period, the combined remedy wells treated 10,613.24 AF of contaminated water and removed 1,622.32 pounds of contaminants from the aquifer.

The SGVWC Plant No. 8 and the GSWC remedy wells exceeded the annual combined target extraction rates. The City of Monterey Park (CMP) well No. 5 also exceeded the annual combined target extraction rates. The CMP wells 12 and 15 did not achieve the target extraction rates. Well 15 was down for two months for redevelopment and maintenance. Of the 15 production wells that are not considered remedy wells, the following wells were pumping: CMP wells No. 1, 9, 10, Fern; SGVWC wells G4, 8E, and 8F.

Table 2. Summary of Remedy Well Performance for 3rd Quarter 2014 to 2nd Quarter 2015

Extraction Well	Targeted Minimum Flow Requirements (gpm)	Production Rate (gpm) 3Qtr2014 to 2Qtr2015	Contaminant Mass Removal (lbs)
CMP			
Well 5	517	2907	104
Well 12	8000	6788	372
Well 15	7657	4630	454
SGVWC			
Well 8B	0	17	3
Well 8C	3348	2676	263
Well 8D	796	4285	395
Plant subtotal	4144	6978	
GSWC			
Well SG1	2051	3772	31
Well SG2	1436	1216	2
Plant subtotal	3487	4988	

Recommendations were made in a capture zone analysis by CH2MHill (2015). In the Central Containment Area, Plant 8 wells pumping rates should be increased to 1,300 gpm to provide the required hydraulic control in the northern part of this containment area. The recommended pumping is different than the target pumping rates reported by WQA (2015). The capture zone analysis memorandum recommended that pumping rates in the Western Containment Area remain unchanged.

Compliance with IROD Performance Criteria/Capture Zone Analysis Conclusions

The extent of contamination in the intermediate aquifer is defined laterally and vertically. The only uncertainty is in the northwestern portion of the SEMOU, where concentrations fluctuate from levels slightly above to below the MCLs. The contamination in this area is limited to the upper intermediate aquifer, and gradients are inward toward the extraction system in the upper and middle intermediate aquifers.

The groundwater extraction systems are in general compliance with the IROD. The capture zone analysis, using a recently updated (Gilbane, 2016) SEMOU groundwater model, indicates that the extraction systems are achieving approximately complete capture of the VOC plume. As of June 30, 2015, the intermediate zones' remedy projects have treated approximately 131,395.29 acre-feet of contaminated groundwater and have removed approximately 16,697.1 lbs. of VOCs and perchlorate.

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WQA, 2014. San Gabriel Basin Water Quality Authority. *Revised Annual Performance Report (July 1, 2013 thru June 30, 2014), South El Monte Operable Unit.* July 25, 2014.

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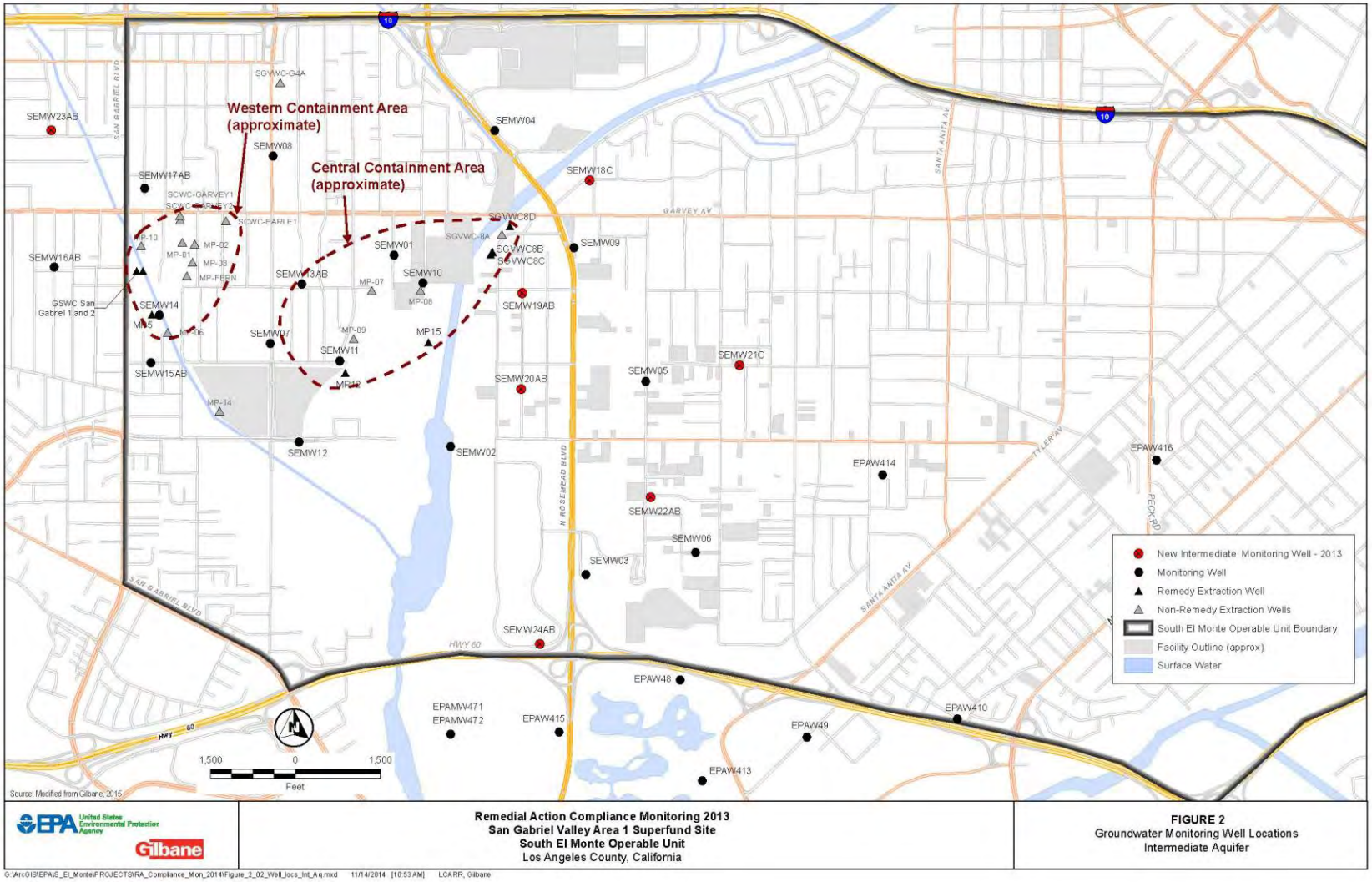

Figure 10. South El Monte OU Monitoring and Extraction Well Locations. Source: Remedial Action 2013 Compliance Monitoring Report, prepared by Gilbane and CDM for EPA, February 2015.

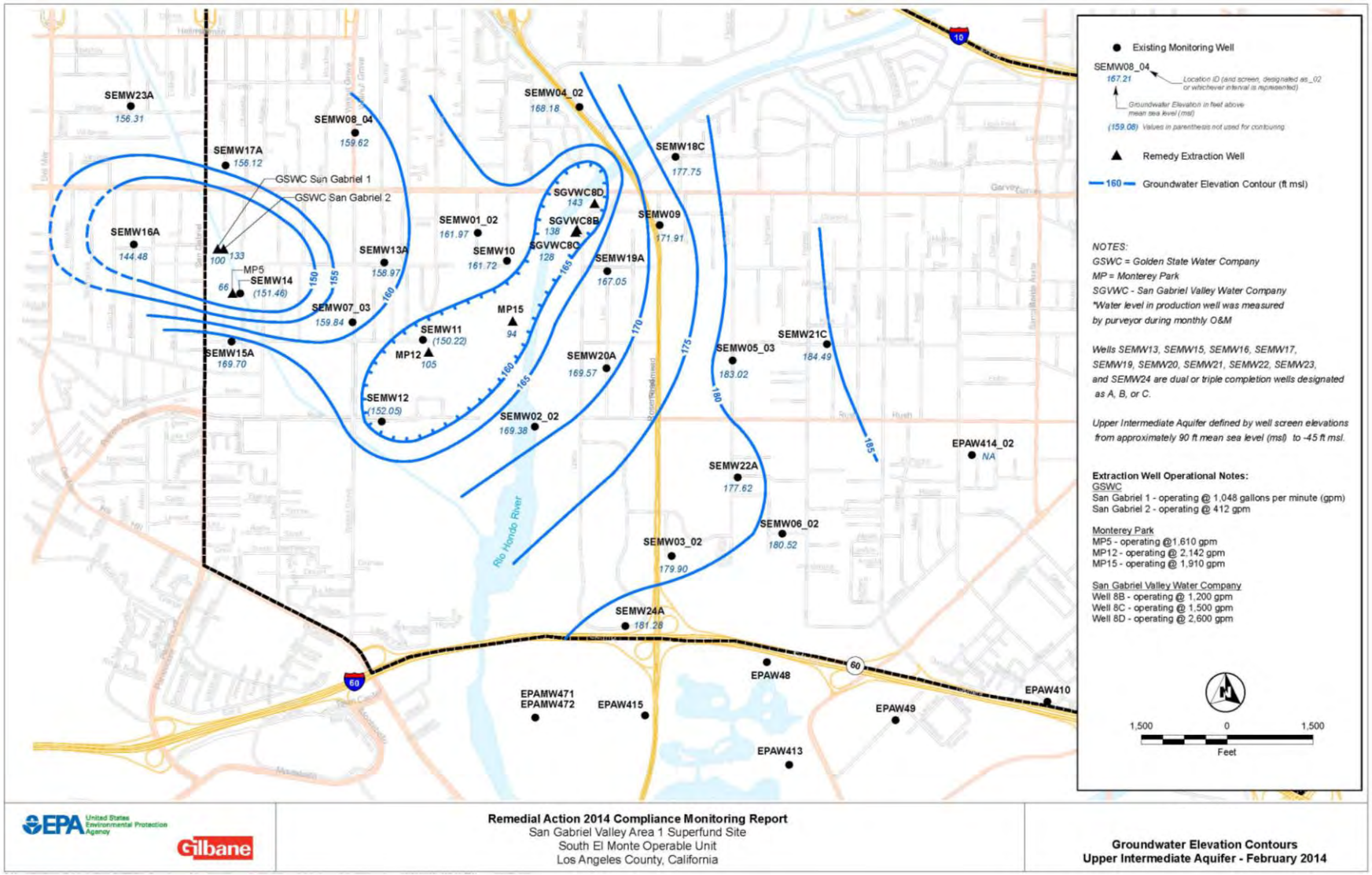

Figure 11. Groundwater Elevation Contours, Upper Intermediate Aquifer (February 2014). From Gilbane, 2016

