Five-Year Review Report

First Five-Year Review Report

for

San Gabriel Valley Area 1 Superfund Site
Whittier Narrows Operable Unit

Los Angeles County, California

September 2006

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Five-Year Review Report

Table of Contents

List of Acronyms		4
Executive Summary		5
Five-Year Review Summary Form		6
I.	**Introduction**	8
II.	**Site Chronology**	10
III.	**Background**	11
	Physical Characteristics	11
	Land and Resource Use	11
	History of Contamination	11
	Initial Response	12
	Basis for Taking Action	12
IV.	**Remedial Actions**	12
	Remedy Selection	12
	Remedy Implementation	13
	System Operations/Operation and Maintenance (O&M)	14
V.	**Progress Since the Last Five-Year Review**	17
VI.	**Five-Year Review Process**	17
	Administrative Components	17
	Community Notification and Involvement	17
	Document Review	17
	Data Review	17
	Site Inspection	20
	Interviews	20
VII.	**Technical Assessment**	20
	Question A: Is the remedy functioning as intended by the decision documents?	20
	Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?	21
	Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	22
	Technical Assessment Summary	22
VIII.	**Issues**	23
IX.	**Recommendations and Follow-up Actions**	23
X.	**Protectiveness Statement(s)**	23

XI. Next Review 24

Tables

Table 1 – Chronology of Site Events
Table 2 – Annual System Operations/O&M Costs
Table 3 – Downgradient PCE Water Quality Data
Table 4 – Issues
Table 5 – Recommendations and Follow-up Actions

Figures

Figure 1 – Site Location Map
Figure 2 – Whittier Narrows Project Components
Figure 3 – Whittier Narrows Treatment Plant Layout
Figure 4 – Whittier Narrows Monitoring Wells

Appendices

Appendix 1 – List of Documents Reviewed
Appendix 2 – Applicable or Relevant and Appropriate Requirements (ARARs)
Appendix 3 – Data Review Technical Memorandum and Data Tables
Appendix 4 – Site Inspection Report
Appendix 5 – Interview Report
Appendix 6 – Toxicity and Ecological Risk Analysis Technical Memorandum

List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
DTSC	California Department of Toxic Substances Control
CADHS	California Department of Health Services
LARWQCB	Los Angeles Regional Water Quality Control Board
gpm	gallons per minute
IC	Institutional Control
LGAC	liquid-phase granular activated carbon
MCL	Maximum Contaminant Level
USACE	United States Army Corps of Engineers
NCP	National Contingency Plan
NDMA	n-Nitrosodimethylamine
NPL	National Priorities List
O&F	Operational and Functional
O&M	Operation and Maintenance
ORD	EPA's Office of Research and Development
OU	Operable Unit
PCE	perchloroethylene
ng/L	nanograms per liter
µg/L	micrograms per liter
RPM	Remedial Project Manager
RSE	Remedial System Evaluation
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
FS	Feasibility Study
IROD	Interim Record of Decision
TCE	trichlorethylene
TBC	To Be Considered
VOC	Volatile Organic Compound

Executive Summary

The remedy for the Whittier Narrows Operable Unit (OU) of the San Gabriel Valley (Area 1) Superfund Site in Los Angeles County, California includes groundwater extraction and treatment to provide containment of volatile organic compound (VOC) contamination. The trigger for this five-year review was the actual start of construction on June 11, 2001. The other operable units in Area 1, South El Monte OU and El Monte OU, are both located upgradient of the Whittier Narrows OU and are in the remedial design phase.

The assessment of this five-year review found that the remedy was constructed in accordance with the requirements of the November 1999 Interim Record of Decision (IROD) Amendment. The remedy is functioning as designed. The remedy is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: San Gabriel Valley (Area 1) – Whittier Narrows OU		
EPA ID *(from WasteLAN)*: CAD980677355		
Region: 9	**State: CA**	**City/County: South El Monte/Los Angeles**
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete		
Multiple OUs?* ☒ YES ☐ NO	**Construction completion date:** N/A	
Has site been put into reuse? ☐ YES ☐ NO N/A		
REVIEW STATUS		
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____		
Author name: Patricia Bowlin		
Author title: Remedial Project Manager	**Author affiliation: U.S. EPA Region 9**	
Review period: 3/2006 to 9/2006		
Date(s) of site inspection: 08/17-18/2006		
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☒ Actual RA Onsite Construction at OU #2 ☐ Actual RA Start at OU#____ ☐ Construction Completion ☐ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date *(from WasteLAN)*: 06/11/2001		
Due date *(five years after triggering action date)*: 06/11/2006		

* ["OU" refers to operable unit.]

Five-Year Review Summary Form, cont'd.

Issues:

Shallow zone extraction rate less than 50% of design rate

Long-term shallow water end-use to be determined

Actual O&M costs exceed estimated costs, esp. electricity, labor, and analytical costs

Electrical cable and system failures

Revisit frequency of downgradient monitoring

Recommendations and Follow-up Actions:

Evaluate contaminant transport within shallow zone to determine minimum necessary extraction rate; permanently reduce shallow zone extraction rate as appropriate

Finalize agreements for long-term shallow water end-use

Conduct Remedy System Evaluation (RSE) to identify optimization opportunities and cost savings

Negotiate reduction in CADHS permit monitoring requirements

Continue USACE investigation into electrical cable and system failures

After conducting September 2006 monitoring event, reevaluate monitoring frequency

Protectiveness Statement:

The Whittier Narrows OU remedy is protective of human health and the environment. Other Comments: The problems encountered in finalizing the long-term shallow water end-use results from water rights issues. This issue does not impact protectiveness and is expected to be resolved within the next year.

Five-Year Review Report

I. Introduction

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

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

The agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §300.430(f)(4)(ii) states:

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

The United States Environmental Protection Agency (EPA) Region 9 has conducted a five-year review of the interim remedial action (RA) implemented at the Whittier Narrows Operable Unit (OU) of the San Gabriel Valley (Area 1) Superfund Site in Los Angeles County, California. This review was conducted from March 2006 through September 2006 by the Remedial Project Manager (RPM) and the EPA Region 9 Technical Support Program. EPA contractors, including the RA Contractor, CH2MHill, provided analyses in support of the five-year review. The United States Army Corps of Engineers (USACE) conducted the site inspection on August 17 and 18. This report documents the results of the review.

This is the first five-year review for the San Gabriel Valley (Area 1) Superfund Site. The triggering action for this statutory review is the date of actual RA on-site construction at the Whittier Narrows OU, as shown in EPA's WasteLAN database: June 11, 2001. The five-year review is required due to the fact that the interim remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure.

The San Gabriel Valley (Area 1) Superfund Site, which includes the Whittier Narrows Operable Unit (OU), is one of four San Gabriel Valley groundwater sites listed on the National Priorities List. The other San Gabriel Valley sites are San Gabriel Valley Area 2 (which includes the Baldwin Park OU), San Gabriel Valley Area 3, and San Gabriel Valley Area 4 (which includes the Puente Valley OU).

This five-year review only addresses the interim remedy implemented for the Whittier Narrows OU of the San Gabriel Valley (Area 1) Superfund Site. This review does not address the other operable units in Area 1, South El Monte and El Monte, which are located upgradient of Whittier Narrows OU and are in the early stages of the Remedial Design process.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Initial discovery of problem or contamination	1979
NPL listing	May 8, 1984
Remedial Investigation/Feasibility Study complete	September 1992
ROD signature: Monitoring-only IROD signed for the Whittier Narrows OU	March 31, 1993
Increasing VOC concentrations prompt additional fieldwork	1997-1998
Feasibility Study Addendum and Proposed Plan	October 1998
Remedial design start	April 5, 1999
ROD Amendment: IROD Amendment signed for the Whittier Narrows OU	November 10, 1999
Superfund State Contract signature	August 31, 2000
Remedial action start	September 27, 2000
Design completed for the wellheads, well pumps, and conveyance pipelines	January 2001
Design completed for the groundwater treatment plant	March 2001
Start of on-site construction	June 11, 2001
Construction of the conveyance pipelines began	June 2001
Construction of the groundwater treatment plant began	July 2001
EPA and the State conduct pre-final inspection of the RA	January 24, 2002
Beginning of startup and testing, initial groundwater extraction and treatment	February 15, 2002
Remedial design complete	March 29, 2002
CH2M HILL determines contractor has completed construction	March 31, 2002
EPA and the State conduct final inspection of the RA	May 16, 2002
Start of full-scale (11,000 gpm) system operations test	June 19, 2002
End of two-month, full-scale operations test	August 23, 2002
Treatment plant modifications to split intermediate zone and shallow zone flows, construction of pipeline to City of Whittier (final connection not completed)	September 2002
Begin interim system operations and maintenance (O&M)	October 23, 2002
Detection of NDMA in shallow zone	December 2002
Remedy becomes O&F one year after final EPA and State inspection	May 16, 2003
CADHS issues drinking water permit amendment to City of Whittier to allow treated intermediate zone water from the remedy to be used as drinking water supply	September 5, 2003
RA complete (Interim Remedial Action Report signed)	September 30, 2003
Construction of final connection to City of Whittier	October 2003
Transfer of O&M responsibilities from CH2MHill to City of Whittier	November 2004
Treated water from the remedy is delivered to the City of Whittier distribution system	December 14, 2005

III. Background

Physical Characteristics

San Gabriel Valley (Area 1) Superfund Site is located in eastern Los Angeles County. The Whittier Narrows OU encompasses approximately four square miles in the southern portion of the San Gabriel Basin (See Figure 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 downgradient 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.

Land and Resource Use

Groundwater flow in the Whittier Narrows OU is principally from northeast to southwest from the San Gabriel Basin into the Central Basin. There are shallow, intermediate, and deep drinking water and irrigation wells located within Whittier Narrows and immediately downgradient 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 Whittier Narrows OU. This includes extensive industrial areas in the immediately upgradient South El Monte OU. Industrial activities within the Whittier Narrows OU are generally limited to the far eastern portion of the Narrows.

History of Contamination

Groundwater contamination was first detected in the San Gabriel Valley in 1979. By 1984, high levels of volatile organic compounds (VOCs) were found in 59 wells. Over the years more and more wells have become contaminated with VOCs, 1,4 dioxane, perchlorate, N-nitrosodimethylamine (NDMA), and other contaminants. The soil and groundwater contamination results 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 demonstrate that local officials were concerned about the potential for groundwater contamination by industrial activity in the San Gabriel Valley as early as the 1950s.

The shallow and intermediate VOC contamination found in Whittier Narrows is migrating into the area from upgradient industrial contaminant sources. EPA has not found any significant sources of VOC contamination within the Whittier Narrows OU. Remediation of upgradient contaminant sources is occurring and will continue as part of activities in other San Gabriel Basin OUs.

Initial Response

Since the late 1980s, EPA has conducted field investigations and evaluated remedial actions in Whittier Narrows. EPA signed an Interim Record of Decision (IROD) on March 31, 1993, specifying that remedial action would be limited to groundwater monitoring throughout Whittier Narrows.

EPA implemented the monitoring-only IROD, including installation of several monitoring wells and routine quarterly monitoring of wells in the area. For several years, contaminant concentrations were relatively low throughout Whittier Narrows and groundwater resources in the Central Basin were not threatened. However, starting in 1997, impacted groundwater from upgradient areas began migrating into the western side of Whittier Narrows causing significant increases in contaminant concentrations. The increases in contaminant concentrations suggested an imminent threat to groundwater resources in the Central Basin. This threat prompted EPA to prepare an IROD Amendment (signed on November 10, 1999) calling for implementation of more aggressive remedial actions.

Basis for Taking Action

VOCs are the primary groundwater contaminants found above state and federal drinking water standards in the Whittier Narrows OU and upgradient areas. The VOCs found in the Whittier Narrows OU are mobile in groundwater and are probable and/or potential carcinogens. The primary route of potential exposure for the public would be through domestic use of untreated groundwater. Tetrachloroethylene (PCE) and trichloroethylene (TCE) have been detected most often in groundwater, although there are sporadic detections of other VOCs. Elevated VOC contamination primarily occurs in the western half of Whittier Narrows and PCE is the VOC detected at the highest concentrations. Exceedances of drinking water standards for both PCE and TCE have been detected up to 400 feet below ground surface in western Whittier Narrows. PCE concentrations just above drinking water standards have been detected in isolated locations in the Montebello Forebay, downgradient of Whittier Narrows.

Groundwater contamination is flowing out of the San Gabriel Basin through Whittier Narrows and into the Montebello Forebay portion of the Central Basin. The Montebello Forebay area is the primary source of recharge for the Central Basin's drinking water aquifers. Groundwater contamination migrating from the San Gabriel Basin into this area could impact the water supply for millions of Central Basin water users. At this time, contaminant levels in the Central Basin generally remain below drinking water standards.

IV. Remedial Actions

Remedy Selection

The IROD Amendment for the Whittier Narrows OU was signed on November 11, 1999. As stated in the IROD Amendment, the Remedial Action Objective (RAO) for Whittier Narrows OU is:

> "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."

EPA's objective for the Whittier Narrows OU is to protect groundwater resources in Whittier Narrows and the Montebello Forebay portion of the Central Basin from VOC contamination emanating from the San Gabriel Valley. At the time of the IROD Amendment, groundwater contaminated with PCE at levels above the drinking water standard had been detected just south of Whittier Narrows Dam in the Central Basin. EPA's remedy is intended to prevent further migration of contamination above state or federal drinking water standards into the Central Basin.

The major components of the Whittier Narrows remedy include:

- Groundwater containment through extraction in the vicinity of Whittier Narrows Dam near the downgradient limit of contaminant concentrations exceeding MCLs;

- Groundwater treatment using two-stage liquid-phase granular activated carbon (LGAC) treatment;

- 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, potentially combined with recharge of some treated water back to the aquifer using existing Montebello Forebay or other spreading facilities;

- Groundwater monitoring to help measure the performance of the containment system and provide early warning of upgradient conditions that could affect the remedy.

Remedy Implementation

Groundwater flow modeling indicated that four shallow wells, extracting a total average of 5,000 gallons per minute (gpm), would provide shallow-zone containment and that three intermediate-depth extraction wells, extracting a total average of 6,000 gpm, would provide intermediate-zone containment. EPA installed the groundwater extraction wells during two phases of well drilling in May/June 1999 and August/September 2000.

The design of this large-scale extraction and treatment system was split into two design packages: one covering the extraction wellheads, pumps and controls and all conveyance pipelines and one covering the groundwater treatment plant. The design of the extraction well/pipeline portion of the remedy included multiple pipelines and centralized extraction well power/control centers and was completed in January 2001. The two-stage LGAC treatment plant design was completed in March 2001.

Installation of the conveyance pipelines from the extraction wells to the treatment plant and from the treatment plant to the three surface water discharge points (Legg Lakes, Nature Center Lake, and the Zone 1 Ditch-see Figure 2) began on June 11, 2001. Construction of the treatment plant began in July 2001 (see Figure 3). Initial pumping and treating of limited amounts of groundwater began in late February 2002. This initiated a 30-day startup and testing period that extended through the end of March 2002. Although there were still some minor punch-list items to address, EPA's RA contractor CH2MHill determined that the construction contractor had achieved substantial completion of system construction at the end of March 2002.

From June 2002 through August 2002, the system operated at the design extraction rates for both the shallow and intermediate zones. During this period, all treated water was discharged to the Zone 1 Ditch pursuant to a Water Production Agreement with the Main San Gabriel Basin Watermaster (Watermaster). Los Angeles County Department of Public Works captured the discharged water in the Rio Hondo Spreading Grounds and recharged it into the aquifer in the Central Basin.

In September 2002, an additional conveyance pipeline was installed to allow for connection to the City of Whittier's system. Modifications were made at the treatment plant to isolate three of the shallow wells (EW4-4, EW4-8, and EW4-9) from the intermediate wells and shallow well EW4-3. From October 2002 through September 2003, the intermediate wells generally operated at the full 6,000 gpm extraction rate required for containment. Shallow extraction well EW4-3 also operated nearly continuously at rates between 1,100 and 1,400 gpm. EW4-3 is the shallow well that captures the higher concentration shallow groundwater contamination migrating through Whittier Narrows. The treated water from these wells was discharged to Zone 1 Ditch pursuant to the Water Production Agreement. The other three shallow extraction wells were operated only intermittently and discharged to Legg Lakes.

In September 2003, the City of Whittier obtained the permit amendment from the California Department of Health Services (CADHS) that allows the City to use the treated intermediate zone water from the Whittier Narrows treatment plant as a source of drinking water supply. EPA separated EW4-3 from the intermediate wells and constructed the final connection to Whittier in October 2003 which eliminated the discharge pipeline to Zone 1 Ditch. Subsequently, only the shallow wells could be operated and discharged to surface water; in addition, shallow zone extraction was intermittent and minimal due to the terms of the Water Production Agreement.

In September 2004, EPA began continuously operating the shallow wells at an extraction rate of between 2000 to 3500 gpm pursuant to a new two-year Water Production Agreement with the Watermaster. Due to the configuration of the LGAC vessels (14 pairs for the potable system and 6 pairs for the non-potable system) the treatment capacity for the non-potable shallow wells is approximately 4,000 gpm. In addition, the shallow zone extraction rate is limited by the recharge capacity of Legg Lakes and Mission Creek.

System Operations/Operation and Maintenance (O&M)

EPA entered into a Cooperative Agreement with the City to operate and maintain the Whittier Narrows groundwater treatment system. CH2MHill began transferring the treatment plant operations to the City of Whittier in November 2004. Pursuant to the CADHS permit, the

City modified the extraction wellheads and constructed flushlines. In addition, the City changed out the carbon for all the potable vessels and conducted additional monitoring for CADHS. Since December 14, 2005, the City has distributed treated water from the permitted intermediate zone wells to residents.

System operations/O&M requirements

Routine system O&M procedures and requirements are outlined in the Operations and Maintenance Manual (O&M Manual) and the Operations, Maintenance, and Monitoring Plan (OMMP) approved by the CADHS. In addition, the use of the treated intermediate zone water from the Whittier Narrows system has resulted in significant operational requirements pursuant to the CADHS permit, including active operator involvement on a daily basis and extensive water quality monitoring.

