UST CASE CLOSURE SUMMARY

Agency Information

Agency Name: County of Orange Health Care Agency (County)	Address: 1241 E. Dyer Road, Suite 120, Santa Ana, CA 92705-5611
Agency Caseworker: Shyamala Kalyanasundaram	Case No.: 98UT083

Case Information

USTCF Claim No.: 16192	Global ID: T0605901961
Site Name: Texaco	Site Address: 2640 Santiago Boulevard, Orange, CA 92867 (Site)
Petitioner: Shell Oil Products US Attention: Andrea Wing	Address: 20945 South Wilmington Avenue, Carson, CA 90810
USTCF Expenditures to Date: $0	Number of Years Case Open: 17

URL: http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0605901961

Summary

The Low-Threat Underground Storage Tank Case Closure Policy (Policy) contains general and media-specific criteria, and cases that meet those criteria are appropriate for closure pursuant to the Low-Threat Policy. This Case meets all of the required criteria of the Policy. A summary evaluation of compliance with the Policy is shown in **Attachment 1: Compliance with State Water Board Policies and State Law**. The Conceptual Site Model upon which the evaluation of the Case has been made is described in **Attachment 2: Summary of Basic Site Information.** Highlights of the Conceptual Site Model of the Case are as follows:

The release at the Site was discovered when the former underground storage tanks (UST), dispenser islands, and piping were removed and replaced in November 1995. During the 1995 UST removal, approximately 1,500 tons of impacted soil was excavated and disposed. Between 2003 and 2005, a soil vapor extraction (SVE) system was operated. Operation of the SVE system ceased due to decreasing influent concentrations and low to decreasing extraction rates. In 2010, a five-day SVE rebound test demonstrated increasing to stable trends in concentrations and extraction rates; however, the influent concentrations and extraction rates remained low.

The petroleum release is primarily limited to soil to a depth of approximately 140 feet below ground surface (bgs). The dispenser canopy and underground improvements limit access to soil beneath the dispensers. Groundwater, estimated between 175 to 205 feet bgs, has not been encountered to a maximum depth explored of 170 feet bgs. Post-remediation soil data beneath the source area indicate there are residual contaminants in soil between 120 to 140 feet bgs. The residual contaminants at this depth do not pose a significant risk for leaching to groundwater. Additionally, soil vapor data from two

deep SVE wells (VW-7 [145 feet bgs] and VW-8 [170 feet bgs]) located approximately 10 to 20 feet from the center of the release show minimal concentrations in soil vapor between 135 to 170 feet bgs.

The Site is located along the boundary of the Coastal Plain of Orange County Groundwater Basin (Department of Water Resources Bulletin 118). This basin is a high use basin and is listed as "Hydrogeologically Vulnerable" per State Water Resources Control Board's (State Water Board) response to Executive Order D-5-99. The basin's designated beneficial uses of groundwater are not threatened and considering the Site setting, it is highly unlikely that they will be in the foreseeable future. Remaining petroleum constituents are limited, stable and declining. Remedial actions have been implemented and further remediation would be ineffective and expensive. Additional assessment/monitoring will not likely change the conceptual model. Any remaining petroleum constituents do not pose significant risk to human health, safety, or the environment.

Rationale for Closure under the Policy

- General Criteria – Site **MEETS ALL EIGHT GENERAL CRITERIA** under the Policy.

- Groundwater Media-Specific Criteria – Site meets the **EXCEPTION**. Based on an analysis of Site-specific conditions that under current and reasonably anticipated near-term future scenarios, the soil at the Site does not contain sufficient mobile constituents [leachate, vapors, or light non-aqueous-phase liquids (LNAPL)] to cause groundwater to exceed the groundwater criteria.

- Petroleum Vapor Intrusion to Indoor Air – Site meets the **EXCEPTION**. The Site is operated as an active commercial fueling facility and has no release characteristics that can be reasonably believed to pose an unacceptable health risk.

- Direct Contact and Outdoor Air Exposure – Site meets **CRITERIA (3) b**. A Site-specific risk assessment demonstrates that maximum concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health.

Objections to Closure

County staff objected to UST case closure because:

1. Further SVE will remove significant mass of soil contamination. The rebound test in 2010 showed increasing trends for extraction rate and vapor concentrations; asymptotic conditions not demonstrated.
   RESPONSE: Between 2003 and 2005, SVE remediation was used to remove approximately 23,500 pounds of hydrocarbons from soil. Post-remediation soil samples show significantly decreased concentrations. The 2010 rebound test did show stable to increasing trends for extraction rates and vapor concentrations; however, the extraction rates and vapor concentrations were significantly lower than original concentrations. Extraction rates have reduced from approximately 7.96 pounds per hour (lbs/hr) to between 0.22 and 0.5 lbs/hr. Vapor concentrations at the end of the 2010 rebound test are approximately 98% lower than original values. Even with the 2010 rebound test results, asymptotic conditions are demonstrated.