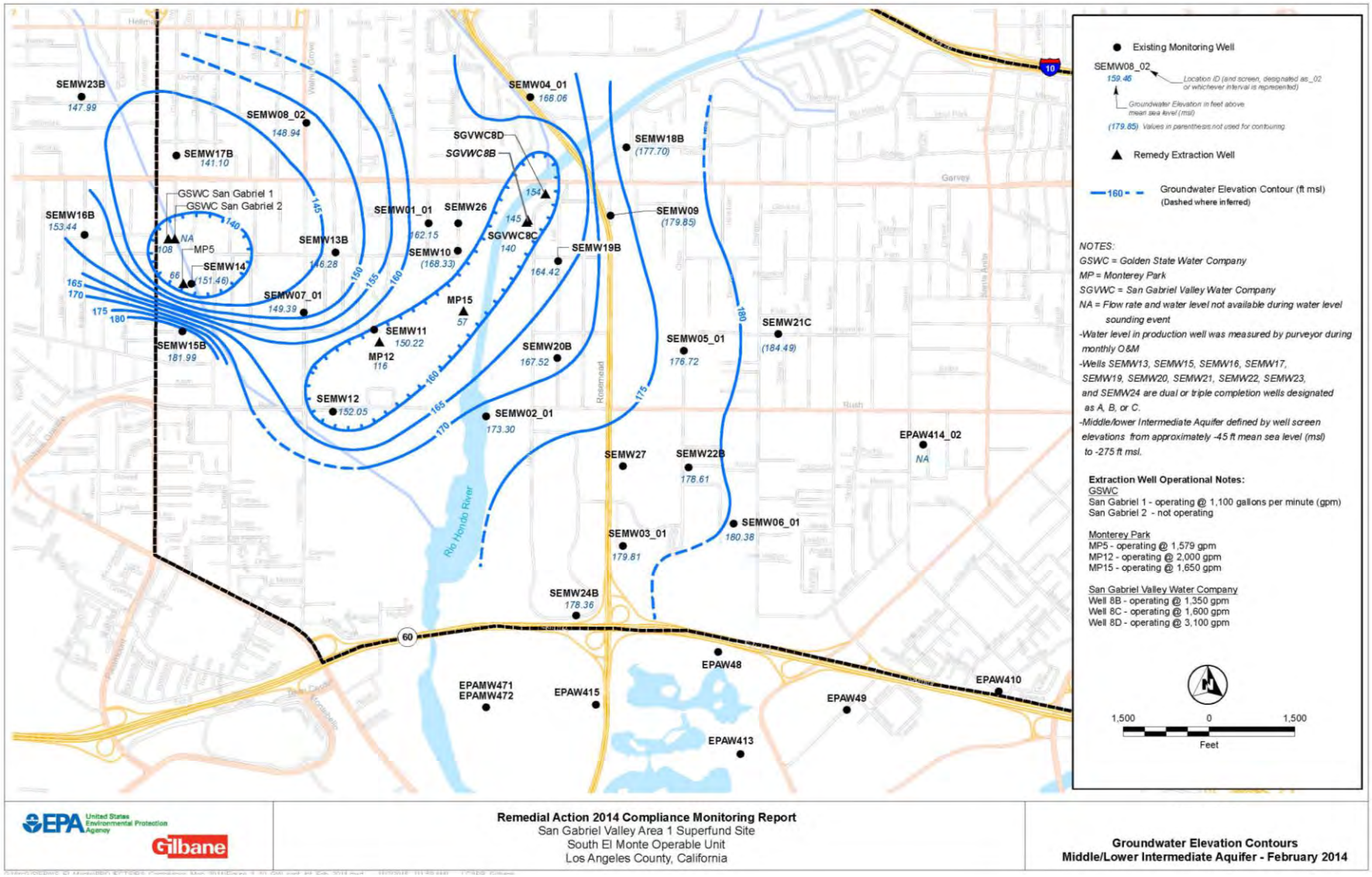

Figure 12. Groundwater Elevation Contours, Middle/Lower Intermediate Aquifer (February 2014). From Gilbane, 2016

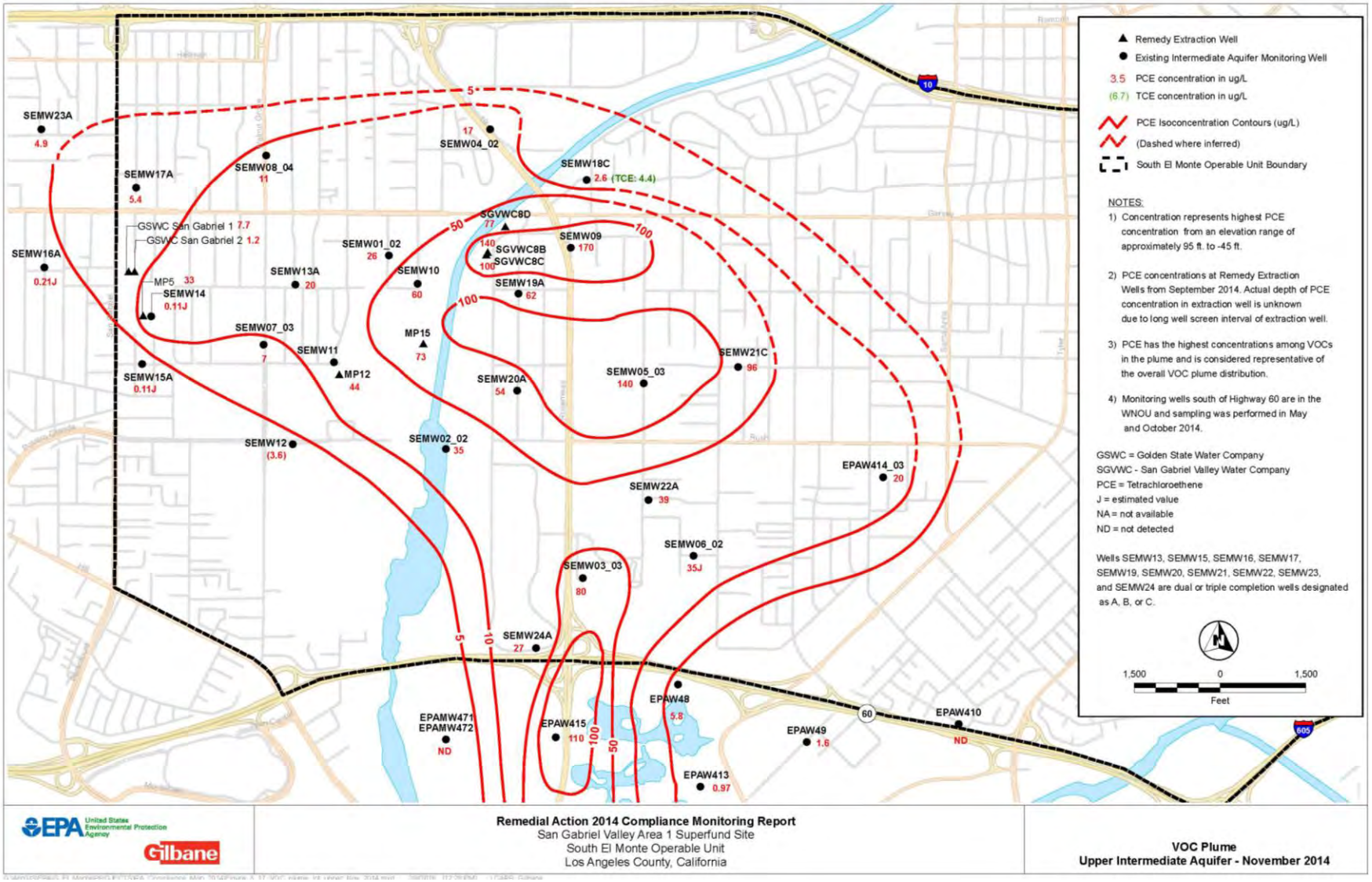

Figure 13. VOC Plume, Upper Intermediate Aquifer (November 2014). From Gilbane, 2016

