

Second 5-Year Review Report

Purity Oil Sales, Inc. Superfund Site

Fresno County, California

Prepared for



Region 9

United States Environmental Protection Agency
San Francisco, California

September 28, 2006

Second 5-Year Review Report
Purity Oil Sales, Inc. Superfund Site
Fresno County California

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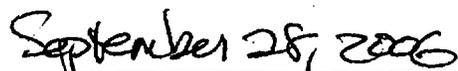

Date

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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or relevant and appropriate requirement
bgs	Below ground surface
BTPL	Beyond the property line
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CFR	<i>Code of Federal Regulations</i>
COC	Contaminant of concern
DCA	Dichloroethane
DHS	Department of Health Services
DNAPL	Dense nonaqueous-phase liquid
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FID	Fresno Irrigation District
FS	Feasibility study
FYR	5-Year review
GSM	Golden State Market
LNAPL	Light nonaqueous-phase liquid
MNA	Monitored natural attenuation
MCL	Maximum contaminant level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and maintenance
OU	Operable Unit
OU-1	Operable Unit 1 - Ground water and Tanks
OU-2	Operable Unit 2 - Soils
PAH	Polycyclic aromatic hydrocarbon
PRP	Potentially responsible party
Purity Oil	Purity Oil Sales Superfund
RAO	Remedial action objective
RAWP	Remedial action work plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
ROD	Record of decision
Water Board	Regional Water Quality Control Board – Central Valley Region
SARA	Superfund Amendments and Reauthorization Act
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
TBC	To be considered
VOC	Volatile organic compound

EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA), Region 9, conducted the second 5-year review (FYR) of the remedy implemented at the Purity Oil Sales, Inc., Superfund (Purity Oil) site in Malaga, California. This review was conducted by the Remedial Project Manager (RPM) for the entire site from May 2006 through September 2006, and covers the review period from September 28, 2001 through September 28, 2006. This report documents the results of the review.

The site remedies have been divided into two operable units (OU): Operable Unit 1 (OU-1), Groundwater and Tanks, and Operable Unit 2 (OU-2), Soils. OU-1 involves pumping and treatment of contaminated groundwater to restore the aquifer to beneficial use beneath the property within a reasonable timeframe and implementation of a groundwater management zone institutional control strategy. OU-2 involves neutralization and capping of contaminated soils, extraction and treatment of vapors from contaminated soil, and institutional controls.

This FYR found that the OU-1 remedy was constructed in accordance with the requirements of the Record of Decision (ROD); however, this FYR indicates that the groundwater extraction wells are essentially ineffective in removing contaminants and controlling groundwater flow. Despite the ineffective pump-and-treat system, groundwater monitoring data indicate that the groundwater plume remains stable, both in concentration and position, within the core plume area beneath the property, most probably due to natural attenuation. Additional monitoring wells within the plume area are necessary to better define the performance of the remedy. The groundwater management zone strategy has worked to date because plume contaminants have not migrated to any nearby drinking water wells, which would constitute an immediate threat to human health and the environment; however, this groundwater management zone strategy does not comply with EPA's current approach for managing institutional controls. Since 2001, an OU-1 focused feasibility study (FS) has been drafted that identifies potential alternatives to the current groundwater extraction well system. The focused FS report recommends demonstration pilot tests for nutrient-enhanced bioremediation. Currently, the groundwater extraction wells are shut down.

By 2001, the OU-2 remedial action phase had begun; however, during construction of the remedy, EPA documented the appearance of seeps of highly acidic sludge from a former disposal area. The sludge threatened the integrity of the planned synthetic liner component of the cap, which would reduce the remedy's overall protection of human health and the environment. In addition, site-related sludge and contaminated soils were found on adjacent properties, including residential areas of the adjacent Tall Trees Mobile Home Park property. In 2002, residents were relocated from the mobile home park.

For the OU-2 soil remedy, as of July 2006, EPA has addressed the seeps and the presence of sludge and remaining contaminated soils on adjacent properties through two Explanations of Significant Differences (ESD) and one ROD amendment. Currently, the remedial action work plan (RAWP, SECOR 2006b) is under revision to provide for construction of the remedy

described in the ROD amendment. Site preparation for the continued construction of the OU-2 soil remedy has resumed.

A protectiveness determination of the remedy at OU-1 cannot be made at this time until further information is obtained about the ability of the current remedy to restore the aquifer to beneficial use. There is no current or potential exposure related to groundwater. Further information will be obtained by taking the following actions: completing OU-1 focused FS, performing pilot testing to demonstrate the preferred alternatives presented in the FS report, and installing and operating additional monitoring wells within the core plume area. It is expected that these actions will take approximately 3 years to complete, at which time a protectiveness determination will be made. In addition, the following actions need to be taken to ensure the long-term protectiveness of OU-1: implementation of a revised OU-1 groundwater institutional control strategy and amendment of the OU-1 groundwater ROD to incorporate the revised institutional control strategy and preferred alternative demonstrated during pilot studies.

The remedy at OU-2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

5-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site name (from WasteLAN): Purity Oil Sales, Inc.		
EPA ID (from WasteLAN): CAD 980736151 CERCLIS ID: 0921		
Region: 9	State: CA	City/County: Malaga, Fresno County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: ___ / ___ / _____	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Gary Riley		
Author title: Remedial Project Manager	Author affiliation: EPA Region 9	
Review period: 9/28/2001 through 9/28/2006		
Date(s) of site inspection: 7/19/2006		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
Triggering action date (from WasteLAN): 9 / 28 / 2001		
Due date (five years after triggering action date): 9 / 28 / 2006		

5-YEAR REVIEW SUMMARY FORM (cont.)

Issue: The current pump-and-treat system specified in the OU-1 ROD is neither hydraulically controlling nor reducing concentrations of COCs that may be acting as a continuing source of groundwater contamination. In addition, continued decreases in the level of the groundwater table affect the ability of extraction wells to remove water and contaminants. However, the plume appears to be stable due to natural attenuation mechanisms. Re-examination of the current OU-1 ROD remedy is required to establish hydraulic control of the contaminant plume and achieve water quality goals as soon as possible.

Recommendation: EPA recommends that either the extraction well system be fully implemented as indicated in the OU-1 ROD or that other remediation approaches, such as nutrient-enhanced bioremediation, be further evaluated and a remedy change pursued. The next stage in a remedy change would be to proceed with pilot-scale studies to further evaluate remedies for nutrient-enhanced bioremediation.

Issue: OU-1: The current groundwater monitoring well network does not define the concentration gradients within the western portion of the plume. Also, deeper monitoring wells are needed to assess the vertical distribution of groundwater contaminants. Although the plume is stable and the extent of the plume is defined, monitoring wells are required within the source area to better define the performance of the groundwater remedy.

Recommendation: Additional groundwater monitoring wells are required and the existing groundwater monitoring program needs improvement within the source area to allow better evaluation of the performance of the groundwater remedy. A formal work plan should be prepared that presents well construction details, procedures, and locations for the recommended wells to address data gaps.

Issue: The current OU-1 groundwater management zone institutional control strategy extending 1 to 2 miles from the cleanup target area to coordinate the remedy with other uses of the aquifer and to maintain groundwater levels is impracticable.

Recommendation: An institutional control strategy should be developed to replace the existing groundwater management zone strategy.

Protectiveness Statement(s):

A protectiveness determination of the remedy at OU-1 cannot be made at this time until further information is obtained about the ability of the current remedy to restore the aquifer to beneficial use. There is no current or potential exposure related to groundwater. Further information will be obtained by taking the following actions: completing OU-1 focused FS, performing pilot testing to demonstrate the preferred alternatives presented in the FS report, and installing and operating additional monitoring wells within the core plume area. It is expected that these actions will take approximately 3 years to complete, at which time a protectiveness determination will be made. In addition, the following actions need to be taken to ensure the long-term protectiveness of OU-1: implementation of a revised OU-1 groundwater institutional control strategy and amendment of the OU-1 groundwater ROD to incorporate the revised institutional control strategy and preferred alternative demonstrated during pilot studies.

The remedy at OU 2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

1.0 INTRODUCTION

The purpose of the 5-year review (FYR) for remedial actions implemented at the Purity Oil Sales, Inc., Superfund (Purity Oil) site is to evaluate the remedy's implementation and performance to determine whether it is or will be protective of human health and the environment. This report documents the methods, findings, and conclusions of the FYR. In addition, this FYR report identifies deficiencies found during the review and identifies recommendations to address them.

The U.S. Environmental Protection Agency (EPA) Region 9 conducted the 5-year review of the remedy implemented at the Purity Oil site. This review was conducted by the Remedial Project Manager (RPM) for the entire site from May 2006 through August 2006. This report documents the results of the review.

The EPA prepared this FYR review report for the Purity Oil site in Fresno County, California, pursuant to the following requirements in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section (§) 121:

"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 5 years after the initiation of such remedial action to assure that human health and the environment is 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."

This requirement is further described as follows in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) in Title 40 of the *Code of Federal Regulations* (CFR), § 300.430(f)(4)(ii):

"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 5 years after the initiation of the selected remedial action."

The current FYR is required because hazardous substances, pollutants, or contaminants remain on site at levels that exceed levels required to allow unlimited site use and unrestricted exposure. This is the second FYR for the Purity Oil site. The triggering action for this review is the first FYR report issued on September 28, 2001. Additional FYRs will be required until the site is allowed for unlimited use and unrestricted exposure. The completed second FYR report will be available in the information repository for the Purity Oil site. Notice of its completion will be placed in the local newspaper.

2.0 SITE CHRONOLOGY

This section lists the chronology of events for the Purity Oil site.

Date	Event
1980-1981	California Regional Water Quality Control Board – Central Valley Region (Water Board) conducts surface water and groundwater sampling
February 1982	EPA, Department of Health Services (DHS), and Water Board perform site investigation
September 1983	Site placed on National Priorities List (NPL)
January 1986	EPA becomes lead agency
May 1986	DHS issues a remedial investigation (RI) report
May 1986	EPA implements emergency response “tarry” soil removal
September 1987	EPA implements emergency response oil and water removal
October 1988	EPA issues supplemental RI report
April 1989	EPA issues feasibility study (FS) and proposed plan for soils and groundwater
September 1989	EPA issues ROD for Operable Unit 1 (OU-1), Groundwater and Tanks
October 1990	Remedial action to remove seven tanks
September 1991	Unilateral Administrative Order issued to potentially responsible parties (PRP) to design and construct groundwater remedial action
March 1992	Alternate drinking water supply provided to downgradient private well users
June 1992	Revised proposed plan for Operable Unit 2 (OU-2), Soils
September 1992	EPA issues ROD for OU-2
January 1994	On-site construction of OU-1 begins
December 1994	Treatment system commissioned and begins operation
July 1996	EPA issues Explanation of Significant Differences (ESD) for OU-2 remedy to revise design requirements
February 1998	Existing portions of the North Central Canal that abut the site were enclosed within a reinforced concrete pipe
December 1998	Consent Decree entered
February 2000	Construction of OU-2 remedy begins
March 2001	EPA issues second ESD to temporarily relocate residents during construction of OU-2 remedy
October 2001	Residents relocated from Tall Trees Mobile Home Park
September 2001	First FYR completed

December 2002 EPA confirms that contamination from site has impacted the following neighboring properties: Bruno's Iron and Metal, Tall Trees Mobile Home Park, Golden State Market (GSM), and Pick-A-Part Auto Wrecking.

July 2002 End of bench-scale testing to evaluate most effective solidification and neutralization reagents for treating acidic materials; Quicklime® deemed most effective

June 2003 End of pilot-scale testing of Quicklime® and calcium carbonate as neutralization agents; calcium carbonate deemed most effective

October 2003 Chevron submits OU-1 improvement evaluation, which recommends monitored natural attenuation (MNA) as most effective OU-1 remedy

December 2003 EPA approves MNA as part of the OU-1 remedy and states that it would like to evaluate additional remedial action alternatives before selecting final groundwater remedy

April 2005 EPA publishes OU-2 proposed plan

June 2005 OU-1 extraction wells and treatment system shut down to begin construction of the OU-2 soil cap.

March 2006 Chevron submits OU-1 focused FS

May 2006 Chevron begins site preparation activities, including segregating concrete rubble from waste areas

July 2006 EPA publishes OU-2 soils remedy ROD amendment

3.0 SITE BACKGROUND

The Purity Oil site is located on a 7-acre parcel at 3281 South Maple Avenue (at Golden State Boulevard) approximately 0.5 mile south of the Fresno city limits in an unincorporated area of the Malaga township (Figure 1). The site's identification number is CAD980736151 in EPA's Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) database.

The site is located in a mixed-use area and is surrounded by agricultural and industrial land to the west, a metal recycling facility to the north (Bruno's Iron and Metal), a convenience market (GSM) and former residential trailer park (Tall Trees Mobile Home Park) to the northeast, a propane distributor to the east, and a used automobile parts business to the south (Pick-A-Part Auto Wrecking) (see Figure 1). Each of these adjacent properties is included in this evaluation and are referred to as the "beyond the property line (BTPL)" properties.

3.1 Physical Characteristics

The Purity Oil site is located in the San Joaquin River drainage basin approximately 12 miles south of the San Joaquin River. No natural watercourses exist in the vicinity of the Purity Oil site. The natural ground slope in the area is approximately 0.1 percent (5 feet per mile) to the west-southwest. The groundwater aquifer in the Fresno area is designated as a sole-source aquifer. The aquifer in the vicinity of the site is unconfined to depths of several hundred feet. The depth to groundwater at the site is 55 to 65 feet below ground surface (bgs), with flow to the northwest.

The basement rock at the site is located at greater than 1,000 feet bgs and does not influence groundwater flow under the site. Unconsolidated flood plain deposits that overlay the basement rock consist of thick alluvial fans formed by the San Joaquin and King Rivers.

Soils at the site consist of sands and silty sands interspersed with layers of lower-permeability silt. The habitat on the Purity Oil Site and adjacent properties consists of ruderal grasses (plants commonly found in ecosystems disturbed by human activity) and ornamental trees and shrubs. This vegetation provides marginal habitat for species adapted to highly disturbed areas impacted by industrial activities.

3.2 Land and Resource Use

Under the Fresno County general plan, the Purity Oil site is located in a zone designated for heavy industrial use (Figure 2). Most land in the vicinity of the site is used for industrial or agricultural purposes. Exceptions were located immediately north and south of the eastern portion of the site, where a single-family residence with a horse enclosure and the Tall Trees Mobile Home Park border the property. By 2001, the single-family residence and horse enclosure were removed. In 2001, the residents of the Tall Trees Mobile Home Park were relocated in conjunction with the OU-2 soil remedial action.

Industrial activity in the area includes businesses such as agricultural support industries, heavy equipment rental facilities, repair shops, retail shops, a former cotton oil manufacturing facility (Producer's Cotton Oil), scrap yards, several trucking yards, and other miscellaneous "light"

industries. Immediately bordering the Purity Oil site are two junk yards, Pick-A-Part Auto Wrecking and Bruno's Iron and Metal; the Burlington Northern Santa Fe Railway Company right-of-way; the GSM, a former service station now used mostly as a convenience store but including an apartment; and a propane distributor.

The area is traversed by the North Central and Central Canals, which are operated and maintained by the Fresno Irrigation district (FID). The North Central Canal flows west along the southern edge of the Purity Oil site and cuts across its southwestern corner. As part of EPA's remedy, the on-site portion of the North Central Canal has been placed in a concrete pipe.

About 0.5 mile to the west and southwest of the site are fields of oats, cotton, fruit trees, and grapes. During the summer, these fields are irrigated with water from the North Central Canal.

3.3 History of Contamination

Purity Oil re-refined petroleum waste oils at the site between 1934 and 1975. These waste oils came from businesses (such as service stations, car dealers, truck stops, and electrical transformer yards), municipalities, school districts, and the military. Historically, the easternmost portion of the site included storage and processing facilities for re-refining and recycling operations. The oil was re-refined using treatment processes that included clarification, chemical addition, acidification, dehydration, distillation, and filtration. The westernmost portion of the site consisted of unlined sumps and storage tanks used for collection and storage of oil and by-products from the refining process. The oil and by-products were disposed of in approximately seven large on-site sludge pits.

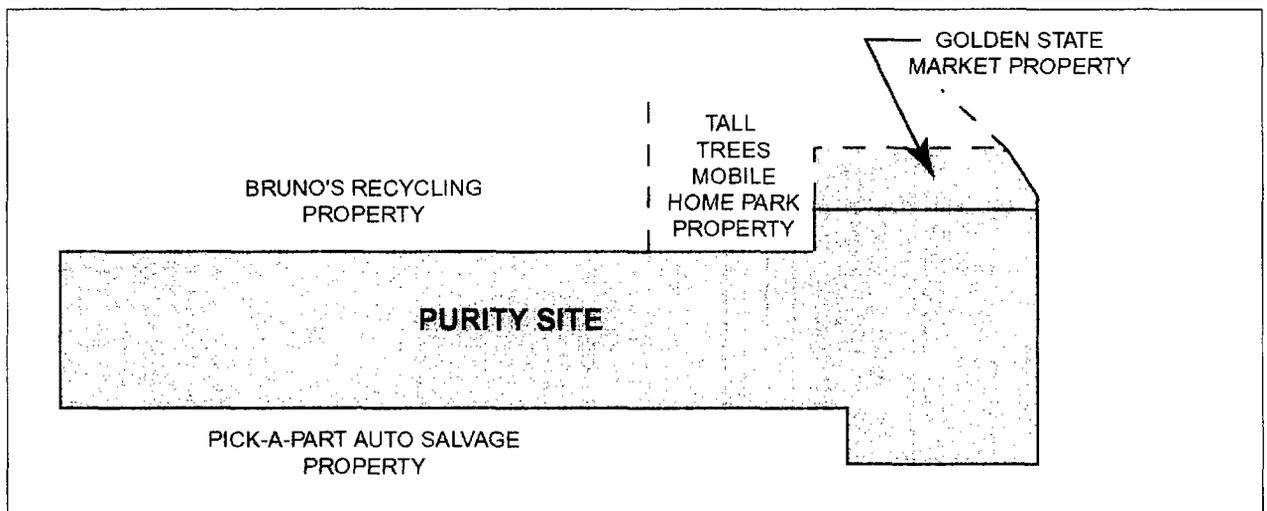
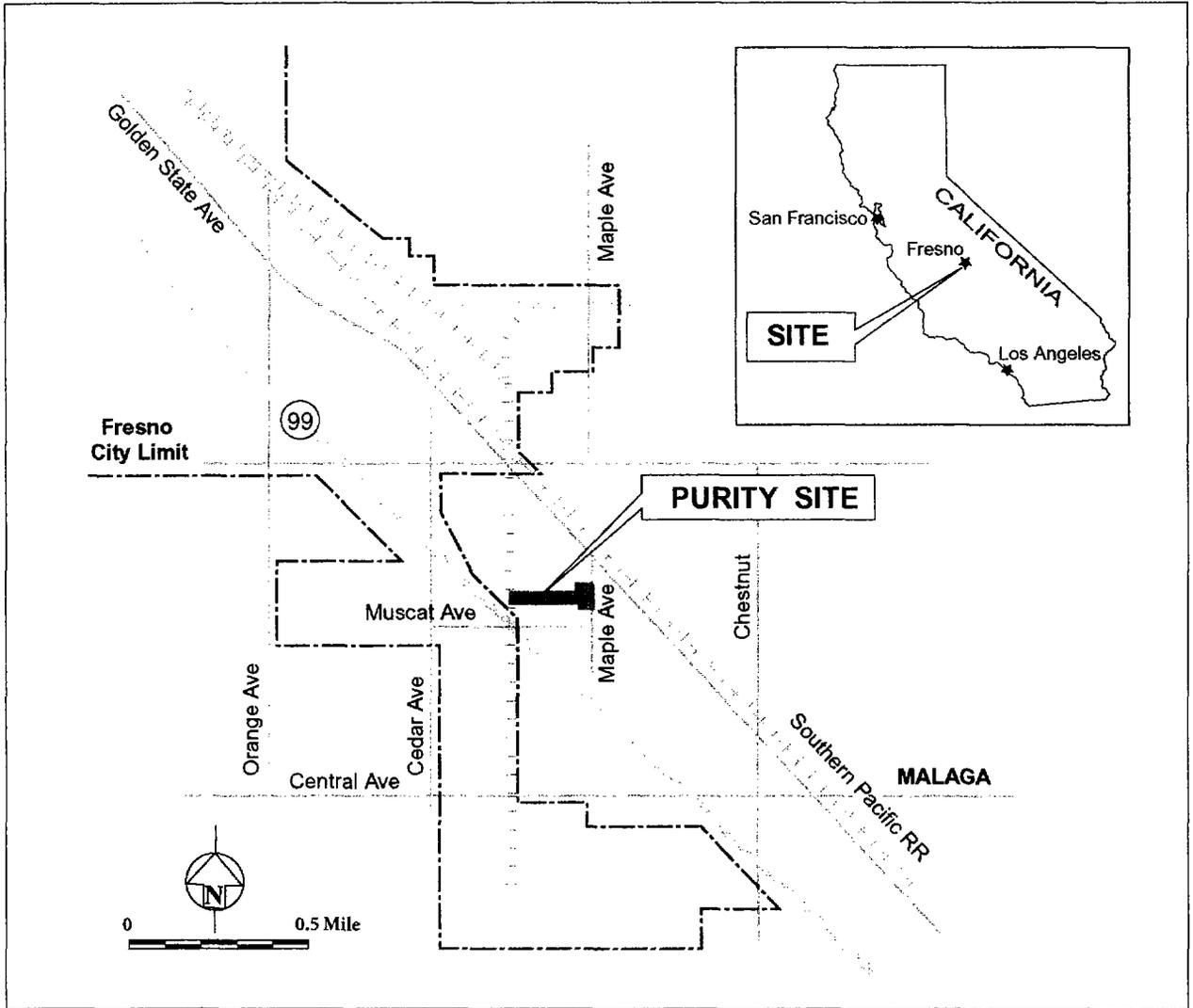
In the 1960s, neighbors of the site noticed contaminant discharges from the site. Overflow from the site's unlined sumps and sludge pits flowed onto adjacent properties. Per the owner of the scrap yard, waste oils from the site would make roadways too slick for equipment operation (see Appendix C, Site Interviews).