2. Vertical extent of hydrocarbons beneath dispenser island and canopy is not characterized near soil borings B-21 and B-28.
   RESPONSE: The vertical extent of petroleum hydrocarbons beneath the canopy and dispensers island has been characterized to a depth of approximately 140 feet bgs. Slanted post-remediation boring, B-28, contained total petroleum hydrocarbons as gasoline (TPHg) and total xylenes at a depth of 140 feet bgs at concentrations that exceed San Francisco Bay Environmental Screening Levels (ESLs) for leaching to groundwater. There is no other soil sample beyond this depth near this location.

   However, hydrocarbon concentrations in soil deeper than 140 feet bgs can be inferred using soil vapor data. Most recent soil vapor data from VW-7 (screened from 135 to 145 feet bgs and located approximately 10 feet from the soil contamination) and VW-8 (screened from 140 to 170 feet bgs and located approximately 20 feet from the deep soil contamination) show minimal vapor concentrations. This indicates that the residual contaminants in soil deeper than 140 feet bgs are minimal.

3. Site is within the Forebay Area of the Coastal Plain of Orange County Groundwater Basin which is designated as Hydrogeologically Vulnerable per Governor's Executive Order D-5-99.
   RESPONSE: The Site is located along the border of the Coastal Plain of Orange County Groundwater Basin. The closest potential receptor for hydrocarbons in groundwater is City of Orange Well No. W-350 located approximately 2,200 feet to the northwest. The Site overlies the western flank of the Peralta Hills, an outcrop of the Fernando Formation. The Fernando Formation is composed of low permeable silty-sandstone to gravely-sandstone interbedded with micaceous clayey-siltstone or silty-claystone from approximately 40 feet bgs to a maximum depth explored of 170 feet bgs. Soil overlies the Fernando Formation from ground surface to approximately 40 feet bgs. Soil is composed of clay, silt, silty-sand and sand. Groundwater has not been encountered to a maximum depth explored of 170 feet bgs. It is unlikely that groundwater sources at this location will be used as a source of drinking water or for any other designated beneficial uses in the foreseeable future.

Recommendation for Closure

The corrective action performed at this Site ensures the protection of human health, safety, the environment and is consistent with Chapter 6.7 of the Health and Safety Code and implementing regulations, applicable state policies for water quality control and the applicable water quality control plan, and case closure is recommended.

Prepared By: _____ 7/3/2013
Steve McMasters, PG No. 8054 — Date
Engineering Geologist

Reviewed By: _____ 7/3/2013
Benjamin Heningburg, PG No. 8130 — Date
Senior Engineering Geologist

ATTACHMENT 1: COMPLIANCE WITH STATE WATER BOARD POLICIES AND STATE LAW

The Site complies with State Water Resources Control Board policies and state law. Section 25296.10 of the Health and Safety Code requires that Sites be cleaned up to protect human health, safety, and the environment. Based on available information, any residual petroleum constituents at the Site do not pose significant risk to human health, safety, or the environment.

The Site complies with the requirements of the Low-Threat Underground Storage Tank (UST) Case Closure Policy as described below.[1]

Is corrective action consistent with Chapter 6.7 of the Health and Safety Code and implementing regulations? The corrective action provisions contained in Chapter 6.7 of the Health and Safety Code and the implementing regulations govern the entire corrective action process at leaking UST sites. If it is determined, at any stage in the corrective action process, that UST case closure is appropriate, further compliance with corrective action requirements is not necessary. Corrective action at this Site has been consistent with Chapter 6.7 of the Health and Safety Code and implementing regulations and, since this case meets applicable case-closure requirements, further corrective action is not necessary, unless the activity is necessary for case closure.	☒ Yes ☐ No
Have waste discharge requirements or any other orders issued pursuant to Division 7 of the Water Code been issued at this Site?	☐ Yes ☒ No
If so, was the corrective action performed consistent with any order?	☐ Yes ☐ No ☒ NA
General Criteria General criteria that must be satisfied by all candidate sites:	
Is the unauthorized release located within the service area of a public water system?	☒ Yes ☐ No
Does the unauthorized release consist only of petroleum?	☒ Yes ☐ No
Has the unauthorized ("primary") release from the UST system been stopped?	☒ Yes ☐ No
Has free product been removed to the maximum extent practicable?	☐ Yes ☐ No ☒ NA
Has a conceptual site model that assesses the nature, extent, and mobility of the release been developed?	☒ Yes ☐ No

[1] Refer to the Low-Threat Underground Storage Tank Case Closure Policy for closure criteria for low-threat petroleum UST sites.