Daily operator activities include driving around the project site to visually inspect the extraction wells, the wellfield power/control platforms, and the treatment plant. The operator also visually inspects the LGAC vessels and checks the pressure drop across each LGAC vessel. In addition, the operator conducts meter reads, sampling, routine cleaning, maintenance, and necessary repairs.

The system is setup with a large number of automated alarm conditions that, if encountered, will place a telephone call to the operator. Examples include failure of a system component such as a booster pump or detection of an operating parameter outside of the designated range such as an elevated pressure differential across an LGAC vessel. The operator performs system checks to confirm the readings recorded by the operating system.

The primary measurement of system performance is water quality monitoring. The CADHS permit contains extensive monitoring requirements to monitor system performance and ensure that all treated water is non-detect for VOCs. In addition, the permit requires extensive monitoring for non-VOCs. Monitoring locations include: upgradient monitoring wells, operating extraction wells, in-plant water from each LGAC vessel, and treatment plant effluent. All effluent samples collected to date have confirmed complete removal (to non-detect levels) of all VOCs present in the extracted groundwater.

Problems in the implementation of system operations/O&M

In December 2002, NDMA was detected in EW4-3 above the CADHS Notification Level of 10 nanograms per liter (ng/L) which resulted in the removal of the EW4-3 from the drinking water permitting process. Subsequently, EPA began investigating the NDMA in the shallow zone and identified the discharges from nearby water reclamation plants as the source of NDMA in the Whittier Narrows OU. The Los Angeles County Sanitation Districts (LACSD), under the oversight of the Los Angeles Regional Water Quality Control Board (LARWQCB), has implemented a number of measures to address NDMA, including operational changes to reduce NDMA formation and studies on the fate and transport of NDMA in the Whittier Narrows OU. In addition, LACSD conducts monthly monitoring of EPA's monitoring and extraction wells.

Due to the NDMA and surface water influence in the shallow zone, particularly the western shallow zone wells (EW4-3 and EW4-8), the long-term end-use for the treated shallow

water is uncertain. Currently, all extracted shallow zone water is treated for VOCs and then discharged to Legg Lakes pursuant to a Water Production Agreement that expires on December 31, 2006. Any long-term discharge to Legg Lakes would require a multi-party agreement that addressed water rights issues.

When the intermediate zone wells were started up in December 2004, EW4-6 could not be operated. Prior to initiating troubleshooting at the wellhead or downhole, the wellfield was flooded in January 2005. Subsequent testing indicated that the electrical cables running from the electrical platform to the wellhead had failed. In addition, the cable conduits were filled with water. In the fall of 2005, shallow well EW4-9 also stopped operating due to failure of the electrical cables. In April 2006, intermediate well EW4-5 stopped operating. Investigation by CH2MHill did not attribute the failure of EW4-5 to the failure of the electrical cables but to failure of the pump motor due to a large voltage spike or surge. After consultation with the USACE, the cables to EW4-6 and EW4-9 were replaced and all splices and connections were completed above-grade, limiting the potential for future flooding to impact the cables. In May 2006, the variable frequency drives were adjusted to help prevent the frequent "overvoltage" trips when starting up the wells. The EW4-5 pump motor was replaced in August 2006. The USACE is continuing to investigate the electrical system failures.

Annual O&M costs

Table 2 provides a summary of the O&M costs incurred to operate the system over the last five years. The actual costs are also compared to the estimated projects costs from the IROD Amendment.

Table 2: Annual System Operations/O&M Costs

Dates		**Approximate Volume Extracted (acre-feet)**	**Total Cost rounded to nearest $1,000**	**Cost per acre-foot of extracted water**
From	**To**			
Annual O&M Cost Estimate from IROD Amendment		12,100	$675,000 (2001 dollars)	$56
February 2002	September 2002	3,478	$185,000	$53
October 2002	September 2003	9,253	$277,000	$30
October 2003	September 2004	32	$81,000	$2531
October 2004	September 2005	3,078	$278,000	$90
October 2005	June 2006	5,142	$850,000	$106

In the first two years, the O&M costs were consistent with or less than the IROD Amendment estimates. The costs incurred over the last two years have been much higher per acre-foot extracted. Part of the increase can be attributed to the relatively large cost of non-routine items such as the potable side carbon changeout in 2005 and the cable replacement costs in 2006. Once the system is in a more normal operating mode for a longer period, it can be determined if the O&M costs are consistent with the original estimates.

V. Progress Since the Last Review

This was the first five-year review for the site.

VI. Five-Year Review Process

Administrative Components

The Whittier Narrows OU Five-Year Review team was led by Patricia Bowlin of EPA, Remedial Project Manager (RPM) for the Whittier Narrows OU Site and Cynthia Wetmore of the Regional Technical Support Program with expertise in engineering and risk assessment. EPA RA Contractor, CH2MHill, and the USACE provided additional technical support.

The report was reviewed by the California Department of Toxic Substances Control (DTSC).

Community Notification and Involvement

In June 2006, EPA mailed out 3,500 copies of the fact sheet entitled "Update on Groundwater Cleanup in the San Gabriel Valley" which provided notice of the five-year review for Whittier Narrows OU.

Document Review

This five-year review consisted of a review of relevant documents (Appendix 1), O&M records, and monitoring data. Applicable groundwater cleanup standards, as listed in the 1999 IROD Amendment, were reviewed (Appendix 2).

Data Review

Groundwater Monitoring

PCE is the primary contaminant in Whittier Narrows OU as it is the most widely detected VOC and is the only VOC that commonly exceeds the MCLs. PCE data from upgradient monitoring wells, remedy extraction wells, and downgradient monitoring and extraction wells were reviewed. See Figure 4 for locations of Whittier Narrows monitoring wells. The PCE data, as well as data on other site contaminants, are further discussed in Appendix 3.

Overall, shallow zone PCE concentrations have dropped significantly in the upgradient portions of the Whittier Narrows OU. In addition, PCE concentrations have declined in all four shallow extraction wells, with the most dramatic reductions occurring in EW4-3 where PCE concentrations dropped from 200 micrograms per liter (µg/L) in December 1999 to less than the PCE drinking water standard of 5 µg/L currently. In June 2006, only one shallow extraction well, EW4-8, had PCE concentrations above the drinking water standard.

Since September 2004, EPA has been operating the shallow zone extraction wells on a continuous basis at an average of approximately 30% of the design extraction rate of 5000 gpm. The primary extraction has been from western shallow wells EW4-3 and EW4-8 which capture

the highest concentration shallow groundwater contamination. Currently, the shallow zone extraction ranges between 40% and 50% of the design rate.

As indicated in Table 3 below, the PCE concentrations in the shallow zone monitoring wells downgradient of the Whittier Narrows OU extraction wells have been consistently non-detect or very low. The September 2006 monitoring event should confirm that these monitoring well concentrations remain non-detect for VOCs. Based on the historical record for these downgradient shallow zone wells, and the declining upgradient concentrations, there is no reason to expect that concentrations have increased. Furthermore, the data support a conclusion that shallow zone extraction at the design rate of 5000 gpm is not necessary to meet the RAO; further evaluation is needed to determine whether to permanently reduce the shallow zone extraction rate.

In the intermediate zone, PCE concentrations have generally been declining, particularly in the three intermediate extraction wells and in downgradient monitoring wells, since implementation of the remedy in 2002. As indicated in Table 3, only two of the 17 intermediate zone monitoring wells downgradient of the Whittier Narrows OU extraction wells were above the PCE drinking water standard of 5 µg/L in August 2004. These PCE concentrations were 5.6 µg/l at MW461 and 9.2 µg/l at 4-12-3 and were collected when the Whittier Narrows extraction system was not operated. Since December 2005, the City of Whittier has been using the treated intermediate zone water as drinking water supply and operating the system at or near the average production rate that provides full capture based on modeling.

In addition, recent water quality data from the downgradient Central Basin Municipal Water District (CBMWD) extraction wells show declining VOC concentrations near the two EPA monitoring wells that had PCE concentrations above 5 µg/L in August 2004. These extraction wells have had concentrations below 5 µg/l since 2005. (See Table 3.) The two extraction wells were installed to capture the intermediate zone VOC contamination that had already migrated past the Whittier Narrows into the Central Basin prior to implementation of EPA's remedy. Well CB-1 is located near EPA monitoring well MW461, and Well CB-2 is located near EPA monitoring well 4-12-3.

Table 3: Downgradient PCE Water Quality Data

Well	Screen Interval	5/2002	8/2002	11/2002	2/2003	5/2003	8/2003	11/2003	3/2004	8/2004*
		PCE (µg/L)								
Shallow Zone										
Wells located between the extraction wells and Whittier Narrows Dam										
MW4-23	70-90	2	nd	nd	nd	nd	nd	nd	nd	nd (nd)
MW4-25	25-50	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW4-26	27-52	nd	nd	nd	nd	nd	nd	nd (nd)	nd	nd
Wells located along Whittier Narrows Dam										
WN01-9	95-105	--	--	--	--	--	--	nd	--	nd (9/05)
4-18-4	95-105	3	3	3 (2)	3	2.5	1.9 (2.1)	1.6	1.6	1.9
4-19-5	40-50	nd	--	nd	--	nd	--	nd	--	nf
4-20-2	70-80	nd	nd	nd	nd	nd	nd	nd	nd	nd
Intermediate Zone										
Wells located along Whittier Narrows Dam										
WN01-6	273-283	nd	--	--	--	nd	--	nd	--	nd (9/05)
WN01-7	233-243	0.5	--	--	--	nd	--	nd, nd	--	nd (9/05)
MW441	285-295	nd (nd)	--	nd	--	nd (nd)	--	nd	--	nd (nd)
MW442	225-235	nd (nd)	--	nd	--	nd	--	nd	--	nd
MW451	270-280	4	4	4	3	2.2	2.1	1.6 (1.7)	1.4	0.66
MW452	200-210	5	5	5 (5)	4	3.8	3.7	3.2	2.6	1.5
MW461	251-261	12	17	14	12	10	12	9.6	8.9	5.6
MW462	140-150	nd (nd)	nd	nd	nd	nd	nd	nd	nd	nd
4-12-2	315-325	5	4	2	3	3.7	2.9	1.6	nd	1.2
4-12-3	224-235	8	10	12	16	9.2	10, 13	6.7, 9.1	10	9.2
4-18-1	280-290	2	2	2	3	2.1	2.5	2.3	2.6	3.2
4-18-2	230-240	4	4	2	4	3.4	4.8	4	4.1	3.6 (4.5)
4-18-3	135-145	4	6	4	6	3.8	3.7	3.4	0.19	2.3
4-19-1	295-305	17	15	13	17	11	6.8	5.6	3.6	3.7
4-19-2	230-240	13	12	9	10	6.3 (5.1)	4.6	4.6	3.7 (4.1)	3.3 (2.7)
4-19-3	160-170	1	2	2	1	0.5	0.6	0.46	0.6	0.12
4-20-1	350-360	nd	0.5	0.6	0.8 (0.7)	0.6	0.5	0.74	0.72(0.71)	0.82

* WN01-6, -7, and -9 were sampled in September 2005.

CBMWD Extraction Well	Screen Interval	12/2004	6/2005	12/2005	6/2006
		PCE (µg/L)			
CB-1	175-210; 230-335	6.9	4.1	1.6	2.0
CB-2	150-225; 250-330	1.6	1.4	1.6	1.1

Site Inspection

The site inspection was conducted on August 17 and 18, 2006 by the USACE. The City of Whittier O&M site manager, Dan McKenna, also participated in the inspection and provided information during it. The purpose of the inspection was to assess the integrity of the treatment plant and facilities, including the record documentation, status of O&M activities, site conditions, and equipment condition. A copy of the site inspection checklist is included in Appendix 4.

The inspection found all equipment and the site to be in good condition. There were a few minor upkeep issues noted, but the site manager was aware of them and in the process of repairing them. The site manager also mentioned the occasional problem of vandalism. None of those issues affect the protectiveness or the integrity of the remedy. The site manager discussed some of the past operational problems; however, all past O&M issues have been resolved.

Interviews

The RPM and Community Involvement Coordinator interviewed Grace Allen, a volunteer docent at the Whittier Narrows Nature Center (WNNC), on September 8, 2006 (Appendix 5). As a docent, Ms. Allen leads group hikes through the WNNC where the Whittier Narrows OU extraction wells and other remedy components are located. She had an overall positive impression of the project and indicated that she had not seen any problems. She also stated that she speaks with many visitors and has never heard of any concerns. The RPM also spoke to the WNNC Superintendent, Colleen McKay, on September 18, 2006. She said she has heard no complaints and had no additional comments.

VII. Technical Assessment

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

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the IROD Amendment. The remedy has achieved the remedial objectives to minimize the migration of contaminants into the Central Basin.

In the shallow zone, although the current extraction rate is less than 50% of the design rate, migration of contaminants has been effectively controlled through a combination of factors, including focused groundwater extraction of the highest concentration shallow water, declining contaminant concentrations in the shallow groundwater migrating through the Whittier Narrows and naturally-occurring hydrogeologic conditions (e.g., extensive recharge of imported water, precipitation, and reclamation plant discharges) that act to inhibit downgradient migration of VOCs. The downgradient shallow zone monitoring well concentrations have always been low (even before the project was extracting shallow groundwater), and they remained low through

August 2004 (and September 2005). The September 2006 sampling will confirm current conditions in the shallow zone and enable EPA to conduct further evaluation of VOC transport and migration in the shallow zone. As part of remedy optimization, EPA will evaluate a permanent reduction in shallow zone extraction.

For the intermediate zone, there have been extended periods, including currently, where extraction has been close to or met the target rate of 6,000 gpm, providing effective containment of contaminant migration and ensuring compliance with the remedial objectives. Downgradient intermediate zone VOC concentrations have declined significantly since 2002, supporting the position that the remedy is meeting remedial objectives.

Operation and maintenance of the groundwater treatment plant has, on the whole, been effective although full-scale operations have been limited due to water rights and other administrative issues. There have also been electrical system difficulties that impacted operations, but these have been addressed. To date, interim O&M costs have exceeded original estimates. However, because of the changing operational conditions experienced in the first several years of operations, it is not yet clear how long-term O&M costs will compare to original estimates. Overall, there were not any O&M problems observed that will impact the long-term operation of the system or limit effectiveness.

There were opportunities for system optimization observed during this review, including reducing the amount of monitoring associated with drinking water production and potentially permanently reducing the shallow zone target extraction rates and taking advantage of the observed contaminant transport conditions near the Whittier Narrows Dam that are reducing shallow zone migration.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considereds (TBCs)

The RAOs used at the time of remedy selection are still valid. And there have been no changes in the ARARs and no new standards or TBCs affecting the protectiveness of the remedy (Appendix 2).

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The previous risk assessments identified the exposure pathways at Whittier Narrows as domestic use of groundwater including ingestion, inhalation, and dermal exposure. This five-year review assessed the potential for vapor intrusion and determined that this exposure pathway was incomplete at Whittier Narrows. See Appendix 6 for further discussion.

Since the 1997 risk assessment addendum and 1998 supplemental risk analysis, there have been a number of changes to the toxicity values for certain contaminants of concern at the Site. Some revisions to the toxicity values indicate a lower risk from exposure to these chemicals than

previously considered. On the other hand, evaluation of the toxicity values for PCE and TCE is ongoing and may indicate higher risks from exposure than previously considered. The greatest uncertainty with toxicological changes for the Site is associated with TCE. In August 2001, U.S. EPA's Office of Research and Development (ORD) released the draft "Trichloroethylene Health Risk Assessment: Synthesis and Characterization" ("TCE Health Risk Assessment") for external peer review. The draft TCE Health Risk Assessment takes into account recent scientific studies of the health risks posed by TCE. According to the draft TCE Health Risk Assessment, for those who have increased susceptibility and/or higher background exposures, TCE could pose a higher risk than previously considered. This issue will need to be updated in subsequent five-year reviews.

Finally, there have been three new contaminants that have been detected at the Whittier Narrows OU: 1,4-dioxane, NDMA, and perchlorate. Concentrations of perchlorate and 1,4-dioxane are below Region 9' s Preliminary Remediation Goals. Groundwater extracted from wells containing NDMA is currently discharged to an on-site lake.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The original assessment of the site concluded that there would be no ecological receptors because it is a groundwater remedy with the preferred end-use of the treated water to be drinking water. However, since the detection of NDMA, a portion of the extracted water is treated for VOCs and discharged on-site into Legg Lake with low-levels of NDMA. A review of current data indicates that the levels are protective of the environment.

The November 1999 IROD Amendment for the Whittier Narrows OU discussed the governmental controls that affect extraction and use of groundwater. There are no specifically tailored institutional control (IC) instruments in place at the site and due to the size of the affected area, it would not be feasible to restrict each individual parcel with land use controls. However, the governmental controls in place at the site act as effective institutional controls. The primary governmental control is the Amended Judgment of August 24, 1989 (including Amendments through February 24, 1992) in the matter of Upper San Gabriel Valley Municipal Water District v. City of Alhambra, et. al., amending the original judgment entered on January 4, 1973 by the Superior Court of California, County of Los Angeles, establishing the entity known as "Watermaster" with full authority to allocate water resources throughout the San Gabriel Valley. In conjunction, governmental controls on the use of groundwater as drinking water include EPA promulgated maximum contaminant levels ("MCLs") and California State Action Levels that require drinking water standards be met prior to serving the water. These drinking water controls and the Watermaster's authority to regulate and allocate water resources eliminate unregulated use of area groundwater; therefore, the remedy is currently protective.