3.4 Initial Response

In 1973, Purity Oil Sales was ordered by the Superior Court to empty and backfill the on-site sludge pits. In 1975, the site owners were issued a Cleanup and Abatement Order under the enforcement authority of the Water Board. The sludge pits were completely filled with construction debris. No available evidence indicates that the wastes in the pits were ever removed.

In 1976, a fire at the site destroyed the main warehouse building and adjacent equipment. After the fire, additional equipment was removed from the site and the area was partially regraded.

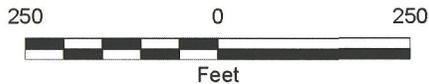
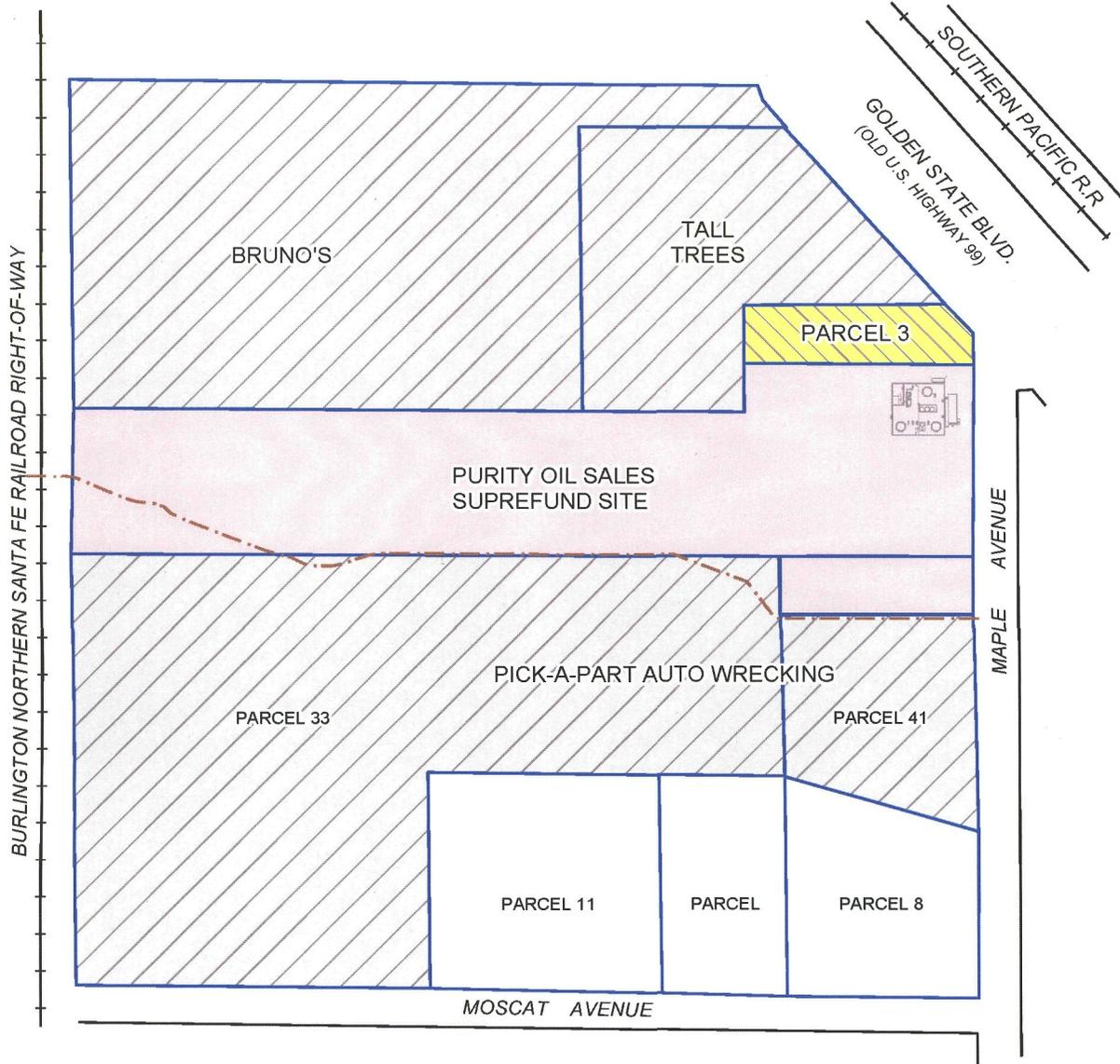
In 1985, EPA conducted a removal action to remove 1,800 cubic yards of hazardous oily/tarry materials from the site. In 1987, EPA's emergency response team removed approximately 33,000 gallons of oil and water from one of seven on-site large steel aboveground tanks to eliminate the potential for a spill. In 1989, EPA issued the ROD for OU-1, which required groundwater treatment and removal of the seven aboveground tanks. In October 1990, EPA had removed the seven tanks and all that remained of the waste oil processing equipment. In 1992, EPA issued the ROD for OU-2, Soils.



TETRA TECH EM INC.

PURITY OIL SALES SUPERFUND SITE
 FRESNO COUNTY, MALAGA, CALIFORNIA

FIGURE 1
SITE LOCATION MAP
 SECOND 5-YEAR REVIEW REPORT
 SEPTEMBER 2006



SITE LOCATION MAP



LAND USE

-  Purity Oil Sales Superfund Site
-  Industrial
-  Residential
-  Unknown
-  Fresno Irrigation District North Central Canal (Buried Underground)

Reference:
Assessor's Map Bk.330 - Pg. 06. County Of Fresno, California



TETRA TECH EM INC.

**PURITY OIL SALES SUPERFUND SITE
FRESNO, CALIFORNIA**

**FIGURE 2
LAND USE**

**SECOND 5-YEAR REVIEW REPORT
SEPTEMBER 2006**

3.5 Basis for Taking Action

At the Purity Oil site, both the groundwater and soil present risks to human health that require remedial action. Table 1 lists contaminants of concern (COC) for the Purity Oil site (EPA 2006).

Groundwater at the site is contaminated with volatile organic compounds (VOC), semivolatile organic compounds (SVOC), iron, and manganese that discharged from the sumps and unlined pits. The primary groundwater contaminant and VOC of most concern is 1,2-dichloroethane (DCA). Acute toxic effects of 1,2-DCA include central nervous system depression, lung irritation, and injury to liver, kidneys, and adrenals. Chronic exposure can cause liver degeneration and kidney damage in laboratory animals. Repeated exposures have been associated with anorexia, nausea, liver and kidney dysfunction, and neurological disorders in workers. The VOC 1,2-DCA is carcinogenic to mice and rats exposed orally. It is mutagenic in some tests to bacteria, barley, and fruit flies.

Soils at the site contain high levels of lead, polycyclic aromatic hydrocarbons (PAH), and several organic compounds. Buried waste contains benzene, toluene, PAHs, methylene chloride, phthalates, acetone, other solvents, lead, and various other metals. Soil contamination extends from the surface to groundwater. Lead is the primary surface soil contaminant, and at depth, all other chemicals listed above are COCs. Acute toxic effects of lead include encephalopathy, abdominal pain, hemolysis, liver damage, seizures, coma, and respiratory arrest. Chronic exposure can affect the hematopoietic, nervous, and cardiovascular systems. Children appear to be especially sensitive to lead-induced nervous system injury.

TABLE 1: CONTAMINANTS OF CONCERN AT THE PURITY OIL SITE

Acetone	1,1-Dichloroethene
Acenaphthylene	1,2-Dichloroethane
Aldrin	Dieldrin
Antimony	Diethyl phthalate
Aroclor 1242	Endosulfan
Aroclor 1248	Ethylbenzene
Aroclor 1254	Gamma-BHC (Lindane)
Aroclor 1260	Heptachlor
Arsenic	Heptachlor epoxide
Barium	Indeno(1,2,-3-cd)pyrene
Benzene	Lead
Benzo(a)anthracene	Methylene chloride
Benzo(a)pyrene	2-Methylnaphthalene
Benzo(b)fluoranthene	
Benzoic Acid	Mercury
Benzo(k)fluoranthene	4-Methyl-2-pentanone
Beryllium	2-Methyl-phenol
Beta-BHC	4-Methyl phenol
Bis(2-ethylhexyl)phthalate	Naphthalene
2-Butanone	N-nitrosodiphenylamine
Cadmium	Phenol
Carbon disulfide	Selenium
Carbon tetrachloride	Silver
Chlorobenzene	Styrene
Chloroform	Tetrachloroethane
Chrysene	Toluene
Cyanide	1,1,1-Trichloroethane
4,4'-DDD	1,1,2-Trichloroethane
4,4'-DDE	Trichloroethene
4,4'-DDT	Vanadium
Di-n-butyl phthalate	Vinyl chloride
Dibenz(a,h)anthracene	Xylenes
1,1-Dichloroethane	Zinc

Note: **Bold** contaminants were added to the COC list since the 1992 ROD.

4.0 REMEDIAL ACTIONS

This section describes the selected remedies from the date of the signing of the RODs to the present, including any changes or problems with remedial components, the current status of remedy implementation, and remedy operation and maintenance (O&M).

4.1 Remedy Selection

The following sections describe the remedy selected by EPA for OU-1, Groundwater and Tanks, and OU-2, Soils, as well as the OU-2 ESD and ROD amendment.

4.1.1 OU-1: Groundwater and Tanks

On September 26, 1989, the OU-1 ROD for the Purity Oil site was signed. The primary human health threats posed by contaminants addressed in the ROD for OU-1 included (1) use of contaminated groundwater by downgradient residents and (2) direct contact with contaminated tarry sludge and soils present in rusting processing tanks. The primary groundwater contaminants of concern included VOCs, iron, and manganese.

Remedial action objectives (RAO) were developed as a result of data collected during the RI (EPA 1988). The RAOs for OU-1 are as follows:

- Restore the sole-source drinking water aquifer as soon as possible to meet federal and state drinking water standards
- Provide safe drinking water to downgradient residents
- Eliminate the direct exposure threat posed by hazardous wastes in the seven on-site steel tanks

The major components of the remedy for the contaminated groundwater and wastes in the on-site tanks in the OU-1 ROD include:

- Removal and proper disposal of the seven remaining on-site tanks and their contents
- Provision of an alternate water supply to affected private well owners located northwest of the site
- Water treatment to remove VOCs, iron, and manganese from groundwater, including the following:
 - Extraction of contaminated groundwater to attain federal and state drinking water standards in the aquifer.
 - Treatment of extracted contaminated groundwater using green sand filtration and air stripping to attain federal and state drinking water standards
 - Disposal of treated and tested water in the North Central Canal
 - Groundwater monitoring to verify contaminant cleanup

- Creation of a groundwater management zone extending 1 to 2 miles from the cleanup target area to coordinate the remedy with other uses of the aquifer and to maintain groundwater levels at the desired configuration

4.1.2 OU-2: Soils

On September 30, 1992, the ROD for OU-2 was signed. The primary human health threats posed by contaminants addressed in the ROD for OU-2 included (1) direct contact with contaminated site soils and wastes in the pits, (2) direct contact with contaminated North Central Canal water and sediments, and (3) inhalation of site-related dust. The primary surface soil contaminant of concern is lead. The primary contaminants of concern for the pits and vadose zone are numerous organic compounds.

RAOs were developed as a result of data collected during the RI (EPA 1988). The RAOs for OU-2 are as follows:

- Prevent further contamination of groundwater by containing contaminated soil and wastes and by capturing and treating contaminants that discharge from the wastes
- Prevent direct contact with contaminated surface soil and waste at the site
- Prevent direct contact with sediments in the North Central Canal

The major components of the remedy for contaminated soil and sludges in the OU-2 ROD include:

- Treatment of soil using soil vapor extraction (SVE) from 14 feet bgs to the water table
- Capping of the site in accordance with Resource Conservation and Recovery Act (RCRA) Subtitle C requirements, including a perimeter retaining wall and synthetic and geosynthetic clay liners
- Installation of a slurry wall around the site perimeter
- Environmental monitoring to ensure the effectiveness of the remedial action
- Enclosure of existing portions of the North Central Canal that abut the site within a reinforced concrete pipe

4.1.3 Explanations of Significant Differences for OU-2

After the OU-2 ROD was signed, two ESDs were issued for differences in how the selected OU-2 remedial action was to be implemented. In July 1996, EPA issued the first ESD to change the design of the SVE and containment systems. EPA eliminated the requirement for a retaining wall with the change to a sloping cover design. The slurry wall was eliminated because no perched groundwater zones were found during pre-design efforts. EPA also approved a 2-year post-construction monitoring period to evaluate the need for the SVE. The ESD also extended the boundaries of the site to include the rear of the GSM because of the discovery of soils contaminated by site-related wastes.

Between December 2000 and October 2002, EPA conducted investigations to assess whether contamination from the Purity Oil site had impacted neighboring properties and to address observations of sludge seepage. Sludge was observed seeping to the surface of the sludge pit slopes at approximately 20 locations. Seeps have been observed at ambient temperatures ranging from 40 to 50 °F as well as at temperatures exceeding 70 °F. Several attempts to remedy the seeps had been unsuccessful. EPA was concerned that the acidic sludge (with pH as low as less than 1) or other acidic liquids within the sludge pits would continue to seep out and either damage the closure cover system planned in the OU-2 ROD or migrate to adjacent properties. The synthetic liner component of the cover system is rated for a pH environment of 2 or greater according to manufacturer specifications. The contact of low-pH liquids with the geosynthetic clay liner was also a concern because this situation could adversely affect the liner's permeability characteristics and allow infiltration of water into the waste.

In March 2001, EPA issued the second ESD to relocate residents of the Tall Trees Mobile Home Park. EPA determined that it was necessary to (1) temporarily relocate all residents during on-site construction activities because of the potential adverse impacts of exposure to contaminated soils and VOCs, and (2) permanently relocate 17 families closest to the site property line.

4.1.4 OU-2 ROD Amendment

In April and July 2002, bench-scale tests were performed to evaluate the most effective solidification and neutralization reagents for treating the acidic sludge materials. Quicklime® was determined to be the best reagent with respect to strength and neutralization capacity.

In 2003, EPA investigated soils adjacent to the property to define the extent of the acidic sludge. Based on evidence and chemical data collected during this investigation, contamination from the Purity Oil site was determined to have impacted the following neighboring properties: Bruno's Iron and Metal, the Tall Trees Mobile Home Park, the GSM, and Pick-A-Part Auto Wrecking. Contaminants in soil at these four properties included VOCs, SVOCs, pesticides, petroleum hydrocarbons, and metals (EPA 2003).

Between April and June 2003, a pilot-scale neutralization study was conducted to field test the bench-scale test results. Calcium carbonate proved to be the best reagent for strength and neutralization capacity.

In April 2005, EPA published its proposed plan for the OU-2 soil remedy, which reflected the bench- and pilot-scale test results.

In June 2006, the EPA issued the OU-2 ROD amendment to address the presence of acidic sludge discovered during construction of the cap and contamination of adjacent properties.

The OU-2 ROD amendment includes the following additional RAOs:

1. Purity Property Objectives

- Prevent contact of acidic sludge and acid liquids with the cap liner to increase the remedy's overall protection of human health and the environment

- Prevent human exposure (through direct contact) to contaminated soils containing COCs at concentrations exceeding ARARs and criteria to be considered (TBC) for soil
- Prevent or minimize further migration of contaminants from source material to groundwater
- Prevent migration of contaminated groundwater to local domestic or irrigation wells

2. Adjacent Properties Objectives:

- Prevent acidic sludge and other site-related contaminants from contacting industrial workers on properties adjacent to the site (Pick-A-Part Auto Wrecking, Bruno's Iron and Metal, and Tall Trees Mobile Home Park) and residents on the GSM property
- Remove acidic sludge and contaminated soil containing COCs at concentrations exceeding health-based action levels at properties adjacent to the site
- Prevent or minimize further migration of contaminants from source material to groundwater
- Prevent migration of contaminated groundwater to local domestic or irrigation wells
- Remediate COCs in soil and groundwater to drinking water standards and other health-based action levels to reduce risks from potential exposure to indoor air contaminants whose source is site-related contamination
- Prevent further migration of soil vapor containing COCs at concentrations exceeding ARARs and TBC criteria

The OU-2 ROD amendment selects the following remedial actions:

- Neutralization – Neutralize the entire sludge pit area from the ground surface to an estimated depth of 15 feet bgs
- Low Permeability Cap – Construct a low-permeability cap to eliminate the risk of human exposure and to reduce surface water infiltration through the waste material to reduce potential mobilization of contaminants in the vadose zone and their release to groundwater
- Excavation of Contamination at Adjacent Properties– Excavate (down to a depth of 7 feet bgs), neutralize (if pH is less than 4), and place under the-low permeability cap site-related sludge and contaminated soil at the four neighboring properties; backfill excavations with clean soil; and either demolish or purchase and rehabilitate GSM structure
- Additional soil and gas sampling – Determine extent of contamination left in place between bottom of excavations and top of water table

- Groundwater Monitoring Program – Continue with the quarterly groundwater monitoring program currently in place to assess the effectiveness of both the groundwater and soil remedies
- SVE and Vadose Zone Monitoring System – Install SVE wells to remove contaminants, and install vadose zone monitoring wells to monitor soil vapor concentrations and the vacuum created by the extraction wells
- Institutional Controls - Such as deed restrictions, to ensure sensitive uses do not occur at adjacent properties

4.2 Remedy Implementation, Including Operation and Maintenance

To date, the OU-1 remedy has essentially been implemented, and the OU-2 remedy is under construction. The following sections discuss the remedy implementation and O&M.