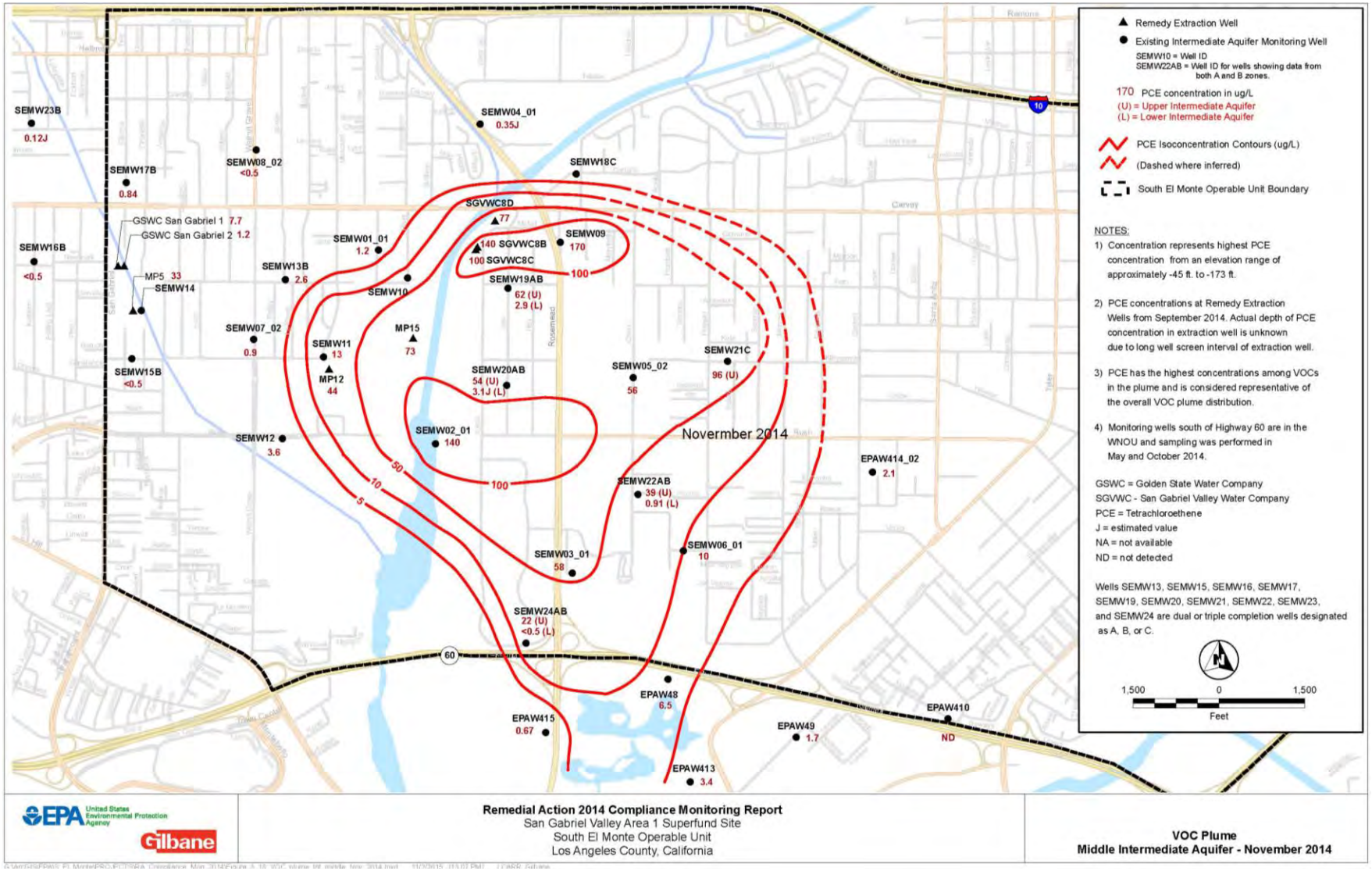

Figure 14. VOC Plume, Middle Intermediate Aquifer (November 2014). From Gilbane, 2016

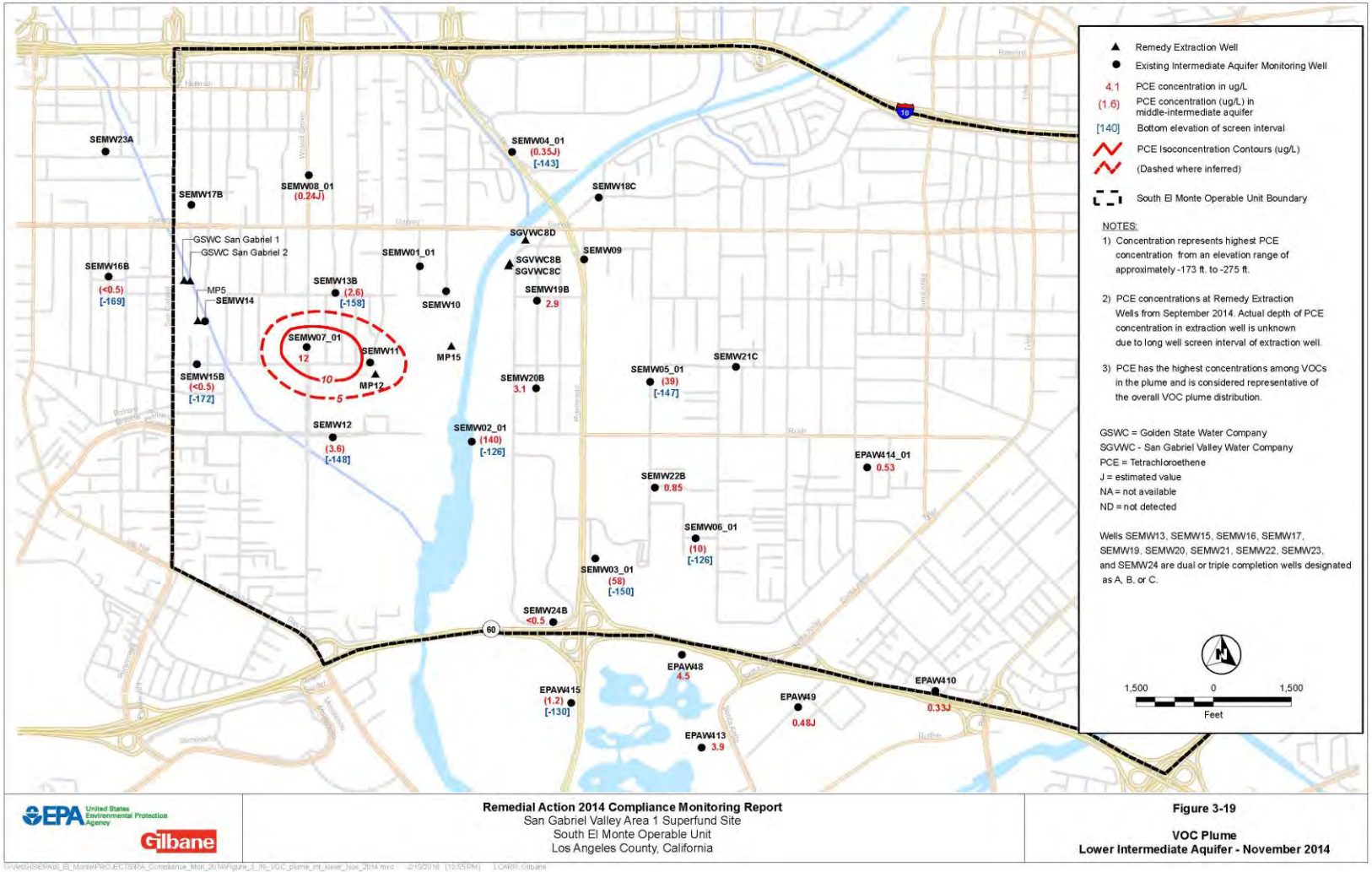

Figure 15. VOC Plume, Lower Intermediate Aquifer (November 2014). From Gilbane, 2016

Richwood OU

In December 1999, California Department of Toxic Substance Control (DTCS) entered into an agreement with SGVWC in which SGVWC would provide water to approximately 200 residences served by RMWC. The former RMWC customers are primarily supplied water from SGVWC Plants 1 and 2. RMWC continues to supply water to its customers.

Data for the Richwood OU after the acquisition of Richwood Mutual Water Company (RMWC) by San Gabriel Valley Water Company (SGVWC) are limited. The Main San Gabriel Basin Watermaster's *Draft Five-Year Water Quality and Supply Plan* (Watermaster, 2015) includes pumping and water quality data for the Hemlock Mutual Water Company (HMWC), and Rurban Homes Mutual Water Company (RHMWC) production wells for the 2014-2015 water year. These wells are sampled annually and no contaminants have been detected in recent years.

Suburban OU

In September 1988, EPA selected a remedy for the Suburban OU that was intended to partially control the movement and spread of contaminants in the Whittier Narrows area of the San Gabriel Valley and to address the potential public health threat posed by contaminants in the Suburban Water Systems (SWS) Bartolo Well Field. The Suburban OU, also referred to as SWS Bartolo Well Field, consisted of four water supply wells (201W-2, 201W-4, 201W-5, and 201W-6). In 1993, EPA amended the remedy by changing the treatment level from 1 µg/L to the newly established primary drinking water maximum contaminant level (MCL) of 5 µg/L for PCE, and delaying construction of a treatment system because contaminant concentrations remained below MCLs. PCE concentrations in the Bartolo Well Field have continued to be well below the MCL since that time so a treatment system was never constructed.