There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the IROD Amendment. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. The remedy is meeting all ARARs in the IROD Amendment, and there have been no changes in ARARs affecting the protectiveness of the

remedy. There have been no changes in the toxicity factors for the contaminants of concern that were use in the previous risk assessments or the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Table 4: Issues

Issues	Affects Current Protectiveness	Affects Future Protectiveness
Shallow zone extraction rate less than 50% of design rate	No	No
Long-term shallow water end-use to be determined	No	No
Actual O&M costs exceed estimated costs, esp. electricity, labor, and analytical costs	No	No
Electrical cable and system failures	No	No
Revisit frequency of downgradient monitoring	No	No

IX. Recommendations and Follow-up Actions

Table 5: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Milestone Date	Affects Protectiveness	
			Current	Future
Shallow zone extraction and long-term end-use	1) Evaluate contaminant transport within shallow zone to determine minimum necessary extraction rate; permanently reduce shallow zone extraction rate as appropriate 2) Finalize agreements for long-term end-use	12/31/07	No	No
Annual O&M Costs	1) Conduct Remedy System Evaluation (RSE) to identify optimization opportunities and cost savings 2) Negotiate reduced CADHS permit monitoring	12/31/07	No	No
Electrical system failures	USACE investigation into electrical cable and system failures	3/31/07	No	No
Downgradient monitoring	After conducting September 2006 monitoring event, reevaluate monitoring frequency	6/30/07	No	No

X. Protectiveness Statement

The remedy at Whittier Narrows OU is protective of human health and the environment.

XI. Next Review

The next five-year review for the Whittier Narrows OU, San Gabriel Valley (Area 1) Superfund Site is required by September 2011, five years from the date of this review.

Attachments

Figures 1-4

Appendices 1-6

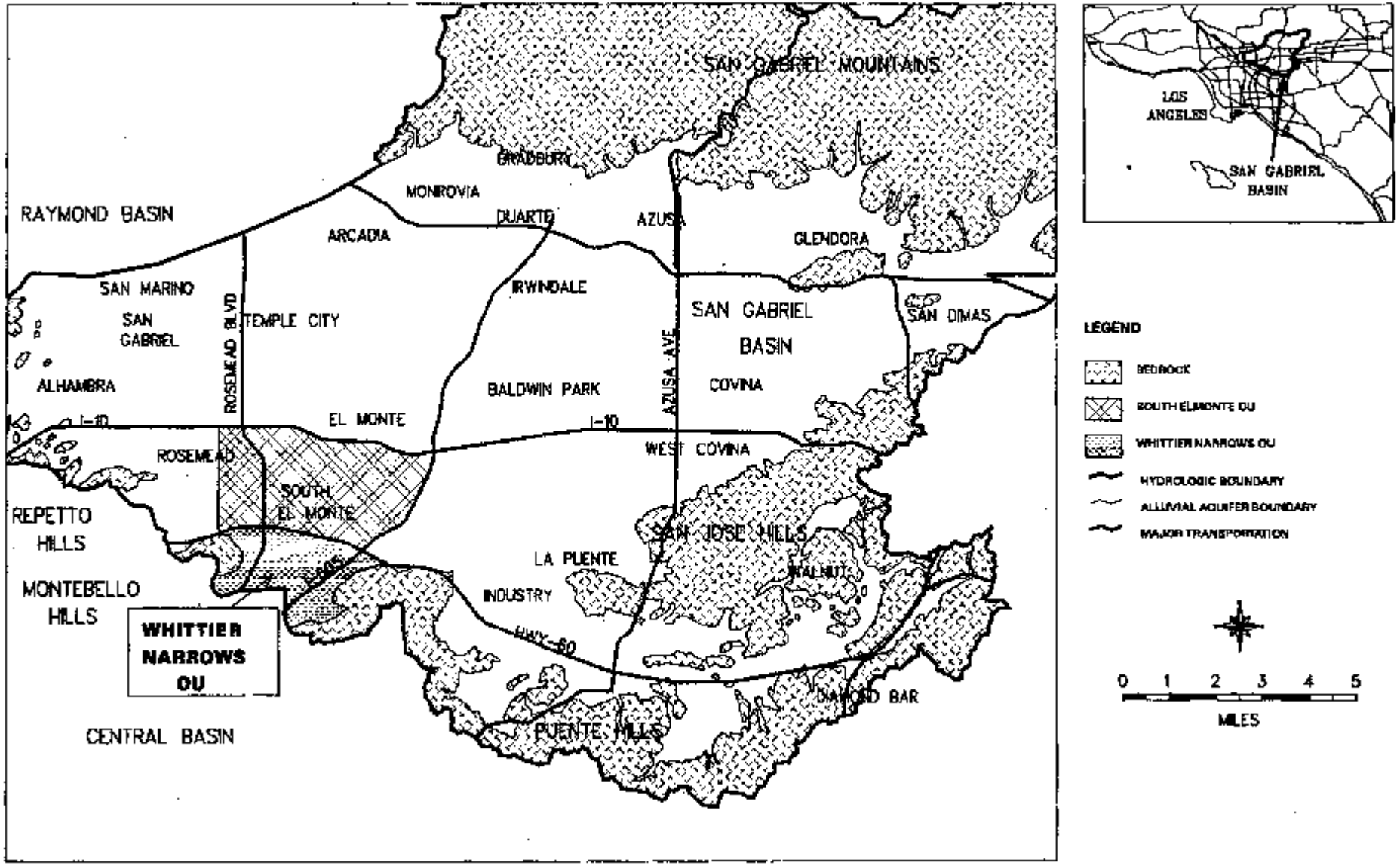

FIGURE 1
SITE LOCATION MAP

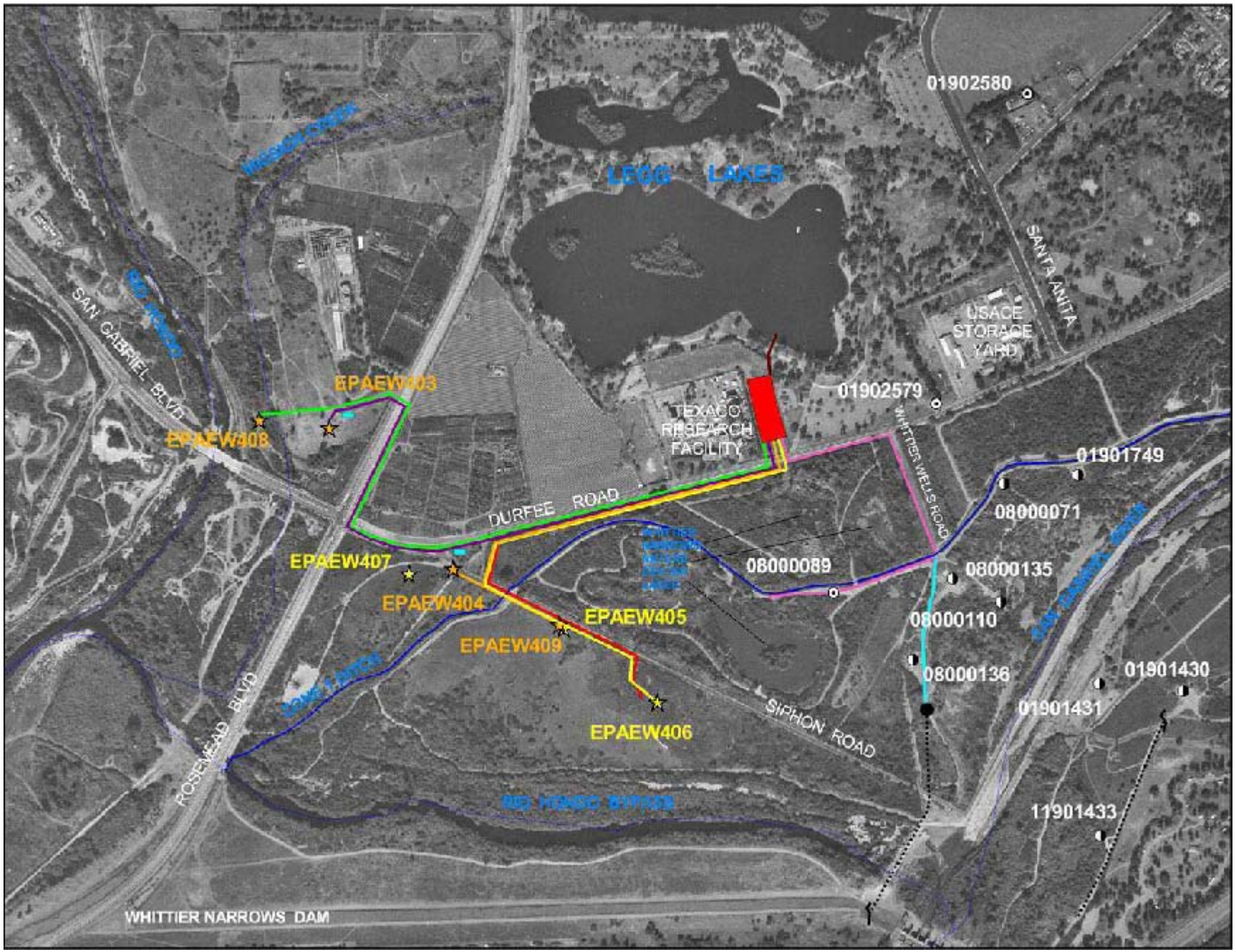

FIGURE 2
WHITTIER NARROWS PROJECT COMPONENTS

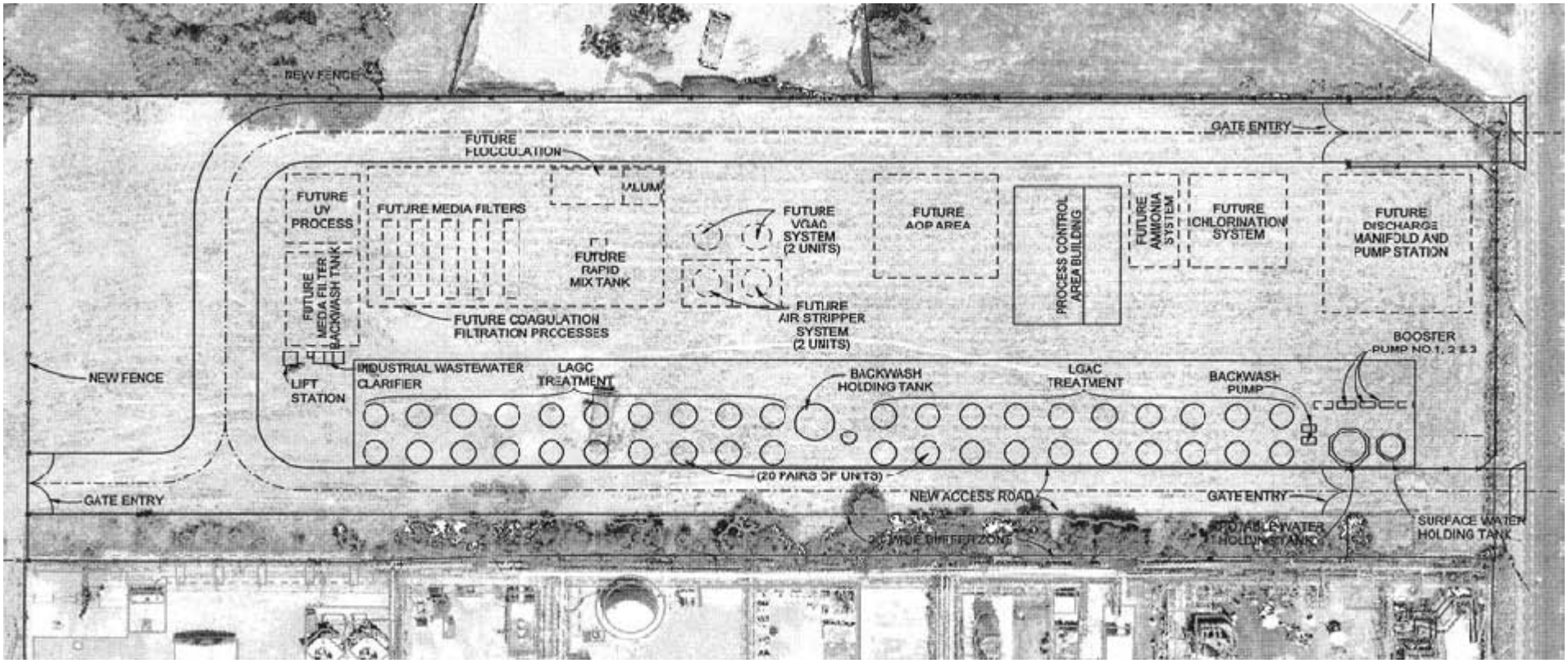

FIGURE 3
WHITTIER NARROWS TREATMENT PLANT LAYOUT

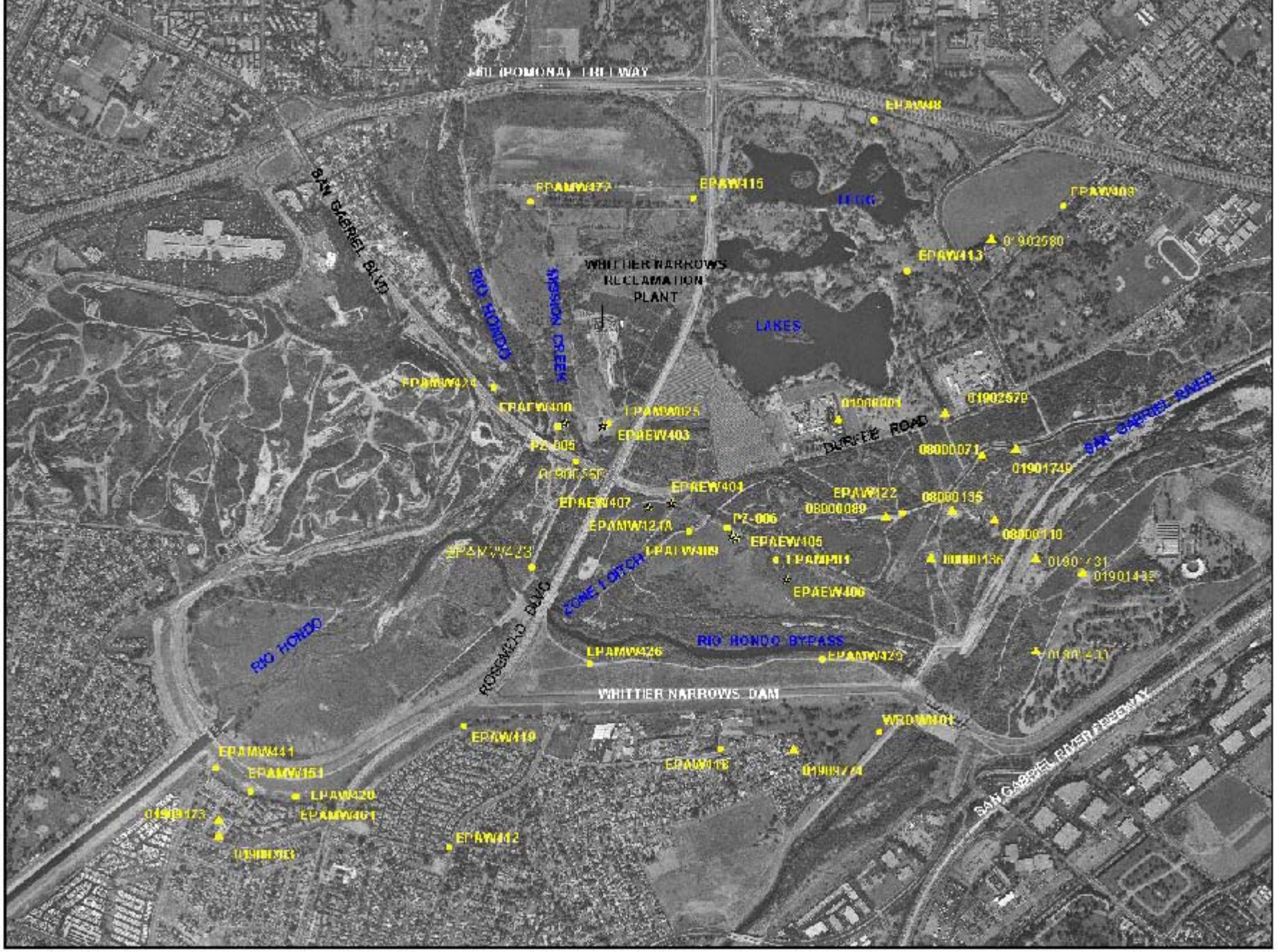

FIGURE 4
WHITTIER NARROWS MONITORING WELLS

Whittier Narrows Five-Year Review
List of Documents Reviewed

Interim Record of Decision Amendment, San Gabriel Valley Superfund Site, Whittier Narrows Operable Unit, U.S. Environmental Protection Agency, November 10, 1999

Interim Remedial Action Report, San Gabriel Valley Area 1 Superfund Site – OU 2, Whittier Narrows Operable Unit, U.S. Environmental Protection Agency, September 30, 2003

Recommendations to Repair Service to Pumps EW4-6 and EW4-9 for Whittier Narrows, U.S. Army Corps of Engineers, March 24, 2006

Review of the Monitoring Program at the Whittier Narrows Operable Unit – Groundwater Treatment Plant, Neptune and Company, Inc., August 1, 2006

System Operations/O&M Technical Memorandum, CH2MHill, August 6, 2006

Whittier Narrows Supplemental Risk Assessment to the 1992 Baseline Risk Assessment – Risk-Based Evaluation of 1997 Groundwater Data, CH2MHill, July 24, 1998

5-Year Review – Applicable or Relevant and Appropriate Requirements (ARARs) Evaluation for the Whittier Narrows OU, San Gabriel Valley Superfund Sites

PREPARED FOR: Patricia Bowlin/EPA Region IX

PREPARED BY: CH2M HILL

DATE: August 14, 2006

PROJECT NUMBER: 164018.PJ.07

This technical memorandum presents an evaluation of the Applicable or Relevant and Appropriate Requirements (ARARs) at the Whittier Narrows OU (WNOU) of the San Gabriel Valley Superfund Sites (site).

Purpose of ARARs Review

The purpose of an ARARs review is to determine whether laws, regulations, or guidance promulgated since approval of site decision documents alter the remedy's protectiveness of human health and the environment.

ARARs are established in the Record of Decision (ROD). Changes to ARARs, where necessary, can be memorialized in ROD Amendments or Explanation of Significant Differences (ESDs).

The preamble to the National Contingency Plan (NCP) states that remedy selection decisions are not to be reopened unless new or modified requirements call into question the protectiveness of the selected remedy (55 CFR 8757, March 8, 1990). This is interpreted to mean generally that ARARs are frozen at the time of remedy approval, unless updated by additional decision documents.