4.2.1 OU-1 Remedy: Groundwater and Tanks

Implementation of the OU-1 remedy is summarized below.

- October 1990, seven large tanks and their contents were removed from the site.
- On September 30, 1991, EPA issued Unilateral Administrative Order 91-28 requiring nine PRPs to design and construct the groundwater extraction, treatment, and disposal system. The PRPs agreed to perform the design and construct the groundwater remedial action for the Purity Oil site. The PRPs formed a technical steering committee and conducted extensive pre-design studies to further characterize the geology and groundwater contamination at the site. The final design was completed on June 22, 1993.
- In March 1992, private well users downgradient from the site were connected to either the Malaga County Water District or the City of Fresno water system. On July 13, 2006, EPA interviewed West Coast Waste and Bruno's Iron and Metal. These landowners are still using potable water supplied by the City of Malaga (see Appendix C). No problems were noted with this water.
- In January 1994, the remedial action to construct the extraction wells and treatment system started with the award of all contracts for the construction. Construction was substantially completed in August 1994. Start-up/shake-down operations continued through December 1994. The system began routine treatment of groundwater on December 28, 1994.
- In December 1994, two groundwater extraction wells, EW-1 and EW-2, were installed for the OU-1 remedy. No other extraction wells have been installed.
- In January 1995, routine O&M of the OU-1 remedy began.

The objective of the groundwater management zone described in the OU-1 ROD was either to coordinate the remedy with other uses of the aquifer or to control the influence of the remedy on

groundwater levels in the regional aquifer. To date, information gathered indicates that both of these objectives of the groundwater management zone are being achieved. Pre-design engineering studies and evaluation of subsequent quarterly groundwater monitoring efforts indicate that the contaminant plume is neither currently migrating nor influenced by regional groundwater users of the aquifer. Because of the hydrogeologic limitations and the subsequent low pumping rates, EPA's remedy has had limited effect on groundwater levels in the vicinity of the site and has not impacted the regional groundwater regime. Monitoring well data show no change in the groundwater flow gradient outside the immediate zone of influence of the groundwater extraction wells. EPA is continuing to monitor groundwater levels on a quarterly basis to ensure that this objective of the OU-1 ROD is being met.

Groundwater treatment system O&M includes the performance of all necessary inspections, operational tasks, maintenance, repair, monitoring, and reporting necessary to ensure the proper treatment and discharge of the extracted groundwater from the two extraction wells.

Since the last FYR in September 2001, the system operated sporadically until it underwent a temporary shutdown in June 2005. IT Corporation operated the system from September 2001 through December 2001, when it declared bankruptcy and ceased operation of the system. SECOR International, Inc., operated the system from May 2002 through June 2005. From January 2002 through April 2002, no contractor operated the system while Chevron changed contractors. During operation, the two extraction wells produced an average of 2.7 gallons per minute. Approximately 100,000 gallons were treated and discharged to the FID pipeline each month. Table 2 includes detailed operational data. In June 2005, groundwater intake from the two extraction wells was temporarily ceased. Currently, groundwater is not being extracted.

The system continues to collect purge water from the sampling of off-site wells and rainfall accumulating inside the treatment system containment pad. The system is operated as needed to treat the accumulated water and to meet the sampling requirements under the system's National Pollutant Discharge Elimination System (NPDES) permit issued by the Water Board.

Because the treatment system is being operated in batch rather than continuous mode, the system condition is somewhat degraded. Some parts (such as valves) have been removed from unneeded areas to repair parts of the system that remain in use. The system would require repair to perform in continuous operation.

In June 2006, the double-walled groundwater conveyance piping and control wiring from the extraction wells to the groundwater treatment system were temporarily removed to allow construction of the OU-2 soil remedy.

4.2.2 OU-2 Remedy: Soils

Implementation of the OU-2 remedy is summarized below.

In January 1994, an Administrative Order on Consent was issued requiring the PRPs to design the remedial action for OU-2. The FID designed the portion of the remedy that encloses the existing portions of the North Central Canal that abut the site. EPA approved the final design for OU-2 in September 1996.

TABLE 2: EXTRACTION AND DISCHARGE INFORMATION SINCE JULY 2001 FOR GROUNDWATER TREATMENT SYSTEM

Contractor	Date	Combined Extraction Rate (two wells)* (gpm)	Volume to FID (gallons)	Backwash to POTW (gallons)
IT Corporation	Jul-01	No data	78,248 gallons	
	Aug-01		169,816 gallons	
	Sep-01		126,807 gallons	
	Oct-01		40,976 gallons	
	Nov-01		59,980 gallons	
	Dec-01		149,548 gallons	
No contractor	Jan-02	No extraction; system shutdown		
	Feb-02			
	Mar-02			
	Apr-02			
SECOR International, Inc.	May-02	3.38	--	26,233
	Jun-02	5.06	204,612	42,252
	Jul-02	4.49	181,424	33,019
	Aug-02	4.62	200,394	24,644
	Sep-02	4.37	187,319	23,721
	Oct-02	4.21	184,983	23,727
	Nov-02	3.25	136,372	23,944
	Dec-02	3.40	148,697	29,583
SECOR International, Inc.	Jan-03	3.77	147,917	31,109
	Feb-03	3.60	148,114	17,643
	Mar-03	3.57	156,975	22,785
	Apr-03	3.13	152,333	23,397
	May-03	3.14	159,123	22,717
	Jun-03	3.10	148,621	22,854
	Jul-03	2.70	138,578	28,469
	Aug-03	2.85	79,920	11,454
	Sep-03	2.35	88,074	29,575
	Oct-03	2.74	111,900	22,855
	Nov-03	2.52	97,061	18,694
	Dec-03	2.70	124,374	29,148

**TABLE 2: EXTRACTION AND DISCHARGE INFORMATION SINCE JULY 2001 FOR
GROUNDWATER TREATMENT SYSTEM (CONTINUED)**

Contractor	Date	Combined Extraction Rate (two wells)^a (gpm)	Volume to FID (gallons)	Backwash to POTW (gallons)
SECOR International, Inc.	Jan-04	2.60	111,588	17,221
	Feb-04	2.89	88,429	23,378
	Mar-04	2.39	98,862	23,390
	Apr-04	2.20	89,028	16,995
	May-04	2.15	84,000	22,789
	Jun-04	2.04	69,981	22,528
	Jul-04	1.95	69,384	22,718
	Aug-04	1.82	67,527	28,121
	Sep-04	1.79	60,311	17,497
	Oct-04	1.88	83,547	11,132
	Nov-04	1.71	59,987	28,512
	Dec-04	1.59	37,083	16,917
SECOR International, Inc.	Jan-05	1.81	67,137	34,213
	Feb-05	1.71	64,228	16,957
	Mar-05	1.33	61,304	24,302
	Apr-05	1.43	43,194	23,709
	May-05	1.43	45,767	19,336
	Jun-05	1.43	17,670	--
Average (May-02 through June-05)		2.71	108,536	23,717
SECOR International, Inc.	Jan-06	--	22,401 ^b	--
	Mar-06	--	16,839 ^b	--
	Jun-06	--	28,400 ^b	--

Notes:

- = No groundwater extraction or discharge to POTW
- FID = Fresno Irrigation District North Central Canal
- gpm = Gallons per minute
- POTW = Publicly Owned Treatment Works, Malaga County Water District

- a Extraction Wells EW-1 and EW-2
- b Because the extraction wells were not operating during this time, only seasonal rainwater and purge water from monitoring wells that accumulated since the previous discharge event was treated and discharged.

In March 1998, the FID enclosed the flow from the original canal within a reinforced concrete pipeline in accordance with the approved design.

In April 1998, a Consent Decree and a Statement of Work requiring implementation of the approved remedial design for OU-2 was lodged in Federal Court.

In November 2000, construction of the other portions of the OU-2 remedial action began; however, construction ceased in December 2000 pending further investigations by EPA. These investigations are discussed in Section 4.1.3 for the second ESD and in Section 4.1.4 for the OU-2 ROD amendment. As discussed there, new concerns regarding contamination extending beyond the Purity Property boundaries and the appearance of acidic sludge prompted EPA to issue the OU-2 ROD amendment in June 2006.

In June 2006, site preparation activities began for construction of the remedy described in the OU-2 ROD amendment.

On June 19, 2006, it was noted during the site inspection that the FID pipeline is still enclosed, with no evidence at the ground surface of leakage or breakage (see Appendix B).

5.0 PROGRESS SINCE THE LAST 5-YEAR REVIEW

This is the second FYR for the site. The previous protectiveness statement for OU-1 and OU-2 are as follows:

“Immediate threats have been addressed through the provision of alternate water supply, removal of seven storage tanks, enclosure of the North Central Canal in a pipeline, and relocation of nearby residents.

The treatment system for OU-1 is effective in meeting regulatory requirements for the water treated at the facility. The OU-2 remedy currently being constructed is expected to be protective upon completion with respect to eliminating threats posed by direct contact with the wastes.

The remedy for OU-1, the Groundwater and Tanks Operable Unit, is protective over the near-term, however, the long-term protectiveness determination for OU-1 cannot be made at this time until further information is obtained.

It is expected that these actions will take approximately two and one-half years to complete, at which time a protectiveness determination will be made.”

The first FYR recommends the following:

“It is important that the long-term aspects of ground water cleanup issues and goals be addressed through further study and additional remedial action to assure attainment of EPA’s water quality cleanup goals for the Site.

Further information will be obtained regarding the OU-1 ROD remedy by:

- revising sampling protocols to include appropriate additional data parameters and to ensure that the data meet appropriate data quality objectives.
- acquiring additional groundwater monitoring data from existing wells;
- installing and monitoring additional groundwater wells as necessary;
- conducting testing to determine the feasibility of addressing the sources of volatile organic compounds in groundwater with nutrient enhanced bioremediation; and
- conducting testing to determine the feasibility of addressing chlorinated solvents in groundwater by addition of hydrogen-releasing or oxygen-releasing compounds to the subsurface.”

The sections below discuss progress since the last FYR for OU-1 and OU-2.

5.1 OU-1 Progress

During the last 5 years, the long-term effectiveness of the remedy at OU-1 has been further studied. Table 3 below summarizes further progress and information-gathering efforts since the first FYR in 2001.

TABLE 3: OU-1 PROGRESS SINCE PREVIOUS 5-YEAR REVIEW

Issue from Previous Review	Recommendations/Follow-up Actions	Party Responsible	Milestone Date	Action(s) Taken and Outcome	Date of Action
The long-term protectiveness determination for OU-1 cannot be made until further information is obtained.	Revise sampling protocols to include appropriate additional data parameters and to ensure that the data meet appropriate data quality objectives	PRPs	2004	OU-1 sampling protocols will be prepared as part of pilot studies for alternatives resulting from SECOR OU-1 focused FS (SECOR 2006a) OU-2 sampling protocols are currently being prepared as part of the (RAWP) (SECOR 2006b)	No action
	Acquire additional groundwater monitoring data from existing wells	PRPs	Quarterly for 5 years	Quarterly groundwater monitoring occurred, but number of groundwater monitoring wells included in reports decreased	Quarterly
	Install and monitor additional groundwater wells as necessary	PRPs	2004	Temporary piezometers and wells installed by PRPs during off-property characterization report used to develop OU-1 focused FS; no new or replacement monitoring wells installed since then	2003 – temporary wells
	Conduct tests to determine feasibility of addressing sources of VOCs in groundwater with nutrient-enhanced bioremediation and chlorinated solvents in groundwater through addition of hydrogen-releasing or oxygen-releasing compounds to the subsurface	PRPs	2004	OU-1 focused FS evaluated nutrient-enhanced bioremediation for VOCs and hydrogen-releasing and oxygen-releasing compounds for solvents in groundwater	2006

Notes:

FS Feasibility study, OU-1 Operable Unit 1, Groundwater and Tanks, PRP Potentially responsible party,
 RAWP Remedial Action Work Plan VOC Volatile organic compound

5.2 OU-2 Progress

As documented in the first FYR report, the OU-2 remedy was found to be ineffective because of the appearance of highly acidic sludge in the sludge pit area and the migration of contamination to adjacent properties; however, since publication of the first FYR report, additional site characterization and studies have been performed, and these efforts are reflected in the OU-2 ROD amendment (see Section 4.1.4). The OU-2 ROD amendment remedy is expected to be effective in protecting human health and the environment. Currently the remedial action work plan is being updated to reflect the OU-2 ROD amendment.

6.0 5-YEAR REVIEW PROCESS

The Purity Oil site FYR effort was led by Mr. Gary Riley, remedial project manager for the site. The following team members assisted in the FYR: Mr. Luis Garcia-Bakarich, Community Involvement Coordinator, EPA Region 9; Pacific Western Technologies, Ltd. of Lakewood, Colorado; and Tetra Tech EM Inc. of San Francisco, California, under Remedial Action Contract No. EP-W-06-006.

This FYR consisted of a review of relevant documents and data (Appendix A), a site inspection (Appendix B), site interviews (Appendix C), review of ARARs (Appendix D), and evaluation of human health risk and ecological risk (Appendices E and F).

6.1 Community Involvement

EPA placed a notice announcing the FYR in the *Fresno Bee* on August 10, 2006. No community inquiries have been received by EPA as a result of this notice. Upon completion of the FYR, a notice will be provided to the local community summarizing the findings.

6.2 Data Summary and Document Review (Appendix A)

Based on the quarterly groundwater data from OU-1 since the last FYR, the VOCs that exceed the cleanup goals include benzene; 1,1-dichloroethane; 1,2-dichloroethane; cis-1,2-dichloroethene; and vinyl chloride. Quarterly data indicate that the VOC plume beneath the property and extending slightly off the Purity Property to the northwest has been in a stable position and has had stable concentrations over the last 5 years. "Stable" here means that the highest concentrations of VOC contaminants along the center line of the plume have remained constant. Sporadic low-level detections of 1,2-dichloroethane have occurred in a well approximately 2,400 feet downgradient from the site. The concentrations in this distal well have been at or near the MCLs and within the risk range. The other VOCs have not been detected. Appendix A includes time-concentration charts for selected wells along the center line of the plume.

Review of the quarterly groundwater monitoring reports also indicates a lack of groundwater monitoring wells in the western portion of the site and a potential dilution of sample concentrations resulting from long screens in the existing wells. Although the plume is stable and the extent of plume defined, monitoring wells are required within the core area to better define the performance of the groundwater remedy. The "core" area is defined as the chlorinated compound plume beneath the Purity Oil site. The installation of additional monitoring wells within the core area is follow-up issue for this FYR.

The overall effectiveness of the groundwater extraction well approach is limited by the locations of the wells, the screened intervals, the complex area geology, and the distribution of contaminants within the plume. In addition, the regional water table has significantly declined by at least 20 feet over the past 12 years resulting from drawdown by the City of Fresno water district, making it more difficult to extract sufficient quantities of water from the aquifer. Currently, the groundwater extraction wells are neither hydraulically controlling nor reducing concentrations of contaminants in groundwater.

Further details explaining the limitations on the groundwater extraction wells are provided below.

Well location, screen interval, and geology: The installed groundwater extraction wells (EW-1 and EW-2) are located in a complex geologic setting of thin and discontinuous sand and silty sand layers of low transmissivity that limit the production of these wells. The capture effectiveness of the extraction system is further diminished by the ongoing depletion of the water table and fouling of the well sand packs. Current rates of extraction are significantly less than the expected design flow rates. Additionally, based on operations data prior to June 2005, the groundwater extraction wells have not been effective at reducing the chemical concentrations in the plume to meet water quality standards. The most recent potentiometric data presented in the latest quarterly groundwater reports during extraction well operation indicate that the plume and the gradient across the site are unaffected by the extraction wells.

Distribution of contaminants within the plume: Based on available monitoring data, chemical contaminants in the groundwater plume include a dense nonaqueous-phase liquid (DNAPL) layer below the water table in a residual and immobile state that continues to be a source of groundwater contamination. In addition to concerns regarding DNAPL in the saturated zone, light nonaqueous-phase liquid (LNAPL) in the vadose zone in contact with the water table could also be a continuing source of groundwater contamination.

The monitoring data also indicate that benzene, toluene, ethylbenzene, and xylene concentrations are not diminishing but stable, thereby implying that a source of these chemicals is partitioning to groundwater. The source may be by-products from masses of LNAPL in either the vadose or saturated zones. Because geochemical processes that degrade and move contaminants in groundwater are time-dependent and limited by mass transfer processes, the current OU-1 design may not provide for the long-term degradation and removal of LNAPL sources at the site.

Finally, the quarterly groundwater monitoring data also indicate that some degree of biodegradation of the chlorinated compounds is occurring; however, the data suggest that through the use of the current extraction wells, the ROD remediation goals will not be met within a reasonable timeframe.

6.3 Site Inspection (Appendix B)

The site inspection revealed that the OU-2 remedy had started and that the conveyance piping and control system wiring for the OU-1 extraction wells, EW-1 and EW-2, had been removed in order to construct the OU-2 soils remedy. These systems require reinstallation after the completion of OU-2 work in these areas.

Inspectors indicated that the OU-1 groundwater treatment system is operated on an infrequent batch basis instead of in continuous mode because the extraction system is currently shut down. The system continues to collect purge water from the sampling of monitoring wells located off the Purity Property, and rainfall that accumulates inside the treatment system containment pad. The system is operated as needed to treat the accumulated water and to meet the sampling requirements in the system's NPDES permit.

Because the treatment system is not being operated as designed (not in continuous mode), the system condition is somewhat degraded. Some parts (such as valves) have been removed from unneeded areas to repair parts of the system that remain in use. The system would require repair to return to continuous operation.

6.4 Site Interviews (Appendix C)

Five interviews were conducted of owners of properties adjacent to the Purity Oil site: Pick-a-Part Auto Wrecking and Allied Waste, both upgradient of the site, and West Coast Waste, Bruno's Iron and Metal, and the GSM, all downgradient of the site. None of the landowners had any concerns with the ongoing OU-2 remedy but did raise the issues summarized below.

- Trespassers are accessing the Pick-A-Part Auto Wrecking property through the Purity Oil site to steal parts. Chevron's remediation contractor frequently has to repair fencing damaged by these trespassers. This is a potential issue for this FYR; however, as long as Chevron inspects and repairs the fence as necessary, no follow-up action is required.
- Both the West Coast Waste and Bruno's Iron and Metal property owners were concerned about assuming liability for contaminants that have migrated onto their properties. They wished to receive a "comfort" letter ensuring them of legal immunity as innocent landowners or purchasers.
- The West Coast Waste property owner indicated that at least one current monitoring well is located in the center of the West Coast Waste yard and that this well interferes with traffic patterns. A more optimal location for future wells would be around the property at the fenceline.
- The downgradient landowners, West Coast Waste and Bruno's Iron and Metal, were using city water.

6.5 ARARs Analysis (Appendix D)

No review of the ARARs for the OU-2 remedy was necessary because current ARARs were identified in the OU-2 ROD amendment dated June 30, 2006 (EPA 2006).

For OU-1, EPA has reviewed the ARARs identified in the 1989 OU-1 ROD and compared them to current statutes, regulations, and policies. There have been several changes to federal and state maximum contaminant levels (MCL); however, these changes will not impact the protectiveness of the remedy. California has published new MCLs, and the table below illustrates, these new MCLs are the same as the cleanup levels in the OU-1 ROD (EPA 1989).

CHANGES IN CLEANUP STANDARDS

Contaminant	ROD Cleanup Level	Standard		Source/Year
		Previous	Current	
cis-1,2-DCE	6 ppb	Previous	6 ppb	California Department of Health Service (DHS) Action Level adopted as cleanup level in ROD
		Current	6 ppb	California MCL, 2006
1,1 DCA	5 ppb	Previous	5 ppb	DHS Action Level adopted in ROD
		Current	5 ppb	California MCL, 2006
trans-1,2-DCE	10 ppb	Previous	10 ppb	DHS Action Level adopted in ROD
		Current	10 ppb	California MCL, 2006

Notes:

DCA Dichloroethane
DCE Dichloroethene
MCL Maximum contaminant level
OU-1 Operable Unit 1, Soils
ppb Part per billion

In addition, there have been some citation changes to the statutory and regulatory framework. For example, Fresno County Ordinance 470-A-39 was repealed and replaced with Chapter 14.08 of the current Fresno County Ordinance Code. These changes should not have a substantive impact on the remedy implementation.