The most recent groundwater quality sampling results, as available, for the active wells in the SWS Bartolo Well Field is presented in the Main San Gabriel Basin Watermaster's *Draft Five-Year Water Quality and Supply Plan* the (Watermaster 2015) and indicated these four water supply wells had no detections for COCs.

Based on these recent data for the SWS Bartolo Well Field production wells, the water quality in the Suburban OU continues to meet drinking water standards.

Appendix C: ARAR Assessment

Section 121(d)(1)(A) of CERCLA requires that remedial actions at CERCLA sites attain (or justify the waiver of) any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal requirements and that are identified by the state in a timely manner. ARARs are identified on a site-specific basis from information about the chemicals at the site, the RAs contemplated, the physical characteristics of the site, and other appropriate factors. ARARs include only substantive, not administrative, requirements and pertain only to onsite activities. There are three general categories of ARARs: chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs identified in the selected remedy within the RODs and subsequent ROD Amendments for the groundwater at this Site and considered for this FYR for continued groundwater treatment, are shown in Table C.1. Contaminants with ROD standards that exceed their current Maximum Contaminant Level (MCL) are highlighted in light green below.

Table C.1. Summary of Groundwater ARAR Changes

Contaminants of Concern	ROD Standard (µg/L)[1]	Current State MCL (µg/L)	Current Federal MCL (µg/L)	Is the cleanup goal above the current MCL?
Organic Constituents				
1,1,1-trichloroethane	200	200	200	No
1,1-dichloroethane	5	5	5	No
1,1-dichloroethylene	6	6	7	No
1,2-dichlorobenzene	600	600	600	No
1,2-dichloroethane	0.5	0.5	5	No
1,2-dichlorethylene, cis-	6	6	70	No
1,2-dichloroethylene	6	-	-	
1,2-dichloropropane	5	5	5	No
1,4-dioxane	3	[2]-	-	No
Benzene	1	1	5	No
Carbon tetrachloride	0.5	0.5	5	No
Chlorobenzene	70	70	100	No
Chloroform[3]	100	80	80	Yes
Ethylbenzene	700	300	700	Yes
Methylene chloride	5	-	-	No
NDMA	0.1	-	-	No
Perchlorate	4 (EMOU) 6 (SEMOU)	-	-	No
Styrene	100	100	100	No
Tetrachloroethylene	5	5	5	No
Toluene	150	150	1,000	No
Trichloroethylene	5	5	5	No
Trichlorofluoromethane	150	150	-	No
Vinyl chloride	0.5	0.5	2	No
Xylenes	1,750	1,750	10,000	No
Inorganic Constituents				
Hexavalent chromium[4]	11	10	10	Yes

Notes: [1]ROD standards apply to the groundwater after it is pumped above ground and treated. They are not in-situ cleanup levels.

[2]1,4-dioxane ROD standard was based on the public notification level, which is not an ARAR, at the time of the ROD. This value was updated in November 2010. See discussion in Table C-2.
[3]Total trihalomethanes MCL used.
[4] The EMOU ESD identifies the treatment standard for hexavalent chromium as the California Toxics Rule 4-day average. The current federal MCL for chromium is presented as total chromium. The current state MCL was promulgated in July 2014.

Three compounds now have ROD standards that are above their respective current MCL. One standard changed because the federal and state MCLs for that compound was eliminated in favor of a combined MCL. Specifically, the federal and state MCL for chloroform was removed and is now regulated as part of "total trihalomethanes (THM)." Chloroform is a COC for the Whittier Narrows OU and has been not been detected above the new THM MCL over the past five years. Ethylbenzene is a COC for the Whittier Narrows OU and has not been detected above the current MCL.

Hexavalent chromium is a COC for the El Monte OU. Concentrations of hexavalent chromium are within the performance criterion of 10 times the ROD standard in the shallow aquifer; therefore the shallow zone treatment systems for the El Monte OU do not treat for hexavalent chromium. Concentrations of hexavalent chromium were observed in 2014 samples from deep zone extraction wells DEW-2 (9.4 μg/L) and DEW-3 (10 μg/L) on the east side of the OU. These concentrations are either below or at the current MCL but are less than the ROD standard. Based on review of data, hexavalent chromium has been increasing in these two wells. The PRP consultant recommended an alternative sampling mechanism and O&M procedures to avoid introduction of elevated hexavalent chromium in the deep aquifer which is used as drinking water supply. Because the deep zone treatment plant is not yet operational (as of the preparation of this FYR), there is currently no exposure to concentrations of hexavalent chromium. Continued monitoring of this compound should occur. If concentrations continue to increase in these wells, additional treatment is recommended prior to use as drinking water supply.

Federal and State laws and regulations other than the chemical-specific ARARs (i.e. location- and action-specific ARARs) that have been promulgated or changed over the past five years are described in table A-2. The table does not include those ARARs identified from the decision documents that are no longer pertinent, now that the response action has transitioned from construction to long-term O&M phase work. For example, ARARs related to remedial design and construction are not included in the table if they do not continue into long-term O&M. There have been no revisions to laws or regulations that affect the protectiveness of the remedy. There have been no new laws that have been promulgated that affect the protectiveness of the remedy.

The following ARARs have not changed since the last Five Year Review; and therefore, do not affect protectiveness:

Resource Conservation and Recovery Act (Parts 262-261, 264-265, 268)
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA Section 140(b))
National Pollution Discharge Elimination System (40 CRF Parts 122, 123, 124, 131 and California Code Section 13263)
Federal Clean Water Act (40 CFR 403, Section 141 Subparts B and G)
Federal Clean Air Act (42 USC Section 7401 et seq.)

Endangered Species Act (15 USC Sections 1531 through 1544, 40 CFR Section 6.302(h) and 50 CFR parts 17, 222, 402)

Preservation of Historic and Archeological Resources (16 USC Sections 461 through 467, 469 and 40 CFR Parts 6.301 (a) and (c))

South Coast Air Quality Management District (Rules 401 through 403)

Effluent Discharge Limits for Centralized Hazardous Waste Treatment Facilities, Sanitation Districts of Los Angeles County

California Solid Waste Management and Resource Recovery Act of 1972 (Section 17794, 17783-17783.15)

California Hazardous Waste Act (California Code of Regulations (CCR) Title 22, Division 4.5)

Title 23, California Code of Regulations (Chapter 3, Subchapter 15 –Section 2546 and 2547)

Title 27, California Code of Regulations (Sections 20405, 20415-20430, 21190, 20921, 20923, 20925, 20932, 20927, 20415, 21180)

California Fish and Wildlife Code (Sections 2080, 5650(a), (b), and (f), 12015, 12016)

Porter-Cologne Water Quality Control Act, California Water Code (Sections 13240, 13241, 13242, 13243: State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Water Quality in California";

Table C-2. Applicable or Relevant and Appropriate Requirements Evaluation

Original ARAR	Document	Original ARAR requirement	Revised requirement	Revision Date (between Sept. 2010-present)	Effect on Protectiveness
California Domestic Water Quality Monitoring (22 CCR 64401) California Notification Levels (California Health and Safety Code Section 116455)	EMOU 2002 ESD SEMOU 2005 ESD WNOU 1999 ROD Amendment	Safe levels for some chemicals lack MCLs are specified by notification levels. EMOU and SEMOU ESDs present this as an ARAR. The WNOU presented this as a TBC.	The notification level for 1,4-dioxane was lowered from 3 µg/L to 1 µg/L.	November 2010	The lower 1,4-dioxane notification level could effectiveness of treatment at the OUs where 1,4 For the SEMOU, the 2015 performance report 1 µg/L in the City of Monterey Park wells 12 a since been taken off-line. Note, there is no treat of the remedy at SEMOU. However, it is being whether additional actions are needed in the fut For the EMOU, the Westside treatment plants dioxane. The well for which 1,4-dioxane treatm run dry. For WNOU, 1,4-dioxane was detected in monit MW4-10-4 at concentrations of 1 µg/L and 1.1
Porter-Cologne Water Quality Act (Water Quality Control Plan (Basin Plan) for the Los Angeles Region	EMOU 1999 Interim ROD SEMOU 2000 Interim ROD WNOU 1999 ROD Amendment	Requires that high-quality surface water and groundwater be maintained to the maximum extent possible	The Basin Plan was revised to include TMDL requirements; other administrative changes.	September 2011 (TMDL) January 2016 (administrative changes)	The TMDL requirements could potentially affe requirements into Legg Lakes for the WNOU. specific to Legg Lakes in the Basin Plan relate from the treatment plant. Therefore, the TMDL not affect protectiveness. The administrative changes do not affect protec
South Coast Air Quality Management District Rules 1301 through 1313 and 1401	EMOU 1999 Interim ROD WNOU 1999 ROD Amendment	Provides new source (air contaminant units) review requirements	Administrative changes were made.	February 2015 June 2015 January 2016	These changes do not affect protectiveness.

WNOU – Whittier Narrows OU, SEMOU – South El Monte OU; EMOU – El Monte OU

ESD – Explanation of Significant Differences; ROD – Record of Decision; TMDL – Total Maximum Daily Load

Appendix D: Human Health and Environment Risk Assessment

The risk assessments for each OU were reviewed to identify any changes in exposure or toxicity that would impact protectiveness.

El Monte OU

A preliminary baseline risk assessment (RA) was completed in 1997. The three primary COCs found in groundwater in the El Monte OU are TCE, PCE, and carbon tetrachloride. The baseline RA evaluated two scenarios in which individuals might be exposed to contaminated groundwater: 1) potential for a current resident to be exposed to contamination in groundwater through domestic use and 2) potential for a future resident to be exposed to contamination in groundwater through domestic use. The RA concluded that risks from contaminated groundwater were high for the current and future residents. The exposure pathways described in the RA remain valid.