ARARs Background

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that remedial actions implemented at CERCLA sites are carried out in compliance with any Federal or more stringent State environmental standards, requirements, criteria, or limitations that are determined to be ARARs.

CERCLA response actions are exempted by law from the requirement to obtain Federal, State or local permits related to any activities conducted completely on-site. However, this does not remove the requirement to meet the substantive provisions of permitting regulations that are ARARs.

Applicable. Applicable requirements are cleanup standards, criteria, or limitations promulgated under federal or state law that specifically address the situation at a CERCLA site. A requirement

is applicable if the jurisdictional prerequisites of the environmental standard show a direct correspondence when objectively compared with the conditions at the site.

Relevant and appropriate. If a requirement is not legally applicable, the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations sufficiently similar to the circumstances of the proposed response action and are well suited to the conditions of the site. The criteria for determining relevance and appropriateness are listed in 40 CFR 300.400(g) (2).

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

Pursuant to EPA guidance, ARARs generally are classified into three categories: chemical-specific, location-specific, and action-specific requirements. These categories of ARARs are identified below:

- **Action-specific ARARs** are requirements that apply to specific actions that may be associated with site remediation. Action-specific ARARs often define acceptable handling, treatment, and disposal procedures for hazardous substances. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Examples of action-specific ARARs include requirements applicable to landfill closure, wastewater discharge, hazardous waste disposal, and emissions of air pollutants.

- **Chemical-specific ARARs** include those laws and regulations that regulate the release to the environment of materials possessing certain chemical or physical characteristics or containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limits for specific hazardous substances.

- **Location-specific ARARs** are those requirements that relate to the geographical or physical location of the site, rather than the nature of the contaminants or the proposed site remedial actions. These requirements may limit the placement of remedial action, and may impose additional constraints on the cleanup action. For example, location-specific ARARs may refer to activities in the vicinity of wetlands, floodplains, endangered species habitat, and areas of historical or cultural significance.

Whittier Narrows OU Background

The WNOU is located within the San Gabriel Valley Superfund Site, Area 1 (CAD980677355), in Los Angeles County, California. The San Gabriel Valley Area 1 site is part of a larger area of groundwater contamination located near the San Bernardino County border, in Los Angeles County, California. The site is situated to the south of the Pomona Freeway and to the west of the San Gabriel Freeway, and consists of low lying hills. Much of WNOU is utilized for flood control, and the Whittier Narrows Flood Control Dam serves as a boundary between the adjacent San

Gabriel and Central Basins. Two major rivers located within WNOU boundaries are the San Gabriel and Rio Hondo Rivers. Land use in the area is a mix of residential, commercial, recreational, and light industrial. The nearest residential areas are South El Monte and South San Gabriel to the north and Montebello and Pico Rivera to the south. Groundwater from onsite production wells is used for domestic, industrial, and agricultural purposes. Whittier Narrows is the only location where groundwater flows out of the San Gabriel Basin into the adjoining Central Basin.

The San Gabriel Valley has been the subject of environmental investigation since 1979 when groundwater contaminated with volatile organic compounds (VOCs) was first identified. Subsequent investigation by EPA and others revealed the extent of groundwater contamination in the aquifers of the San Gabriel Valley (the San Gabriel Valley groundwater system is known as the San Gabriel Basin). In May 1984, four broad areas of contamination within the basin were listed as San Gabriel Areas 1 through 4, and the San Gabriel Valley was listed on EPA's NPL.

WNOU is officially part of the San Gabriel Valley Area 1 Superfund Site. EPA divided the San Gabriel Basin into eight operable units (OUs) to provide a means of planning remedial activities in the basin. WNOU is one of eight OUs within the San Gabriel Valley Superfund Site. The other OUs identified by EPA are Alhambra, Baldwin Park, El Monte, Puente Valley, Richwood, South El Monte and Suburban.

The groundwater contamination in the San Gabriel Basin results from the historic use and improper handling and disposal of tetrachloroethene (PCE), trichloroethene (TCE), and other chemicals. These chemicals were used in large quantities at industrial facilities across much of the San Gabriel Valley as early as the 1940s, and by hundreds of businesses in the 1960s, 1970s and 1980s for degreasing, metal cleaning, and other purposes. The chemicals were released to the ground by a combination of disposal, careless handling, leaking tanks and pipes, and other means.

EPA conducted Remedial Investigation/Feasibility Study (RI/FS) activities in the WNOU beginning in the late 1980s. The RI/FS approach is a methodology that the Superfund program has established for characterizing the nature and extent of risks posed by uncontrolled hazardous waste sites to evaluate potential remedial options. The RI serves as a mechanism to collect data for site characterization. The FS serves as the mechanism for development, screening, and evaluation of potential remedial alternatives. An Operable Unit Feasibility Study (OUFS) Report for the WNOU was completed and issued for public review in September 1992. At that time, contaminant concentrations were low and posed a minimal threat to human health and groundwater supplies in the Central Basin.

EPA has issued the following decision documents for the WNOU:

- Record of Decision (ROD), issued March 31, 1993

- ROD Amendment, issued November 10, 1999

The WNOU 1993 ROD focused on evaluation of groundwater contamination potentially flowing from upgradient areas in the San Gabriel Basin into the Whittier Narrows Area and subsequently into the Central Basin. The selected remedial action, as stated in the ROD, was no action, with groundwater monitoring.

Initially, contaminant concentrations were relatively low throughout Whittier Narrows and groundwater resources in the Central Basin were not threatened. Then contaminated groundwater from upgradient areas began migrating into the western side of Whittier Narrows causing significant increases in contaminant concentrations. The increases in contaminant concentrations posed an imminent threat to groundwater resources in the Central Basin. This threat prompted EPA to initiate additional data collection activities and evaluation of active remedial actions.

In 1997, EPA initiated additional groundwater monitoring and further characterization of the hydrogeology in western Whittier Narrows. New monitoring wells were installed, and large-scale aquifer tests were conducted using City of Whittier, Pico Rivera, and Texaco production wells. Results of EPA's investigations in Whittier Narrows were presented in the Site Characterization Report for Whittier Narrows (EPA, 1998a).

The 1999 ROD Amendment specified containment of groundwater exceeding drinking water standards in the vicinity of Whittier Narrows Dam as the site remedy. The selected remedial actions included groundwater containment near the Whittier Narrows Dam by extraction, treatment and discharge.

The system was designed to contain groundwater with chemical contaminant concentrations above primary drinking water standards and consisted of five key components:

- Groundwater extraction system located near the downgradient limit of contaminant concentrations exceeding maximum contaminant levels (MCLs).

- Centralized treatment to reduce contaminant concentrations to acceptable levels.

- Conveyance systems, such as pipelines and booster pumps, to transport contaminated groundwater from the wells to the treatment plant and to transport treated water from the plant to the designated end use.

- Discharge of the treated water; discharge options include use by a local water purveyor, recharge of the water back to the aquifer using existing Montebello Forebay spreading grounds or other recharge facilities.

- Groundwater monitoring to help optimize system design; measure the performance of the containment system and provide early warning of upgradient conditions that could affect the system.

The remedy was configured to meet ARARs. This includes ARARs related to protection of the drinking water supply, treatment of extracted groundwater, and discharge of the treated water (either to water purveyors or to the San Gabriel River and/or Rio Hondo).

The following chemicals of concern (COCs) at the site were identified in the 1999 ROD Amendment:

- Chloroform
- 1,1-Dichloroethene (1,1-DCE)
- 1,2-Dichloroethane (1,2-DCA)
- 1,4-Dioxane
- Tetrachloroethene (PCE)
- Trichloroethene (TCE)

The ROD identified MCLs as groundwater cleanup standards for the site.

Whittier Narrows OU ARARs Review

The following three tables list the ARARs established in the 1999 ROD Amendment, summarize the requirement for each ARAR, cite the regulatory basis for each ARAR, state the evaluated status of each ARAR, and comment on regulatory changes for each ARAR where applicable.

Table 1 contains action-specific ARARs, Table 2 contains chemical-specific ARARs, and Table 3 contains location-specific ARARs. The tables provide the applicable requirements and citation for each established ARAR; and describe whether any updates have occurred for each ARAR in the previous five years. Current versions of the California Code of Regulations (CCR), and the Code of Federal Regulations (CFR) were consulted to review pertinent updates of laws, regulations, or guidance.

Action-specific ARARs and TBCs

Actions identified in the 1999 ROD Amendment include:

- groundwater extraction, treatment, and treated water discharge
- management and disposal of hazardous waste

Table 1 presents the action-specific ARARs and TBCs for the site. As stated in the 1999 ROD Amendment, Subsection III.G of the California State Water Resources Control Board (SWRCB) Resolution 92-49 "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304" requires attainment of background water quality or, if background levels cannot be restored, the best quality of water that is reasonable. Resolution 92-49 is not an ARAR because this is a remedial action intended to contain the spread of contamination, rather than a final action intended to restore groundwater in the WNOU.

Chemical-specific ARARs and TBCs

Table 2 presents the chemical-specific ARARs and TBCs for the site.

The 1999 ROD Amendment specified MCLs as groundwater cleanup standards for the site. Based on the Safe Drinking Water Act (SDWA), and pursuant to 40 CFR Section 300.430(e)(2)(i)(B), MCLs and non-zero Maximum Contaminant Level Goals (MCLGs) are relevant and appropriate as in-situ aquifer standards for groundwater that is used, or may be used, as drinking water. None of the chemicals of concern in WNOU groundwater has an MCLG that is more stringent than its MCL.

As stated in the 1999 ROD Amendment, EPA has determined that the federal MCLs are ARARs for any groundwater that is treated and used for domestic, municipal, industrial, or agricultural purposes, and for any groundwater that is discharged to the environment. In addition, these MCLs are ARARs for currently uncontaminated groundwater in the Montebello Forebay downgradient of Whittier Narrows Dam.

California has established state MCLs for sources of public drinking water, under the California Safe Drinking Water Act of 1976, Health and Safety Code (H&SC) Section 4010.1 and 4026(c), CCR Title 22, Sections 64431 and 64444. Some state MCLs are more stringent than the

corresponding federal MCLs. EPA has determined that the more stringent state MCLs are relevant and appropriate for the WNOU.

There are also some chemicals that lack federal MCLs. Where state MCLs exist for chemicals that lack federal MCLs, EPA has determined that the state MCLs are relevant and appropriate for the WNOU.

As stated in the 1999 ROD Amendment, because the selected remedy is an interim measure to contain contaminant migration, EPA has not established chemical-specific ARARs for restoration of the contaminated portions of the WNOU; therefore, ARARs for restoration will be addressed in the Final ROD for the San Gabriel Valley Superfund Sites.

Location-specific ARARs and TBCs

Table 3 presents location-specific ARARs and TBCs for the site. The table shows that revisions in the state and federal regulations did not affect the location-specific ARARs and TBCs in the ROD.

TABLE 1
Action-Specific ARARs

Action	Requirement	Citation	Origin	Determination	Status	Comments
Groundwater Extraction, Treatment, and Treated Water Discharge	Protect water quality objectives as identified in the Water Quality Control Plan for the Los Angeles Region (Basin Plan).	CWA; SDWA; and Porter-Cologne	1999 ROD Amendment	Applicable	No Change	Porter-Cologne Water Quality Act incorporates the requirements of the federal Clean Water Act and implements additional standards and requirements for surface and groundwater of the state.
Groundwater Extraction, Treatment, and Treated Water Discharge	Any activity that may increase the volume or concentration of a waste discharged to surface or groundwater is required to use the "best practicable treatment or control."	State Water Resource Control Board Resolution 68-16	1999 ROD Amendment	Applicable	No Change	Resolution 68-16 is applicable if the remedy discharges treated groundwater to either the Rio Hondo or the San Gabriel River.
Groundwater Extraction, Treatment, and Treated Water Discharge	Site investigation activities removal actions meet best available technology economically achievable for treatment and disposal of discharges.	CERCLA Section 104(b)	1999 ROD Amendment	Applicable	No Change	Site investigation activities undertaken pursuant to CERCLA § 104(b) are considered to be removal actions (e.g., discharges from aquifer testing and spinner logging/depth specific sampling of water supply wells).
Management and disposal of hazardous waste	Land disposal requirements	RCRA; and CCR Title 22, Division 4.5	1999 ROD Amendment	Applicable	No Change	Land disposal requirements are applicable to the disposal of spent carbon generated during the treatment of groundwater for removal of VOCs.
Management and disposal of hazardous waste	Manifest requirements.	RCRA; and CCR Title 22, Division 4.5	1999 ROD Amendment	Applicable	No Change	Manifest requirements are ARARs in the event that the remedial action involves multiple water treatment units at different locations and requires the movement of hazardous wastes (e.g., spent carbon) between these locations.
Vadose zone extraction and treatment	New source (air contaminant units) review requirements.	CAA; and SCAQMD Rules 1301 through 1313	1999 ROD Amendment	Applicable	No Change	Rule 1303 requires that all new sources of air pollution in the district use best available control technology and meet appropriate offset requirements. Emissions offsets are required for all new sources that emit in excess of one pound per day.
Vadose zone extraction and treatment	New source (air contaminant units) review requirements.	CAA; and SCAQMD Rule 1401	1999 ROD Amendment	Applicable	No Change	SCAQMD Rule 1401 requires that best available control technology for toxics be employed for new stationary operating equipment, so that the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of 10 in 1 million (1 x 10-5). Many of the contaminants found in the WNOU groundwater are air toxics subject to Rule 1401.

TABLE 1
Action-Specific ARARs

Action	Requirement	Citation	Origin	Determination	Status	Comments
Vadose zone extraction and treatment	New source (air contaminant units) review requirements.	CAA; and SCAQMD Rules 401 through 403	1999 ROD Amendment	Applicable	No Change	SCAQMD Rules 401 through 403 are also ARARs for construction and operation of remedial action facilities. SCAQMD Rule 401 limits visible emissions from a point source. Rule 402 prohibits discharge of material that is odorous or causes injury, nuisance, or annoyance to the public. Rule 403 limits downwind particulate concentrations.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

CCR = California Code of Regulations

CFR = Code of Federal Regulations

EPA = U. S. Environmental Protection Agency

Porter-Cologne = CA Porter-Cologne Water Quality Act

RCRA = Resource Conservation and Recovery Act

SCAQMD = Couth Coast Air Quality Management District

SDWA = Safe Drinking Water Act

VOCs = Volatile Organic Compounds

TABLE 2
Chemical-Specific ARARs

Contaminant	Requirement	Citation	Origin	Determination	Status	Comments
Chemicals of Concern (COCs) (Chloroform, 1,1-DCE, 1,2-DCA, 1,4-Dioxane, PCE and TCE)	MCLs and MCLGs are applicable to water treatment standards.	SDWA; 40 CFR Section 300.430(e)(2)(i)(B) CA H&SC Section 4010.1 and 4026(c), CCR Title 22, Sections 64431 and 64444	1999 ROD Amendment	Applicable	No Change (i.e., MCLs and MCLGs remain applicable as aquifer standards	Federal MCLs and MCLGs, or California MCLs are relevant and appropriate as treatment standards for groundwater that is or may be used as drinking water.

Notes:
CA H&SC = California Health and Safety Code
CFR = Code of Federal Regulations
COCs = Chemicals of Concern
EPA = U. S. Environmental Protection Agency
MCLs = Maximum Contaminant Levels
MCLGs = Maximum Contaminant Level Goals
SDWA = Safe Drinking Water Act

TABLE 3
Location-Specific ARARs

Location	Requirement	Citation	Origin	Determination	Status	Comments
Locations that may impact listed threatened or endangered species	Avoid adverse impacts to listed threatened or endangered species, or conduct appropriate mitigation.	ESA; 15 USC Sections 1531 through 1544; 40 CFR Section 6.302(h) and 50 CFR Parts 17, 222 and 402	1999 ROD Amendment	Applicable	No Change	Any remedial actions that impact a proposed or listed threatened or endangered species or destroy or adversely modify the critical habitat of a listed species must comply with ESA.
Discharge to locations that may deleteriously affect fish, wildlife, or plant life	Prohibit the discharge of harmful quantities of hazardous materials into places that may deleteriously affect fish, wildlife, or plant life.	CA F&GC Sections 2080, 5650(a), 5650(b), 5650(f), 12015, and 12016	1999 ROD Amendment	Applicable	No Change	These provisions are applicable if the remedial action will result in the discharge of treated groundwater to surface waters.
Location of Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)	Prohibits the placement of TSDFs within 200 feet of a fault displaced during the Holocene epoch; and requires that TSDFs located within a 100-year floodplain be capable of withstanding a 100-year flood.	22 CCR Section 66264.18	1999 ROD Amendment	Applicable	No Change	These standards are applicable to the construction of any new groundwater treatment facilities used as part of this remedial action.
Preserve historic and archaeological resources	Establishes requirements for the evaluation and preservation of historical and archaeological data that may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	16 USC Section 469; and 40 CFR Part 6.301(c)	1999 ROD Amendment	Applicable	No Change	There are several documented archeological sites within the Whittier Narrows Flood Control Basin. These requirements are applicable if the remedial action will interfere with any of these facilities.
Preserve historic sites	Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	16 USC Sections 461 through 467; and 40 CFR Part 6.301(a)	1999 ROD Amendment	Applicable	No Change	The remedial action is not anticipated to affect any of the facilities regulated under the act. However, during any additional preliminary designs, a complete review shall be made of impacted areas.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

CFR = Code of Federal Regulations

ESA = Endangered Species Act of 1973

FR = Federal Register

TSDF = Hazardous Waste Treatment, Storage and Disposal Facilities

USC = United States Code

USFWS = U.S. Fish and Wildlife Service

Data Review Technical Memorandum

PREPARED FOR: Patricia Bowlin/U.S. EPA

PREPARED BY: David Towell/CH2M HILL

FINALIZED BY: Cynthia Wetmore/U.S. EPA

DATE: October 16, 2006

This memorandum provides an evaluation of the data collected in the Whittier Narrows OU over the five-year review period.