Has secondary source been removed to the extent practicable?	☒ Yes ☐ No
Has soil or groundwater been tested for MTBE and results reported in accordance with Health and Safety Code, Section 25296.15?	☒ Yes ☐ No
Does nuisance as defined by Water Code, section 13050 exist at the Site?	☐ Yes ☒ No
Are there unique Site attributes or Site-specific conditions that demonstrably increase the risk associated with residual petroleum constituents?	☐ Yes ☒ No
Media-Specific Criteria Candidate sites must satisfy all three of these media-specific criteria: **1. Groundwater:** To satisfy the media-specific criteria for groundwater, the contaminant plume that exceeds water quality objectives must be stable or decreasing in areal extent, and meet all of the additional characteristics of one of the five classes of sites:	
Is the contaminant plume that exceeds water quality objectives stable or decreasing in areal extent?	☐ Yes ☐ No ☒ NA
Does the contaminant plume that exceeds water quality objectives meet all of the additional characteristics of one of the five classes of sites? If YES, check applicable class: ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5**	☐ Yes ☐ No ☒ NA
For sites with releases that have not affected groundwater, do mobile constituents (leachate, vapors, or light non-aqueous phase liquids) contain sufficient mobile constituents to cause groundwater to exceed the groundwater criteria?	☐ Yes ☒ No ☐ NA
2. Petroleum Vapor Intrusion to Indoor Air: The Site is considered low-threat for vapor intrusion to indoor air if Site-specific conditions satisfy all of the characteristics of one of the three classes of sites (a through c) or if the exception for active commercial fueling facilities applies.	
Is the Site an active commercial petroleum fueling facility? Exception: Satisfaction of the media-specific criteria for petroleum vapor intrusion to indoor air is not required at active commercial petroleum fueling facilities, except in cases where release characteristics can be reasonably believed to pose an unacceptable health risk.	☒ Yes ☐ No
a. Do Site-specific conditions at the release Site satisfy all of the applicable characteristics and criteria of scenarios 1 through 3 or all of the applicable characteristics and criteria of scenario 4? If YES, check applicable scenarios: ☐ **1** ☐ **2** ☐ **3** ☐ **4**	☐Yes ☐ No ☒ NA
b. Has a Site-specific risk assessment for the vapor intrusion pathway been conducted and demonstrates that human health is protected to the satisfaction of the regulatory agency?	☐ Yes ☐ No ☒ NA

c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, has the regulatory agency determined that petroleum vapors migrating from soil or groundwater will have no significant risk of adversely affecting human health?	☐ Yes ☐ No ☒ NA
3. Direct Contact and Outdoor Air Exposure: The Site is considered low-threat for direct contact and outdoor air exposure if Site-specific conditions satisfy one of the three classes of sites (a through c).	
a. Are maximum concentrations of petroleum constituents in soil less than or equal to those listed in Table 1 for the specified depth below ground surface (bgs)?	☐ Yes ☒ No ☐ NA
b. Are maximum concentrations of petroleum constituents in soil less than levels that a Site-specific risk assessment demonstrates will have no significant risk of adversely affecting human health?	☒ Yes ☐ No ☐ NA
c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, has the regulatory agency determined that the concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health?	☐ Yes ☐ No ☒ NA

ATTACHMENT 2: SUMMARY OF BASIC INFORMATION (Conceptual Site Model)

Site Location/ History

- The Site is an active commercial fueling facility and is located approximately 1,000 feet south of the intersection of Lincoln Avenue and Santiago Boulevard.
- The Site is bounded by commercial properties to the north and south, by Highway 55 to the west, and Santiago Boulevard and residential properties to the east.
- Nature of Contaminants of Concern: Petroleum hydrocarbons only.
- Primary Source of Release: UST System
- Discovery Date: 1995
- Release Type: Petroleum[2]
- No groundwater monitoring wells have been installed; soil only case.
- Free Product: None reported

Table A. USTs:

Tank No.	Size	Contents	Status	Date
1	Unknown	Gasoline	Removed	1995
2	Unknown	Gasoline	Removed	1995
3	Unknown	Gasoline	Removed	1995