Whittier Narrows OU

EPA's initial screening baseline RA was presented in the 1992 Feasibility Study. In 1997, EPA completed a screening RA addendum to update the 1992 RA. An additional supplemental RA was presented in 1998. Exposure pathways at the Whittier Narrows OU presented in the 1997 RA addendum and the 1998 supplemental RA were related to domestic use of groundwater including ingestion, inhalation of volatiles from water used for bathing, cooking and laundering, and dermal exposure. The 1997 RA addendum and 1998 supplemental RA identified the following VOCs exceed risk-based levels: chloroform, 1,1,-dichloroethylene (DCE), DCA, 1,4-dioxane, PCE, and TCE. Extracted water is treated to drinking water standards [Maximum Contaminant Levels (MCLs)]. Exposure pathways described in the RAs are still valid. There are currently no domestic uses for treated water. Treated water is discharged to Legge Lakes, a local recreational area.

Richwood OU

A preliminary risk assessment (RA) was not performed for the Richwood OU. The 1987 ROD Amendment identified tetrachloroethylene (PCE) as the primary contaminant of concern (COC) at the Richwood OU in groundwater used as drinking water. The intent of the remedy was to supply clean water that meets drinking water standards. Treatment at this site was discontinued in 1994 for Richwood Water Company customers and San Gabriel Valley Water Company currently provides water from its distribution system to these customers. Other water purveyors provide water to other area customers and consistently meet drinking water standards.

Suburban OU

Baseline health risks were calculated for the Suburban OU. Risks were evaluated for residents that obtained water from the Bartolo Well Field. Exposure pathways associated with potential residential use of groundwater were primarily domestic uses including: ingestion of groundwater, inhalation of volatile organic compounds (VOCs) while engaged in domestic activities (e.g. showering, dish washing, doing laundry.) Contaminants used in this assessment were trichloroethylene (TCE), PCE, 1,2-dichloroethane (DCA), methylene chloride, and 1,1,2,2-tetrachlorethane. The calculated risks were within the EPA

acceptable risk range and below the non-cancer hazard index. The remedy was never implemented at this site because site contaminant levels were not high enough to trigger action.

South El Monte OU

The 1997 preliminary baseline RA results were presented in the ROD. The exposure scenarios evaluated in this baseline RA were the potential for current and future residents to be exposed to contamination in groundwater through domestic use. The RA concluded that risks to current residents were within the acceptable risk range and below the hazard index of 1. Risk to future residents exceeded the acceptable risk range and greater than the hazard index of 1 with the following major chemical contributors: 1,2-DCA, 1,2-dichloropropane, PCE, TCE, and vinyl chloride (for cancer risk) and benzene, cis-1,2-DCE, 1,2-DCE, PCE and TCE for non-cancer risk. The exposure pathway remains valid.

A screening level evaluation of volatile emissions to indoor air (vapor intrusion) performed in the 1997 preliminary baseline risk assessment concluded that risks were well below the acceptable risk range. Additional discussion on vapor intrusion at this OU is presented below.

Vapor Intrusion

EPA's understanding of contaminant migration from soil gas and/or groundwater into buildings has evolved over the past few years, leading to the conclusion that vapor intrusion may have a greater potential for posing risk to human health than assumed when the RODs were prepared. EPA evaluates the potential for vapor intrusion using a "multiple lines of evidence" approach consistent with its 2015 vapor intrusion guide, "OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air," OSWER Publication 9200.2-154." Numerical screening levels are derived in the Vapor Intrusion Screening Level (VISL) calculator, http://www2.epa.gov/vaporintrusion.

Suburban OU was not evaluated for vapor intrusion because groundwater contaminant concentrations have remained below ROD standards.

El Monte OU

Vapor intrusion was not considered in the 1997 baseline RA. The OU encompasses both industrial and residential areas. The El Monte OU has a shallow zone of contamination throughout the site, and deep zone contamination in the northwestern and southern areas of the OU. The shallow groundwater zones are most likely to impact indoor air in buildings that overlie the contaminated groundwater. The following paragraphs evaluates the potential for vapor intrusion at the El Monte OU using the most current and available groundwater monitoring data.

PCE and TCE are considered sufficiently volatile and toxic per the definitions in the EPA 2015 vapor intrusion guidance. There no detections of carbon tetrachloride in site groundwater, so this compound is not included in the vapor intrusion evaluation. The highest concentrations in the shallow water zone from the latest monitoring events for both COCs were used to determine whether there is a potential for vapor

intrusion using the VISL calculator for each COC. In addition, the EPA 2015 vapor intrusion guidance provides a recommended distance for an initial vapor intrusion evaluation of 100 feet; vertical and lateral. Tables D-1 and D-2 provide the potential for vapor intrusion risks for the east and west sides of the El Monte OU.

For the eastside of the OU, the highest concentrations of PCE and TCE in groundwater were observed in four wells; BH-27, BH-10, SEPZ-3, and SEPZ-4. These wells are within 100 feet of a building and have a depth to groundwater of less than 100 feet. For residential receptors, the calculated vapor intrusion risks for TCE were greater than the EPA acceptable risk range of 10^{-6} to 10^{-4} and greater than the non-cancer hazard index of 1 for both PCE and TCE. For industrial receptors, the calculated vapor intrusion risks for PCE and TCE were within the EPA acceptable risk range and greater than the non-cancer hazard index for PCE and TCE in two wells (BH-27 and BH-10) and for TCE in the remaining two wells (SEPZ-3 and SEPZ-4).

For the west side of the OU, the highest concentrations of PCE and TCE in groundwater from the March 2015 even, were observed in three wells; ERP-15, ERP-17, and MCMW1. These wells were within 100 feet of a building and have a depth to groundwater of less than 100 feet. For residential receptors, calculated vapor intrusion risks were outside of the EPA acceptable risk range of 10^{-6} and 10^{-4} for TCE in two wells (ERP-15 and MCMW1). The calculated non-cancer hazard is greater than the non-cancer hazard index of 1 for PCE and TCE in ERP-15 and only for TCE in two wells (ERP-17 and MCMW1). For industrial receptors, calculated vapor intrusion risks were within the EPA acceptable risk range for both PCE and TCE in all three wells. The calculated non-cancer hazard is greater than the non-cancer hazard index for TCE in all three wells.

Based on this evaluation, there is a potential for vapor intrusion at the site at a few locations.

Table D-3. Potential Vapor Intrusion Risks for El Monte East Side OU

Chemical Name	Groundwater concentration (µg/L)	VI Carcinogenic Risk (residential)	VI Hazard (residential)	VI Carcinogenic Risk (industrial)	VI Hazard (industrial)	Depth to groundwater (ft BTOC)	Buildings within 100 feet of well? (Y/N)	If yes, what type? (Residential or Industrial
Well BH-27[1]								
PCE	760	5.1×10^{-5}	13	1.2×10^{-5}	3.1	85.15	Y	Industrial
TCE	2,200	3.6×10^{-3}	420	3.4×10^{-4}	100			
Well BH-10[1]								
PCE	430	2.9×10^{-5}	7.5	6.6×10^{-6}	1.8	73.89	Y	Industrial
TCE	280	4.6×10^{-4}	54	3.8×10^{-5}	13			
Well SEPZ-3[2]								
PCE	93	6.2×10^{-6}	1.6	1.4×10^{-6}	0.38	86.10	Y	Residential
TCE	100	1.6×10^{-4}	1.9	1.3×10^{-5}	4.6			
Well SEPZ-4[2]								
PCE	110	7.4×10^{-6}	1.9	1.7×10^{-6}	0.45	92.68	Y	Industrial
TCE	200	3.3×10^{-4}	39	2.7×10^{-5}	9.2			

µg/L – microgram per liter; ft BTOC – feet below top of casing

1 – Wells BH-27 and BH-10 were sampled in June 2014. These were not sampled in December 2014; 2 – Wells SEPZ-3 and Wells SEPZ-4 were sampled in December 2014.

Table D-4. Potential Vapor Intrusion Risks for El Monte West Side OU

Chemical Name	Groundwater concentration (µg/L)	VI Carcinogenic Risk (residential)	VI Hazard (residential)	VI Carcinogenic Risk (industrial)	VI Hazard (industrial)	Depth to groundwater (ft BTOC)	Buildings within 100 feet of well? (Y/N)	If yes, what type? (Residential or Industrial
Well ERP-15								
PCE	94	6.3×10^{-6}	1.6	2.9×10^{-6}	0.78	- [1]	Y	Residential
TCE	110	1.8×10^{-4}	21	1.9×10^{-5}	6.4			
Well ERP-17								
PCE	20	1.3×10^{-6}	0.35	3.1×10^{-7}	0.083	77.36	Y	Industrial/ Residential
TCE	22	3.5×10^{-5}	4.2	$3.0\ 10^{-6}$	1			
MCMW1								
PCE	3.8	2.5×10^{-7}	0.066	5.8×10^{-8}	0.016	94.86	Y	Industrial
TCE	130	2.1×10^{-4}	25	1.8×10^{-5}	6			

µg/L – microgram per liter; ft BTOC – feet below top of casing; Groundwater concentrations and depth to groundwater were from the March 2015 monitoring event.
1 – no depth of groundwater reported. Well ERP-15 is screened between 69-89 ft bgs. As of summer 2016, no water was detected in this well.