6.6 Human Health Risk Assessment Evaluation and Toxicity Criteria Review (Appendix E)

For OU-1, cleanup levels in the ROD are based on promulgated DHS action levels. Current federal and state MCLs were reviewed to determine if any MCLs for groundwater COCs had been updated since the issuance of the ROD for OU-1 (EPA 1989). The California MCLs have been updated as shown in the table above; however, they have not changed the cleanup standards that were based on the promulgated DHS action levels. The reduction of concentrations of COCs in groundwater to the OU-1 ROD cleanup standards meets federal and state MCLs and is considered protective of drinking water.

Recently, EPA's understanding of contaminant migration from groundwater into buildings has indicated that vapor intrusion may have a greater potential for posing risk to human health than originally assumed at the time the OU-1 ROD was prepared. In September 2002 (after the ROD for OU-1 was issued), EPA released an external review draft version of its vapor intrusion guidance titled "Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils" (EPA 2002). The migration of contaminants from groundwater into buildings (groundwater vapor intrusion) is a relatively new consideration at sites where groundwater has been impacted by volatile chemicals. Groundwater vapor intrusion is a potential concern if a complete exposure pathway exists. Tables 2a through 2c of the draft vapor intrusion guidance

list target groundwater concentrations for the groundwater-to-indoor air migration pathway that are equivalent to a cancer risk range of 10^{-4} to 10^{-6} or hazard quotient of 1 (EPA 2002).

At the Purity Oil site, the most recent groundwater data from May 2006 indicate that concentrations of volatile COCs in groundwater are below the draft Table 2a target groundwater concentrations, which are equivalent to the upper bound of the cancer risk management range (or a 10^{-4} risk level). In addition, there are no buildings over the area where VOC contamination currently exists. Vapor intrusion is therefore not a potential issue for this FYR.

The OU-2 remedy will be protective upon completion. The potential for vapor intrusion from any remaining VOC contaminated soils will be addressed by post-excavation soil and soil gas sampling, and by a soil vapor extraction system.

6.7 Screening Level Ecological Risk Assessment and Toxicity Criteria Review (Appendix F)

No ecological risk evaluation was performed for OU-1 because there are no pathways for discharges of groundwater to the surface at the Purity Oil site.

For OU-2, a qualitative evaluation of risk to ecological receptors on-site at Purity Oil Site and at the adjacent properties was performed. The qualitative risk assessment found that the selected remedy in the OU-2 ROD amendment will eliminate exposure pathways by which contaminants in soil can be taken up by ecological receptors on the Purity Property and on adjacent properties; however, once the OU-2 remedy is completed, the site will be covered with topsoil and vegetation. It is recommended that backfill for the excavations and the soil cap consist of soil that meets the ecological soil screening levels to be protective of ecological receptors that may inhabit the vegetated site.

6.8 Institutional Controls Assessment

The OU-2 ROD amendment requires institutional controls on the Purity Oil site in the form of an Environmental Restriction Covenant to protect the cap and other remedy components and to prevent exposure to neutralized sludge. Environmental Restriction Covenants will also be required for the adjacent properties to ensure that sensitive uses (such as residential, school, or daycare facilities) do not occur. Restrictions will not be necessary for the GSM property if the site is cleaned up for unrestricted use. Such cleanup is contingent on whether the PRP is able to acquire the GSM property from the current owner. If the PRP is able to purchase this property, the site will be remediated to industrial cleanup levels and an Environmental Restriction Covenant will be required.

The OU-1 ROD requires a groundwater management zone for the plume. The groundwater management zone strategy has been effective at meeting the goal of coordinating the remedy with other uses of the aquifer and maintaining groundwater levels at the desired configuration; however, the strategy is not in conformance with EPA's current approach for implementing institutional controls. The groundwater management zone strategy will be reassessed as part of EPA's institutional control strategy development.

7.0 TECHNICAL ASSESSMENT

The technical assessment of the OU-1 and OU-2 remedies was evaluated by asking the following three questions:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are the assumptions used at the time of remedy selection still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The answers to each question are provided below.

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

OU-1: Groundwater and Tanks

Several components of the remedy selected for OU-1 for the Purity Oil site are functioning effectively as intended; the alternate source for drinking water provided under the OU-1 ROD to downgradient residents that historically relied on private wells for drinking water has effectively removed the threats posed by the contaminated sole-source aquifer. The OU-1 ROD tank removal has effectively removed the threat of direct exposure to contaminants in the tanks. The OU-1 ROD wastewater treatment system is able to effectively remove contaminants from extracted groundwater conveyed to the system for treatment and meets ROD regulatory requirements.

However, the extraction system for the groundwater pump-and-treat remedy is not functioning as intended. It has failed to capture the contaminant plume and effectively treat contaminants within the plume, which are the primary objectives of the remedy, and the remedy design may not achieve aquifer restoration within a reasonable timeframe. In addition, the current design of the groundwater pump-and-treat system is not adequate to remove contaminated groundwater to a degree sufficient to achieve restoration; therefore, the system will need improvements. The plume appears to be stable due to natural attenuation mechanisms based on regular groundwater monitoring conducted over the FYR period (SECOR 2006a).

OU-2: Soils

The OU-2 ROD remedy has been under construction since 1998, when existing portions of the North Central Canal that abut the site were enclosed within a reinforced concrete pipe. This enclosure has effectively eliminated the exposure pathway for site contaminants to impact irrigation water in the supply canal.

Since November, 2000, capping of the site has been ongoing. The appearance of acidic sludge seepage from the waste area and contamination extending beyond the Purity Property boundaries has been addressed through ESDs and the OU-2 ROD amendment. The OU-2 ROD amendment

and corresponding remedial action work plan (RAWP) being prepared to implement the ROD are anticipated to be effective.

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

OU-1: Groundwater and Tanks

Since the time of remedy selection as documented in the OU-1 ROD, there have not been any significant changes in exposure pathways, toxicity data, or cleanup levels, or any new discovery of contaminants that would impact RAOs.

Of the three RAOs in the OU-1 ROD, two have been completed: provide safe drinking water to downgradient residents and eliminate the direct exposure threat posed by the hazardous wastes present in the seven on-site steel tanks. The status of the third RAO, restore the sole-source drinking water aquifer as soon as possible to meet federal and state drinking water standards, is uncertain at this time. Currently, the OU-1 ROD selects a pump-and-treat remedy to comply with this third RAO.

The pump-and-treat remedy that has operated for 11 years has not impacted groundwater as expected and is not restoring the sole-source aquifer "as soon as possible." The plume appears to be stable due to natural attenuation mechanisms. A re-examination of the current remedy is required to establish hydraulic control of the contaminated plume and achieve water quality goals as soon as possible. The re-examination of the current remedy has included preparation of a focused FS to evaluate other treatment alternatives that may accelerate achievement of the water quality goals.

OU-2: Soils

Any significant changes in standards and assumptions from the OU-2 ROD have been incorporated into the OU-2 ROD amendment. The ROD amendment and this second FYR report were published at the same time.

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

OU-1, Groundwater and Tanks

No other additional information for OU-1 calls into question the protectiveness of the remedy.

OU-2 Remedy, Soils

The qualitative ecological risk assessment performed as part of the FYR process indicates that at both the Purity Oil site and the BTPL properties, the selected remedy will eliminate the exposure pathway by which contaminants in soil can be taken up by ecological receptors. It is recommended that backfill for the excavations and the soil cap consist of soil that is protective of ecological receptors.

8.0 ISSUES

Issues relating to current site conditions that may prevent the remedies of the OU-1 and OU-2 RODs from being protective are summarized in the table below.

Issue	Affects Current Protectiveness	Affects Future Protectiveness
1. OU-1: The current pump-and-treat system specified in the OU-1 ROD is neither hydraulically controlling nor reducing concentrations of COCs in saturated and vadose zones that may be acting as a continuing source of groundwater contamination. In addition, continued decreases of the groundwater table affect the ability of extraction wells to remove water and contaminants; however, the plume appears to be stable due to natural attenuation mechanisms (see Section 7.1). Re-examination of the current OU-1 ROD remedy is required to achieve water quality goals as soon as possible (see Section 7.2)	Unknown	Yes
2. OU-1: The current groundwater monitoring well network does not allow definition of concentration gradients within the western portion of the plume. Also, deeper monitoring wells are needed to assess the vertical distribution of groundwater contaminants. Although the plume is stable and the extent of plume has been defined, monitoring wells are required within the core area to allow better evaluation of the performance of the groundwater remedy (see Section 6.2).	No	Yes
3. OU-1: Revise the current groundwater management zone strategy. The current strategy extending 1 to 2 miles from the cleanup target area to coordinate the remedy with other uses of the aquifer and to maintain groundwater levels is impracticable (see Section 6.8).	No	Yes
4. OU-2: Trespassers are damaging the fence around the Purity Oil site, and Chevron's remediation contractor frequently has to repair this fencing (see Section 6.2). As long as Chevron inspects and repairs the fence as necessary, no follow-up action is required.	No	No

Notes:

- COC Chemical of concern
- OU-1 Operable Unit 1, Groundwater and Tanks
- OU-2 Operable Unit 2, Soils
- ROD Record of Decision

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

For the OU-1 groundwater remedy, the current pump-and-treat system appears to have little or no effect on the groundwater plume. EPA recommends that either the extraction well system be fully implemented as indicated in the OU-1 ROD or that other remediation approaches, such as nutrient-enhanced bioremediation as described in the OU-1 focused FS report (SECOR 2006a) be further evaluated. The OU-1 FS report indicates that to achieve ROD remediation goals for the plume, an *in situ* remediation system may be feasible. Pilot-scale studies are required to verify the efficacy of *in situ* remediation.

Before further study is approved by EPA, the existing groundwater monitoring program should be improved within the core area to allow better evaluation of the performance of the groundwater remedy. This effort will require additional monitoring wells, additional monitoring parameters, and different sampling techniques.

In addition, the current groundwater management zone institutional control strategy is difficult to implement. An institutional control strategy should be developed to replace the existing groundwater management zone strategy.

Table 4 summarizes recommendations and follow-up actions for each OU.

TABLE 4: RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
1	OU-1: The current pump-and-treat system specified in the OU-1 ROD is neither hydraulically controlling nor reducing concentrations of COCs in saturated and vadose zones that may be acting as a continuing source of groundwater contamination. EPA recommends that either the extraction well system be fully implemented as indicated in the OU-1 ROD or that other remediation approaches, such as nutrient-enhanced bioremediation, be further evaluated and a remedy change pursued. The next stage in a remedy change would be to proceed with pilot-scale studies to further evaluate remedies for nutrient-enhanced bioremediation. A draft work plan for pilot scale studies has been developed. Results of the pilot study are expected to be presented in a report on or before December 2008.	Chevron	EPA	December 2008	No	Yes
2	OU-1: The current groundwater monitoring well network does not allow definition of concentration gradients within the western portion of the plume. Also, deeper monitoring wells are needed to assess the vertical distribution of groundwater contaminants. Although the plume is stable and the extent of plume has been defined, monitoring wells are required within the source area to better define the performance of the groundwater remedy. Additional groundwater monitoring wells are required and the existing groundwater monitoring program needs improvement within the source area to allow better evaluation of the performance of the groundwater remedy. A formal work plan should be prepared that presents well construction details, procedures, and locations for the recommended wells to address these data gaps (see Appendix A) by December 2007.	Chevron	EPA	December 2007	No	Yes
3	OU-1: The current groundwater management zone institutional control strategy extending 1 to 2 miles from the cleanup target area to coordinate the remedy with other uses of the aquifer and to maintain groundwater levels is impracticable. An institutional control strategy should be developed through an appropriate decision document to replace the existing groundwater management zone strategy.	Chevron	EPA	December 2009	No	Yes

Notes:

ARAR	Applicable or relevant and appropriate requirement	EPA	U.S. Environmental Protection Agency
CFR	Code of Federal Regulations	FR	Federal Regulations
DHS	Department of Health Services	FS	Feasibility study

FYR	5-Year review
MCL	Maximum contaminant level
OU-1	Operable Unit 1, Groundwater and Tanks
OU-2	Operable Unit 2, Soils
RAWP	Remedial action work plan
ROD	Record of Decision
TBC	To be considered

10.0 PROTECTIVENESS STATEMENTS

The protectiveness statements for OU-1 and OU-2 are presented below.

10.1 OU-1: Protectiveness Deferred

A protectiveness determination of the remedy at OU-1 cannot be made at this time until further information is obtained about the ability of the current remedy to restore the aquifer to beneficial use beneath the property within a reasonable timeframe. There is no current or potential exposure related to groundwater.

Further information will be obtained by taking the following actions:

- Completing OU-1 focused FS (Issue 1)
- Performing pilot tests demonstrating the preferred alternatives and presenting results in the focused FS report (Issue 1)
- Installing and operating additional monitoring wells within the core plume area (Issue 2)

It is expected that these actions will take approximately 3 years to complete, after which time a protectiveness determination will be made. In addition, the following actions will need to be taken to ensure long-term protectiveness:

- Revise and implement OU-1 institutional controls strategy (Issue 3)
- Amend the OU-1 groundwater ROD to incorporate the revised institutional controls strategy and preferred alternative demonstrated with pilot studies

10.2 OU-2: Will Be Protective

The remedy at OU-2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

The OU-2 ROD remedy should be implemented so that any excavation or cap area is backfilled with clean soil that meets all applicable human health and ecological risk standards. Except for access by intruders, exposure pathways that could result in unacceptable risks are being controlled (see Issue 5 in the table in Section 8.0). The OU-2 O&M plan should be revised as needed to consider repair of fences damaged by these intruders.

The OU-2 remedy includes an SVE system to remove volatile organics in soil below the site and at BTPL properties to eliminate vapor intrusion from COCs in underlying contaminated soils and groundwater that may migrate into enclosed industrial areas (see Issue 4 in the table in Section 8.0).

11.0 NEXT REVIEW

The next FYR for the Purity Oil site will be conducted within 5 years of the completion of this review. The next FYR has a projected date of September 28, 2011.

12.0 REFERENCES

- SECOR International (SECOR). 2003. "OU-1 Improvement Evaluation." Purity Oil Sales Superfund (Purity Oil) Site. October.
- SECOR. 2006a. "OU-1 Focused Feasibility Study for Chevron Environmental Management Company, Purity Oil Sales Superfund Site, Malaga, Fresno County, California." March 13.
- SECOR 2006b. "Operational Unit 2 – Remedial Action Work Plan for Purity Oil Sales Superfund Site, 3281 South Maple Avenue, Malaga, Fresno County, California." June 20.
- U.S. Environmental Protection Agency (EPA). 1988. "Final Remedial Investigation Report, Purity Oil Sales Superfund Site, Fresno, California." Region 9. October.
- EPA. 1989. "Record of Decision for the Purity Oil Sales Superfund Site, Groundwater and Tanks Operable Unit." Region 9. San Francisco, California. September.
- EPA. 1992. "Record of Decision for the Purity Oil Sales, Inc. Superfund Site, Soil Operable Unit." Region 9. San Francisco, California. September.
- EPA. 2001. "Five-Year Review Report for Purity Oil Sales, Fresno County, California." Region 9. San Francisco. September 28,
- EPA. 2002. "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils." November.
- EPA. 2003. "Technical Memorandum. Beyond the Property Line Investigations, Purity Oil Sales Superfund Site, Fresno, California." April.
- EPA. 2005. "Purity Oil Sales Superfund Site Proposed Plan." Region 9. San Francisco. April.
- EPA. 2006. "Record of Decision Amendment, Purity Oil Sales Superfund Site, Soils Operable Unit No. 2., Malaga, California." Region 9. San Francisco. June 30.

APPENDIX A
DOCUMENT REVIEW

APPENDIX A DOCUMENT REVIEW

For this second 5-year report (FYR) for the Purity Oil Sales Superfund (Purity Oil) site, most of the documents reviewed are listed in Section 12.0, References, of the second FYR report. As discussed in the second FYR report, the site remedies have been divided into two operable units (OU): Operable Unit 1 (OU-1), Groundwater and Tanks, and Operable Unit 2 (OU-2), Soils. Other documents also reviewed and not listed in Section 12.0 of the second FYR report in order to assess the OU-1 and OU-2 remedies are discussed below.

OU-1: Groundwater and Tanks

OU-1's current status was evaluated by reviewing analytical data from quarterly groundwater monitoring reports not listed in Section 12.0 of the second FYR report related to trends, data gaps, and conclusions that could influence the protectiveness of the OU-1 remedy. The reports were prepared by Chevron's various consultants. The following available quarterly groundwater monitoring reports from 1995 through 2006 were reviewed:

- International Technology (IT) Corporation. 1995. Groundwater Monitoring Report for First Quarter 1995. Purity Oil Sales Superfund (Purity Oil) Site. March.
- IT Corporation. 1999. Groundwater Monitoring Report for Second Quarter 1999. Purity Oil Site. September 10.
- IT Corporation. 2000. Groundwater Monitoring Report for Fourth Quarter 1999. Purity Oil Site. March.
- IT Corporation. 2001. Groundwater Monitoring Report for Third Quarter 2000. Purity Oil Site. December.
- IT Corporation. 2001. Groundwater Monitoring Report for Fourth Quarter 2000. Purity Oil Site. March. Contained in Data from 1992 through 2000.
- IT Corporation. 2001. Groundwater Monitoring Report for First/Second Quarter 2001. Purity Oil Site. July 31.
- IT Corporation. 2002. Groundwater Monitoring Report for Third Quarter 2001. Purity Oil Site. March.
- SECOR International (SECOR). 2002. Groundwater Monitoring Report for Second Quarter 2002. Purity Oil Site. August.
- SECOR. 2002. Groundwater Monitoring Report for Third Quarter 2002. Purity Oil Site. December.

- SECOR. 2003. Groundwater Monitoring Report for Fourth Quarter 2002. Purity Oil Site. March.
- SECOR. 2003. Groundwater Monitoring Report for First Quarter 2003. Purity Oil Site. July.
- SECOR. 2003. Groundwater Monitoring Report for Second Quarter 2003. Purity Oil Site. November.
- SECOR. 2004. Groundwater Monitoring Report for Third Quarter 2003. Purity Oil Site. February.
- SECOR. 2004. Groundwater Monitoring Report for Fourth Quarter 2003. Purity Oil Site. April.
- SECOR. 2004. Groundwater Monitoring Report for First Quarter 2004. Purity Oil Site. June.
- SECOR. 2004. Groundwater Monitoring Report for Second Quarter 2004. Purity Oil Site. August.
- SECOR. 2005. Groundwater Monitoring Report for First Quarter 2005. Purity Oil Site. July.
- SECOR. 2005. Groundwater Monitoring Report for Second Quarter 2005. Purity Oil Site. November.
- SECOR. 2006. Groundwater Monitoring Report for Third Quarter 2005. Purity Oil Site. March.
- SECOR. 2006. Groundwater Monitoring Report for Fourth Quarter 2005. Purity Oil Site. April.
- SECOR. 2006. Groundwater Monitoring Report for First Quarter 2006. Purity Oil Site. June.
- SECOR. 2006. Groundwater Monitoring Report for Second Quarter 2006. Purity Oil Site. August.

Based on the quarterly groundwater data from OU-1 since the last FYR, the VOCs that exceed the cleanup goals include benzene; 1,1-dichloroethane; 1,2-dichloroethane; cis-1,2-dichloroethene; and vinyl chloride. The quarterly data also indicate that the groundwater plume is not migrating further. The concentrations appear to be stable over the last 5 years, and there are potential data gaps. "Stable" is defined here as the highest concentrations of VOC contaminants along the center line of the plume remaining constant. Time-concentration charts for selected wells along the center line of the plume (MW-34I, MW-06s, and MW-10) follow.

