UST CASE CLOSURE SUMMARY

Agency Information

Agency Name: Central Valley Regional Water Quality Control Board	Address: 11020 Sun Center Drive #200 Rancho Cordova, CA 95670
Agency Caseworker: Mr. Peter Minkel	Case No.: 550041

Case Information

USTCF Claim No.: 12335	Global ID: T0610900033
Site Name: Twain Harte Chevron	Site Address: 22920 Twain Harte Drive Twain Harte , Tuolumne County (Site)
Petitioner: Carol Matts	Address: CALTRANS District 3, P.O. Box 911, Marysville, CA 95901
USTCF Expenditures to Date: $897,258	Number of Years Case Open: 23

URL: http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=%20T0610900033

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 unauthorized release was discovered in 1989 when one of the Underground Storage Tanks (USTs) was punctured with a dip stick. It has been reported that based on quantity remaining in the tank, between 500 and 800 gallons of product was released. Four gasoline USTs, one waste oil UST, and approximately 210 cubic yards of soil were removed in 1989. Approximately 600 gallons of groundwater containing free phase hydrocarbons were removed from the tank cavity. The tanks were not replaced and no tanks remain on-Site. Periodic extraction events and a pump and treat system removed approximately 10 pounds of hydrocarbons and more than 2.5 million gallons of impacted groundwater. A mobile high vacuum dual phase extraction (HVDPE) system was operated in the source area for 53 consecutive days.

The petroleum release is limited to the shallow soil and groundwater. The affected groundwater is not currently being used as a source of drinking water or for any other designated beneficial use, and it is highly unlikely that the affected groundwater will be used as a source of drinking water or any other

beneficial use in the foreseeable future. Public supply wells in the area are required to be constructed with competent sanitary seals. Production intervals are in deeper protected aquifers. Remaining petroleum constituents are limited, stable, and declining. Remedial actions have been implemented and additional corrective actions are not necessary. Additional assessment/monitoring will not likely change the conceptual site model. 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 criterion in **CLASS 5**. Based on an analysis of Site specific conditions that under current and reasonably anticipated near-term future scenarios, the contaminant plume poses a low threat to human health and safety and to the environment and water quality objectives (WQOs) will be achieved within a reasonable time frame.

- Petroleum Vapor Intrusion to Indoor Air – Site meets **CRITERIA (2) a, Scenario 4 –** Direct Measurement of Soil Gas Concentrations with no Bioattenuation Zone.

- Direct Contact and Outdoor Air Exposure – Site meets **CRITERIA (3) a**. Maximum concentrations of petroleum constituents in soil are less than or equal to those listed in Table 1. Soil data was not collected from depths between 0-5 feet. However, the contaminated soil surrounding the tanks was removed to a depth of approximately 23 feet. Boring B2 was located immediately downgradient of the source area and beyond the limits of the tank pit excavation. Photo Ionization Detector (PID) readings from B2 at 4-feet were three orders of magnitude lower than at 8-feet. The concentrations form the B2 8-foot sample were less than those listed in Table 1. Based on the correlation to PID readings it is highly unlikely that the soil adjacent to the tank pit exceeds the threasholds listed in Table 1. The estimated naphthalene concentrations in soil 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 the soil, if any, exceed the threshold.

Objections to Closure

Central Valley Regional Water Quality Control Board (Regional Water Board) staff objected to UST case closure because:

1. The Conceptual Site Model (CSM) referenced in the Petition was prepared and submitted in 2002 and aspects of the investigation at this Site were not adequately addressed at that time. The CSM should be updated.
   RESPONSE: A CSM need not be a singular document. The entire record, including the current reports make up the CSM.

2. The Site meets none of the Groundwater Specific Criteria in the Low Threat UST Case Closure Policy (Policy).
   RESPONSE: Based on an evaluation of site specific conditions the groundwater plume poses a low threat to human health and safety and the environment. The historic trends and "bio remediation" data indicate the Site will reach water quality objectives within a reasonable period of time.

3. Delineation of groundwater impacts have not been adequately characterized in the area of high petroleum hydrocarbon concentrations noted in soil gas samples SGW-2.
   RESPONSE: The 38 soil borings and eleven monitoring wells adequately define the plume. The soil gas concentrations in the vicinity of SGW-2 don't warrant further investigation because they meet the requirements of the Policy.