Whittier Narrows OU

Vapor intrusion (VI) was not considered in the 1997 RA addendum nor the 1999 supplemental RA for the Whittier Narrows OU. This OU area is predominantly open space with a few administrative or maintenance buildings. The shallow water zone, which would impact indoor air more than the deeper water zones, had a maximum concentration of 0.82 µg/L PCE in 2014. This concentration was input into the VISL calculator to determine whether there was a potential VI risk or hazard under residential and commercial exposure scenarios. The VISL calculated a 5.5×10^{-8} cancer risk and 1.4×10^{-2} non-cancer hazard under a residential scenario and 1.8×10^{-8} cancer risk and 3.4×10^{-3} non-cancer hazard for a commercial scenario. In both cases, the cancer risks and non-cancer hazards were well below the EPA acceptable cancer risk range of 10^{-6} and 10^{-4} and hazard index of 1 indicating that VI is not an issue at this time. Continued monitoring of the shallow zone should occur to verify vapor intrusion risks in the future.

South El Monte OU

EPA is currently conducting a vapor intrusion investigation that includes soil gas and indoor air sampling at selected facilities identified during a screening-level assessment. Data results from this evaluation are discussed in Section 4.2.2 in the main body of the Five-Year Review.

In 2011, EPA conducted an updated assessment for TCE which included a risk of fetal cardiac malformations due to short-term in utero exposures to TCE as a result of inhalation. This IRIS assessment set a reference concentration (RfC) of 2 $\mu g/m^3$. In 2014 EPA Region 9 issued a memorandum regarding *EPA Region 9 Interim Action Levels and Response Recommendations to Address Potential Developmental Hazards Arising from Inhalation Exposures to TCE in Indoor Air from Subsurface Vapor Intrusion* and EPA's Office Of Superfund Remediation and Technology Innovation issued a memorandum to the EPA Regional Superfund offices on *Compilation of Information Relating to Early/Interim Actions at Superfund Sites and the TCE IRIS Assessment.* These changes indicate that the risk from indoor air TCE that is greater than the RSL may be of concern for short term exposure. It is recommended that a vapor intrusion evaluation be performed to verify vapor intrusion at the site.

<u>Toxicity values</u>

EPA's Integrated Risk Information System (IRIS) has a program to update toxicity values used by the Agency in risk assessment when newer scientific information becomes available. In the past five years, there have been a number of changes to the toxicity values for many COCs at the Site.

To evaluate the protectiveness of the ROD standards for this FYR, those standards were compared to EPA's current Regional Screening Levels (RSLs). The RSLs for cancer are chemical-specific concentrations for individual contaminants that correspond to an excess cancer risk level of 1×10^{-6} (or

a Hazard Quotient (HQ) of 1 for non-carcinogens). The RSLs have been developed for a variety of exposures scenarios (e.g., residential, commercial/industrial) and use the most current toxicity values. RSLs are not de facto cleanup standards for a Superfund site, but they do provide a good indication of whether actions may be needed to address potential human health exposures. The EPA risk range is between $1x10^{-6}$ and $1x10^{-4}$. RSL values that fall within this range were determined to be acceptable from a risk stand point. The non-cancer RSLs correspond to a hazard index of 1. Table 1 below presents this comparison.

Table 1. Comparison of Tap Water RSL to ROD Standards

Contaminant of Concern	Tap Water RSL[1] for cancer risk (µg/L)	Protective Cancer Risk Range (µg/L)	Tap Water RSL[1] for non-cancer hazard (µg/L)	ROD Standard[2] (µg/L)	Is the Cleanup Standard still protective?
1,1,1-trichloroethane	-	-	8,000	200	Yes
1,1-dichloroethane	2.8	2.8-280	3,800	5	Yes
1,1-dichloroethylene	-	-	280	6	Yes
1,2-dichloroethane	0.17	0.17-17	13	0.5	Yes
1,2-dichlorethylene, cis-	-	-	36	6	Yes
1,2-dichloroethylene	-	-	-	6	N/A
1,2-dichloropropane	0.44	0.44-44	8.3	5	Yes
1,4-dioxane	0.46	0.46-46	57	3	Yes
Benzene	0.46	0.46-46	33	1	Yes
Carbon tetrachloride	0.46	0.46-46	49	0.5	Yes
Chlorbenzene	--	-	78	70	Yes
Chloroform	0.22	0.22-22	97	100	No
Ethylbenzene	1.5	1.5-150	810	700	No
Methylene chloride	11	11-1,100	110	5	Yes
NDMA	0.0001	0.001-0.001	0.055	0.01	Yes
Perchlorate	--	-	14	4 (EMOU) 6 (SEMOU)	Yes
Styrene	--	-	1,200	100	Yes
Tetrachloroethylene	11	11-1100	140	5[3]	Yes
Toluene	-	-	1,100	150	Yes
Trichloroethylene	0.49	0.49-49	2.8	5	No

Contaminant of Concern	Tap Water RSL[1] for cancer risk (µg/L)	Protective Cancer Risk Range (µg/L)	Tap Water RSL[1] for non-cancer hazard (µg/L)	ROD Standard[2] (µg/L)	Is the Cleanup Standard still protective?
Trichlorofluoromethane	-	--	5,200	150	Yes
Vinyl chloride	0.019	0.019-1.9	44	0.5	Yes
Xylenes	--	-	190	1,750	No
Hexavalent chromium	0.035	0.035-3.5	44	11	No

1 -November 2015 RSLs used for this analysis
2 – ROD standard are not in-situ cleanup standards but are performance and treatment standards
3 – The 1987 Richwood OU ROD amendment presents a treatment standard of 1 µg/L.
Shading indicate ROD standards greater than RSL.
EMOU – El Monte OU; SEMOU – South El Monte OU

Any concentration below the cancer RSL indicates that cancer risk is low, while concentrations significantly above the cancer RSL may indicate an increase in cancer risk. For several COCs, the tap water RSLs for cancer risk are less than the cleanup standards as noted above. However for many of these COCs, the ROD standards fall within the protective cancer risk range. For three COCs, the tap water RSLs for cancer risk are less than the cleanup standards and are outside of the protective cancer risk range: chloroform, ethylbenzene, and hexavalent chromium (chromium VI). Any concentration below the non-cancer RSL indicates that no adverse health effect from exposure is expected, while concentrations significantly above the non-cancer RSL may indicate an increased potential for non-cancer effects. The tap water RSLs for non-cancer hazard are less than the ROD standards for three COCs: chloroform, TCE, and xylenes. The following paragraphs discusses the impact to the protectiveness of the remedy for each of the chemicals mentioned.

- Chloroform is a COC at the Whittier Narrows, South El Monte, and El Monte OUs. Chloroform detected in the most recent sampling event in May 2014 at Whittier Narrows with a maximum concentration of 0.93 µg/L, which is within the acceptable risk range and significantly less than the non-cancer RSL. Chloroform was detected in latest compliance sampling event in Oct 2013 for South El Monte with a maximum concentration of 0.44 µg/L, which is within the acceptable cancer risk range and significantly less than the non-cancer RSL. Chloroform was not detected in the most recent monitoring event for the east and west sides of the El Monte OU. Therefore, there are no impacts to the protectiveness of the ROD standard for Whittier Narrows, South El Monte, or El Monte OUs.

- Ethylbenzene is a COC at the South El Monte and El Monte OUs. Ethylbenzene was not detected in the most recent monitoring event for the both the east and west sides of the El Monte OU. Therefore, there is no impact to the protectiveness of the ROD standard for the South El Monte and El Monte OUs.

- TCE is a COC at the Suburban, Whittier Narrows, South El Monte, and El Monte OUs. From the most recent monitoring event in November 2014 at Whittier Narrows, TCE was detected with a maximum concentration of 2.2 µg/L. This concentration is within the acceptable cancer risk range and below the non-cancer RSL. TCE was detected in the latest compliance sampling event in Oct 2013 for South El Monte with a maximum concentration of 150 µg/L, which is greater than the ROD standard, non-cancer RSL, and outside of the acceptable cancer risk. TCE was detected in the most recent monitoring events for the east and west sides of the El Monte OU with maximum concentrations of 2,220 µg/L and 110 µg/L, respectively. The ROD standard is the current MCL, which EPA considers protective of human health. Therefore, there is no impact to the protectiveness of the ROD standard for Suburban, Whittier Narrows, South El Monte, and El Monte OUs.

- Xylenes are COCs at the Whittier Narrows, South El Monte, and El Monte OUs. Xylenes were not detected in the most recent and available monitoring report (May 2014) for the Whittier Narrows OU. Xylenes are not reported in the annual performance reports or the latest remedial action compliance reports for South El Monte. Xylenes were not detected in the most recent monitoring event for the east side of the El Monte OU. Xylenes were not reported in the most recent monitoring report for the west side of the El Monte OU. The ROD standard is the current MCL, which EPA considers protective of human health. Therefore, there is no impact to the protectiveness of the ROD standard for Whittier Narrows, South El Monte, and El Monte OUs.

- Hexavalent chromium is a COC at the South El Monte and El Monte OUs. Hexavalent chromium was detected at in the most recent monitoring events for the east and west sides of the El Monte OU with a maximum concentrations of 19 µg/L and 22 µg/L, respectively. These concentrations are greater than the ROD standard of 11 µg/L and outside of the acceptable risk range. In 2014, California released a MCL specific to hexavalent chromium of 10 µg/L. The U.S. EPA IRIS (Integrated Risk Information System) program is conducting its own re-assessment of the toxicity of hexavalent chromium and EPA has committed to revise the chromium MCL upon completion of the IRIS re-assessment. Should the ROD standard change to the MCL, EPA considers the MCL protective of human health.