Potential data gaps related to the current groundwater monitoring system are summarized below.

Lack of Functional Monitoring Wells in Western Portion of Site: Uncontrolled releases of waste oil from the on-site sludge pits occurred in the western portion of the site similar to those in the eastern portion of the site. Groundwater quality cannot be fully assessed because of the lack of a functional monitoring well network in this area. Additionally, well MW-14D has historically contained volatile organic compounds (VOC) and metals, so further monitoring in this portion of the site is also justified. The SECOR International (SECOR) cone penetrometer test (CPT) results from borings downgradient of this area (CPTS-8B, CPTS-9A, CPTS-12, and CPTS-16A) also show detections of VOCs (SECOR 2003), so monitoring downgradient of the western portion of the site is also justified.

Lengths of Existing Monitoring Well Screens are Potentially Diluting Sample Concentrations: Some of the sample concentrations may be diluted because well screens are longer than 10 feet at many wells as discussed below.

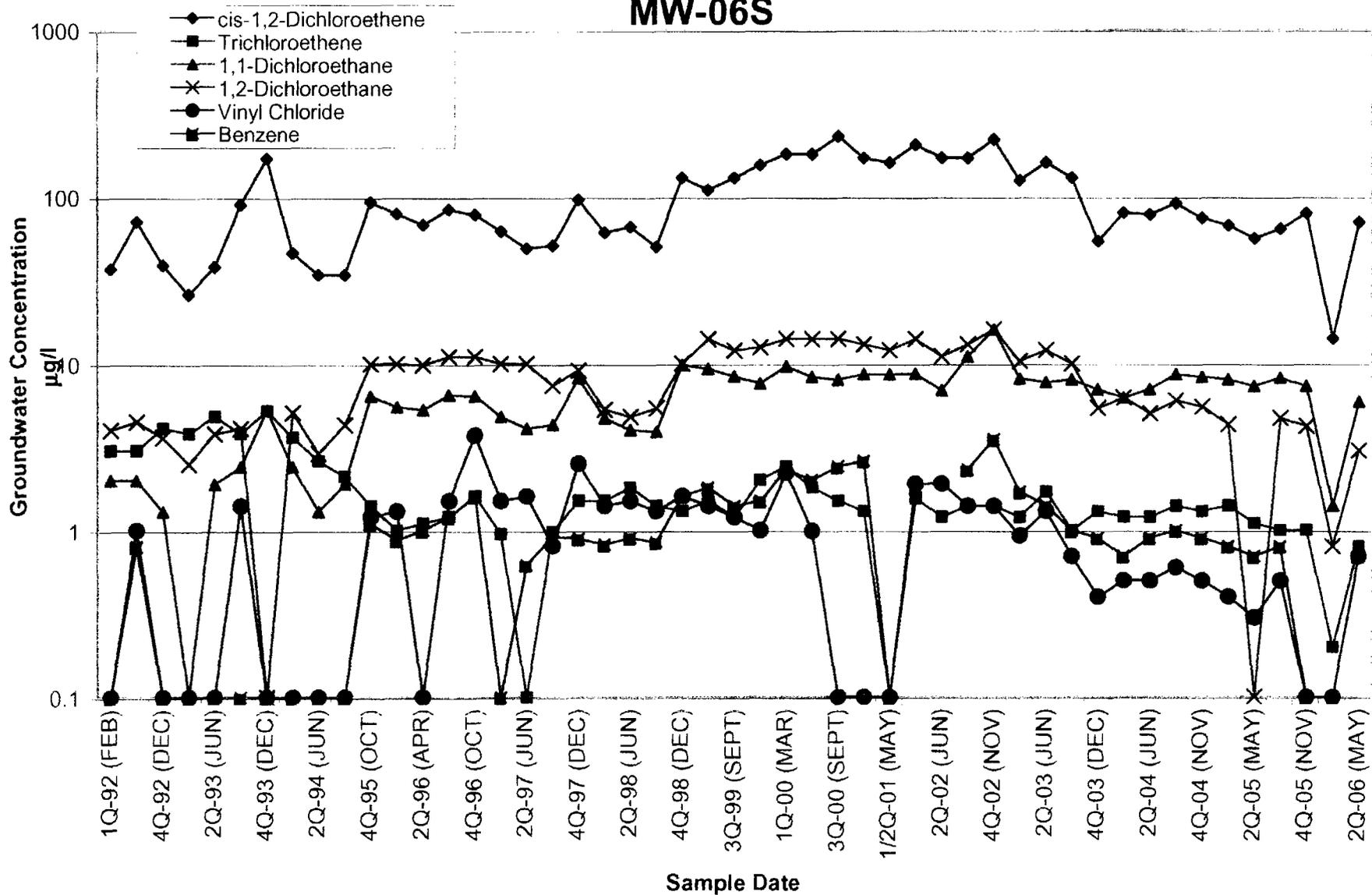
- **Vertical Extent of VOCs in Central Portion of Plume -** Well MW-6D has a screened interval at 154 to 175 feet below the top of the casing and has exhibited increasing concentrations of cis-1,2-dichloroethene (DCE) and trichloroethene (TCE) since the first quarter of 2003. Additionally, results from the SECOR CPT investigation reveals detections of cis-1,2-DCE in groundwater at depths of 59, 72, 93, and 115 feet below ground surface (bgs) from boring CPTS-13A near well MW-6D (SECOR 2003). Although the concentrations in samples from well MW-6D are low and so far have not exceeded the Record of Decision (ROD) cleanup goals, the 21 feet of screen length in well MW-6D likely intersects multiple water-bearing zones, which could dilute sample concentrations unless the dedicated sampling pump was in or very near the contaminated interval. The vertical extent of the VOC plume is therefore undefined in this area because MW-6D is a deep well with an excessive screen length of 21 feet.
- **Vertical Extent of VOCs in Western Portion of Site and Area Downgradient of Site:** The SECOR CPT results reveal VOC contaminants as deep as 94 feet bgs in borings CPTS-8B, CPTS-9A, CPTS-12, and CPTS-16A (SECOR 2003). In some cases, this depth represents the deepest sample collected at that location. The only well that currently monitors this area of the plume is MW-25, which extends no deeper than 67 feet bgs.

A formal work plan should be prepared that presents well construction details, procedures, and locations for the recommended wells to address these data gaps.

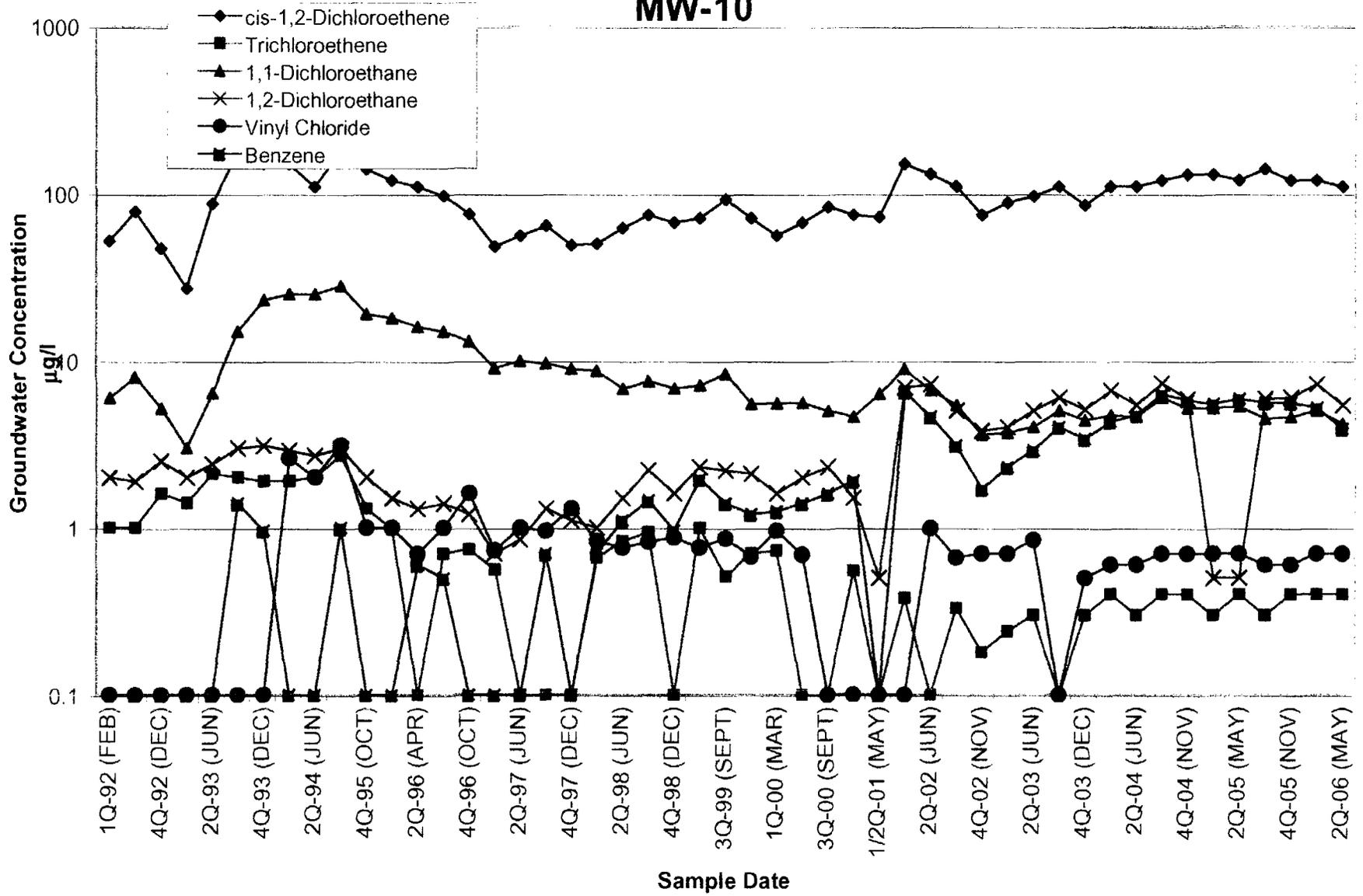
OU-2: Soils

OU-2's current status was evaluated by reviewing the documents listed in Section 12.0 of the second FYR report.

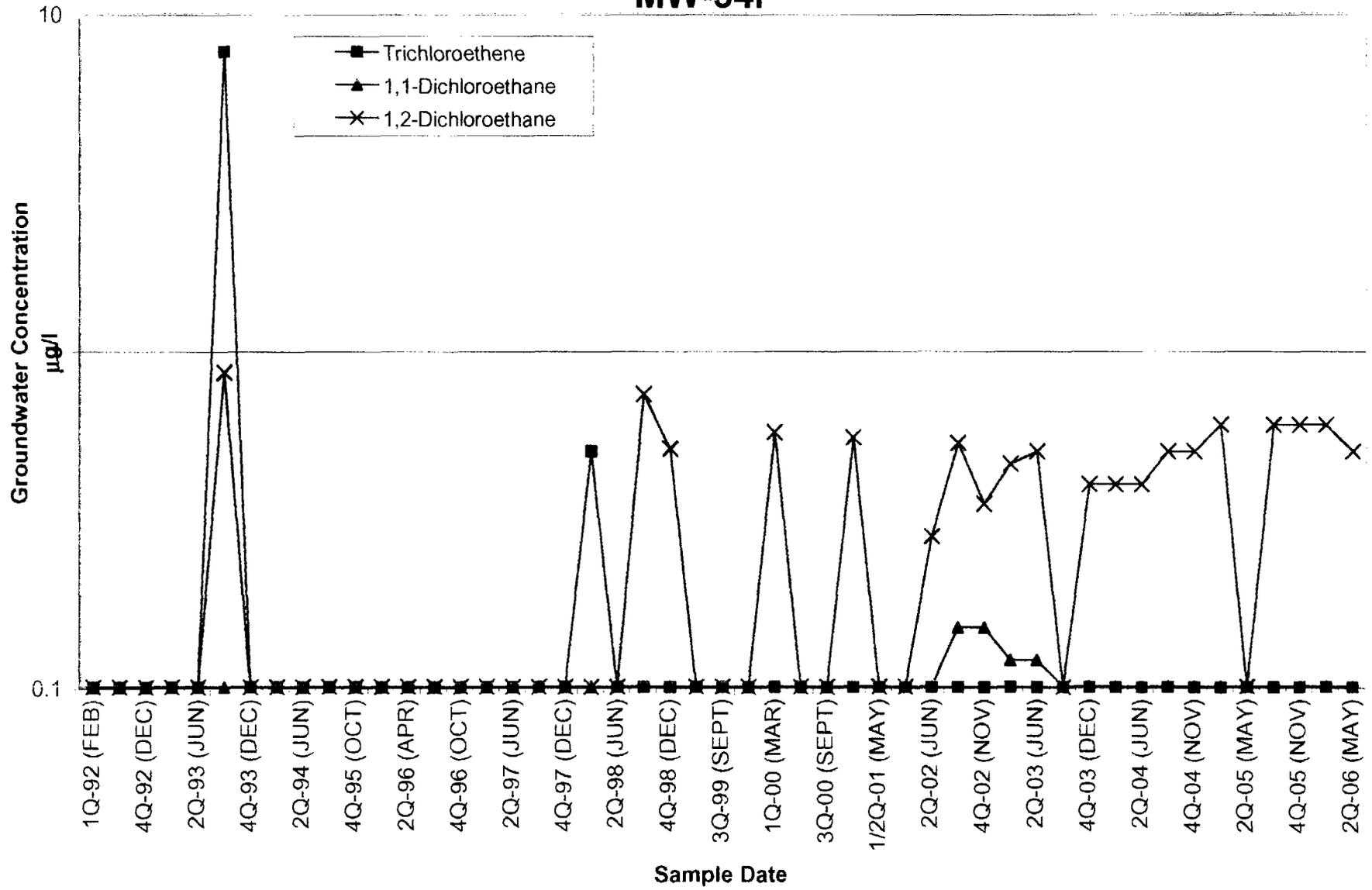
MW-06S



MW-10



MW-34I



APPENDIX B
SITE INSPECTION

APPENDIX B SITE INSPECTION

The site is currently in use for construction and operation of the remedial action. The site contains the groundwater pump-and-treat system, temporary office trailers for contractors, and construction equipment associated with the OU-2 soils remedial action. Neighboring site uses include two salvage yards, the vacant former Tall Trees Mobile Home Park, a railroad, and South Maple Avenue.

Work at the site was in progress to prepare the site for construction of the OU-2 soils remedy described in the July 2006 ROD Amendment. The remedy was not yet implemented, so the site inspection focused on access restrictions to the site to ensure protection of human health and the environment during construction of the remedy.

The OU-1 groundwater remedy was shut down so that construction could continue on the OU-2 soil remedy, including removing groundwater conveyance piping between the extraction wells and treatment system.

Access controls at the site include fencing, signage, and security guards. The site inspection found the fence was intact but is subject to frequent damage by intruders. SECOR staff report they repair holes in the fence on a daily, to weekly basis. Intruders reportedly enter the site to access to the neighboring Pick-a-Part auto salvage property. A security guard is present at the site during non-working hours in the vicinity of the treatment system and temporary office trailers. No intruders in these areas have been reported.

Surface water accumulates at the site in the winter months, but does not flow off the site due to a perimeter anchor trench that surrounds the site. No water was observed on the site during the inspection, other than the small amount applied for dust control. No areas of serious erosion were observed.

The site is covered with a temporary soil cap that prevents direct contact with acidic sludge. No sludge was observed exiting the surface.

The groundwater system is operated on an infrequent, batch basis because the extraction system is currently shut down for evaluation of an MNA remedy. The system continues to collect purge water from sampling of monitoring wells located off the Purity Property and rainfall that accumulate inside the treatment system containment pad. The system is operated as needed to treat the accumulated water and to meet the sampling requirements in the system's NPDES permit issued by the Central Valley Regional Water Quality Control Board.

Since the treatment system is not being operated as designed (i.e., in batch rather than continuous mode) the system condition is somewhat degraded. Some parts (valves, etc.) have been removed from unneeded areas to repair those parts of the system that remain in use. The system will require repair when required to return to continuous operation.

The conveyance piping and control system wiring for extraction wells EX-1 and EX-2 have been removed in order to construct the soils OU-2 remedy. These systems require reinstallation following completion of OU-2 work in these areas.

APPENDIX C
SITE INTERVIEWS

**APPENDIX C
SITE INTERVIEWS**

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews. Interviews were conducted by Mr. Gary Riley, RPM, of Region 9 EPA, Mr. Luis Garcia-Bakarich, Community Involvement Coordinator, of EPA Region 9. Assistance was provided by Mr. Jerry Faucheux and Mr. Kevin Bricknell of Tetra Tech EM Inc.

<u>Ms. Herlinda Pizana</u>	<u>General Manager</u>	<u>Pick-A-Part</u>	<u>7/12/06</u>
Name	Title/Position	Organization	Date
<u>Mr. John Brown</u>	<u>General Manager</u>	<u>Allied</u>	<u>7/13/06</u>
Name	Title/Position	Organization	Date
<u>Mr. Randy Tassi</u>	<u>Owner</u>	<u>Bruno's Iron & Metal</u>	<u>7/13/06</u>
Name	Title/Position	Organization	Date
<u>Mr. Alex Hussein</u>	<u>Owner's rep.</u>	<u>Golden State Market</u>	<u>7/13/06</u>
Name	Title/Position	Organization	Date
<u>Mr. Dennis Balakian</u>	<u>Owner</u>	<u>West Coast Waste</u>	<u>7/13/06</u>
Name	Title/Position	Organization	Date

The following list of questions were used to guide conversations with each individual:

1. What is your overall impression of the project? (general sentiment)
2. What effects have site operations had on the surrounding community?
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
5. Do you feel well informed about the site's activities and progress?
6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
7. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe the changes and impacts

INTERVIEW RECORD

Site Name: Purity Oil Sales, Inc, Superfund Site		EPA ID No.:	
Subject: Five -Year Review		Time: 1515	Date: 7/12/06
Type: <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit:		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
Contact Made By:			
Name: Jerry Fauchoux		Title: Project Oversight	Organization: TTEMI
Individual Contacted:			
Name: Ms. Herlinda Pizana		Title: General Manager	Organization: Pick-A-Part Auto Wrecking
Telephone No: 559.485.3071 Fax No: E-Mail Address:		Street Address: 2274 E. Muscat City, State, Zip: Fresno, CA 93725	
Summary Of Conversation			
<ul style="list-style-type: none"> · EPA discussed purpose of 5 - year review · Pick-A-Part stated no problems with any emissions onto their property · Pick-A-Part uses bottled water and city supplies water for their property · It was discussed that construction activities began in October 2000 · Pick-A-Part's main concern is the theft on their property and the security (night guard) provided for Purity. Mentioned that \$50K of parts (catalytic converters, aluminum wheels, etc.) have been stolen and people are entering through the front chain-link fence adjacent to Purity. · No problems with any activities as a result of field activities being conducted on-site other than the security guards being perceived as being inattentive. · Pick-A-Part stated they would take the fence down, if necessary, to conduct any removal related work on their property, however, would like for Chevron to provide a temporary fence until work is completed. · EPA provided Pick-A-Part with a copy of the April 2005 Proposed Plan. · Pick-A-Part mentioned a more "aggressive" guard is needed on-site · Pick-A-Part stated they are aware of field activities conducted on-site and the remediation involved with this project. Mentioned that everyone on-site has been pleasant and cooperative. Also, mentioned the berm in-place has been effective and has controlled any possibly run-off or surface water from their property. · EPA discussed the preferred Alternative for the site and the upcoming neutralization field 			

activities to be performed.

- Pick-A-Part inquired about future use of property and EPA informed Pick-A-Part that a cap will be installed and once installed digging will be limited.
- Pick-A-Part inquired about Tall Trees Trailers and the re-location of it.
- EPA informed Pick-A-Part that the re-location was due to contamination from the Purity Site located within the Tall Trees property.