Data Reviewed

The primary contaminant in Whittier Narrows is perchloroethylene (PCE). PCE concentrations in Whittier Narrows OU (and some South El Monte OU) monitoring wells are shown in Table 1. Data on three other contaminants, commonly referred to as "emerging contaminants", are also reviewed in this TM. These are 1,4-dioxane, n-nitrosodimethylamine (NDMA) and perchlorate.

There are four primary sources of water quality data in the Whittier Narrows area:

1) OU-wide sampling of monitoring wells conducted periodically by EPA. As is shown in Table 1, EPA monitoring events occurred quarterly between 2001 and 2003. Semiannual events were conducted in 2004, with the last OU-wide event in August 2004.[1] Table 1 also includes other data sources, including early-warning well monitoring discussed below.

2) Extraction well and early-warning well monitoring conducted in accordance with the DHS operating permit. This sampling was conducted periodically through much of 2005, with the frequency increasing in late 2005 and into 2006 as the intermediate wells began producing potable water. Table 2 shows extraction well PCE data. The data in Table 2 are a combination of older data collected by EPA and the more recent sampling associated with the DHS permit.

3) Extraction well sampling conducted at the two Central Basin Water Quality Protection Project (WQPP) production wells south of the Whittier Narrows Dam. Starting in December 2004, these two extraction wells have been sampled monthly. PCE data from the two extraction wells are presented in Table 3.

4) NDMA monitoring is being conducted throughout the Whittier Narrows area by the County Sanitation District of Los Angeles County. They are evaluating the water quality impacts (both surface water and groundwater) of the elevated NDMA present in the reclamation plant discharges. Table 4 summarizes available NDMA data between 2002 and 2006.

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1 EPA has just completed the September 2006 OU-wide monitoring event; data from this event is not yet available.

The other two emerging contaminants, 1,4-dioxane and perchlorate, have been analyzed periodically as part of both the 1st and 2nd data sources listed above. Table 5 presents available 1,4-dioxane data measured in Whittier Narrows (and some South El Monte) monitoring wells and Table 6 presents 1,4-dioxane results from the Whittier Narrows extraction wells. Similarly, Table 7 presents available perchlorate data from Whittier Narrows, and other nearby, monitoring wells and Table 8 shows perchlorate data from Whittier Narrows extraction wells. Table 9 shows PCE data from downgradient monitoring wells. Table 10 provides NDMA data from Whittier Narrows extraction wells.

Concentration Distribution and Trends

Shallow Zone Data

Overall, shallow zone PCE concentrations have dropped significantly in the upgradient portions of the Whittier Narrows OU. For examples, see wells 4-8-10, 4-15-5, and 4-72 on Table 1. In addition, shallow extraction well PCE concentrations have declined in all four wells (Table 2), with the most dramatic reductions occurring in EW4-3 where PCE concentrations dropped from 200 µg/L in December 1999 to less than 5 µg/L currently. The upgradient and early-warning well concentrations indicate that although there are slight increases in shallow extraction well PCE concentrations in the next couple of years, the long-term trend should be continued low levels. The declining upgradient concentrations, combined with the consistently non-detect or very low shallow zone concentrations downgradient (Table 9), support a conclusion that full, active containment of all shallow zone contamination water may not be necessary to meet the remedial action objectives.

The shallow 1,4-dioxane data shown in Table 5 indicate that elevated 1,4-dioxane concentrations are detected in the upgradient South El Monte OU. However, in the upgradient portions of the Whittier Narrows OU, concentrations remain relatively low (see 4-8, 4-13, 4-15, and 4-72.). Further, 1,4-Dioxane concentrations in Whittier Narrows OU shallow extraction wells (Table 6) remain low to non-detect. At this stage the existing data are inconclusive regarding whether or not 1,4-dioxane concentrations will increase enough in the future to result in the need for treatment (the current DHS notification level is 3 µg/L). However, increases in 1,4-dioxane concentrations at the shallow extraction wells do not appear to be imminent.

Only limited recent perchlorate data are available for Whittier Narrows monitoring wells (Table 7). However, there are enough data points to conclude that perchlorate is not currently an issue that requires attention in Whittier Narrows. Perchlorate is not present in the Whittier Narrows OU shallow extraction wells (Table 8).

The NDMA data presented in Table 4 indicate that NDMA is not generally present at elevated concentrations in shallow groundwater in Whittier Narrows at the present time. However, NDMA concentrations are likely strongly influenced by where the Sanitation District is directing their effluent discharge from the Whittier Narrows Reclamation Plant and potentially the San Jose Creek Reclamation Plant. Most of the time over the last two years, the Sanitation District has been discharging to the San Gabriel River rather than the Rio Hondo or Zone 1 Ditch. Table 10 provides NDMA data from Whittier Narrows extraction wells. As shown in the table, shallow extraction wells EW4-3 and 4-8 were both impacted by elevated NDMA for over two years from late 2002 into early 2005. However, these levels have declined considerably over the last year.

Intermediate Zone Data

Similar to the shallow zone, PCE concentrations have generally been declining in the intermediate zone in Whittier Narrows (Table 1). However, in general the reductions have been less dramatic and less consistent in the intermediate zone compared to the shallow zone. One key observation is that intermediate zone PCE concentrations downgradient of the remedy (Table 9), were consistently decreasing between late 2002/early 2003 and 2004. This is important, because for several years prior to 2002 downgradient intermediate zone concentrations had been increasing. Although there are no monitoring well data available after August 2004 to confirm whether or not this trend has continued, PCE data are available from the two Central Basin MWD production wells that are located near some of these downgradient monitoring wells. Table 3 includes the PCE data for CB-1 (located near monitoring wells 4-6 and 4-20) and CB-2 (located near monitoring well 4-12). The monthly monitoring data from the two active production wells indicate that PCE concentrations have remained fairly constant over the last 1.5 years. Although these data are not directly comparable to the nearby monitoring wells, it is likely that the general trends between the two data points would be similar. The declining concentrations are likely at least partly attributable to the extensive Whittier Narrows intermediate zone pumping in 2002 and 2003.

PCE concentrations in all three of the three Whittier Narrows intermediate zone extraction wells (Table 2) have dropped since 2002, consistent with the overall PCE trend in Whittier Narrows. However, significant upgradient intermediate zone concentrations remain in southern South El Monte OU (see SEMW-3 data in Table 1). The current distribution of PCE in upgradient wells indicates the extraction rates needed to provide intermediate zone containment are not likely to change significantly over the next several years.

The intermediate zone 1,4-dioxane data shown in Table 5 indicate that low-level detections are fairly prevalent in the upgradient portions of the Whittier Narrows OU and southern portion of the South El Monte OU. Concentrations are generally at or below 1 µg/l except at SEMW3-3 where they are higher (8.3 µg/L in February 2006). 1,4-Dioxane is present in all three Whittier Narrows OU intermediate-depth extraction wells (Table 6) at concentrations less than 1 µg/L. Based on the current distribution of 1,4-dioxane, contaminant levels are not likely to increase substantially over the next several years and should remain well below the DHS notification level of 3 µg/L.

The recent perchlorate data from southern South El Monte indicate that perchlorate is not likely going to be a concern in Whittier Narrows well into the future. Perchlorate concentrations in the SEMOU wells located closest to Whittier Narrows are generally less than 2 µg/L (Table 7). Perchlorate has not been detected in the Whittier Narrows intermediate extraction wells since two low-level detections in early 2002 (Table 8).

Fairly limited monitoring of NDMA has occurred in the intermediate zone in the Whittier Narrows area. However, the available data in Table 4 indicate that NDMA is not generally present at elevated concentrations in the intermediate zone. As shown in Table 10, one exception has been EW4-7, the westernmost Whittier Narrows intermediate extraction well. This well is screened a bit shallower than the other intermediate wells (up to 160 feet below ground) and is located more directly downgradient of the elevated shallow zone concentrations of NDMA observed in the EW4-3 and EW4-8 vicinity. The highest concentrations were detected at the same general time frame as the record-setting rainfalls and flooding occurred in Whittier Narrows. This additional recharge may have temporarily increased vertical migration of the shallow NDMA impacts in western Whittier Narrows. NDMA concentrations in EW4-7 have been consistently in the 3 to 6 ppt range for the last year. These concentrations are expected to remain low as long as the shallow NDMA levels and local hydrogeologic conditions don’t change.

Conclusions

In the shallow zone, migration of contaminants has been effectively controlled through a combination of factors, including focused groundwater extraction of the highest concentration shallow water (e.g., the western portion of the shallow zone), declining contaminant concentrations in the shallow water migrating through the Whittier Narrows and naturally-occurring hydrogeologic conditions (e.g., extensive recharge of imported water, precipitation [including record-setting rainfall] and reclamation plant discharges) that act to inhibit downgradient migration of VOCs. The downgradient shallow zone monitoring well concentrations have always been low (even before the project was extracting shallow groundwater) and they remained low through August 2004. September 2006 sampling will confirm current conditions in the shallow zone. If shallow VOC concentrations remain low in downgradient areas, EPA should consider conducting additional evaluations of contaminant transport within the shallow zone in Whittier Narrows. These technical evaluations could potentially form the basis for a permanent reduction in the target extraction rates.

For the intermediate zone, there have been extended periods, including currently, where extraction has been close to or met the target rate of 6,000 gpm, thereby providing effective containment of contaminant migration and ensuring compliance with the remedial objectives. Downgradient intermediate zone VOC concentrations have declined significantly since 2002, supporting the position that the remedy is meeting remedial objectives. To continue to meet the remedial objectives, it appears that intermediate zone extraction will need to continue at close to the target rates. Past monitoring has confirmed that VOCs migrate relatively quickly downgradient in the intermediate zone and, without extraction, represent a threat to aquifer intervals used for drinking water production in Whittier Narrows and the Central Basin.

Table 1
PCE Data for Selected Wells in the Whittier Narrows and South El Monte Operable Units
(Updated through June 2006)

Well	Screen Interval	PCE																		
		Feb-2001	May-2001	Aug-2001	Nov-2001	Feb-2002	May-2002	Aug-2002	Nov-2002	Feb-2003	May-2003	Aug-2003	Nov-2003	Feb/Mar-2004	Aug-2004	Apr-2005	Aug/Sep-2005	Dec-2005	Feb/Mar-2006	Jun-2006
Pomona Fwy West																				
4-8-5	460-470	---	nd	---	nd, nd	---	---	---	nd, nd	---	---	---	0.21/0.19	---	---					
4-8-6	375-385	12, 16	---	17	21	---	---	---	27	---	---	---	10	---	---					
4-8-7	285-295	20	---	23	29	29, 29	29	25, 30	30	22, 27	26	26, 27	8.5	23/29	23					
4-8-8	230-240	---	32	---	25	---	---	---	49	---	---	42	4.6	---	18/23					
4-8-9	95-105	9	---	18	34	26	26	49	24	20	17	23	4.8	19	4.4					
4-8-10	45-55	12	---	23	24	---	---	---	35	---	---	---	4.1	---	6.5					
Pomona Fwy West-Central																				
4-9-6	350-360					---	---	---	nd	---	---	---	ND	---	---					
4-9-7	295-305					---	---	---	nd	---	---	---	ND	---	---					
4-9-8	230-240	---	0.5	---	0.85	1	1	1	1	2	1.8	2.4	1.7	3.5	4.2			5.1	ND	5.6
4-9-9	100-110	---	10	---	17, 15	---	---	---	10, 12	---	5.3	---	2.9	---	---					
4-9-10	40-50	---	10	---	1.8	1	nd	nd	nd	11	---	0.5	0.25	3.6	ND					
Pomona Fwy East-Central																				
4-10-2	675-685																	ND		ND
4-10-3	595-605																	1.3		1.1
4-10-4	470-480																	2.6		2.2, 1.0
4-10-5	320-330	---	---	---	0.6	---	---	---	2	---	---	---	0.95	---	---			0.56		0.56
4-10-6	220-230	---	---	---	nd, nd	---	---	---	nd, nd	---	---	---	0.23/0.3	---	---			0.38		ND
4-10-7	130-140	---	---	---	nd	---	---	---	nd	---	---	---	ND	---	---			ND		ND
4-10-8	65-75	nd	---	nd	nd	---	---	---	nd	---	---	---	ND	---	---					
4-10-9	35-45	nd	---	nd	nd	---	---	---	nd	---	---	---	---	---	---					
Central Basin nr. Rosemead																				
4-12-1	490-500	nd, nd	---	nd	nd	---	nd	---	nd	---	---	---	ND	---	---					
4-12-2	315-325	7	9	2	3	7	5	4	2	3	3.7	2.9	1.6	nd	1.2					
4-12-3	225-235	4	6,5	4,4	5,6	8	8	10	12	16	9.2	10, 13	6.7/9.1	10	9.2					
4-12-4	120-130	---	0.9	---	1	---	1	---	0.8	---	0.6	---	ND	---	---					
4-12-5	45-55	---	nd	---	nd	---	nd	---	nd	---	---	---	ND	---	---					
Legg Lake																				
4-13-1	415-425	---	---	11	nd	---	---	---	2	---	---	---	1.9	---	---					
4-13-2	340-350	5	---	10	29	---	---	---	17	---	---	---	25	---	---					
4-13-3	225-235	22	---	16	17	17, 20	23	22	17	20	15	18	10	16	15			14	9.7	7.4
4-13-4	130-140	9	---	8	8	10	9	15, 18	16	16, 25	18	19, 14	12	13/7.4	5.4			0.65	ND	ND
4-13-5	50-60	8	---	13,11	16	---	---	---	11	---	---	---	1.7	---	---					
Gun Range																				
4-15-1	335-345	8	---	8	8	---	---	---	8	---	---	8.6	5.8	---	---					
4-15-2	290-300	5	---	2	2, 2	---	---	---	0.9	---	---	---	0.84	---	---					
4-15-3	230-240	5	---	23	42	41	60	110	120, 90	130	170	190	110	170	99			3.2	29	43
4-15-4	145-155	66	29	59	93	100	120	80	230	240	210	240	180	220	210					
4-15-5	44-55	130,59	84	16,18	160	93	80	60	70	76	15, 14	35	58	20	6.9			32	6.3	21
Pachmayr Gun Range																				
472	82-92	110	100	77	120, 120	140	110, 120	140	140	150	100	160	120/81	80	31			8.9	ND	6.4
471	210-220	nd	---	---	nd	---	---	---	nd	---	---	---	ND	---	---					
WN Dam East																				
4-18-1	280-290	2	1	1	1	2	2	2	2	3	2.1	2.5	2.3	2.6	3.2					
4-18-2	230-240	3	4	2	3	5	4	4	2	4	3.4	4.8	4	4.1	3.6/4.5					
4-18-3	135-145	5	4	3	3	4	4	6	4	6	3.8	3.7	3.4	0.19	2.3					
4-18-4	95-105	3	2	2	2,2	4	3	3	3, 2	3	2.5	1.9, 2.1	1.6	1.6	1.9					
WN Dam Central																				
4-19-1	295-305	12	21	15	22	32	17	15	13	17	11	6.8	5.6	3.6	3.7					
4-19-2	230-240	11, 9	13,11	11	12	12	13	12	9	10	6.3, 5.1	4.6	4.6	3.7/4.1	3.3/2.7					
4-19-3	160-170	2	2	nd	2	2	1	2	2	1	0.5	0.6	0.46	0.6	0.12					
4-19-4	100-110	---	nd	---	nd	nd	nd	nd	nd	nd	nd	nd	ND	nd	ND					
4-19-5	40-50	---	nd	---	0.8	---	nd	---	nd	---	nd	---	ND	---	ND					
S. of Siphon Road on Zone 1 Ditch																				
4-21-A	266-296	---	6	---	6, 7	---	9	---	8, 8	---	9.2, 9.4	---	8.5/8	---	8.3					

Table 1
PCE Data for Selected Wells in the Whittier Narrows and South El Monte Operable Units
(Updated through June 2006)