<u>Ecological Review</u>

Richwood and Suburban OUs did not evaluate ecological risk. These OUs are located within the same area as the other OUs and would have the similar ecological pathways. The other OUs where an evaluation of ecological exposure pathways was performed and groundwater is not discharged to surface water bodies (South El Monte OU) determined that there are no complete ecological pathways. This conclusion would applicable to the Richwood and Suburban OUs.

El Monte

The 1997 preliminary baseline RA included an evaluation to determine whether there are any potential ecological exposure pathways. The evaluation concluded that there are no complete ecological pathways in the El Monte OU. This conclusion is still valid.

Whittier Narrows

The 1993 ROD included an evaluation of environmental risks related to production wells that were used primarily for irrigation or other non-drinking water purposes. Potential environmental receptors include vegetation and wildlife exposed to contaminated groundwater. The detected VOCs were not expected to significantly bioconcentrate in aquatic organisms or adsorb to sediment. This conclusion is still valid. The detected VOC concentrations were compared to the National Ambient Water Quality Criteria, which were considerable higher (greater than 400 times) than the detected concentrations, at the time of the ROD. Treated groundwater is currently discharged to Legg Lakes, a recreational area and meets MCLs for site COCs. The current National Recommended Aquatic Life Criteria does not list the site COCs.

South El Monte

The 1997 preliminary groundwater RA included an evaluation to determine whether there are any potential ecological exposure pathways. The evaluation concluded that there are no complete ecological pathways in the South El Monte OU. This conclusion is still valid.

Appendix E: Press Notice

MASS TRANSIT

A web of connections to Gold Line stations

First-last mile problem most vexing

By Steve Scauzillo
steve.scauzillo@langnews.com
@stevscaz on Twitter

He bought his house at Rosedale for its close proximity to a Gold Line Foothill light-rail station. All he has to do is walk 10 minutes from his new home in the planned Azusa community to the APU/Citrus College Station, take the train to Little Tokyo and walk a few blocks to his employer, Caltrans. In the afternoon, he reverses his no-car commute.

But Rich Kester is not typical.

The conundrum of first-mile, last mile

For most people, train-riding won't be that easy. Many are caught in a chicken-and-egg battle called first-mile, last mile. In other words, how do they reach the train station? If they drive and park, why not just drive all the way? If they take the train, how will they get from the station to their workplace?

Moving the 99,000-pound train down the track is the easy part. Its cantilever rods are connected to overhead electrical wires pulsing with 750 volts of electricity. For those with a choice, deciding whether the train trip is smarter than driving is the hard part. It's a question of convenience and cost-effectiveness.

Solving the convenience factor is an uphill battle, especially when compared to the ease of a private car. Parking at all the six new stations of the Gold Line Extension opening up on Saturday is free. Put that in the cost-effectiveness category. But what about getting from the train to work? Or from the train to home? Or to the train station?

"Obviously, that is the big problem," began Doug Tessitor, board member of the Metro Gold Line Foothill Extension Construction Authority and former Glendora city councilman. "If you are within a quarter of a mile, people will walk that distance. Anything more than that, you have to have an alternative mode of transportation."

Companies ready for Rideshare requests

Tessitor is counting on ridesharing companies, such as Uber and Lyft, to fill in the gaps. People can tap for a ride on their phones and a nearby Uber or Lyft driver can arrive in less than five minutes to shuttle them to their destination.

An Uber spokesman said the company is prepared to handle more calls to and from Gold Line Stations. In September, 14 percent of UberPOOL trips requested in Los Angeles began or ended within one-eighth mile of a Metro rail stop, he said.

Uber recommends its UberPOOL service over the regular UberX because it is cheaper, if you don't mind riding with another passenger or two. The spokesman said data shows more are using Uber to connect with public transit in L.A. County.

However, a quick check of rates found the service is more than twice the cost of the $1.75 train ride. From the Monrovia station at Primrose near Duarte Road to Aerovironment, a world-renowned tech company on Huntington Drive, found a trip using either Uber service costs between $4 and $5 a ride. Likewise, an Uber trip from the Arcadia station located at First Avenue near Santa Clara Street to the L.A. County Arboretum runs exactly the same, according to Uber rate estimator.

"How many poor people can afford Uber and Lyft?" asks Catherine Burke, a professor at the USC Sol Price School of Public Policy, who suggests other transit options are needed. She's working with cities from Minneapolis to Morgantown, West Virginia about installing driverless transit lines from rail stations to city centers that run on narrow tracks above ground.

Metro has contracted with Lyft to be able to talk to passengers and ask them their first-mile/last-mile patterns. The company may also share data with Metro, according to Metro's Paul Gonzales. "Lyft mines its customers for a lot of data, most of which Metro is not interested in, but issues related to first/last mile connections are important for us," he said.

New bus lines for the Gold Line

Meanwhile, some entities are filling the gap the old fashioned way.

Foothill Transit added new lines that run from the Downtown Azusa Station: Bus 185 and Bus 280. It also added Bus 272, that will connect to the Duarte/City of Hope Station, and Bus 284 and Bus 488 to the APU/Citrus College Station.

Cities, businesses invest in services

Arcadia will roll out a brand new shuttle service connecting the station with key destinations, including City Hall, Santa Anita Park (race track), Westfield Santa Anita (shopping mall) and the Arboretum. From the train station to the race track takes 7 minutes by shuttle, 18 minutes to the Arboretum. The shuttle is free.

The racetrack is hoping the Gold Line will bring more spectators and it is considering adding a shuttle service on race days that would run from the station to the race track every hour, said Pete Siberell, director of special events.

Monrovia has a dial-a-ride system through Monrovia Transit that is for everyone, not just the elderly and disabled. Train riders can call and await a pickup at the station. The service is free.

"We've thought about creating a fixed route but until we see what the ridership looks like and what the actual usage patterns are, our initial thought is that's probably not the best way to invest until we see what the actual need is," said Monrovia City Manager Oliver Chi. Duarte Transit's Blue Line and Green Line buses will connect with the Duarte/City of Hope Station. They are free.

The Gold Line opening ceremony starts at 10 a.m. Saturday at the Duarte/City of Hope Station, at Highland and Duarte Road. Stations at Irwindale, Downtown Azusa, Arcadia and Monrovia also will have celebrations. Rides on the Gold Line are free from noon to midnight on Saturday.

Staff Writer Courtney Tompkins contributed to this article.

PHOTOS BY WALT MANCINI — STAFF PHOTOGRAPHER

Peach Cafe at 141 E. Colorado Blvd. in Monrovia is a wildly popular for its menu offering home-cooked Americana meals.

Short-rib grilled cheese sandwich at Peach Cafe.

The Gourmet Kobe Beef burger with bacon, blue cheese and an egg at Picasso's in Irwindale.

Customers may dine outside at Picasso's in Irwindale. Picasso's is a short walk from the new Irwindale Gold Line station.

Eateries

FROM PAGE 1

Panda Beef and Orange Chicken. This is the Chinese restaurant that launched a thousand dumplings.

Arcadia Station

Let us then connect the venerable Panda Inn in Pasadena, with the far newer Din Tai Fung chain (1088 S. Baldwin Ave., Arcadia, 626-446-8588; 1108 S. Baldwin Ave., Arcadia, 626-574-7068; with a new branch set to open soon in Westfield Santa Anita; www.dintaifungusa.com), arguably the most famous Chinese dumpling operation not just in the San Gabriel Valley, but in the world, with locations throughout Asia.

The crowds waiting for a table can be daunting, but the wait is always worthwhile, especially for the much-loved Soup Dumplings.

Those in the know make a reservation (in person is the only way) at both branches (they're right next to each other), and go to the first one to text their cell phone.

In the meanwhile, there are tasty Chinese bakeries nearby — and watching the dumplings being made is a fine show.

Monrovia Station

They only serve breakfast and lunch at the Peach Café (141 E. Colorado Blvd., Monrovia; 626-599-9092; www.thepeachcafe.com), but then, if you choose well at this wildly popular, extremely good destination for home-cooked Americana just off Myrtle Avenue, dinner won't be necessary. The portions are massive — and this is the sort of food that makes you wonder if anyone will complain if you lick your plate clean.

From the perfect house-made corned beef hash and classic Monte Cristo sandwich, to the chicken-blueberry salad and short rib grilled cheese sandwich, there is pleasure to be found, in every bite.

Near the Duarte Station

Sometimes, when traveling by Metro, what you need is a hot dog. Which is what you'll find at the Duarte branch of The Slaw Dogs (1355 Huntington Drive, Duarte; 626-358-8898; www.theslawdogs.com), where the selection of wieners verges on the obsessively maniacal — the Picnic Dog served with onion rings and Mom's potato salad; the LA Street Dog, a bacon-wrapped dog with garlic mayo and pico de gallo; the Hulk Dog, built around a seriously spicy ghost pepper link, jalapenos, bacon wrapped pepper jack cheese, roasted pasillas, habanero pickled onions and chipotle aio meal that should make rest of your train ride a very interesting endeavor.

Irwindale Station

The bad news is that Picasso's Café (6070 N. Irwindale Ave., Irwindale, 626-969-6100, www.picassoscafe.com) isn't open on weekends. And it's only breakfast and lunch on weekdays. But the cafe has one of the best in-house bakeries around, allowing train travelers to grab a bag or a box of tasty breads and fine pastries for the rest of their trip.