Receptors

- Groundwater Basin: Lower Santa Ana River Hydrologic Area; East Coastal Plain Hydrologic Subarea (also Coastal Plain of Orange County Groundwater Basin)
- Groundwater Beneficial Uses: Municipal and domestic supply (MUN), industrial service supply (IND), industrial process supply (PROC), and agricultural supply (AGR).
- Designated Land Use: General commercial (GC)
- Public Water System: City of Orange
- Distance to Nearest Surface Waters: Eisenhower Park Lake is greater than 1,000 feet northwest; Santa Ana River is greater than 1,000 feet to the northwest; Orange County Water District groundwater recharge basins are greater than 1,000 feet to the north and west.
- Distance to Nearest Supply Wells: Supply well is greater than 1,000 feet northwest

Geology/ Hydrogeology

- Average Groundwater Depth: Groundwater not encountered to a maximum depth explored of 170 feet bgs. Groundwater estimated between 175 and 205 feet bgs.
- Minimum Groundwater Depth: Groundwater not encountered to a maximum depth explored of 170 feet bgs.
- Groundwater Flow Direction: Regional groundwater flow in adjacent basin is south to southwest.
- Geology: Site overlies the western flank of Peralta Hills, an outcrop of the Fernando Formation. Soil encountered from surface to a depth of approximately 40 feet bgs and includes clay, silt, silty-sand and sand. Fernando Formation, from approximately 40 feet bgs to maximum depth explored

[2] "Petroleum" means crude oil, or any fraction thereof, which is liquid at standard conditions of temperature and pressure, which means at 60 degrees Fahrenheit and 14.7 pounds per square inch absolute.
(Health & Saf. Code, § 25299.2.)

of 170 feet, includes silty-sandstone to gravely-sandstone interbedded with micaceous clayey-siltstone or silty-claystone.

- Hydrogeology: Groundwater not encountered to a maximum depth explored of 170 feet bgs.

Corrective Actions

- Three USTs, dispenser islands, and piping were removed and replaced in 1995.
- During 1995, approximately 1,500 tons of impacted soil were removed and disposed offsite.
- Between 2003 and 2005, SVE was successfully implemented and operated. Approximately 23,500 pounds of hydrocarbons removed from soil.
- The SVE system was shut down during 2005 because of diminishing influent concentrations and extraction rates.

Table B. Concentrations of Petroleum Constituents in Soil

Constituent	Maximum 0-5 feet bgs (mg/kg)	Maximum 5-10 feet bgs (mg/kg)	San Francisco Bay Regional Water Quality Control Board's[1] Construction/Trench Worker Direct Exposure Screening Levels (mg/kg)
Benzene	<0.130	0.028	12
Ethylbenzene	0.52	0.099	210
Naphthalene	Not Analyzed	Not Analyzed	130
PAHs[2]	Not Analyzed	Not Analyzed	-

1. San Francisco Bay Regional Water Board
2. Poly-aromatic hydrocarbons as benzo(a)pyrene toxicity equivalent

Petroleum constituents in soil are from post-remediation soil samples only.

Evaluation of Risk Criteria

- Maximum Petroleum Constituent Plume Length above WQOs: not applicable.
- Petroleum Constituent Plume Determined Stable or Decreasing: not applicable
- Soil/Groundwater Sampled for MTBE: Yes, see Table C above
- Residual Petroleum Constituents Pose Significant Risk to the Environment: No
- Residual Petroleum Constituents Pose Significant Vapor Intrusion Risk to Human Health: No – Petroleum constituents most likely to pose a threat for vapor intrusion were removed during soil excavation and over-excavation. Site conditions demonstrate that the residual petroleum constituents in soil and groundwater are protective of human health.
- Residual Petroleum Constituents Pose a Nuisance[3] at the Site: No
- Residual Petroleum Constituents in Soil Pose Significant Risk of Adversely Affecting Human Health: No – A site-specific risk assessment from exposure shows that maximum concentrations of petroleum constituents in soil will have no significant risk of adversely affecting the human health, because the Site is paved and accidental access to soils at the Site is prevented. As an active gasoline service station, any construction worker working at the Site or adjacent to the Site will be prepared for exposure in their normal daily work.
- Residual Petroleum Constituents Pose Significant Direct Contact and Outdoor Air Exposure to Human Health: No – Concentrations of soil samples that exceed Table 1 of the Policy were collected in 1997 (B-5 and B-11) and in 2004 (B-21) prior to or during remediation. Post

[3] Nuisance as defined in California Water Code, section 13050, subdivision (m).