Well	Screen Interval	PCE																		
		Feb-2001	May-2001	Aug-2001	Nov-2001	Feb-2002	May-2002	Aug-2002	Nov-2002	Feb-2003	May-2003	Aug-2003	Nov-2003	Feb/Mar-2004	Aug-2004	Apr-2005	Aug/Sep-2005	Dec-2005	Feb/Mar-2006	Jun-2006
4-21-B	70-90	---	8	---	4	---	3	---	11	---	1.2	---	5.8	---	1.3					
N.E. of Wildlife Ponds																				
4-22-1	430-440	---	0.3	---	0.3	---	0.7	---	1	---	1.3	---	ND	---	2.9					
4-22-2	385-395	---	12,10	---	10	---	17	---	21	26	21	---	ND	17	26					
4-22-3	315-325	---	17	---	13	---	22	---	20	24	20	---	5.8	28	11					
4-22-4	215-225	---	8	---	3	---	7	---	4, 4	---	3	---	1.9/1.3	---	0.18					
4-22-5	130-140	---	2	---	1	---	1	---	0.8	---	nd	---	ND	---	---					
4-22-6	45-55	---	nd	---	nd	---	nd	---	---	---	nd	---	ND	---	---					
Rosemead & San Gabriel																				
MW2-3									nd	---	---	---	ND	---	---					
MW2-4	202-222	nd	---	nd	nd	---	nd	---	nd	---	nd	---	ND	---	---					
MW2-5	68-88	25, 20	19, 16	54, 57	87, 85	140	90	29	6	0.6	27	1.7	ND	0.25	0.27					
Siphon Road																				
MP1-1	700-710	---	---	---	0.3	---	---	---	---	---	---	---	---	---	---					
MP1-2	610-620	---	---	---	nd	---	---	---	---	---	---	---	---	---	---					
MP1-3	500-510	---	---	---	0.7	---	---	---	0.8	---	---	---	ND	---	---					
MP1-4	430-440	4, 4	---	---	4	---	4	---	4	---	---	---	1.1	---	---					
MP1-5	380-390	20	---	---	19	---	23	---	---	---	19	---	2.2	---	17					
MP1-6	290-300	9	---	---	6,7	---	8	---	10	---	14	---	11	---	4.8/5.2					
MP1-7	230-240	5	---	---	3	---	4,6	---	13	---	4.7, 4	---	0.16	---	0.28					
MP1-8	155-165	8	---	---	3	---	0.8	---	0.7	---	nd	---	0.23	---	---					
Same as MP1 zones																				
MW1-3	380-390	---	---	---	---	---	26	---	35	---	---	---	---	---	---					
MW1-5	90-100	---	---	---	2	---	1	---	0.6	---	nd	---	ND	---	0.15					
Along WN Dam W. of Rosemead																				
MW461	251-261	5	5,5	7	7	12	12	17	14	12	10	12	9.6	8.9	5.6					
MW462	140-150	nd	nd	nd	nd	nd	nd, nd	nd	nd	nd	nd	nd	ND	nd	ND					
MW451	270-280	nd	0.5	1	2	3	4	4	4	3	2.2	2.1	1.6/1.7	1.4	0.66					
MW452	200-210	1	2	2	3	4	5	5	5, 5	4	3.8	3.7	3.2	2.6	1.5					
MW441	285-295	nd	---	nd	nd	---	nd, nd	---	nd	---	nd, nd	---	ND	---	ND/ND					
MW442	225-235	nd	---	nd	nd	---	nd, nd	---	nd	---	nd	---	ND	---	ND					
4-20-1	350-360	---	---	---	0.4	0.7	nd	0.5	0.6	0.8, 0.7	0.6	0.5	0.74	0.72/0.71	0.82					
4-20-2	70-80	---	---	---	nd	nd, nd	nd	nd	nd	nd	nd	nd	ND	nd	ND					
Los Angeles County and Texaco																				
08000088	NA	nd	---	---	---	---	---	---	---	---	---	---	---	---	---					
08000089	53-115	nd	---	nd	---	---	---	---	---	---	---	---	---	---	---					
01902579	264-683	---	---	0.3	---	---	---	---	---	---	---	---	---	---	---					
01900001	0-60	---	---	nd	---	---	---	---	---	---	---	---	---	---	---					
South El Monte OU																				
SEM 3-1	371-380	---	10	---	16	19	---	25	---	34	---	39	---	40	36	84	130		76	
SEM 3-2	265-275	---	50	---	81	120, 130	130	110	140	110, 140	150	200	150	140, 120	120	190			110	
SEM 3-3	180-190	---	30	---	77	81	---	80	---	120	---	190	---	69	78	210	210		273, 96	
SEM 3-4	62-72	---	10	---	5	---	2	6, 6	5, 5	8	5.2, 5.3	---	4.7	3.1	4.3	5.3, 5.4	6.6		18, 18	
SEM 5-1	381-391	---	22	---	---	36	---	40	---	60	---	66	---	65	35	78			52	
SEM 5-2	299-309	---	140	---	---	---	---	260	---	240	---	220	---	---	68	170	140			
SEM 5-3	209-218	---	440	---	---	510, 520	---	570	---	580, 610	---	910	---	350, 210	---	240 (6/05)	440, 480		468	
SEM 6-1	357-366	---	17	---	14	20	---	---	---	---	---	24	---	26	---	16				
SEM 6-2	270-280	---	100, 110	---	200	220	470	280	430	360	---	310	300	---	74	130	220	95	89 (ND)	70
SEM 6-3	120-129	---	29	---	67	---	---	90	---	170	---	220	---	140	---	150	180, 83		60	
SEM 6-4	58-67	---	56	---	57	---	90, 130	50, 60	81	160	---	150	88	77	48	57, 47	62	42	ND	37
WN Dam and SG River																				
WN01-3	462-482																0.7			
WN01-4	392-402	---	---	---	0.3	---	---	---	---	---	---	---	0.69	---	---		0.9			
WN01-5	334-344	---	---	---	0.6	---	---	---	---	---	---	---	0.4	---	---		ND			
WN01-6	273-283	---	1	0.6	0.3	---	nd	---	---	---	nd	---	ND	---	---		ND			
WN01-7	233-243	---	1,2	1	0.4, 0.5	---	0.5	---	---	---	nd	---	ND/ND	---	---		ND			
WN01-8	163-173	---	nd	nd	nd	---	nd	---	---	---	nd	---	ND	---	---		ND			

Table 1
PCE Data for Selected Wells in the Whittier Narrows and South El Monte Operable Units
(Updated through June 2006)

Well	Screen Interval	PCE																		
		Feb-2001	May-2001	Aug-2001	Nov-2001	Feb-2002	May-2002	Aug-2002	Nov-2002	Feb-2003	May-2003	Aug-2003	Nov-2003	Feb/Mar-2004	Aug-2004	Apr-2005	Aug/Sep-2005	Dec-2005	Feb/Mar-2006	Jun-2006
WN01-9	95-105	---	nd	---	nd	---	---	---	---	---	---	---	ND	---	---		ND			
SG Blvd. Near west. Hills																				
4-24	24-45	0.5	0.4	---	---	---	nd	---	nd	nd	nd	---	ND	---	ND					
Rio Hondo Bypass																				
4-23	70-90	nd	0.3	---	6	nd	2	nd	nd	nd	nd	nd	ND	nd	ND/ND					
4-25	25-50	---	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	ND	nd	ND					
4-26	27-52	---	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	ND/ND	nd	ND					

Notes:
nd = analyte not detected above detection limit (typically 1μg/L but ranged from 0.5 μg/L to 10 μg/L)
--- indicates that well was not in existence or was not sampled
duplicate samples separated by comma
NA = not available
sampling dates may vary slightly from months shown
some sampling data may be estimations of actual levels

TABLE 2

Shallow and Intermediate Extraction Well PCE Data

Whittier Narrows Operable Unit, Los Angeles County, California

	Date	PCE (ug/L)
		MCL = 5
Shallow Wells		
EW4-3	Aug-99	**65**
	Dec-99	**200**
	Aug-00	**63**
	Mar-02	**130**
	May-02	**70**
	Jun-02	**38**
	Aug-02	**14**
	Dec-02	0.5 U
	Jun-03	**5.4**
	Jan-05	**0.53**
	Dec-05	**0.9**
	Mar-06	**3.2**
	Jun-06	**3.3**
EW4-4	Aug-99	**18**
	Aug-00	**1.2**
	Mar-02	**11**
	May-02	**10**
	Jun-02	**11**
	Aug-02	**11**
	Sep-03	**15**
	Jan-05	**4.7**
	Dec-05	**2.7**
	Mar-06	**3.6**
	Jun-06	**0.88**
EW4-8	Aug-00	**13**
	Mar-02	**34**
	May-02	**13**
	Jun-02	**9**
	Aug-02	**4/3**
	Jun-03	0.5 U
	Jan-05	0.5 U
	Jan-06	0.5 U
	Jun-06	**6.8**
EW4-9	Aug-00	**9.5**
	Mar-02	**12**
	May-02	**8**
	Jun-02	**7**
	Aug-02	**9**
	Jun-03	**2**
	Jan-05	0.5 U
	Jun-06	**2**

TABLE 2

Shallow and Intermediate Extraction Well PCE Data

Whittier Narrows Operable Unit, Los Angeles County, California

	Date	PCE (ug/L)
Intermediate Wells		
EW4-5	Aug-99	**24**
	Mar-02	**23**
	May-02	**14**
	Jun-02	**24**
	Dec-02	**30**
	26-Jan-05	**4.6**
	27-Apr-05	**2.2**
	09-Dec-05	**15**
	10-Jan-06	**19**
	09-Feb-06	**18**
	08-Mar-06	**18**
EW4-6	Aug-00	**11**
	Mar-02	**14**
	May-02	**12**
	Jun-02	**12/12**
	Aug-02	**13**
	Dec-02	**10**
	01-Jun-05	**1.8**
	25-May-06	**3.8**
	06-Jun-06	**8.1**
	18-Jul-06	**6.5**
EW4-7	Aug-00	**15**
	Apr-02	**16**
	May-02	**17/17**
	Jun-02	**16**
	Aug-02	**19**
	Dec-02	**22**
	26-Jan-05	**12**
	27-Apr-05	**4.3**
	09-Dec-05	**7.7**
	10-Jan-06	**8.2**
	09-Feb-06	**8.1**
	08-Mar-06	**7.4**
	19-Apr-06	**7.0**
	10-May-06	**6.4**
	06-Jun-06	**7.0**
	18-Jul-06	**5.4**

Notes-

All data reported in µg/L.

Bold- Detected; Shaded- Exceeds drinking water standard

Table 3		
Central Basin Extraction Wells - PCE Data CBMWD's WQPP Project		
	Extraction Wells	
	CB-1	**CB-2**
Screens:	**175-335**	**150-330**
Month	**(ug/L)**	
December-04	6.9	1.6
January-05	6.0	1.8
February-05	2.9	1.0
March-05	3.7	1.5
April-05	2.9	0.8
May-05	3.8	1.4
June-05	4.1	1.4
July-05	2.1	1.4
August-05	-	1.4
September-05	1.6	1.4
October-05	1.3	1.4
November-05	1.3	1.4
December-05	1.6	1.6
January-06	1.2	1.2
February-06	2.6	1.8
March-06	2.2	1.5
April-06	2.7	1.6
May-06	1.8	1.2
June-06	2.0	1.1
July-06	1.2	0.9

Table 4

LACSD SUMMARY OF NDMA DATA FROM THE WHITTIER NARROWS OPERABLE UNIT (WNOU) WELLS
2002 THROUGH JULY 2006

Date	EW 4-3 (S)	EW 4-4 (S)	EW 4-5 (I)	EW 4-6 (I)	EW 4-7 (I)	EW 4-8 (S)	EW 4-9 (S)	MW 2-5	MW 4-21A	MW 4-21B	MW 4-23	MW 4-24	MW 4-25	MW 4-26	MW 4-72
Screens (bgs)	50 - 110	60 - 120	160 - 390	160 - 390	160 - 350	54 - 104	50 - 120	68 - 88	250 - 270	70 - 90	70 - 90	24 - 45	25 - 50	27 - 52	82 - 92
3/26/02			***< 2***	***< 2***											
3/28/02	***< 2***	***< 2***				***< 2***	***< 2***								
4/11/02					***< 2***										
12/3/02			***< 2***	***< 2***											
12/4/02	***97***				***2.1***										
2/19/03	***47***														
4/8/03	***30***				***2.1***										
5/14/03	19.6 (***25.9***)							12.5 (***12.6***)				3 (***2.95***)			< 2 (***<2***)
6/19/03						***26***	***< 2***								
8/13/03	8.1 (***6.65***)					7.7 (***6.13***)		6.2			36.5 (***26.7***)	< 2			< 2
9/23/03	8.2	< 2 (***< 2***)	< 2	< 2	7.6	12.8	< 2								
9/25/03								18	< 5		18.6	7	*	32.3	*
11/19/03															***<2***
11/25/03															<2**
2/11/04	11						< 2								
3/9/04															7.5
7/26/04	12	< 2				150	< 2	13	< 2		3	51	< 2	62	< 2
9/27/04	39	< 2				120	< 2	65	< 2		2.4	320	< 2	5.2	< 2
10/26/04	81	< 2				120	< 2	19	< 2		2.2	260	7.6	100	< 2
12/9/04	11	< 2	< 2		16	62	< 2	15	< 2		3.1	59	< 2	< 2	< 2
1/26/05		2.2	2.4		11		< 2								
2/1/05	16					13		21	< 2		2	9	< 2		< 2
4/21/05	5.3	< 2	< 2		6.8		< 2	< 2	< 2	< 2		< 2			< 2
6/1/05	3.3	< 2	< 2	< 2	3.1	5.8	< 2	< 2	< 2	2.5		< 2			< 2
6/29/05	E 1.8	< 2	< 2		2.7	2.8	< 2	< 2		< 2	< 2	< 2		28	
7/13/05										< 2		E 1			
8/18/05										E 0.63		< 2			
9/15/05	E 1.89	< 2	< 2		2.8	E 1.89	< 2	< 2	< 2	< 2		3			< 2
9/20/05										< 2					
9/22/05												34			
9/23/05											< 2.1				
10/26/05	< 2	< 2			5.8	< 2	< 2	< 2	< 2	< 2		230			< 2
10/28/05										< 2		230			
11/18/05										< 2		200			
12/14/05										< 2					
12/19/05												170			
12/20/05														2.7	
12/21/05	E 1.64				6.1										
12/22/05											20				
1/25/06	< 2	< 2	< 2		4.1	2.9		< 2	< 2	< 2		120			
1/26/06										< 2		120			
2/21/06										< 2					
3/22/06										< 2		55			
3/24/06	E 1.1				3.6	3.6									
3/27/06											3.2				
4/11/06										< 2		38			
4/12/06															
4/19/06	< 2	< 2			3.8	3.2			< 2	< 2		36			
5/18/06	< 2	< 2			2.4	2.8	< 2		< 2	< 2		16			
7/26/06	< 2	< 2		< 2	2.2	< 2	< 2	< 2	< 2	< 2		3.6			

Units = ppt S = Shallow Well I = Intermediate Well

EPA split samples are shown in parenthesis for the May and August 2003 sampling events.
EPA results are shown in **bold** and *italics*.
*Result invalidated per Districts Laboratory 12/02/03.
** Split samples were sent to two contract laboratories. Both laboratories reported results of <2 ppt.

Table 5

1,4-Dioxane Data for Whittier Narrows/Southern SEMOU Monitoring Wells

(Data from 2001 through June 2006)

Well	Screen Interval	Feb-Mar-2001	May-Jun-2001	Aug-2001	Nov-2001	Feb-Mar-2002	May-2002	Aug-2002	Nov-2002	Feb-2003	May-2003	Nov-2003	Feb-2004	Aug-2004	Apr-2005	Aug-2005	Dec-2005	Feb/Mar-2006	Jun-2006
Pomona Fwy West																			
4-8-7	285-295				1 U														
4-8-8	230-240										**1.2**	**1.1**		**1.1 J, 1.0 J**					
4-8-9	95-105	1 U		1 U	1 U		1 U							**1.1**					
4-8-10	45-55	1 U							**1**		**0.8**	**2.3**		**0.9 J**					
Pomona Fwy West-Central																			
4-9-7	295-305		1 U																
4-9-8	230-240		1 U		1 U				1 U			**0.7 J**					ND	**0.51**	ND
4-9-9	100-110		1 U																
4-9-10	40-50		1 U		1 U		1 U		1 U										
Pomona Fwy East-Central																			
4-10-1	810-820																ND		ND
4-10-2	675-685																ND		ND
4-10-3	595-605																ND		ND
4-10-4	470-480																**0.7 J**		**0.5 J, 0.6 J**
4-10-5	320-330																**0.7 J**		**0.7J**
4-10-6	220-230																ND		ND
4-10-7	130-140																**0.9 J**		**0.8 J**
Pomona Fwy East- @605																			
4-11-1	545-555																ND, ND		ND
4-11-2	490-500																ND		ND
4-11-3	400-410																**1**		**1.1**
4-11-4	305-315																**0.9 J**		**0.9 J**
4-11-5	225-235																**0.8 J**		**0.8 J**
4-11-6	120-130																**0.8 J**		**0.8 J**
Legg Lake																			
4-13-3	225-235				1 U				**1 J**			**0.7 J**					**0.81**	**0.68**	ND
4-13-4	130-140				1 U							**0.7 J**					ND	**0.64**	**0.59**
4-13-5	50-60	1 U							**0.9 J**										
Gun Range																			
4-15-3	230-240				**0.54 J**				**2**		**1.6**	**1.6**		**1.1**			ND	ND	ND
4-15-4	145-155	**0.99 J**		**0.8 J**	**0.87 J**		**0.72 J**		**2 J**		**1.5**	**1.5**		**1.7 J**					
4-15-5	44-55			1 U	**1.1**		1.1 U		**2 J**		1 U, 1 U	**1.0 J**		**1.2**			ND	ND	ND
Pachmayr Gun Range																			
472	82-92	**2.3**	**2**	**2.2**	**1.9, 1.8**		**2.1, 1.9**		**3**			**2.6, 2.6**		**1.2 J**			ND	ND	ND
Rosemead & San Gabriel																			
MW2-5	68-88	1 U	1 U	1 U										**0.6 J**					
Siphon Road																			
MP1-8	155-165	**0.62 J**																	
South El Monte OU																			
SEM 2-1	344-354													1.0 U					
SEM 2-2	248-258		**0.65 J, 0.63 J**			1 U				**1**			**1.1**		**0.9J, 0.9J**	**1.5J**		ND	

Table 5

1,4-Dioxane Data for Whittier Narrows/Southern SEMOU Monitoring Wells

(Data from 2001 through June 2006)

Well	Screen Interval	Feb-Mar-2001	May-Jun-2001	Aug-2001	Nov-2001	Feb-Mar-2002	May-2002	Aug-2002	Nov-2002	Feb-2003	May-2003	Nov-2003	Feb-2004	Aug-2004	Apr-2005	Aug-2005	Dec-2005	Feb/Mar-2006	Jun-2006
SEM 2-3	112-122																		
SEM 2-4	38-48		**0.8 J**											1.2 U					
SEM 3-1	371-380														**1**	**1.4**			
SEM 3-2	265-275				**0.51 J**				1 U		**1.3**	**1.6**			**1.5**				
SEM 3-3	180-190		**1.4**			**0.98 J**				**3**			**3.1**	**5.4**	**5.3**	**7.3**		**8.3, 7.7**	
SEM 3-4	62-72		**1.5**		**2.5**		1.1 U	**0.9 J, 0.8 J**	**1 J**	**1**	**1.6**	**1.7**	**1.8**	**2.3**	**1.3, 1.2**	**2**		**6.2**	
SEM 5-1	381-391		1 U																
SEM 5-2	299-309		1 U												1 U				
SEM 5-3	209-218		1 U			1 U, 1 U				**0.9 J, 0.8 J**			1.1 U, 1.2 U		1.5 U (6/05)	**0.9J, 2**		ND	
SEM 5-4	98-107															**10**		**5.1**	
SEM 5-5	65-74		1 U, 1 U												1 U				
SEM 6-1	357-366															1 U			
SEM 6-2	270-280				1 U				**1 J**			**0.7 J**		**0.9 J**	**0.7 J**		ND	ND	ND
SEM 6-3	120-129		1 U											**1 J**	**3**	**1.3**			
SEM 6-4	58-67		1 U		**0.79**				**3 J**			**3.1**		**3.1**	**1 J, 1.1 U**		ND	**0.79**	**0.66**
EW 4-1	40-95	**7.4**	**5**	**4.8**	**5.1**	**4.5**													
EW 4-2	38-93	**3.7**	**3.4**	**3.7**	**3.3**	**3.7**													