Or, if you have the time, just make yourself at home under one of the outdoor tables, and indulge in classic sandwiches, pastas and grilled dishes — nothing as artistically edgy as the namesake's paintings — but food that satisfies with every bite.

Downtown Azusa Station and Citrus College Station

What better way to come to the end of the journey east than with a big — very big! — platter of barbecue from Canyon City Barbeque (347 N. San Gabriel Ave., Azusa; 626-815-4227; www.canyoncitybbq.com), the destination of choice for pulled pork and brisket. rib tips and St. Louis spareribs, even Frito pie and barbecue nachos.

If you're feeling a tad thirsty after your journey, they have a proper selection of beers, both big names and small.

The servers are friendly as could be, the crowd leans towards big groups, and there's sports on the TV.

Eat enough, and you'll nap on the train, all the way back.

Angelina Mungilla delivers a turkey sandwich at Picasso's in Irwindale on Wednesday. Picasso's is a short walk from the new Irwindale Gold Line station.

PUBLIC NOTICE
THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY BEGINS SECOND FIVE-YEAR REVIEW OF CLEANUP AT THE SAN GABRIEL VALLEY AREA 1 SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) has begun its second five-year review of cleanup actions at the San Gabriel Valley Area 1 Superfund Site (Site) located in Los Angeles County. Because the Site is large, it includes multiple cleanup actions or operable units (OUs), including the South El Monte OU, the Whittier Narrows OU, the Richwood OU, the Suburban OU, and the El Monte OU. Five-year reviews for the Whittier Narrows OU were completed in 2006 and 2011, and a five-year review for the South El Monte OU, Richwood OU, and Suburban OU was completed in 2013. All of the cleanup actions at the Site address contaminated groundwater.

THE REVIEW PROCESS
The primary purpose of a five-year review is to determine whether a site remedy remains protective of human health and the environment. EPA generally conducts five-year reviews when hazardous substances remain in the groundwater above risk-based levels that prevent unrestricted use and exposure. As part of the review, EPA will be looking at how well the remedy is achieving EPA's cleanup goals, changes in scientific knowledge about site contaminants, changes in exposure pathways, and changes in regulations.

COMMUNITY INVOLVEMENT
If you have any concerns about the San Gabriel Valley Area 1 Site, and particularly if you have direct knowledge regarding the operation and maintenance of the remedy, then EPA would like to talk with you. When completed, a copy of the five-year review report will be placed in the information repository and will be available on-line at EPA's website listed below.

SITE HISTORY
The Site is an area of contaminated groundwater over 4 miles long and 1½ miles wide located in the San Gabriel Valley. The Site is one of four groundwater cleanup sites in the San Gabriel Valley being addressed under EPA's Superfund cleanup program since 1984. The groundwater contamination is the result of decades of poor chemical handling and disposal practices by hundreds of industrial facilities. The primary chemical contaminants in the Site's groundwater are volatile organic compounds including tetrachloroethene (PCE) and trichloroethene (TCE), which are both industrial solvents. EPA has multiple ongoing remedies throughout Area 1, including extracting and treating contaminated groundwater.

FOR MORE INFORMATION
Please visit EPA's website for the San Gabriel Valley, Area 1 Site:
www.epa.gov/region09/SouthElMonte

Information Repositories:
Rosemead Public Library
880 Valley Blvd.
Rosemead, CA 91770
(626) 573-5220

West Covina Public Library
1601 West Covina Parkway
West Covina, CA 91790-2786
(626) 962-3541

Superfund Records Center
75 Hawthorne St.
San Francisco, CA 94105
(415) 947-8000
Hours: Mon-Fri 8am-5pm

Contact Information:
Viola Cooper
Community Involvement Coordinator
75 Hawthorne Street (SFD-6-3)
San Francisco, CA 94105
(800) 231-3075 or (415) 972-3243
cooper.viola@epa.gov

Rachelle Thompson
Project Manager, South El Monte OU
75 Hawthorne Street (SFD-7-3)
San Francisco, CA 94105
(415)-972-3962
thompson.rachelle@epa.gov

Bella Dizon
Project Manager, Whittier Narrows OU & El Monte OU
75 Hawthorne Street (SFD-7-3)
San Francisco, CA 94105
(415)-972-3190
dizon.bella@epa.gov

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Appendix F: Site Inspection Checklists

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: San Gabriel Valley Area 1 (Richwood, Suburban, South El Monte OUs)	**Date of inspection: Jan 19-20, 2016**
Location: San Gabriel Valley, Los Angeles County, CA	**EPA ID:**
Agency, office, or company leading the five-year review: EPA	**Weather/temperature**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: *e.g. Groundwater monitoring*
- ☐ Monitored natural attenuation
- ☒ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

(NOTE: only South El Monte has an active treatment; Richwood and Suburban locations were just observed during this site visit)

II. INTERVIEWS ***(No interviews were conducted.)***

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

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

Agency:
Contact: _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

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

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

1. **O&M Documents**

☐ O&M manual	☒ Readily available	☐ Up to date	☐ N/A
☐ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☒ Readily available	☐ Up to date	☐ N/A

Remarks_____
_____

2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☐ Up to date	☐ N/A
	G Contingency plan/emergency response plan	☒ Readily available	☐ Up to date	☐ N/A
	Remarks_____			
3.	**O&M and OSHA Training Records**	☒ Readily available	☐ Up to date	☐N/A
	Remarks_____			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☐ N/A
	☐ Effluent discharge	☐ Readily available	☐Up to date	☐ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☐ N/A
	☐ Other permits_____	☐ Readily available	☐ Up to date	☐ N/A
	Remarks_____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks_____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks_____			
7.	**Groundwater Monitoring Records**	☒ Readily available	☐ Up to date	☐N/A
	Remarks_____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks_____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☐ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☐ N/A
	Remarks_____			
10.	**Daily Access/Security Logs**	☒Readily available	☐ Up to date	☐ N/A
	Remarks_____			

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☒ Other: *The Golden State Water Company, San Gabriel Valley Water Company, and the City of Monterey Park operate the treatments plants as part of their water distribution systems.*

2. **O&M Cost Records**

☒ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_____

C. Institutional Controls (ICs) (N/A)

1. **Implementation and enforcement**

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

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

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

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

_____
_____
_____
_____

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____
_____
_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____
_____

2. **Land use changes on site** ☒ N/A

Remarks: *No on-site land uses have changed within this five-year review period.*

3. **Land use changes off site** ☒ N/A

Remarks_____
_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks_____
_____

B. Other Site Conditions

Remarks _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent_____ Depth_____
Remarks_____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_____ Depth_____
Remarks_____
_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent_____ Depth_____
Remarks_____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_____
_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks_____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent_____ Height_____
Remarks_____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐Location shown on site map Areal extent_____
Remarks_____
_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____
_____

B. Benches ☐ Applicable ☐ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

C. Letdown Channels ☐ Applicable ☐ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** ☐ Location shown on site map ☐No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☐N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition G Needs Maintenance
Remarks_____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks_____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks_____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
☐ Siltation not evident
Remarks_____
_____

2. **Erosion** Areal extent_____ Depth_____
☐ Erosion not evident
Remarks_____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks_____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks_____
_____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement_____ Vertical displacement_____
Rotational displacement_____
Remarks_____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks_____
_____

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

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent_____ Depth_____
Remarks_____
_____

2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent_____ Type_____ Remarks_____
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent_____ Depth_____ Remarks_____
4.	**Discharge Structure** ☐ Functioning ☐ N/A Remarks_____
	VIII. VERTICAL BARRIER WALLS ☐ Applicable ☐ N/A
1.	**Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent_____ Depth_____ Remarks_____
2.	**Performance Monitoring** Type of monitoring_____ ☐ Performance not monitored Frequency_____ ☐ Evidence of breaching Head differential_____ Remarks_____
	IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ 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_____
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☒ Good condition ☐ Needs Maintenance Remarks_____
3.	**Spare Parts and Equipment** ☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☒ Air stripping ☒ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☒ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☒ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks: *City of Monterey uses an air stripper on Well 12; San Gabriel Valley Water Company also uses an air stripper in addition to GAC units*.

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐N/A ☒ Good condition G Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ☐N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☒ Good condition ☐ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____

6.	**Monitoring Wells** (pump and treatment remedy) ☒ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks_____
D. Monitoring Data	
1.	Monitoring Data ☒ Is routinely submitted on time ☒ Is of acceptable quality
2.	Monitoring data suggests: ☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining
D. Monitored Natural Attenuation (N/A)	
1.	**Monitoring Wells** (natural attenuation remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐All required wells located ☐Needs Maintenance ☐N/A Remarks_____
3.X. OTHER REMEDIES	
	If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.
XI. OVERALL OBSERVATIONS	
A.	**Implementation of the Remedy**
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). *The remedy is to contain contamination within the intermediate zone aquifer where concentrations exceeds the ROD standards. The water purveyors (Golden State, San Gabriel Valley, and the City of Monterey) have been treating the water to meet drinking water standards. A recent capture zone analysis indicates that the extraction systems are achieving capture of the VOC plume.*
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. *O&M at each of the treatment facilities appear to be operation well and achieving remedy requirements.*

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. *No issues were observed.*
4.D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. *The water purveyors appear to be continually looking for methods to optimize operation of the plants. No other opportunities were noted.*