INTERVIEW RECORD

Site Name: Purity Oil Sales, Inc, Superfund Site			EPA ID No.:		
Subject: Five-Year Review			Time: PM		Date: 7/13/06
Type: <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit:			<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing		
Contact Made By:					
Name: Gary Riley Accompanied by: Luis Garcia-Bakarich, EPA Community Involvement Coordinator & Kevin Bricknell, Tetra Tech			Title: RPM		Organization: EPA
Individual Contacted:					
Name: Mr. Randy Tossi		Title: Owner		Organization: Bruno's Iron & Metal	
Telephone No:			Street Address:		
Fax No:			City, State, Zip: Fresno, CA 93725		
E-Mail Address:					
Summary Of Conversation					
<ul style="list-style-type: none"> • Ongoing work at Purity has no impact on his ongoing operations • Wants return of 25 foot easement granted to Chevron for the duration of OU 2 remedy construction • Uses City of Malaga water • Two groundwater monitoring wells installed as part of Purity Oil project have been removed from property over years • Concerned that he will become responsible for any remaining contamination in soil underneath his property or Tall Trees if he purchases it, especially acidity in soil. Acidity in soil has corroded metal parts in the past. • Removed and disposed off site at a hazardous waste landfill 23 tons of soil when constructed stormwater runoff sump near Tall Trees • Wants to purchase Tall Trees without assuming the liability • Has excellent security, and monitors his property with video cameras and laser beams • Likes working with Bob, current Chevron PM 					

INTERVIEW RECORD

Site Name: Purity Oil Sales, Inc, Superfund Site		EPA ID No.:	
Subject: Five-Year Review		Time: AM	Date: 7/13/06
Type: <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit:		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
Contact Made By:			
Name: Gary Riley Accompanied by: Luis Garcia-Bakarich, EPA Community Involvement Coordinator & Kevin Bricknell, Tetra Tech		Title: RPM	Organization: EPA
Individual Contacted:			
Name: John Brown	Title: General Manager	Organization: Allied	
Telephone No:	Street Address:		
Fax No:	City, State, Zip: Fresno, CA 93725		
E-Mail Address:			
Summary Of Conversation			
<ul style="list-style-type: none">• No impacts from Purity Oil on Allied• He has been with Allied at this site for about 30 years• Parking by workers at Purity in front of Allied's entrance was a problem 5 years ago• Has a functioning groundwater well, however, uses bottled water• Has impression that security guards are ineffective, and ineffectiveness stems from guard not being allowed on the Purity site• Asked why cleanup crews aren't local workers? EPA responded that workers have hazardous waste site training.			

INTERVIEW RECORD

Site Name: Purity Oil Sales, Inc, Superfund Site		EPA ID No.:	
Subject: Five-Year Review		Time: AM	Date: 7/13/06
Type: <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit:		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
Contact Made By:			
Name: Gary Riley Accompanied by: Luis Garcia-Bakarich, EPA Community Involvement Coordinator & Kevin Bricknell, Tetra Tech		Title: RPM	Organization: EPA
Individual Contacted:			
Name: Mr. Alex Hussein	Title: Owner	Organization: Golden State Market	
Telephone No:		Street Address:	
Fax No:		City, State, Zip: Fresno, CA 93725	
E-Mail Address:			
Summary Of Conversation			
<ul style="list-style-type: none">• No concerns• No complaints from customers			

APPENDIX D
ARARs ANALYSIS

APPENDIX D ARARs ANALYSIS

The U.S. Environmental Protection Agency (EPA) has reviewed the applicable or relevant and appropriate requirements (ARAR) identified in the 1989 Record of Decision (ROD) and has compared them to current statutes, regulations and policies. This analysis is presented in Table D-1 below. As discussed below, several changes have been made to the federal and state maximum contaminant levels (MCL) that may impact the protectiveness of the remedy. In addition, there have been some citation changes to the statutory and regulatory framework. For example, Fresno County Ordinance 470-A-39 was repealed and replaced with Chapter 14.08 of the current Fresno County Ordinance Code. These changes should not have a substantive impact on the implementation of the remedy.

Federal and California MCLs are identified as ARARs in the ROD. The federal secondary MCLs for iron and manganese have not changed. The primary federal MCLs for the following compounds have also not changed: trichloroethene (TCE); 1,2-dichloroethane (DCA); 1,1-dichloroethene (DCE); benzene; vinyl chloride; and carbon tetrachloride. At the time of the ROD, the MCLs for cis-1,2-DCE and trans-1,2-DCE were proposed. They are now final and are the same as the levels proposed in the ROD.

- For 1,1 DCA, no California MCL is identified in the ROD. Instead, the California State Action Level of 5 parts per billion (ppb) was used as the cleanup goal. Table 6 of the ROD indicates that Department of Health Services (DHS) action levels for Public Drinking Water Supplies (January 1987) are "to be considered" (TBC) as cleanup goals for the aquifer. The DHS action level is equal to the current California MCL of 5 ppb.
- For cis-1,2-DCE, no California MCL is identified in the ROD. Instead, the California State Action Level of 6 ppb was used as the cleanup goal. The DHS action level is equal to the current MCL of 6 ppb.
- For trans -1,2-DCE, no California MCL is identified in the ROD. Instead, the California State Action Level of 10 ppb was used as the cleanup goal. The DHS action level is equal to the current California MCL of 10 ppb.

Title 52 of the *Federal Regulations* (FR) 3748 was defined as a TBC. These standards propose volatile organic compound (VOC) emissions levels from product accumulator vessels and leak detection programs. These standards are still in effect. 52 FR 3748 proposes numerous changes to the *Code of Federal Regulations* (CFR) and became final and was promulgated on June 21, 1990 (55 FR 25454).

TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL

Action	Requirement	Citation	Origin	Determination	Status	Comments
Action-Specific ARARs						
Treatment Groundwater Extraction	Reporting requirements for well construction, alteration or abandonment under the Water Code are relevant and appropriate for extraction wells due to the technical value of the report information. Reports are filed with the Department of Water Resources.	CA Water Code §§ 13750-13755 (I)	ROD	Applicable	No change	CA Water Code Sections 13750.5 - 13755 still contains requirements for well construction and reporting.
Treatment Groundwater Extraction	This Ordinance governs well construction in Fresno County, and is applicable to extraction well construction.	Fresno County Well Construction Ordinance 470-A-39	ROD	Applicable	Ordinance was amended.	Chapter 14.08 of the current Fresno County Ordinance Code governs well construction, pump installation and well destruction standards. The original requirement was adopted in 1974 and repealed by Ordinance 584. Any new well construction should be governed by the current regulations (Chapter 14.08).
Treatment Air Stripping	The proposed standard for VOC emissions from “product accumulator vessels” and leak detection programs, if finalized, will be relevant and appropriate to certain air stripping processes. This proposed standard is currently “to be considered.”	Resource Conservation and Recovery Act (RCRA) as amended 42 U.S.C. § 9601 et seq. 52 FR 3748 (Feb. 5, 1987)	ROD	Applicable	Regulations were promulgated on June 21, 1990.	These standards are still in effect. 52 FR 3748 proposed numerous changes to the CFR and was promulgated on June 21, 1990 (55 FR 25454). Because these standards were promulgated, they are no longer “to be considered” criteria.

**TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL
(Continued)**

Action	Requirement	Citation	Origin	Determination	Status	Comments
Treatment Air Stripping	The substantive provisions of these regulations may be applicable to the air-stripping tower. These regulations cover design standards, permitting requirements, modeling, control technology, air quality standards and hazardous constituents.	Clean Air Act (CAA) 42 U.S.C. §§ 7401 - 7642 40 CFR §§ 50-99 CAA § 101	ROD	Applicable	No change	These standards are still in effect.
Treatment Air Stripping	Mulford-Carrell Air Resources Act (CARA) meets the requirements of the federal CAA for state primacy. CARA is regulated by the Air Resources Board and enforced by the Fresno APCD. In addition, CARA establishes specific requirements, some of which are more stringent than the federal standards for a number of pollutant sources including toxic air contaminants. These regulations may be applicable to the air-stripping tower.	CA Health & Safety Code §§ 3900-44563 Fresno County Air Pollution Control District (APCD), Regulation IV Prohibitory Rules	ROD	Applicable	Regulations were amended.	The California air statute at California Health & Safety Code § 39000 et seq. is still in effect. The Fresno County APCD no longer exists and Fresno is now covered by the San Joaquin Valley Unified APCD. Regulation IV governs prohibitions.

TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL
(Continued)

Action	Requirement	Citation	Origin	Determination	Status	Comments
Treatment Carbon Adsorption and Greensand	If carbon or greensand wastes are taken off site or managed on site, RCRA requirements would be applicable if these wastes are designated as RCRA hazardous wastes. These regulations govern identification, generation, transport and disposal of hazardous waste.	RCRA 42 U.S.C. § 6901 et seq. 40 CFR §§ 261, 263, 264	ROD	Applicable	California became authorized to implement RCRA	These standards are still in effect. However, since 1989, California became authorized to implement RCRA which is now implemented through <i>California Code of Regulations</i> , Title 22.
Treatment Carbon Adsorption and Greensand	CA Admin. Code, Title 22, Chapter 30 The HWCA defines and controls hazardous wastes from generation to disposal. More stringent state regulations would be applicable to carbon or greensand wastes if they are state hazardous wastes.	California Hazardous Waste Control Act (HWCA) CA Health & Safety Code §§ 25100-25395 CA Admin. Code, Title 22, Chapter 30	ROD	Applicable	Statute has been amended.	The HWCA is still in effect but has been amended since 1989. The HWCA regulations are now found at <i>California Code of Regulations</i> , Title 22, Chapter 4.5 § 66000 et seq.
Treatment Carbon Adsorption and Greensand	The water quality objectives in the Basin Plan may be applicable to discharges (e.g., backwash water) from the greensand treatment process. Subchapter 15 requirements of Title 23 are to be considered.	California Porter-Cologne Water Quality Control Act CA Water Code § 13240 CA Admin. Code, Title 23, § 2520	ROD	Applicable	No change	Section 13240 sets forth the authority for establishing water quality control plans for the Regional Water Quality Control Boards (Water Board). Standards for current discharges would be established by existing permits or the current Water Quality Control Plan (Basin Plan).

**TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL
(Continued)**

Action	Requirement	Citation	Origin	Determination	Status	Comments
Treatment Carbon Adsorption and Greensand	For disposal to a POTW, the NPDES pretreatment requirements of the CWA may apply. NPDES requirements are administered under the Porter-Cologne Act. The POTW would issue a permit for this discharge.	CWA 33 U.S.C. §§ 1251-1376 40 CFR § 403	ROD.	Applicable	No change	These CWA provisions are still in effect.
Treatment Groundwater extraction	The California Environmental Protection Agency administers the program for Class I, III, IV, and V wells in California. Reinjection at the Purity site would constitute a Class V well, which currently is not covered under the UIC permitting program but is subject to the inventory provision of the UIC program. The inventory requirement is relevant and appropriate due to the technical value of the report information. The construction, operation and maintenance requirements for UIC wells are to be considered.	SDWA 42 U.S.C. § 300 (f) et seq. 40 CFR §§ 144, 146	ROD	Applicable	No change	These provisions are still in effect.

**TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL
(Continued)**

Action	Requirement	Citation	Origin	Determination	Status	Comments
General Actions	OSHA requirements are applicable to worker exposures during response actions at CERCLA sites, except in states that enforce equivalent or more stringent requirements. California no longer has such a program for non-government employee workplace exposures.	Occupational Safety and Health Administration (OSHA) 29 CFR § 1910	ROD	Not ARARs	No substantive changes	These standards are still in effect. However, although OSHA requirements were considered ARARs in the 1985 National Contingency Plan, they are no longer considered ARARs. Compliance with OSHA requirements is mandatory at CERCLA sites.
Chemical-specific ARARs						
Contaminants of concern	The primary maximum contaminant levels (MCL) of the SDWA are relevant and appropriate requirements as aquifer cleanup goals since the groundwater is a potential source of drinking water, whether or not it is considered a “community” supply.	Safe Drinking Water Act (SDWA) 42 U.S. § 300 (f) et seq. 40 CFR § 142	ROD	Relevant and Appropriate	Regulations were amended in 1996	These citations are still valid, but the SDWA was amended in 1996. The federal MCLs are found in 40 CFR § 141.61. There has not been any change to the federal secondary MCL for iron and manganese. There has been no change to the primary federal MCL for TCE, 1,2 DCA, 1,1-DCE, benzene, vinyl chloride, and carbon tetrachloride. At the time of the ROD, the MCLs for cis-1,2-DCE and trans-1,2-DCE were proposed. They are now final and are the same as the proposed levels in the ROD.

TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL
(Continued)

Action	Requirement	Citation	Origin	Determination	Status	Comments
Contaminants of concern	This Act provides for primacy of California with federal SDWA and requires California to set MCLs equal to or more stringent than federal. California MCLs are relevant and appropriate requirements as aquifer cleanup goals.	California Safe Drinking Water Act CA Health and Safety Code § 4010-4037 CA Admin. Code. Title 22 §§ 64401 et seq.	ROD	Relevant and Appropriate	Regulations have been amended.	<p>The California Safe Drinking Water Act has been amended several times since 1989 and is now found at California Health and Safety Code §§ 116270-116751. The “CA Admin. Code” is now the <i>California Code of Regulations</i>. The California MCLs for organic compounds are found in <i>California Code of Regulations</i>, Title 22, §64444 as follows:</p> <ul style="list-style-type: none"> • 1,2 DCA, benzene, vinyl chloride, and carbon tetrachloride: CA MCLs are the same as the levels identified in the ROD • 1,1 DCA: no California MCL was identified in the ROD, but the current CA MCL is 5 ppb • 1,1 DCE: the ROD states the California MCL is 7 ppb, but the CA MCL is 6 ppb • cis-1,2-DCE: no California MCL was identified in the ROD, but the current level is 6 ppb • trans -1,2-DCE: no California MCL was identified in the ROD, but California MCL is 10 ppb

**TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL
(Continued)**

Action	Requirement	Citation	Origin	Determination	Status	Comments
Contaminants of concern	Health-based numeric guidelines set by DHS for the protection of public drinking water supplies through non-promulgated standards are the levels at which DHS requires water purveyors to take corrective action. These guidelines are to be considered as cleanup goals for the aquifer.	Department of Health Services (DHS) Action levels for Public Drinking Water Supplies (January 1987)	ROD	To be considered	These guidelines have been changed.	Since 2004, DHS “action levels” are now referred to as “notification levels.” They have been used to provide information to public water systems about certain non-regulated chemicals in drinking water that lack MCLs. The 2004 DHS “notification levels” will continue to be “to be considered” criteria. “To Be Considered Criteria” adopted in a ROD are legally enforceable cleanup standards.
Contaminants of concern	Requirements of the Water Board Basin Plan 5(d) are applicable to reinjected water. Substantive and/or administrative requirements may apply depending on whether the wells are on or off- site.	California Porter-Cologne Water Quality Control Act CA Water Code § 13240	ROD	Applicable	No change	Section 13240 sets forth the authority for the establishing of water quality control plans for the Water Boards. Current discharges would be established by existing permits or the current Water Quality Control Plan (Basin Plan).
Contaminants of concern	The North Central Canal is located in the Central Valley Water Board Basin Planning Area 5(D). Requirements of that Water Quality Control Plan are applicable to discharges from the treatment system and would be regulated by the Water Board through Waste Discharge Requirements.	California Porter-Cologne Water Quality Control Act CA Water Code § 13260	ROD	Applicable	No change	Water Code § 13260 contains waste discharge requirements.

TABLE D-1: ARARs ANALYSIS – GROUNDWATER ALTERNATIVES AND TANK REMOVAL
(Continued)

Notes:	
§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
CAA	Clean Air Act
CA	California
CARA	Mulford-Carrell Air Resources Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DCA	Dichloroethane
DCE	Dichloroethene
DHS	Department of Health Services
et seq.	And as follows
FR	Federal Register
HWCA	Hazardous Waste Control Act
NPDES	National Pollutant Discharge and Elimination System
OSHA	Occupational Safety and Health Administration
ppb	Part per billion
POTW	Publicly-owned treatment works
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SDWA	Safe Drinking Water Act
TCE	Trichloroethene
TTEMI	Tetra Tech
UIC	Underground injection control
USC	United States Code
Water Board	Regional Water Quality Control Board

APPENDIX E

**HUMAN HEALTH RISK ASSESSMENT EVALUATION AND
TOXICITY CRITERIA REVIEW**

APPENDIX E HUMAN HEALTH RISK ASSESSMENT EVALUATION AND TOXICITY CRITERIA REVIEW

Tetra Tech EM Inc. (Tetra Tech) reviewed the human health risk assessments in the feasibility study (CH2M Hill 1989), and toxicological criteria as part of the second 5-year review (FYR) Report for the Purity Oil Sales Superfund (Purity Oil) site in Fresno, California.

Groundwater and Tanks Operable Unit (OU-1)

Federal and State Maximum Contaminant Levels (MCL) are the remedial action goals for contaminants of concern (COC) in groundwater (OU-1). Current Federal and State MCLs were reviewed to determine if any MCLs for groundwater COCs had been updated since the issuance of the Record of Decision for OU-1 (EPA 1989a). MCLs represent the allowable concentration of a chemical in a drinking water supply; several State MCLs for COCs in groundwater at the Purity Oil site are lower than the Federal MCLs. The State MCLs for 1,2-dichloroethane, benzene, vinyl chloride, carbon tetrachloride, cis-1,2-dichloroethene, and trans-1,2-dichloroethene are lower than the Federal MCLs.

The migration of contaminants from groundwater into buildings (groundwater vapor intrusion) is a relatively new consideration at sites where groundwater has been impacted by volatile chemicals. In September 2002 (after the ROD for OU-1 was issued), EPA released an external review draft version of its vapor intrusion guidance (VIG) titled "Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils" (EPA 2002). Groundwater vapor intrusion is a potential concern if a complete exposure pathway exists. Factors to consider include identification of chemicals in groundwater of sufficient volatility and toxicity, and the presence of inhabited buildings (or the potential for future buildings) near subsurface contamination (in general, within 100 feet). Volatile chemicals have been detected in groundwater at the Purity Oil site at concentrations exceeding federal and state MCLs. Groundwater at the site is generally present at 55 to 65 feet below ground surface (bgs), and occupied buildings are present over the groundwater plume; therefore, a potentially complete exposure pathway for groundwater vapor intrusion may exist. Tables 2a through 2c of the draft VIG list target groundwater concentrations for the groundwater-to-indoor air migration pathway that are equivalent to a 10^{-4} to 10^{-6} cancer risk or hazard quotient of 1 (EPA 2002). For those chemicals with a Federal MCL, the target groundwater concentration is equivalent to the MCL if its corresponding risk-based concentration is below the MCL. The most recent groundwater data from May 2006 indicate that concentrations of volatile COCs in groundwater are below the draft Table 2a target groundwater concentrations, which are equivalent to the upper bound of the cancer risk management range (or a 10^{-4} risk level).

The long-term protectiveness of the remedy with respect to vapor intrusion from groundwater may require reconsideration should health-based levels replace the Federal MCLs as target groundwater concentrations for this pathway.

The goal of the selected remedy for groundwater (extraction, air stripping, and filtration) is to cleanup the affected aquifer to achieve Federal and State drinking water standards (EPA 1989a).

The ROD also stipulates that users of private wells installed within the affected aquifer will be provided an alternate water supply.

As an alternate water supply has been provided to prevent exposure to contaminated groundwater until the remedial action goals are achieved, the remedy is protective with regards to direct contact with groundwater in the short term.

The reduction of concentrations of volatile chemicals in groundwater to Federal and State MCLs is considered protective of drinking water.