Notes: duplicate samples separated by comma

TABLE 6
Summary of 1,4-Dioxane Data
Shallow and Intermediate Extraction Wells
Whittier Narrows Operable Unit, Los Angeles County, California

	Well Depth	Screened Interval	Sample Date	1,4-Dioxane
	(ft bgs)	(ft bgs)		Action Level - 3 ug/L
Shallow Wells				
EW4-3	120	50-110	08-Jul-99	2 U
			28-Dec-99	2 U
			05-Jan-00	2 U
			13-Jan-00	2 U
			19-Jan-00	2 U
			27-Jan-00	2 U
			17-Feb-00	2 U
			22-Mar-00	2 U
			19-Apr-00	2 U
			17-May-00	2 U
			29-Jun-00	2 U
			24-Jul-00	2 U
			23-Aug-00	2 U
			28-Aug-00	5 U
			22-Sep-00	2 U
			13-Oct-00	2 U
			29-Nov-00	2 U
			28-Dec-00	2 U
			31-May-01	1 U
			28-Mar-02	0.95 U
			04-Dec-02	**0.56**
			17-Jun-03	0.5 U
			15-Dec-05	ND
			15-Mar-06	ND
			01-Jun-06	ND
EW4-4	130	60-120	01-Sep-00	5 U
			28-Mar-02	0.96 U
			23-Sep-03	0.5 U
			14-Dec-05	ND
			15-Mar-06	ND
			01-Jun-06	ND
EW4-8	110	54-104	29-Aug-00	5 U
			28-Mar-02	0.97 U
			19-Jun-03	0.5 U
			19-Jan-06	**1.1**
			01-Jun-06	ND
EW4-9	125	50-120	01-Sep-00	5 U
			28-Mar-02	0.95 U
			19-Jun-03	0.5 U
			01-Jun-06	ND
Intermediate Wells				
EW4-5	400	160-390	**26-Mar-02**	**0.67 J, 0.6 J**
			03-Dec-02	**0.77**
			24-Jan-05	ND
			09-Dec-05	ND
			10-Jan-06	**0.92**
			09-Feb-06	**0.95**
			24-Feb-06	**0.96**
			28-Feb-06	**0.65**
			14-Mar-06	**0.8**
EW4-6	400	160-390	11-Sep-00	5 U
			26-Mar-02	**0.74 J**
			03-Dec-02	**0.65**
			25-May-06	ND
			18-Jul-06	ND
EW4-7	360	160-350	24-Aug-00	5 U
			11-Apr-02	0.95 U
			04-Dec-02	0.5 U
			24-Jan-05	ND
			09-Dec-05	ND
			10-Jan-06	**0.68**
			09-Feb-06	**0.7**
			24-Feb-06	**0.66**
			28-Feb-06	ND
			14-Mar-06	ND
			19-Apr-06	**0.87**
			18-Jul-06	ND

Notes-
All data reported in µg/L.
Bold- Detected; Shaded- Exceeds drinking water standard

Table 7
Perchlorate Data for Whittier Narrows/Southern SEMOU Monitoring Wells
(Data from 2001 through June 2006)

Well	Screen	Perchlorate																
		Feb-Mar-2001	May-Jun-2001	Aug-2001	Nov-2001	Feb-Mar-2002	May-2002	Aug-2002	Nov-2002	Feb-2003	Nov-2003	Feb-2004	Aug-2004	Apr-2005	Aug-2005	Dec-2005	Feb/Mar-2006	Jun-2006
Pomona Fwy West																		
4-8-7	285-295				5 U													
4-8-8	230-240		5 U															
4-8-9	95-105				5 U													
Pomona Fwy West-Central																		
4-9-7	295-305		5 U															
4-9-8	230-240		5 U		5 U				**2**		**1.7 J**					ND	ND	ND
4-9-9	100-110		5 U		5 U													
4-9-10	40-50		5 U		5 U													
Pomona Fwy East-Central																		
4-10-1	810-820															ND		ND
4-10-2	675-685															ND		ND
4-10-3	595-605															ND		ND
4-10-4	470-480															ND		ND, ND
4-10-5	320-330															ND		ND
4-10-6	220-230															2.3		1.5 J
4-10-7	130-140															ND		ND
Pomona Fwy East- @605																		
4-11-1	545-555															ND, ND		ND
4-11-2	490-500															ND		ND
4-11-3	400-410															ND		ND
4-11-4	305-315															ND		ND
4-11-5	225-235															ND		ND
4-11-6	120-130															ND		ND
Legg Lake																		
4-13-3	225-235				5 U				**1 J**		**1.1 J**					ND	ND	ND
4-13-4	130-140				5 U						2 U					ND	ND	ND
4-13-5	50-60								2 U									
Gun Range																		
4-15-2	290-300								**2**									
4-15-3	230-240				5 U				**2**		**2.7**					ND	ND	ND
4-15-4	145-155		5 U		5 U													
4-15-5	44-55		5 U		5 U				**1 J**		**1.8 J**					ND	**3**	ND
Pachmayr Gun Range																		
472	82-92		5 U		5 U				**1 J**		**1.7, 1.9**					ND	ND	ND
N.E. of Wildlife Ponds																		
4-22-1	430-440																	
4-22-2	385-395																	
4-22-5	130-140																	
Siphon Road																		
MP1-4	430-440	5 U																
MP1-8	155-165	5 U																
South El Monte OU																		

Table 7
Perchlorate Data for Whittier Narrows/Southern SEMOU Monitoring Wells
(Data from 2001 through June 2006)

Well	Screen	Perchlorate																
		Feb-Mar-2001	May-Jun-2001	Aug-2001	Nov-2001	Feb-Mar-2002	May-2002	Aug-2002	Nov-2002	Feb-2003	Nov-2003	Feb-2004	Aug-2004	Apr-2005	Aug-2005	Dec-2005	Feb/Mar-2006	Jun-2006
SEM 2-1	344-354												**3.2**					
SEM 2-2	248-258		**12.3, 12.4**			**14**	**13**	**13**		**11**		**11**		**5.2, 5.2**	**5.5**		**4.2**	
SEM 2-4	38-48												2 U					
SEM 3-1	371-380													**2.7**	**3.1**			
SEM 3-2	265-275				**3J**									**3.1**				
SEM 3-3	180-190					**3**		**2**		**3**		**2.5**		**2.3**			**2.1, 1.8**	
SEM 3-4	62-72				5 U							**2.3**	**1.9J**	**2, 2**	**2.7**		**2.0**	
SEM 5-1	381-391														**3.2**			
SEM 5-2	299-309													**3.3**				
SEM 5-3	209-218					**1 J**				**2, 2**		**1.1J, 2**		**2.2J (6/05)**	**2.3, 2.2**		**2.1**	
SEM 5-4	98-107														**1.9J**			
SEM 5-5	65-74													**1.5J**				
SEM 6-1	357-366													**2.5**				
SEM 6-2	270-280				5 U				**2**		**2.1**		**2**	**2.3**		**2.1**	**2.2**	**2.2**
SEM 6-3	120-129												2 U					
SEM 6-4	58-67				**4**				**6**		**4.8**		2 U	2 U, 2 U		ND	ND	ND
EW 4-1	40-95	4 U		4 U		3 U												
EW 4-2	38-93	4 U		4 U		3 U												

Notes: duplicate samples separated by comma

TABLE 8
Summary of Perchlorate Data
Shallow and Intermediate Extraction Wells
Whittier Narrows Operable Unit, Los Angeles County, California

	Well Depth	Screened Interval	Sample Date	Perchlorate
	(ft bgs)	(ft bgs)		Notification Level - 6 ug/L
Shallow Wells				
EW4-3	120	50-110	08-Jul-99	5 U
			28-Aug-00	3 U
			28-Dec-00	4 U
			28-Mar-02	**2**
			04-Dec-02	4 U
			15-Dec-05	ND
			15-Mar-06	ND
			01-Jun-06	ND
EW4-4	130	60-120	01-Sep-00	3 U
			28-Mar-02	2 U
			19-Jun-03	4 U
			14-Dec-05	ND
			15-Mar-06	ND
			01-Jun-06	ND
EW4-8	110	54-104	29-Aug-00	3 U/3 U
			28-Mar-02	2 U
			19-Jun-03	4 U
			19-Jan-06	ND
			01-Jun-06	ND
EW4-9	125	50-120	01-Sep-00	3 U
			28-Mar-02	2 U
			23-Sep-03	4 U
			01-Jun-06	ND
Intermediate Wells				
EW4-5	400	160-390	26-Mar-02	**3**
			03-Dec-02	4 U
			24-Jan-05	ND
			09-Dec-05	ND
			10-Jan-06	ND
			09-Feb-06	ND
EW4-6	400	160-390	11-Sep-00	3 U
			26-Mar-02	**2**
			03-Dec-02	4 U
			30-May-05	ND
			25-May-06	ND
EW4-7	360	160-350	24-Aug-00	3 U
			11-Apr-02	2 U
			04-Dec-02	4 U
			24-Jan-05	ND
			09-Dec-05	ND
			10-Jan-06	ND
			09-Feb-06	ND
			19-Apr-06	ND

Notes-
All data reported in µg/L.
Bold- Detected; Shaded- Exceeds drinking water standard

Table 9: Downgradient PCE Water Quality Data

Well	Screen Interval	5/2002	8/2002	11/2002	2/2003	5/2003	8/2003	11/2003	3/2004	8/2004
		PCE (µg/L)								
Shallow Zone										
Wells located between the extraction wells and Whittier Narrows Dam										
MW4-23	70-90	2	nd	nd	nd	nd	nd	nd	nd	nd (nd)
MW4-25	25-50	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW4-26	27-52	nd	nd	nd	nd	nd	nd	nd (nd)	nd	nd
Wells located along Whittier Narrows Dam										
WN01-9	95-105	--	--	--	--	--	--	nd	--	nd (9/05)
4-18-4	95-105	3	3	3 (2)	3	2.5	1.9 (2.1)	1.6	1.6	1.9
4-19-5	40-50	nd	---	nd	---	nd	---	nd	---	nd
4-20-2	70-80	nd	nd	nd	nd	nd	nd	nd	nd	nd
Intermediate Zone										
Wells located along Whittier Narrows Dam										
WN01-6	273-283	nd	--	--	--	nd	--	nd	--	nd (9/05)
WN01-7	233-243	0.5	--	--	--	nd	--	nd, nd	--	nd (9/05)
MW441	285-295	nd (nd)	--	nd	---	nd (nd)	--	nd	--	nd (nd)
MW442	225-235	nd (nd)	--	nd	---	nd	--	nd	--	nd
MW451	270-280	4	4	4	3	2.2	2.1	1.6 (1.7)	1.4	0.66
MW452	200-210	5	5	5 (5)	4	3.8	3.7	3.2	2.6	1.5
MW461	251-261	12	17	14	12	10	12	9.6	8.9	5.6
MW462	140-150	nd (nd)	nd	nd	nd	nd	nd	nd	nd	nd
4-12-2	315-325	5	4	2	3	3.7	2.9	1.6	nd	1.2
4-12-3	225-235	8	10	12	16	9.2	10, 13	6.7, 9.1	10	9.2
4-18-1	280-290	2	2	2	3	2.1	2.5	2.3	2.6	3.2
4-18-2	230-240	4	4	2	4	3.4	4.8	4	4.1	3.6 (4.5)
4-18-3	135-145	4	6	4	6	3.8	3.7	3.4	0.19	2.3
4-19-1	295-305	17	15	13	17	11	6.8	5.6	3.6	3.7
4-19-2	230-240	13	12	9	10	6.3 (5.1)	4.6	4.6	3.7 (4.1)	3.3 (2.7)
4-19-3	160-170	1	2	2	1	0.5	0.6	0.46	0.6	0.12
4-20-1	350-360	nd	0.5	0.6	0.8 (0.7)	0.6	0.5	0.74	0.72 (0.71)	0.82

TABLE 10

SUMMARY OF NDMA DATA FROM WHITTIER NARROWS EXTRACTION WELLS
JULY 1999 THROUGH JUNE 2006

Date	EW 4-3 (S)	EW 4-4 (S)	EW 4-5 (I)	EW 4-6 (I)	EW 4-7 (I)	EW 4-8 (S)	EW 4-9 (S)
7/19/99	< 10						
8/24/00					< 1.5		
8/28/00	< 1						
8/29/00						< 1	
9/1/00		< 1					< 1
9/11/00				< 1			
12/28/00	< 2000						
3/26/02			< 2	< 2			
3/28/02	< 2	< 2				< 2	< 2
4/11/02					< 2		
12/3/02			< 2	< 2			
12/4/02	***97***				*2.1*		
2/19/03	***47***						
4/8/03	***30***				*2.1*		
5/14/03	***19.6 (25.9)***						
6/19/03						***26***	*< 2*
8/13/03	*8.1 (6.65)*					*7.7 (6.13)*	
9/23/03	*8.2*	< 2 (*< 2*)	< 2	< 2	*7.6*	***12.8***	< 2
2/11/04	***11***						< 2
7/26/04	***12***	< 2				***150***	< 2
9/27/04	***39***	< 2				***120***	< 2
10/26/04	***81***	< 2				***120***	< 2
12/9/04	***11***	< 2	< 2		***16***	***62***	< 2
1/26/05		*2.2*	*2.4*		***11***		< 2
2/1/05	***16***					***13***	
4/21/05	*5.3*	< 2	< 2		*6.8*		< 2
6/1/05	*3.3*	< 2	< 2	< 2	*3.1*	*5.8*	< 2
6/29/05	*E 1.8*	< 2	< 2		*2.7*	*2.8*	< 2
9/15/05	*E 1.89*	< 2	< 2		*2.8*	*E 1.89*	< 2
10/26/05	< 2	< 2			*5.8*	< 2	< 2
12/15-19/05	*2.9*	*2*	< 2		*5.8*		
1/17-19/06			< 2		< 2	< 2	
2/2/06			< 2		*4.0*		
2/14/06			< 2		*3.6*		
2/28/06			< 2		*3.7*		
3/14-15/06	< 2	< 2	< 2		*3.8*		
3/29/06			< 2		*3.7*		
4/12/06			< 2		*3.2*		
4/19/06					*4.0*		
4/25/06					*3.7*		
5/9/06					*3.0*		
5/22-25/2006				< 2	*4.3*		
6/1/06	< 2	2.9				< 2	< 2
6/6/06				< 2	< 2		
6/21/06				< 2	*2.2*		
7/5/06				2.4	*3.2*		
7/18/06				< 2	2.6		

Units = ppt S = Shallow Well I = Intermediate Well

Inspected by: John Parrish, EE, PE
US Army C.O.E. Sacramento
916-557-7223

OSWER No. 9355.7-03B-P

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION

Site name: Whittier Narrows	**Date of inspection:** Aug 17-18, '06
Location and Region: Whittier, CA	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** Sunny, 90°F

Remedy Includes: (Check all that apply)

- G Landfill cover/containment
- G Access controls
- G Institutional controls
- ✓ Groundwater pump and treatment
- G Surface water collection and treatment
- G Other _____
- G Monitored natural attenuation
- G Groundwater containment
- G Vertical barrier walls

Attachments: G Inspection team roster attached G Site map attached N/A

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Dan McKenna (Name) Supervisor (Title) 8-17-06 (Date)
   Interviewed ✓ at site ✓ at office G by phone Phone no. _____
   Problems, suggestions; G Report attached 25 potable filters - bacterial problems since November. Need added header line to facilitate flushing. 12 Non-potable - siphoning problem feeding to lake. Dan stated a back-pressure valve likely would fix the problem.
   • Dan stated they are paying overtime to get all work done - They could use 1 more operator.

2. **O&M staff** N/A (Name) _____ (Title) _____ (Date)
   Interviewed G at site G at office G by phone Phone no. _____
   Problems, suggestions; G Report attached _____

ON-SITE MAN-HOURS AT EPA SITE
- 1 man is on-site 30 hours/week, M-F
- 1 man is on-site 10-15 hours/week, M-F
  Sat-Sun 1½ hours to swing by to check equipment

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.

NONE

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

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

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

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

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

NONE

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

Kept at Plant Also

1. O&M Documents

- ☒ O&M manual + orig. submittals — ☒ Readily available — ☒ Up to date — G N/A
- G As-built drawings (Design Drawings) — ☒ Readily available — ☒ Up to date — G N/A
- ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — G N/A

Remarks: As builts = original design drawings (no changes). Kept at City of Whittier offices (all docs).

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

- ☒ Contingency plan/emergency response plan — ☒ Readily available — ☒ Up to date — G N/A

Remarks: Developed through City of Whittier but site-specific. Kept at City offices + at plant

3. O&M and OSHA Training Records — ☒ Readily available — ☒ Up to date — G N/A

Remarks: Kept current through City of Whittier Human Resources Dept.

4. Permits and Service Agreements

G Air discharge permit	G Readily available	G Up to date	☒ N/A
☒ Effluent discharge	☒ Readily available	☒ Up to date	G N/A
G Waste disposal, POTW	G Readily available	G Up to date	☒ N/A
G Other permits ____	G Readily available	G Up to date	☒ N/A

Remarks: NONE

5. Gas Generation Records — G Readily available — G Up to date — G N/A

Remarks:

6. Settlement Monument Records — G Readily available — G Up to date — G N/A

Remarks:

7. Groundwater Monitoring Records — ☒ Readily available — ☒ Up to date — G N/A

Remarks: Kept at City of Whittier offices

8. Leachate Extraction Records — G Readily available — G Up to date — G N/A

Remarks:

9. Discharge Compliance Records

G Air	G Readily available	G Up to date	G N/A
G Water (effluent)	G Readily available	G Up to date	G N/A

Remarks:

10. Daily Access/Security Logs — G Readily available — G Up to date — ☒ N/A

Remarks: Employees sign log when they go into field (daily) to perform duties.