remediation soil samples (post 2005) collected at depths less than 10 feet are all below Residential pathway concentrations shown in Table 1 of the Policy. There are no soil sample results in the case record for naphthalene. However, the relative concentration of naphthalene in soil can be conservatively estimated using the published relative concentrations of naphthalene and benzene in gasoline. Taken from Potter and Simmons (1998), gasoline mixtures contain approximately 2% benzene and 0.25% naphthalene. Therefore, benzene can be directly substituted for naphthalene concentrations with a safety factor of eight. Post remediation benzene concentrations from the Site are below the naphthalene thresholds in Table 1 of the Policy. Therefore, the estimated naphthalene concentrations meet the thresholds in Table 1 and the Policy criteria for direct contact by a factor of eight. It is highly unlikely that naphthalene concentrations in soil, if any, exceed the threshold

Figure 1

HYDROCARBON EXTRACTION RATE AND CUMULATIVE POUNDS OF HYDROCARBONS RECOVERED VS. TOTAL HOURS

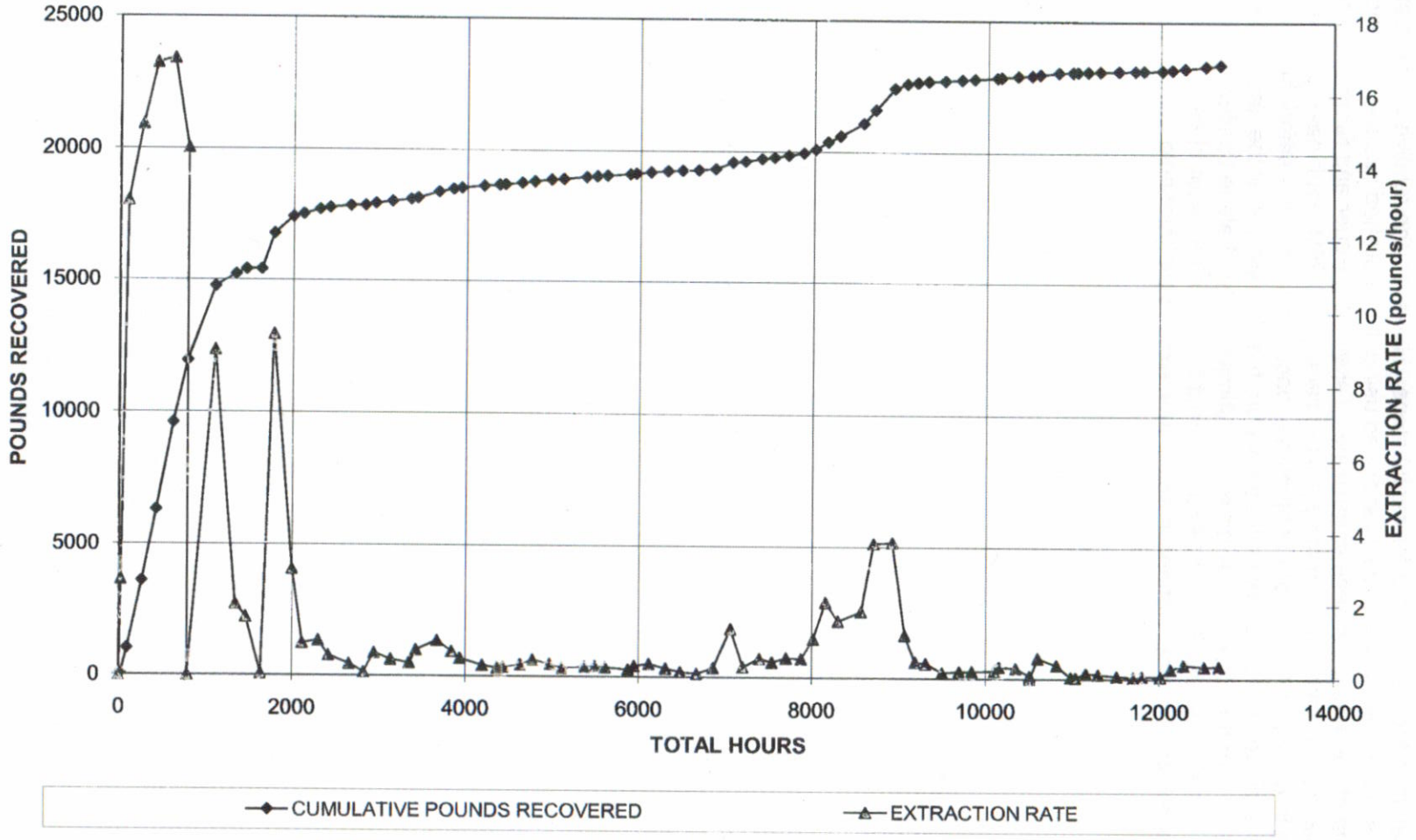
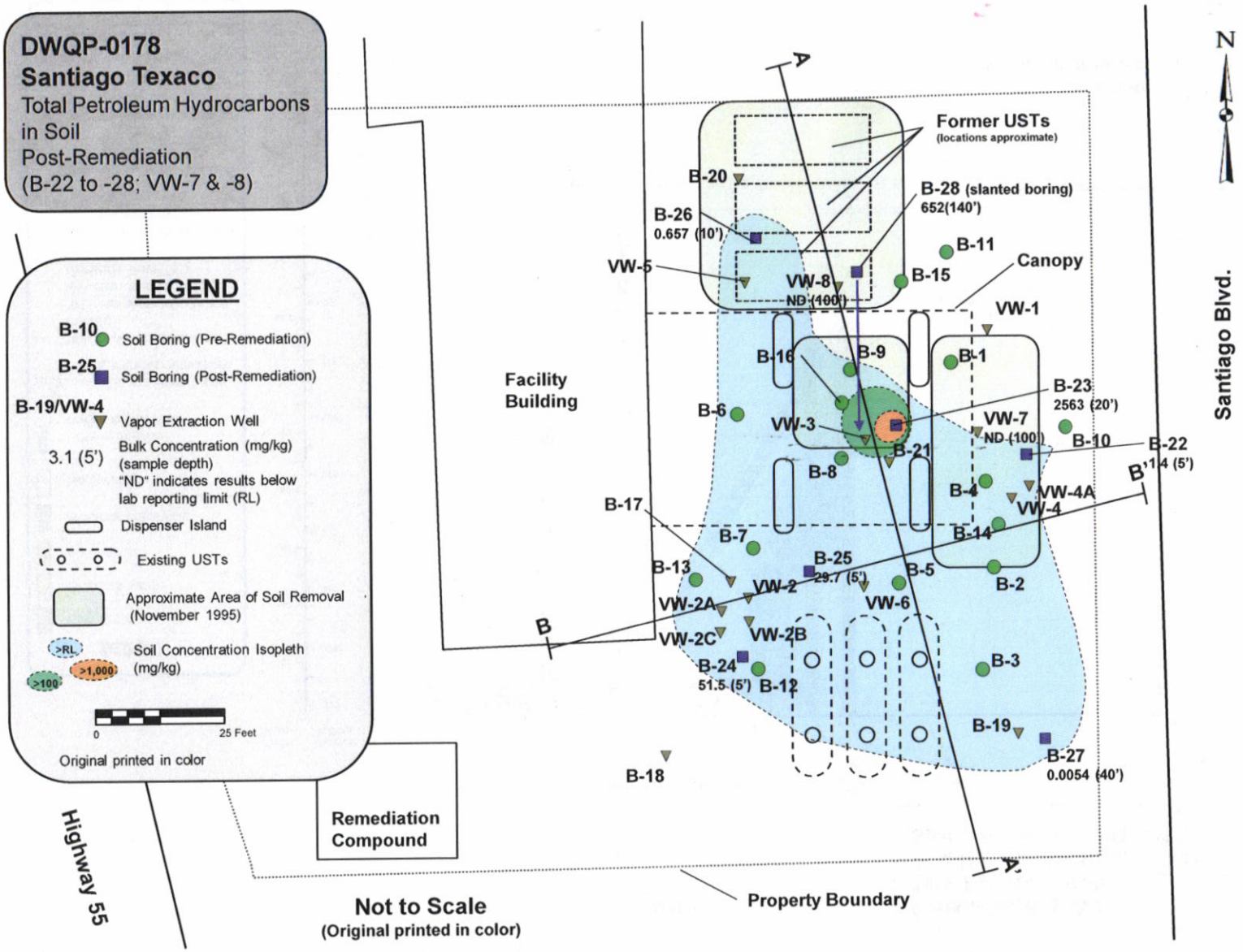