Soils Operable Unit (OU-2)

The soils operable unit is comprised of contaminated soils and sludges located on site and soils and sludges that have migrated to nearby properties (that is, the areas beyond the property line [BTPL]).

On-site Remedy

The remedy, once complete, will be protective in the long-term as it specifies that acidic sludges and contaminated soil will be treated and/or excavated to approximately 13 feet bgs and then capped. A soil vapor extraction system is incorporated into the remedy to treat volatile chemicals in soil below the limits of the excavation to minimize the threat of leaching to groundwater. The cap serves as a barrier to prevent future direct contact with contaminated materials. In order to prevent future direct contact with contaminated materials left in place under the cap, the remedy includes deed restrictions to prevent future excavation (EPA 1992).

The on-site remedy is designed to prevent human exposure (via direct contact with soil) to soils containing COCs at concentrations that exceed applicable or relevant and appropriate (ARAR) and "to be considered" (TBC) criteria for soil.

The remedy for the on-site soils area is protective in the short term. The site is fenced and access is restricted to authorized personnel, which prevents direct contact with contaminated soil. During construction activities, real-time air monitoring will verify that on-site workers are not exposed to volatile organic compounds (VOC), PM₁₀ (particulate matter with a diameter of less than or equal to 10 microns), sulfur dioxide, and hydrogen sulfide at concentrations exceeding the applicable exposure limits in accordance with the *Remedial Action Work Plan* (SECOR International Inc. 2006). Daily air samples are collected during excavation activities upwind and downwind and analyzed for total VOCs, sulfur compounds, total suspended particulates, aluminum, chromium, lead, and nickel.

If the site is used for light industrial activities after cleanup, collection of soil gas samples may be needed to determine if volatile chemicals that are associated with residual contamination beneath the cap present a risk via the vapor intrusion pathway if a complete exposure pathway is present.

Areas Beyond the Property Line

Tetra Tech (Tetra Tech 2005) conducted a human health risk assessment (HHRA) for the areas BTPL that border the Purity Oil site consisting of four neighboring properties:

- Golden State Market (GSM) at the northeastern corner of the site
- The former Tall Trees Mobile Home Park (Tall Trees) at the north-northeast corner of the site
- Bruno's Iron and Metal Recycling (Bruno's Recycling) at the north-northwest corner of the site
- Pick-A-Part Auto Wrecking (Pick-A-Part) south of the site.

The HHRA used a preliminary remediation goal (PRG) assessment based on EPA (2004) Region 9 PRGs to evaluate potential health risks associated with exposure to contaminants in soil in the areas BTPL under current and potential future land use conditions.

The PRG exposure pathways evaluated in the HHRA for soil were incidental ingestion, dermal contact, and inhalation of particulate and volatile chemicals released from soil to ambient air. The risk estimates developed using PRGs represent the risk for all exposure pathways evaluated within the PRG framework and are numerically equivalent to risk estimates obtained using the EPA (1989b) "forward calculation methodology."

As presented in the proposed plan (EPA 2005), the remedial action objectives for the contaminated areas located outside the Purity Property boundaries (including the areas BTPL) include the removal of acidic sludge and contaminated soil containing COC at concentrations exceeding health-based action levels at properties adjacent to the site and the reduction of COC concentrations in soils and groundwater to reduce risks from potential exposure to indoor air contaminants whose source is site-related contamination.

Contaminated soil will be excavated to a maximum depth of 4 feet bgs at industrial sites (Pick-A-Part, Bruno's, and Tall Trees) where concentrations of COCs exceed the health-based cleanup goals calculated from EPA Region 9 Preliminary Remediation Goals (PRG) for industrial use and where total petroleum hydrocarbon (TPH) concentrations exceed 10,000 milligrams per kilogram (mg/kg) (EPA 2005). The proposed plan (EPA 2005) does not stipulate whether the 2004 PRGs or future updates will be used to calculate clean-up goals.

At the GSM property, contaminated soil will be excavated to a maximum depth of 7 feet bgs where concentrations of COCs exceed the health-based cleanup goals calculated from EPA Region 9 PRGs for residential use and where TPH concentrations exceed 2,300 mg/kg.

After excavation, contaminated material (sludge and soil) from the areas BTPL will be consolidated on site and capped.

The remedy for the BTPL areas is protective in the short term because the removal of surface contamination (to depths of 4 or 7 feet bgs) from areas outside the Purity Property, and the cap

for contamination on the Purity Property, will prevent direct contact with contaminated soil at concentrations exceeding health-based levels. In addition, all former residents of the Tall Trees Mobile Home Park have been relocated.

The long-term protectiveness of the remedy for the areas located outside the Purity Property boundaries cannot be determined at this time; however, it should be protective with the implementation of the SVE system as part of the OU-2 soils remedy. The removal of surface contamination to depths of 4 or 7 feet bgs at properties outside the Purity Property will not prevent vapor intrusion of volatile chemicals associated with subsurface contaminated soil or sludge, which will be left in place in these areas at depths below 4 or 7 feet bgs. Volatile chemicals associated with the subsurface contamination left in place may migrate to buildings located near the site; vapor intrusion of these chemicals to indoor air may be of concern if the buildings are inhabited and the chemicals are of sufficient toxicity and volatility. The proposed plan (EPA 2005) specifies that soil and soil gas samples will be collected to determine the extent of contamination left in place between the bottom of the excavation and the top of the water table in contaminated areas adjacent to the Purity Property. Results of this sampling can be used to determine if remaining contamination presents a threat to groundwater (via leaching) or indoor air (via vapor intrusion) and if additional remedial action is warranted (EPA 2005). It is preferred that soil gas samples used for risk assessment purposes be collected from beneath an existing slab, if possible; if no buildings remain, then samples should be collected above the waste layer (at a depth greater than 5 feet bgs).

Review of Toxicity Values

As part of this analysis, toxicity values used to estimate risks in the HHRA for areas BTPL were reviewed. Table E-1 presents toxicity values that have been revised since the supplemental HHRA (Tetra Tech 2005) was completed. Alternate toxicity values from sources specified by EPA's toxicity criteria hierarchy (EPA 2003) are also included in Table E-1. The use of revised or alternate toxicity values would not result in a significant change to the findings of the HHRA for the BTPL areas.

**TABLE E-1:
TOXICITY VALUE UPDATES: HHRA FOR THE BTPL AREAS**

PURITY OIL SALES SUPERFUND SITE, FRESNO, CALIFORNIA

HHRA Analyte	Cancer Toxicity Values		Noncancer Toxicity Values	
	CSE ₁₀ (mg/kg-day)	CSE ₁ (mg/kg-day)	RfDo (mg/kg-day)	RfD ₁ (mg/kg-day)
1,2-Dichlorobenzene	--	--	No change	HHRA value: 5.7E-02 (h) Alternate value: 6.9E-03 (p)
2-Methylnaphthalene	No change (c-s)	No change (c-s)	HHRA value: 2.0E-02 (t-s) New Value: 4.0E-03 (i)	No change
Barium	--	--	HHRA value: 7.0E-02 (i) Revised value: 2.0E-01 (i)	No change
Toluene	--	--	HHRA value: 2.0E-01 (i) Revised value: 8.0E-02 (i)	Previous value: 1.1E-01 (i) Revised value: 1.4E+00 (i)
Trichloroethene	HHRA value: 4.0E-01 (n) Alternate value: 1.3E-02 (c)	HHRA value: 4.0E-01 (n) Alternate value: 7.0E-03 (c)	No change	HHRA value: 1.0E-02 (n) Alternate value: 1.7E-02 (c)

Notes:

Analytes not listed did not have toxicity criteria updates.

"HHRA value" references toxicity values used to estimate risk for the HHRA for the areas beyond the property line (BTPL) (Tetra Tech EM Inc. 2005) or to calculate the EPA Region 9 Preliminary Remediation Goals. "Alternate value" references a toxicity value from an alternate tier in EPA's toxicity value hierarchy, for example, EPA's Provisional Peer-reviewed Toxicity Values or California's Office of Environmental Health Hazard Assessment. "Revised value" references a toxicity value that has been revised as listed in EPA's IRIS database; "New value" specifies toxicity criteria that have been added to EPA's IRIS database since the HHRA for the areas BTPL was completed.

Source codes: c - California Office of Environmental Health Hazard Assessment (OEHHA)

c-s = California OEHHA value for a surrogate chemical (i.e., naphthalene)

h = U.S. Environmental Protection Agency (EPA) Health Effect Assessment Summary Tables (HEAST)

i = EPA Integrated Risk Information System (IRIS)

i-s = EPA IRIS value for a surrogate chemical (i.e., naphthalene)

n = EPA National Center for Environmental Assessment (NCEA)

p = EPA Provisional Peer-Reviewed Toxicity Values

--	Cancer or noncancer toxicity value not available	mg/kg-day	Milligram per kilogram per day
CSFi	Cancer slope factor, inhalation	RfDi	Reference dose, inhalation
CSFo	Cancer slope factor, oral	RfDo	Reference dose, oral
HHRA	Human health risk assessment		

REFERENCES

- CH2M Hill. 1989. "Feasibility Study Report, Purity Oil Sales Site, Fresno, California." EPA Work Assignment No. 3-9L21.1. April.
- SECOR 2006. "Operational Unit 2 – Remedial Action Work Plan for Purity Oil Sales Superfund Site, 3281 South Maple Avenue, Malaga, Fresno County, California." June 20.
- Tetra Tech EM Inc. 2005. "Final Technical Memorandum. Purity Oil Sales Superfund Site. Supplemental Human Health Risk Assessment." June 1.
- U.S. Environmental Protection Agency (EPA). 1989a. Record of Decision for the Purity Oil Sales Superfund Site, Groundwater and Tanks Operable Unit. Region 9. San Francisco, California. September.
- EPA. 1989b. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim Final." Office of Emergency and Remedial Response (OERR). EPA/540/1-89/002. December.
- EPA. 1992. Record of Decision for the Purity Oil Sales, Inc. Superfund Site, Soil Operable Unit. Region 9. San Francisco, CA. September.
- EPA. 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November.
- EPA. 2003. Memorandum: Human Health Toxicity Values in Superfund Risk Assessments. From Michael B. Cook, Director, Office of Superfund Remediation and Technology Innovation. To Superfund National Policy Managers, Regions 1 – 10. OSWER Directive 9285.7-53. December 5. www.epa.gov/oswer/riskassessment/pdf/hhmemo.pdf
- EPA. 2004. Preliminary Remediation Goals. www.epa.gov/region9/waste/sfund/prg/index.html December 28.
- EPA. 2005. Purity Oil Sales Superfund Site. Proposed Plan. April.

APPENDIX F

**SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT AND
TOXICITY CRITERIA REVIEW**

APPENDIX F SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT AND TOXICITY CRITERIA REVIEW

Tetra Tech EM Inc. (Tetra Tech) prepared this ecological evaluation as part of the second 5-Year Review (FYR) Report for the Purity Oil Sales Superfund (Purity Oil) site in Fresno, California. In accordance with the work plan, a final version of this memorandum will not be submitted as a separate formal deliverable. The organization of this Ecological Evaluation is as follows:

- Ecological Evaluation: Presents the site location and history
- Ecological Characterization: Describes the environmental setting
- Qualitative Evaluation of Ecological Risk: Identifies the chemicals of concern (COC) and exposure pathways
- Conclusion and Recommendations

ECOLOGICAL EVALUATION

The 7-acre Purity Oil site is located at 3281 South Maple Avenue, Fresno, California approximately ½ mile south of the Fresno city limits in the township of Malaga. The site is identified as CAD980736151 in the EPA's Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) database. Under the Fresno County General Plan, the Purity Oil site is in a zone designated for heavy industrial use.

The site is located in a mixed-use area and is surrounded by agricultural and industrial land to the west, a metal recycling facility to the north (Bruno's Iron and Metal), a convenience market (Golden Gate Market) and former residential trailer park to the northeast (Tall Trees Mobile Home Park), a propane distributor to the east, and a used auto parts business to the south (Pick-A-Part Auto Wrecking) (see Figure F-1). Each of these adjacent properties are included in this evaluation and are referred to as "the beyond the property line (BTPL) properties."

Purity Oil re-refined petroleum waste oils at the site between 1934 and 1975. These waste oils came from businesses (such as service stations, car dealers, truck stops, and electrical transformer yards), municipalities, school districts, and the military. The oil was re-refined using a number of treatment processes including clarification, chemical addition, acidification, dehydration, distillation, and filtration. The oil and byproducts from the refining process were collected and stored in sumps and storage tanks and were disposed of on site in sludge pits. The easternmost portion of the site included storage and processing facilities for the re-refining and recycling operations. The westernmost portion of the site consisted of unlined sumps and sludge pits used for collection and storage.

ECOLOGICAL CHARACTERIZATION

The Purity Oil site is located in the San Joaquin River drainage basin approximately 12 miles south of the San Joaquin River. No natural watercourses exist in the vicinity of the Purity Oil site. The groundwater aquifer in the Fresno area is designated as a sole-source aquifer. The

aquifer in the vicinity of the site is unconfined to depths of several hundred feet. Depth to groundwater at the site is 55 to 65 feet, with flow in a northwesterly direction. The area surrounding the site is largely industrial.

The habitat on the Purity Oil Site and on BTPL properties consists of ruderal grasses (plants commonly found in ecosystems disturbed by human activity) and ornamental trees and shrubs. This vegetation provides marginal habitat for species adapted to highly disturbed areas impacted by industrial activities. Vegetation observed at the sites also includes species identified by the California Invasive Pest Council (www.cal-ipc.org/ip/inventory/index.php) such as the yellow star thistle (*Centaurea solstitialis*) and *Bromus*. Yellow star thistle is known to preclude native species and provides limited forage habitat for herbivores, and reducing prey species for carnivores at the site. An ecological survey to identify species present at the site and on adjacent properties has not been conducted.

Table F-1 lists the special status species occurring in the township of Malaga in Fresno County and their habitat requirements as provided in the California Natural Diversity Database (CNDDB) (California Department of Fish and Game 2006). Special status species that may occur in Malaga township include the California tiger salamander (*Ambystoma californiense*), the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), and the California jewel-flower (*Caulanthus californicus*). Based on the habitat requirements for these species (CDFG 2006), there is low potential for them to occur at the Purity Oil site and BTPL properties.

QUALITATIVE EVALUATION OF ECOLOGICAL RISK

The following sections provide a qualitative evaluation of risk to ecological receptors at the Purity Oil Site and the BTPL properties.

Chemicals of Concern

The 1989 Feasibility Study Report listed the sources of contamination on the Purity Property as acidic tarry sludges were placed into several pits and buried with soil (CH2M Hill 1989). The sludge-contaminated surface soil extending vertically to a depth of up to 14 feet in an area defined as the eastern 2.5 acres of the site where the former surface impoundments were located. This surface soil is contaminated with metals and organic constituents including pesticides, oil, and grease. The soil contamination has contributed to groundwater contamination including: volatile organic compounds (VOC), mainly dichloroethene and dichloroethane; semivolatile organic compounds; and iron and manganese.

The 2003 BTPL Technical Memorandum (EPA 2003) reported the following chemicals in soil at concentrations exceeding the industrial preliminary remediation goals (PRG) on the adjacent properties:

Metals: arsenic and lead

Pesticides: dieckrin and beta-BHC

Polycyclic aromatic hydrocarbons: benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd) pyrene

Polychlorinated biphenyls: Aroclor-1242, Aroclor 1254, and Aroclor-1260

VOCs: Trichloroethene

For this evaluation, chemicals for which (a) the industrial PRG was exceeded and (b) where the soils will either be capped or excavated, were not screened against ecological benchmarks. For soil to be left in place, chemical concentrations were compared to ecological soil screening levels (ECO-SSL) where available (see Table F-2).

ECO-SSLs are risk-based concentrations of chemicals in soil that are protective of ecological receptors likely to come into contact with soil, either directly or via ingestion of biota that live in or on soil (EPA 2005a). ECO-SSLs are intended for screening chemical concentrations in soil. ECO-SSLs for plants apply to soils where the pH is between 4.0 and 8.5, with an organic matter content less than or equal to 10 percent (EPA 2005b). ECO-SSLs are available for only a few metals (EPA 2005a). ECO-SSLs were derived for the Purity Oil site based on a literature review of available toxicity data on plants, soil invertebrates, birds, and mammals.

Table F-3 lists samples outside the excavation area with one or more ECO-SSLs exceeded. ECO-SSLs were primarily exceeded for chromium and lead along the boundary of Purity Oil and Pick-A-Part Auto Wrecking.

Exposure Pathways

Although exposure is a simple concept, accurately describing the fate and transport of chemicals from their source to a site of toxic action in living organisms can be complicated. In general, a chemical must leave the environmental matrix, move across several biological membranes, and concentrate in a tissue to the extent that its toxic action is exerted for an adverse exposure to occur. A chemical that can move from the environmental matrix to the tissue of a receptor is said to be bioavailable. Toxic effects observed during laboratory testing of field samples can be caused by a number of factors, including exposure to bioavailable chemicals.

The fate and transport of chemicals associated with the Purity Oil and BTPL sites determine the extent to which these stressors may affect various ecological receptors at the sites. Chemical concentrations in soil at various depths may affect surface dwelling and burrowing receptors such as plants, invertebrates, birds, and mammals. VOCs may volatilize from soil and become concentrated in the air of burrows where burrowing mammals may be exposed via inhalation. Due to the depth to groundwater (55 to 65 feet), there is no complete exposure pathway to affect ecological receptors.

At the Purity Oil Site, the selected remedy will eliminate the exposure pathway by which contaminants in the soil can be taken up by ecological receptors. The selected remedy (EPA 2005a) involves excavating the entire waste pit disposal area to a depth of 13 feet below ground surface, neutralizing the excavated material, and placing the treated soil back in the excavation. A low-permeability cap will be constructed over the excavated material. Potential guidance for constructing the cap could include using soil that meets the ECO-SSL (EPA 2005b) to provide protection of ecological receptors.

At the BTPL properties, the selected remedy will eliminate the exposure pathway by which contaminants in the soil can be taken up by ecological receptors. Contaminated soil will be excavated where chemicals of concern exceed the EPA Region 9 health-based cleanup levels for industrial use and total petroleum hydrocarbon (TPH) levels of 10,000 milligrams per kilogram (mg/kg). The contaminated materials will be excavated until the soil cleanup level is met or the maximum depth of 4 feet is reached. At the Golden State Market property, soil with levels of chemicals of concerns exceeding the residential PRG or TPH levels exceeding 2,300 mg/kg will be excavated and disposed of under the engineered cap on the Purity Property. The contaminated materials will be excavated until the soil cleanup level is met or the maximum depth of 7 feet is reached. Excavations at all BPTL properties will be backfilled with clean soil. Figure F-1 shows the excavation boundaries for the BPTL properties. Backfill for excavations could include soil that meets the ECO-SSL (EPA 2005b) to provide protection of ecological receptors.

Outside the areas to be remediated, only chromium exceeded all ECO-SSLs and only in the area along the Purity and Pick-A-Part Auto Wrecking border (see Figure F-1 and Table F-3). The maximum detected concentration of chromium was 79.9 mg/kg versus ECO-SSLs of 26 and 34 mg/kg for birds and mammals, respectively. However, minimal exposure to ecological receptors is expected for the following reasons: 1) this is an industrial site that does not support quality habitat for ecological receptors, 2) the overall area not covered by the remediation is very small, and 3) there is less than an order of magnitude difference between the detected concentrations and the ECO-SSL. Therefore, no additional action is recommended.

CONCLUSIONS AND RECOMMENDATIONS

At both the Purity Oil site and the BTPL properties, the selected remedy will eliminate the exposure pathway by which contaminants in the soil can be taken up by ecological receptors. It is recommended that backfill for the excavations and the soil cap use soil that meets the ECO-SSLs (EPA 2005b) to be protective of ecological receptors.