IV. O&M COSTS

1. **O&M Organization**
   - G State in-house
   - G Contractor for State
   - G PRP in-house
   - G Contractor for PRP
   - G Federal Facility in-house
   - G Contractor for Federal Facility
   - G Other _____

2. **O&M Cost Records**
   - G Readily available G Up to date
   - G Funding mechanism/agreement in place
   - Original O&M cost estimate _____ G Breakdown attached

   Total annual cost by year for review period if available

   From _____ (Date) To _____ (Date) _____ (Total cost) G Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) G Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) G Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) G Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) G Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

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

A. Fencing

1. **Fencing damaged** ☑ Location shown on site map ☑ Gates secured G N/A
   Remarks Fence damaged at Rosemead Platform - looks like vehicle rammed 1 post. Top rail loose. Bent post, chain link

B. Other Access Restrictions

1. **Signs and other security measures** G Location shown on site map G N/A
   Remarks Very few signs on gates; Red flashing light tied motion detectors at Dorfee + Rosemead platforms.

Dan mentioned that signs lead to more graffiti - a negative trade-off if more signs are added. Right now the quantity of signs appears to be insufficient. The fences/gates around potable wells have NO signs. Only security measures, in addition to above, are locks. The County Parks security drives by at night.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented G Yes G No G N/A
Site conditions imply ICs not being fully enforced G Yes G No G 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 G Yes G No G N/A
Reports are verified by the lead agency G Yes G No G N/A

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

2. **Adequacy** G ICs are adequate G ICs are inadequate G N/A
Remarks _____

D. General

1. **Vandalism/trespassing** G Location shown on site map G No vandalism evident ✓
Remarks Stolen circuit breakers; stolen cam-lock connects; stolen sump pump; fence damage; graffiti; hoses stolen

2. **Land use changes on site** G N/A ✓
Remarks _____

3. **Land use changes off site** G N/A ✓
Remarks Adjacent to treatment plant, Texaco moved out Feb. 2006, which led to less of a "presence" on site - security issue.

VI. GENERAL SITE CONDITIONS

A. Roads ✓ Applicable G N/A

1. **Roads damaged** G Location shown on site map ✓ Roads adequate G N/A
Remarks ALL dirt/gravel roads. Roads difficult to traverse in rainy season.

→ Dan recommends to move remaining cam-lock connects into storage when not in use.

B. Other Site Conditions Insofficient lighting at Plant Tanks/Pipes.

Remarks Treatment plant all paved - good condition. Site next to park - it is believed vandals have come from this area. well-pump site has seasonal work restrictions due to migratory birds. Plastic gage covers a little cloudy. Some vegetation growing into Duffee Platform fenced yard. Birds (crows) leave mess on tanks at Plant. One walkway at Plant to cross over pipes is not enough.

VII. LANDFILL COVERS G Applicable G N/A

A. Landfill Surface

1. **Settlement** (Low spots) G Location shown on site map G Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** G Location shown on site map G Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** G Location shown on site map G Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** G Location shown on site map G Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

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

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

7. **Bulges** G Location shown on site map G Bulges not evident
   Areal extent _____ Height _____
   Remarks _____

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

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

B. Benches G Applicable G 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** G Location shown on site map G N/A or okay
Remarks_____

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

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

C. Letdown Channels G Applicable G 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** G Location shown on site map G No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

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

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

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

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

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

D. Cover Penetrations G Applicable G N/A

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

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

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

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

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

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

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

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

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

F. Cover Drainage Layer G Applicable G N/A

1. **Outlet Pipes Inspected** G Functioning G N/A
   Remarks_____

2. **Outlet Rock Inspected** G Functioning G N/A
   *Remarks*_____

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

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

2. **Erosion** Areal extent_____ Depth_____
   G Erosion not evident
   Remarks_____

3. **Outlet Works** G Functioning G N/A
   Remarks_____

4. **Dam** G Functioning G N/A
   Remarks_____

H. Retaining Walls G Applicable G N/A

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

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

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

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

2. **Vegetative Growth** G Location shown on site map G N/A
   G Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

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

4 **Discharge Structure** G Functioning G N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS G Applicable G N/A

1. **Settlement** G Location shown on site map G Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   G Performance not monitored
   Frequency_____ G Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable G N/A

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

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☒ Good condition ☒ All required wells properly operating G Needs Maintenance G N/A
   Remarks A couple wells need repair to meters. Missing bolt at EW4-4. Loose LB-fitting covers. EW4-5 had a leaky air release valve. VFD's cleaned when serviced (were dirty inside).

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☒ Good condition G Needs Maintenance
   Remarks One valve can had cracked concrete cap around it that needs replacing. Peeling paint a few places.

3. **Spare Parts and Equipment**
   ☒ Readily available G Good condition G Requires upgrade G Needs to be provided
   Remarks There are few parts on hand / in stock. Can get needed parts in a day or so. Spare-*

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

1. **Collection Structures, Pumps, and Electrical**
   G Good condition G Needs Maintenance
   Remarks

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

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

* Submersible pump motor will be on-site soon (within next month).

MISCELLANEOUS

OTHER:

1) Float switches on sewage lift station don't work. They must be operated in manual (at Plant, towards the back of property).
2) The potable and non-potable water (at plant) had to be separated per health department. The City must move a flange to backwash potable or non-potable water through.

*** should be replaced every 16 months ±. This was never done until City took over. City has changed these filters

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) Sodium hypochlorite - looks good
   - ☐ 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 (over last 7 months)
   - ☐ Quantity of surface water treated annually N/A
   - Remarks *** logs kept at the office

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - ☐ N/A
   - ☒ Good condition
   - ☐ Needs Maintenance
   - Ducts sealed feeding LCP-02 to stop moisture intrusion.
   - Remarks A few loose LB covers; normal dirt/dust accumulation; 1 missing lock at Duct#2 platform

3. **Tanks, Vaults, Storage Vessels**
   - ☐ N/A
   - ☒ Good condition
   - ☐ Proper secondary containment
   - ☐ Needs Maintenance
   - Remarks Dan stated 20 vessels - lining in good condition. Outside looked good. 12 flow meters don't work.

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 Dirty water supply, black stuff in sump, fed from San Gabriel Valley Water Co. Bars on windows need paint.

6. **Monitoring Wells** (pump and treatment remedy)
   - ☒ Properly secured/locked
   - ☐ Functioning
   - ☒ Routinely sampled
   - ☒ Good condition
   - ☒ All required wells located
   - ☐ Needs Maintenance
   - ☐ N/A
   - Remarks NONE

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

1. **Monitoring Wells** (natural attenuation remedy)
G Properly secured/lockedG Functioning G Routinely sampled G Good condition
G All required wells located G Needs Maintenance G N/A
Remarks_____

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 (Remedy = treatment being done)

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.).

Remedy is to remove volatile organic compounds from the water and contain the contaminant plume. Problems with wells off-line have led to below anticipated water treatment quantities. The system is now working as intended.

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.

City of Whittier took over a plant lacking maintenance. The City appears to have the plant back on track, with good O&M practices, through their hard work (including overtime work).

Cynthia: Add: Pump to Spray Nozzles - see last page.

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.

Problems experienced would not lead to compromising the protectiveness. City is "catching up" on overdue maintenance left over from before City controlled the site.

D. Opportunities for Optimization

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

None cited.

E. MARCH 2006 INSPECTION:

The failed pumps EW4-6 and EW4-9 were back operating. These pumps had failed due to water entering the underground cables feeding them. The cables and associated terminations were replaced, and the VFD's were adjusted by the manufacturer (Beckhaw). It appears the "fix" for EW4-6 and EW4-9 is a success. There have been NO nuisance trips since the "fix"!

INTERVIEW RECORD

Site Name: SGV Area 1 – Whittier Narrows Operable Unit	**EPA ID No.: CAD980677355**	
Subject: Five-Year Review Community Representative Interview	**Time: 10:50 am**	**Date: 9/8/06**
Type: ☒ Telephone Visit Other **Location of Visit:**	Incoming ☒ Outgoing	

Contact Made By:

Name: Patricia Bowlin	**Title: RPM**	**Organization: U.S. EPA**
Name: Jose Garcia	**Title: CIC**	**Organization: U.S. EPA**

Individual Contacted:

Name: Grace Allen	**Title: WNNC Volunteer Docent**	**Organization: WNNC Associates**

Telephone No: 626-575-5523 (WNNC) **Fax No:** **E-Mail Address: N/A**	**Street Address: Whittier Narrows Nature Center** **1000 N. Durfee Avenue** **City, State, Zip: South El Monte, CA 91791**

Summary Of Conversation

See Attached Summary.

Whittier Narrows Five-Year Review Community Representative Interview
Interviewee: Grace Allen, Whittier Narrows Nature Center Volunteer Docent
Interview Date: September 8, 2006

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

- The interviewee said that it "looks fine from what (she) sees." Her overall impression was favorable, and she couldn't "see where any harm was done to the community." She also felt that EPA had "mitigated any destruction to (the) natural area" that was caused by the construction of the remedy by replanting destroyed plants and fixing any disturbed landscape.

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

- The interviewee said that there was not much effect and that she couldn't see where the selected remedy was doing any damage to the area or community.

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

- The interviewee said that she speaks with many people that visit the area and that she hadn't heard of any problems. She visits the area approximately 2-3 times per week during the busy seasons and once per week during the slower seasons.

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

- The interviewee mentioned that there have been several brushfires in the area but believes that they are not related to the work that EPA is doing. She stated that those responsible probably gained access through bike paths that access the area. None have occurred this summer, but several did occur last summer. The fires, according to her, occurred west and south of the "raised (City of) Whittier well."

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

- She stated that she is probably better informed than the average citizen because of her work at the Nature Center. She has also seen some favorable articles in the press regarding the project but wouldn't mind getting more information about the other SGV OUs (especially the Area 3 OU, where she lives.)

6) Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

- None. She is content with how things are proceeding.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

TECHNICAL MEMORANDUM
WHITTIER NARROWS FIVE-YEAR REVIEW

Cynthia Wetmore, Technical Support Team, US EPA

September 19, 2006

This memo is prepared to address Question B of the statement of service, "Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?**"**

Changes in Toxicity

The risk assessment method and results for the Whittier Narrows site are detailed in *Final Whittier Narrows Groundwater Risk Assessment Addendum to 1992 Baseline Risk Assessment* (November 1997). In addition, there was the *Whittier Narrows Supplemental Risk Assessment to the 1992 Baseline Risk Assessment – Risk-Based Evaluation of 1997 Groundwater Data* (July 24, 1998). Directly comparing toxicity values, then (1997 & 1998) and now, is an efficient method through which to screen for changes in the level of protectiveness. Table 1 provides a direct comparison between the 1997 & 1998 toxicity values and current EPA Region IX Preliminary Remediation Goals (PRG) values and current California Public Health Goals (CA PHG). The chemicals listed are compiled from Table 27 in the Risk Assessment Addendum.

Table 1

	1997 Risk Assessment Addendum		2006 Values		CA PHG 2006[1]
Chemical	**MCL (ug/L)**	**Tap Water PRG**	**MCL (ug/L)**	**Tap Water PRG[2]**	**(ug/l)**
1,1,1-Trichloroethane	2.0E+02	7.9E+02	2.0E+02	3.2E+03	1.0E+3
1,1-Dichloroethane	NA	8.1E+02	5.0E+00	8.1E+02	3.0E+0
1,1-Dichloroethylene	7.0E+00	4.6E-02	7.0E+00	3.4E+02	1.0E+1
1,2-Dichloroethylene (cis)	7.0E+01	6.1E+01	7.0E+01	6.1E+01	1.0E+2
Chloroform	1.0E+02	1.6E-01	1.0E+02	1.7E-01	-----
Ethylbenzene	7.0E+02	1.3E+03	7.0E+02	1.3E+03	3.0E+2
Styrene	1.0E+02	1.6E+03	1.0E+02	1.6E+03	-----
Tetrachloroethylene (PCE)	5.0E+00	1.1E+00	5.0E+00	1.0E-01	6.0E-2
Toluene	1.0E+03	7.2E+02	1.0E+03	7.2E+02	1.5E+2
Trichloroethylene (TCE)	5.0E+00	1.6E+00	5.0E+00	2.8E-02	8.0E-1
Xylene (mixed)	1.0E+04	1.4E+03	1.0E+04	2.1E+02	1.8E+3

[1] /www.oehha.ca.gov/water/phg/allphgs.html
[2] /Region 9 PRG table, October 2004

Since the risk assessment addendum and supplemental risk analysis, there have been a number of changes to the toxicity values for certain contaminants of concern at the Site. Revisions to the toxicity values for 1 ,1,1-Trichloroethane and 1 ,1-Dichloroethylene indicate a lower risk from exposure to these chemicals than previously considered. On the other hand, evaluation of the toxicity values for PCE, Xylene, and TCE is ongoing and may indicate higher risks from exposure than previously considered.

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

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

In July 2006, the National Academy of Sciences completed additional peer review of scientific issues that were the basis for the draft TCE Health Risk Assessment. In response to this review, U.S. EPA will revise the draft TCE Health Risk Assessment. Consequently, review of the toxicity value for TCE may continue for a number of years. This issue will need to be updated in subsequent five-year reviews.

New Contaminants

The Interim ROD also identified 1,4-dioxane as a chemical of concern, although it was not analyzed in the Risk Assessment. The chemical 1,4-dioxane is a SVOC that has been detected in other areas of the San Gabriel Basin, including the upgradient South El Monte OU, at concentrations exceeding the State standard. The treatment processes at Whittier Narrows (air stripping and LGAC adsorption) are not very effective at removing 1,4-dioxane from groundwater. At the time of the ROD, there was no federal standard for 1,4-dioxane. However, the California Department of Health Services (CADHS) had set an action level of 3 ppb for 1,4-dioxane (CADHS, 1999). This was the standard used to monitor the movement of 1,4-dioxane to the Whittier Narrows extraction wells.

At the time of the Interim ROD, only the VOCs listed in Table 1 and 1,4-dioxane had been detected within Whittier Narrows. However, the Interim ROD acknowledged that other contaminants, such as perchlorate and NDMA had been detected in the San Gabriel Valley upgradient of the WNOU.

NDMA has been detected in other areas of the San Gabriel Basin at concentrations exceeding the State standards. It has not been detected in the upgradient South El Monte OU and was not detected in the Whittier Narrows OU until December 2002. Although there were no NDMA detections in any extraction wells in March and April 2002, EPA conducted additional sampling in December 2002, as part of the drinking water source assessment for CADHS. NDMA was found in two of the four extraction wells tested with the highest levels found in the shallow groundwater. The source of the NDMA is the effluent from nearby water reclamation plants. EPA expanded its NDMA monitoring program to include monitoring wells in 2003. Levels of NDMA have decreased since in 2002 and range between non-detect (<2ppt) to 120 ppt in the shallow groundwater. The treatment system at Whittier Narrows was not designed to treat NDMA; therefore, extracted groundwater that contains NDMA is treated for VOCs and then discharged to surface water. All water discharged to surface water is at levels below the concentrations of NDMA which produce no effect to aquatic life (ranging from 8 ppb for algae to 3.54 ppm for rainbow trout. LA County San District (LACSD) and RWQCB are monitoring and working on solutions to address the NDMA issue.

Perchlorate has been detected in other areas of the San Gabriel Basin, including the upgradient South El Monte OU, at concentrations exceeding the State standards. Although perchlorate has been sporadically detected in the Whittier Narrows extraction wells, it has not exceeded the State's action level in the Whittier Narrows OU.

The table below compares the range of concentration in 2006 to the current PRG for the new contaminants.

Table 2

Chemical	Current PRG (2004)	Range of Detection in 2006	CA Notification Levels	CA PHGs
1,4-dioxane	6.1 ppb	ND to 0.87 ppb	3 ppb	----
Perchlorate	3.6 ppb	ND[3]	6 ppb	6 ppb
NDMA	1.3 ppt	(<2ppt) to 120 ppt.	10 ppt	----

Changes in Exposure Pathways

The 1997 Risk Assessment Addendum and 1998 Supplemental Risk Analysis identified the exposure pathways at Whittier Narrows as domestic use of groundwater including ingestion, inhalation, and dermal exposure. There are no new exposure pathways.

Since 1999, the understanding of the fate and transport of chemicals in the subsurface has evolved, with greater concern over the vapor intrusion pathway, particularly at sites with past releases of TCE. USEPA's draft Vapor Intrusion Screening Guidance issued November 2002 states that the vapor intrusion pathway should be investigated if the levels of TCE or PCE exceed 5 ug/L [4] in shallow groundwater (less than 15 feet). TCE concentrations in the shallow aquifer at

[3] Although there was no perchlorate detected in 2006, there were sporadic hits between 1999 and 2005, with the highest concentration being detected at 3 ppb.

[4] Table 2 (c) Generic Groundwater Screening Table, draft Vapor Intrusion Screening Guidance

Whittier Narrows OU in June 2006 were non-detect. At these same wells, the PCE concentration ranged from non-detect to 20 ppb. Depth to groundwater in the shallow zone ranges from 15 to 30 feet. The Whittier Narrows OU is located on US Army Corps of Engineers land that is leased to the LA County Parks and Recreation Department. The property is predominately open space with a few maintenance buildings. Therefore, although the PCE level at one well is close to the screening level for vapor intrusion, there is no existing exposure route for it. Therefore, vapor intrusion is not a problem.

Expected Progress Towards Meeting Remedial Action Goals

As stated in the 1999 Interim ROD, the Remediation Goal is:

> 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.

Based on groundwater modeling conducted during the remedial design and the results of a performance test in mid-2002, it was demonstrated that a pumping rate of 11,000 gpm would result in complete hydraulic capture. However, the extraction system has not continuously operated at this level due to technical and administrative issues. Even without full extraction, water quality data indicates that there has been no migration in the shallow zone. Similar water quality data in the intermediate zone indicates that some contamination did escape downgradient prior to operation of the extraction system; however, since full extraction rates have been achieved, the intermediate zone groundwater has achieved capture.