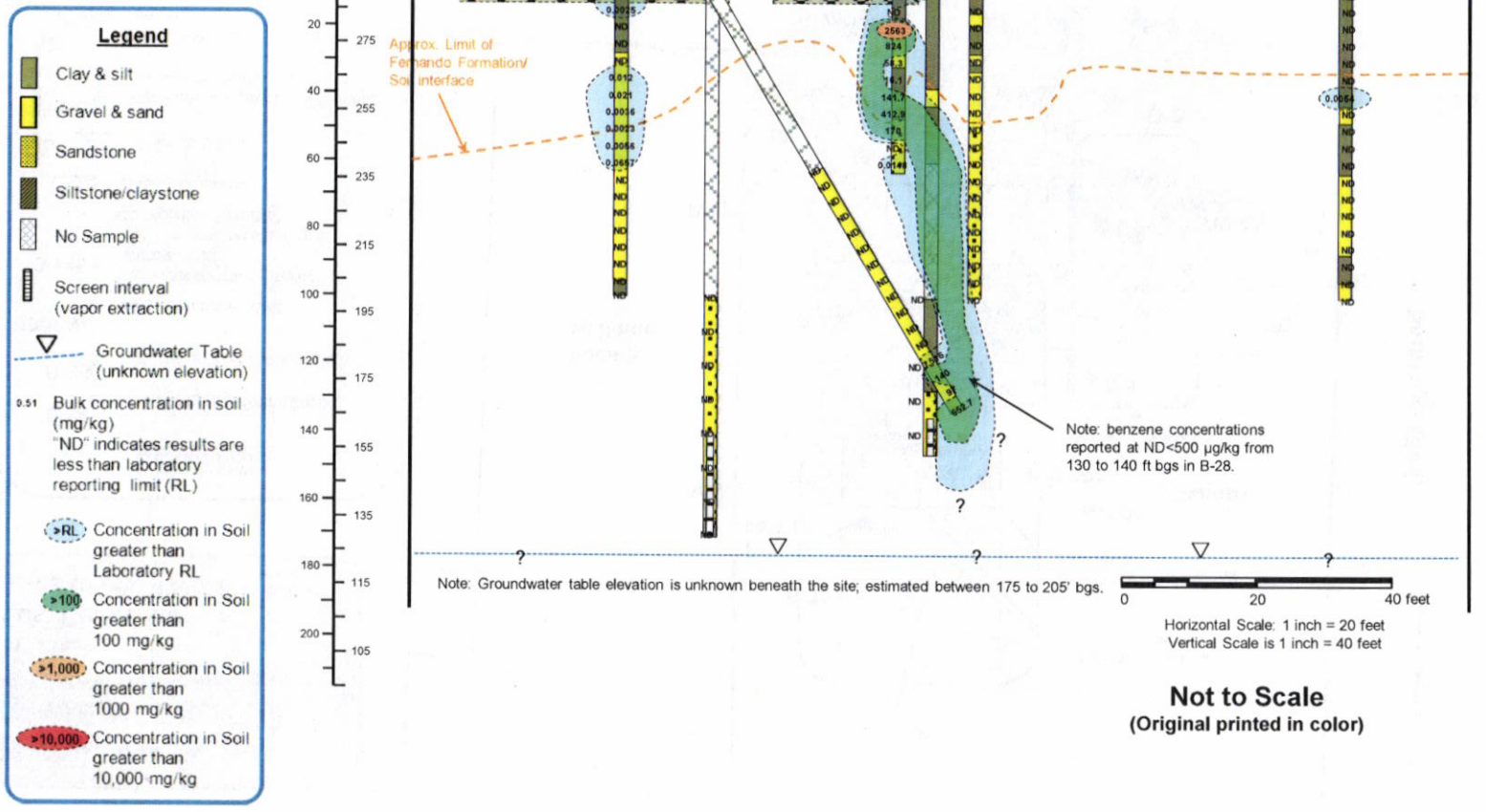
Figure 2


DWQP-0178
Santiago Texaco
Total Petroleum Hydrocarbons in Soil
Post-Remediation
(B-22 to -28; VW-7 & -8)
LEGEND
B-10 Soil Boring (Pre-Remediation)
B-25 Soil Boring (Post-Remediation)
B-19/VW-4 Vapor Extraction Well
3.1 (5') Bulk Concentration (mg/kg) (sample depth)
"ND" indicates results below lab reporting limit (RL)
Dispenser Island
Existing USTs
Approximate Area of Soil Removal (November 1995)
>RL
>100
>1,000
Soil Concentration Isopleth (mg/kg)
0
25 Feet
Original printed in color
Former USTs
(locations approximate)
B-20
B-28 (slanted boring)
652(140')
B-26
0.657 (10')
B-11
VW-5
VW-8
ND (400')
B-15
Canopy
VW-1
B-16
B-9
B-1
Facility Building
B-23
2563 (20')
B-6
VW-3
VW-7
ND (100')
B-10
B-22
B-21
B-8
B-4
VW-4A
VW-4
B-17
B-7
B-14
B-25
29.7 (5')
B-13
B-5
B-2
VW-2
VW-2A
VW-6
B
VW-2C
VW-2B
B-24
51.5 (5')
B-12
B-3
B-19
B-27
0.0054 (40')
B-18
A
A'
B'
N
Santiago Blvd.
Highway 55
Remediation Compound
Property Boundary
Not to Scale
(Original printed in color)