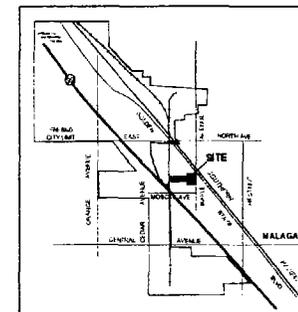
Outside the areas to be remediated, since only chromium exceeded the ECO-SSL, and because this is an industrial site that does not support quality habitat for ecological receptors, minimal exposure is expected. No additional action is recommended for these areas.

REFERENCES

- California Department of Fish and Game. 2006. "California Natural Diversity Database." 2006. www.dfg.ca.gov/whdab/
- California Invasive Pest Council. 2006. www.cal-ipc.org/ip/inventory/index.php
- CH2M Hill. 1989. "Feasibility Study Report, Purity Oil Sales Site, Fresno, California." EPA Work Assignment No. 3-9L21.1. April.
- U.S. Environmental Protection Agency (EPA). 2003. "Technical Memorandum. Beyond the Property Line Investigations, Purity Oil Sales Superfund Site, Fresno, California." April.
- EPA. 2005a. "Purity Oil Sales Superfund Site Proposed Plan." April.

EPA. 2005b. "Ecological Soil Screening Levels." Available on-line at:
www.epa.gov/ecotox/ecossl

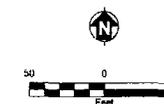
SITE LOCATION MAP



LEGEND

- EXCAVATION SAMPLE
- PERIMETER EXPLORATION ANCHOR TRENCH SAMPLE
- + SOIL BORING
- ▲ TEST PIT
- NO EVIDENCE OF PETROLEUM STAINING OR ODOR
- EVIDENCE OF PETROLEUM STAINING OR ODOR
- EXCAVATION
- PERIMETER EXPLORATION ANCHOR TRENCH
- EXCAVATION
- EAST PERIMETER EXPLORATION ANCHOR TRENCH
- EXCAVATION
- AREA OF SOIL CONTAMINATION IN PERIMETER EXPLORATION ANCHOR TRENCH
- PROPERTY LINE
- FRESNO IRRIGATION DISTRICT NORTH CENTRAL CANAL (APPROXIMATE LOCATION)
- RAILROAD LINE
- INFERRED AREA OF SOIL CONTAMINATION TO 15 FEET OR GREATER
- INFERRED AREA OF SOIL CONTAMINATION GOLDEN STATE MARKET ALTERNATIVE
- GOLDEN STATE MARKET BUILDING
- ESTIMATED AREA OF EXCAVATION BASED ON VISUAL CONTAMINATION TO 4 FEET (INDUSTRIAL) AND TO 7 FEET (RESIDENTIAL)

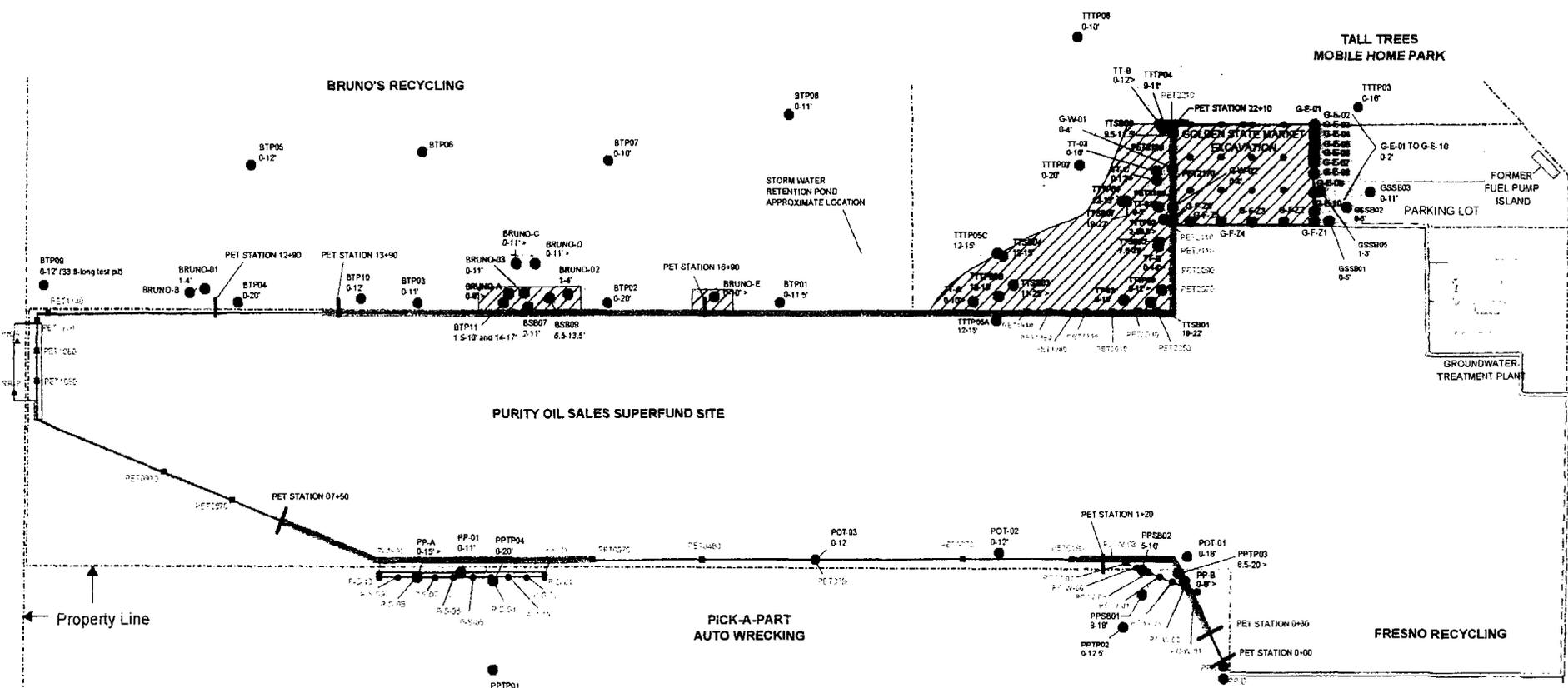
NOTES:
 8-15" = APPROXIMATE DEPTH OF STAINING AND ODOR AT 8 TO 15 FEET BGS
 8-15"> = VERTICAL EXTENT OF STAINING AND ODOR EXTENDS BEYOND MAXIMUM DEPTH OF BORING OF 8 TO 15 FEET BGS



PURITY OIL SALES SUPERFUND SITE
 FRESNO COUNTY, MALAGA, CALIFORNIA

FIGURE F-1
SOIL TO BE EXCAVATED
 BEYOND THE PROPERTY LINE INVESTIGATION
 APRIL 2003

BURLINGTON NORTHERN SANTA FE RAILROAD RIGHT-OF-WAY



Property Line

PICK-A-PART AUTO WRECKING

FRESNO RECYCLING

TALL TREES MOBILE HOME PARK

BRUNO'S RECYCLING

PURITY OIL SALES SUPERFUND SITE

GOLDEN STATE MARKET EXCAVATION

FORMER FUEL PUMP ISLAND

GROUNDWATER TREATMENT PLANT

STORM WATER RETENTION POND APPROXIMATE LOCATION

BTP06 0-12 (33 B-long test pit)

BRUNO-01 1-4

PET STATION 12+90

PET STATION 13+90

BRUNO-C 0-11

PET STATION 16+90

BRUNO-E 0-11

TTTP06 0-10

TTTP04 0-11

PET STATION 22+10

TTTP03 0-18

G-E-01 TO G-E-10 0-2

PARKING LOT

PET1140

PET1141

PET1142

PET1143

PET1144

PET1145

PET1146

PET1147

PET1148

PET1149

PET1150

PET1151

PET1152

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PET1375

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PET1377

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PET1379

PET1380

PET1381

PET1382

Ambystoma californiense

California tiger salamander

Element Code: AAAAA01180

Status	NODD Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTY DPS LISTED AS ENDANGERED.
Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 583	Map Index: 46277	EO Index: 46277	Dates Last Seen
Occ Rank: None			Element: 1938-05-18
Origin: Natural/Native occurrence			Site: 1938-05-18
Presence: Extirpated			Record Last Updated: 2002-08-20
Trend: Unknown			
Main Source: JENNINGS, M. & M. HAYES 1994 (PERS)			

Quad Summary: MALAGA (3611966/357B), FRESNO SOUTH (3611967/358A), CLOVIS (3611976/378C), FRESNO NORTH (3611977/379D)
County Summary: FRESNO

Lat/Long: 36.77388° / -119.77951°	Township: 13S
UTM: Zone-11 N4073392 E251931	Range: 20E
Radius: 5 mile	Section: 27
Elevation: 300 ft	Meridian: M
	Qtr: XX
Mapping Precision: NON-SPECIFIC	
Symbol Type: POINT	

Location: FRESNO

General: 1879 RECORD FROM THE USNM (#11794), NO OTHER INFORMATION GIVEN. CORNELL UNIVERSITY MUSEUM OF VERTEBRATES # 3017 (2 SPECIMENS) COLLECTED 16 MAY 1936 BY L.F. HADSELL. JENNINGS CONSIDERS THIS SITE EXTIRPATED.

Owner/Manager: UNKNOWN

Caulanthus californicus		
California jewel-flower		
Status	NDDB Element Ranks	Element Code: PDBRA31010
Federal: Endangered	Global: G1	Other Lists
State: Endangered	State: S1.1	CNPS List: 1B
		R-E-D Code: 3-3-3
Habitat Associations		
General: CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, PINYON JUNIPER WOODLAND.		
Micro: HISTORICAL FROM VARIOUS VALLEY HABITATS IN BOTH CENTRAL V. AND CARRIZO PLAIN. 65-900M.		

Occurrence No. 38	Map Index: 46277	EO Index: 63230	Dates Last Seen
Occ Rank: None			Element: XXXX-XX-XX
Origin: Natural/Native occurrence			Site: 1986-03-XX
Presence: Extirpated			
Trend: Unknown			Record Last Updated: 2005-11-09
Main Source: TAYLOR, D. W. 1986 (LIT)			

Quad Summary: MALAGA (3611966/357B), FRESNO SOUTH (3611967/358A), CLOVIS (3611976/378C), FRESNO NORTH (3611977/379D)

County Summary: FRESNO

Lat/Long: 36.77388° / -119.77951°	Township: 13S
UTM: Zone-11 N4073392 E251931	Range: 20E
Radius: 5 mile	Section: 27
Elevation: 300 ft	Meridian: M
	Qtr: XX
Mapping Precision: NON-SPECIFIC	
Symbol Type: POINT	

Location: FRESNO.

General: NO HABITAT REMAINS IN VICINITY OF FRESNO. UNKNOWN WHEN ORIGINALLY COLLECTED BY DAVIDSON (SN NO DATE LAN).

Owner/Manager: UNKNOWN

Coccyzus americanus occidentalis

western yellow-billed cuckoo

Element Code: ABNRB02022

Status
 Federal: Candidate
 State: Endangered

NDDB Element Ranks
 Global: G5T2Q
 State: S1

Other Lists
 CDFG Status:

Habitat Associations

General: (NESTING) RIPARIAN FOREST NESTER, ALONG THE BROAD, LOWER FLOOD-BOTTOMS OF LARGER RIVER SYSTEMS.

Micro: NESTS IN RIPARIAN JUNGLES OF WILLOW, OFTEN MIXED WITH COTTONWOODS, W/ LOWER STORY OF BLACKBERRY, NETTLES, OR WILD GRAPE.

Occurrence No. 87	Map Index: 14944	EO Index: 25589	Dates Last Seen
Occ Rank: None			Element: 1902-07-10
Origin: Natural/Native occurrence			Site: 1902-07-10
Presence: Extirpated			Record Last Updated: 1989-08-10
Trend: Unknown			
Main Source: GAINES, D. 1977 (LIT)			

Quad Summary: SANGER (3811965/357A), MALAGA (3611966/357B), ROUND MOUNTAIN (3811975/378D), CLOVIS (3811976/378C)
County Summary: FRESNO

Lat/Long: 36.75271° / -119.63986°	Township: 13S
UTM: Zone-11 N4070690 E264333	Range: 21E
Radius: 1 mile	Section: 36
Elevation: 345 ft	Meridian: M
	Qtr: SW
Mapping Precision: NON-SPECIFIC	
Symbol Type: POINT	

Location: FANCHER CRK, 6 MI NE OF FRESNO.

General: REPORTED AS UNCOMMON BUT NESTING BY TYLER (1913).

Owner/Manager: PVT

TABLE F-2 - PURITY OIL SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT BENCHMARKS

Analyte	Eco-SSL Plant Screening Benchmark ^a (mg/kg)	Eco-SSL Invertebrate Soil Screening Benchmark ^a (mg/kg)	Eco-SSL Soil Screening Benchmarks for Birds ^a (mg/kg)	Eco-SSL Soil Screening Benchmarks for Mammals ^a (mg/kg)
ANTIMONY		78		0.27
ARSENIC	18		43	46
BARIUM		330		2000
BERYLLIUM		40		21
CADMIUM		140		
CHROMIUM			26	34
COBALT	13		120	230
LEAD	120	1700	11	56
VANADIUM			7.8	280

Notes:

Eco-SSL
mg/kg

Ecological Soil-Screening Level
Milligram per kilogram

- a Eco-SSLs are from the EPA's (2005) Interim Final Ecological Soil-Screening Level documents for individual chemicals.
Online: <http://www.epa.gov/ecotox/ecossl/>

References:

EPA. 2005. Interim Ecological Screening Levels. March. Available on-line at: <http://www.epa.gov/ecotox/ecossl/>

TABLE CHEMICAL/LOCATION OUTSIDE OF AREA TO BE REMEDIATED V. E ECO-SSL IS EXCEEDED

Analyte	Site Location	Sample ID	Top Depth	Bottom Depth	Eco-SSL Plant	Eco-SSL Invertebrate	Eco-SSL Bird	Eco-SSL Mammal	Sample Result (mg/kg)	Result Above Most Conservative Eco-SSL	Result Above Least Conservative Eco-SSL
Chromium	Pick-A-Part Auto Wrecking	P-S-09	3	3.5	NA	NA	26	34	79.9	Y	Y
	Pick-A-Part Auto Wrecking	P-S-02	3	3.5	NA	NA	26	34	75.2	Y	Y
	Pick-A-Part Auto Wrecking	P-W-01	3	3.5	NA	NA	26	34	75	Y	Y
	Pick-A-Part Auto Wrecking	P-S-03	3.5	4	NA	NA	26	34	67.5	Y	Y
	Pick-A-Part Auto Wrecking	P-S-04	3	3.5	NA	NA	26	34	53.1	Y	Y
	Pick-A-Part Auto Wrecking	P-S-02	3	3.5	NA	NA	26	34	52.6	Y	Y
	Pick-A-Part Auto Wrecking	P-S-01	3.5	4	NA	NA	26	34	45.8	Y	Y
	Pick-A-Part Auto Wrecking	P-E-01	2	2.5	NA	NA	26	34	41.2	Y	Y
	Pick-A-Part Auto Wrecking	PC-W-01	3	3.5	NA	NA	26	34	27.7	Y	N
	Purity Oil Site	PET0570	3	3.5	NA	NA	26	34	39	Y	Y
Purity Oil Site	PET0270	3	3.5	NA	NA	26	34	35.5	Y	Y	
Purity Oil Site	PET0480	3	3.5	NA	NA	26	34	35	Y	Y	
Cobalt	Pick-A-Part Auto Wrecking	P-S-02	3	3.5	13	NA	120	230	14.3	Y	N
	Golden State Market Area	GSSB01	0.5	2	120	1700	11	56	860	Y	N
Lead	Pick-A-Part Auto Wrecking	P-S-04	3	3.5	120	1700	11	56	125	Y	N
	Pick-A-Part Auto Wrecking	P-S-09	3	3.5	120	1700	11	56	104	Y	N
	Pick-A-Part Auto Wrecking	P-S-02	3	3.5	120	1700	11	56	99.3	Y	N
	Pick-A-Part Auto Wrecking	P-S-10	2	2.5	120	1700	11	56	84.7	Y	N
	Pick-A-Part Auto Wrecking	P-S-01	3.5	4	120	1700	11	56	77.7	Y	N
	Pick-A-Part Auto Wrecking	PC-W-01	3	3.5	120	1700	11	56	71.6	Y	N
	Pick-A-Part Auto Wrecking	P-S-02	3	3.5	120	1700	11	56	60.6	Y	N
	Pick-A-Part Auto Wrecking	P-W-01	3	3.5	120	1700	11	56	51.4	Y	N
	Pick-A-Part Auto Wrecking	P-S-03	3.5	4	120	1700	11	56	47.9	Y	N
	Pick-A-Part Auto Wrecking	PPSB01	1.5	3	120	1700	11	56	20	Y	N
	Pick-A-Part Auto Wrecking	P-E-01	2	2.5	120	1700	11	56	19.1	Y	N
	Pick-A-Part Auto Wrecking	PC-W-02	2	2.5	120	1700	11	56	3.07	Y	N
	Purity Oil Site	PET0480	3	3.5	120	1700	11	56	617	Y	N
	Purity Oil Site	PET0390	3	3.5	120	1700	11	56	172	Y	N
	Purity Oil Site	PET0270	3	3.5	120	1700	11	56	93.3	Y	N
	Purity Oil Site	PET0570	3	3.5	120	1700	11	56	54.9	Y	N
	Purity Oil Site	PET0930	3	3.5	120	1700	11	56	7.11	Y	N
Vanadium	Pick-A-Part Auto Wrecking	P-S-02	3	3.5	NA	NA	7.8	280	49.8	Y	N
	Pick-A-Part Auto Wrecking	P-S-09	3	3.5	NA	NA	7.8	280	45.2	Y	N
	Pick-A-Part Auto Wrecking	P-S-10	2	2.5	NA	NA	7.8	280	44.9	Y	N
	Pick-A-Part Auto Wrecking	P-S-03	3.5	4	NA	NA	7.8	280	44.1	Y	N
	Pick-A-Part Auto Wrecking	P-W-01	3	3.5	NA	NA	7.8	280	43.1	Y	N
	Pick-A-Part Auto Wrecking	P-S-04	3	3.5	NA	NA	7.8	280	37.6	Y	N
	Pick-A-Part Auto Wrecking	P-S-02	3	3.5	NA	NA	7.8	280	35.4	Y	N
	Pick-A-Part Auto Wrecking	P-S-01	3.5	4	NA	NA	7.8	280	33.5	Y	N
	Pick-A-Part Auto Wrecking	P-E-01	2	2.5	NA	NA	7.8	280	28	Y	N
	Pick-A-Part Auto Wrecking	PC-W-01	3	3.5	NA	NA	7.8	280	20.9	Y	N
	Pick-A-Part Auto Wrecking	PC-W-02	2	2.5	NA	NA	7.8	280	19.1	Y	N
Purity Oil Site	PET0270	3	3.5	NA	NA	7.8	280	34.1	Y	N	

TABLE F-3 - CHEMICAL/LOCATION OUTSIDE OF AREA TO BE REMEDIATED WHERE ECO-SSL IS EXCEEDED

Analyte	Site Location	Sample ID	Top Depth	Bottom Depth	Eco-SSL Plant	Eco-SSL Invertebrate	Eco-SSL Bird	Eco-SSL Mammal	Sample Result (mg/kg)	Result Above Most Conservative Eco-SSL	Result Above Least Conservative Eco-SSL
Vanadium	Purity Oil Site	PET0480	3	3.5	NA	NA	7.8	280	32.4	Y	N
	Purity Oil Site	PET0570	3	3.5	NA	NA	7.8	280	25.9	Y	N
	Purity Oil Site	PET0870	3	3.5	NA	NA	7.8	280	19.5	Y	N
	Purity Oil Site	PET0930	3	3.5	NA	NA	7.8	280	18.6	Y	N

Notes:
 ECO-SSL - Ecological soil screening level
 mg/kg - milligram per kilogram
 N - No
 NA - Not available
 Y - Yes