Texaco
2640 Santiago Boulevard, Orange, Orange County

Figure 3

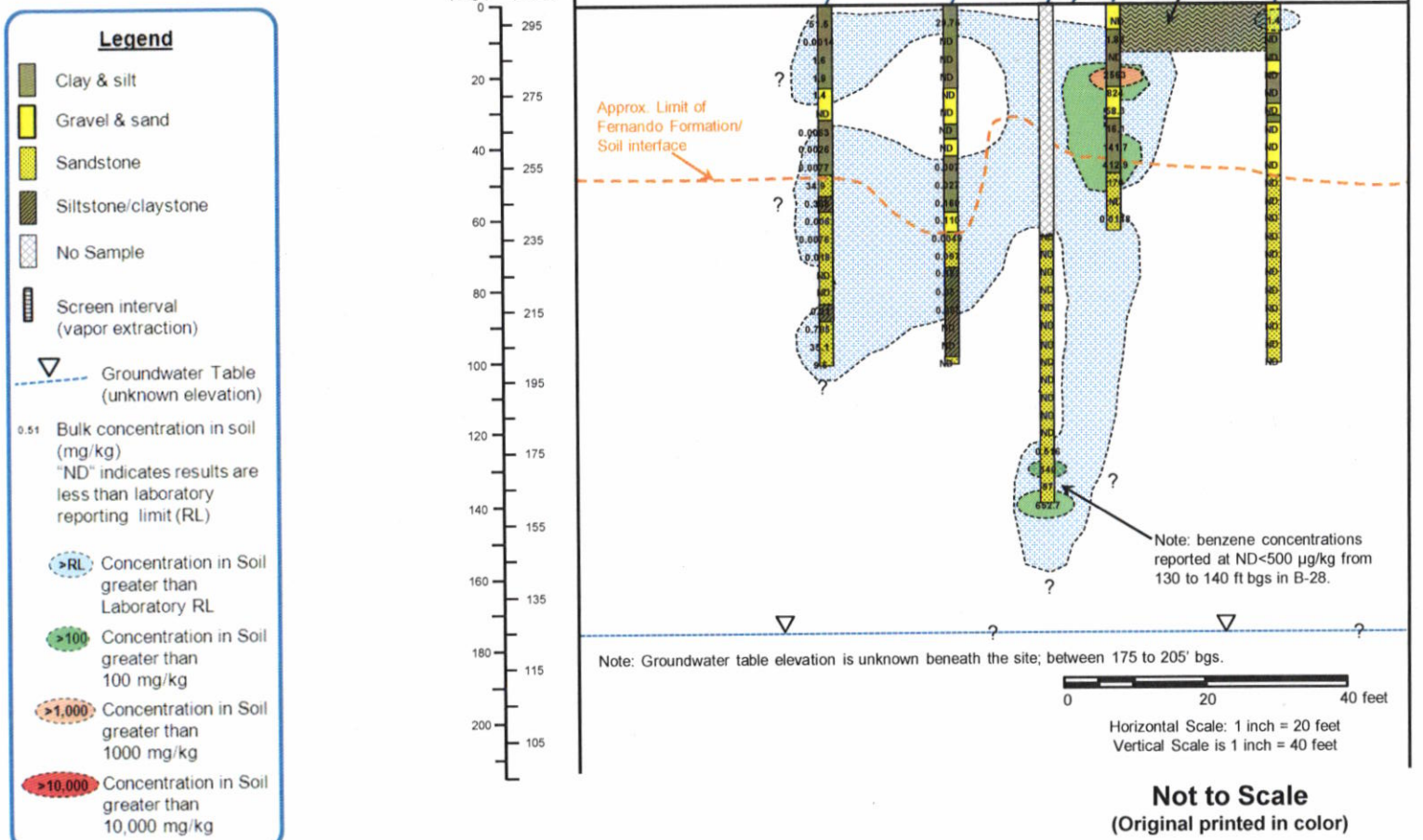
Cross-Section A-A'
Total Petroleum Hydrocarbons in Soil
Post-Remediation Borings Only
Santiago Texaco, DWQP-0178



Not to Scale
(Original printed in color)

Figure 4

Cross-Section B-B'
Total Petroleum Hydrocarbons in Soil
Post-Remediation Borings Only
Santiago Texaco, DWQP-0178



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(Original printed in color)