4. Petroleum concentrations in off-Site wells MW-7 and EX-1 have been increasing since the groundwater extraction system was shut-off in March 2009. The distance to MW-7 indicates that the remaining mass is not limited to the immediate vicinity of the former UST.
   RESPONSE: Dissolved petroleum constituents have fluctuated due to seasonal, sampling, and analytical variations. The last eleven years of analytical data, including pre and post remedial activity, have demonstrated that constituent concentrations are decreasing. The Policy definition of a stable plume is that the plume has reached is maximum extent. Site data meets the policy definition of a stable plume.

5. Depth to groundwater in monitoring well MW-7 has been reported at 0 feet below ground surface, indicating groundwater is potentially surfacing and then discharging to surface water.
   RESPONSE: Monitoring well MW-7 is located in a low lying area and the well vault is susceptible to collection of surface runoff which may provide an appearance that the groundwater has reached the surface. Over the last 23 years there is no empirical evidence collected that suggests groundwater is surfacing.

6. MTBE was in surface water samples collected from Twain Harte Creek, downgradient of the plume and further downstream in December 2001. Plume stabilization is necessary to show that discharges to the creek do not return.
   RESPONSE: Surface water samples were collected from the Twain Harte Creek quarterly between 2001 and 2003. MTBE was detected in surface water samples seasonally following periods of high precipitation. Surface water sampling was discontinued in 2003 because the concentrations identified were attributed runoff from storm water. The Regional Water Board concurred with this conclusion and groundwater sampling was discontinued following the second quarter 2003 event. MTBE was not detected in the creek samples collected in 2003 (March and June).

7. Naphthalene has not been analyzed in soils from 0-10 feet bgs as suggested by the Policy.
   RESPONSE: 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 concentrations can be directly substituted for naphthalene concentrations with a safety factor of eight. Benzene concentrations from the Site are below the naphthalene thresholds in Table 1 of the policy. Therefore, estimated naphthalene concentrations meet the thresholds in Table 1 of the policy criteria for direct contact by a factor of eight. It is highly unlikely that naphthalene concentrations in the soil, if any, exceed the threshold.

8. The HVDPE system did not operate long enough to remove the secondary source to the maximum extent practicable and minimize the spread of contaminants in groundwater as well as discharges to surface water in the area of MW-7. The HVDPE system was shut down while it was still extracting significant petroleum-impacted vapors.
   RESPONSE: The HVDPE system operated near the source area where the majority of the contaminated soil was removed and groundwater concentrations remain are relatively low. A groundwater pump and treat system was operated in the vicinity of MW-7 for over three years and was discontinued because it was no longer effective after removing nearly 2.5 million gallons of

groundwater and 10 pounds of petroleum hydrocarbons. The site meets the requirements of the Policy and further remediation would not be an effective use of resources.

9. Based on groundwater surface fluctuations across the Site, the water level conditions noted at the time of most recent soil gas sampling raises questions about sample validity. Groundwater levels in the area rose but the soil vapor sampling results dropped significantly.
   RESPONSE: Since 2009 soil vapor concentrations have remained consistent and within the same order of magnitude for three years.

10. The Regional Water Board has stated that they believe that soil vapor samples collected from SGW-2 are not valid because water may have been present in the soil vapor well SGW-2 during sample collection due to a very moist condition noted at the time of well installation.
    RESPONSE: A helium shroud was placed over the sampling train during sample collection and the leak detection compound that filled the shroud, was not detected in the soil vapor sample thereby eliminating the possibility of collection of ambient air via short circuiting. No water was detected in the sample collected from SGW-2. While SGW-2 and MW-7 are laterally close the elevation at SGW-2 is approximately 10 feet higher than the elevation at MW-7. Depths to groundwater at wells with similar elevations to SGW-2 have been approximately 10 to 33 feet below ground surface therefore it is unlikely that 5 foot deep SGW-2 contained water during sample collection.

11. Soils surrounding the former waste oil tank were not properly tested for HVOCs, PCBs, PAHs, or metals.
    RESPONSE: In addition to the gasoline related analytes, soil beneath the waste oil tank was analyzed for motor oil, which was not detected above detection limits. The county stated that the waste oil tank was in "very good condition" at the time of removal. The field inspector notes state that there was "no evidence of leaks" and "no soil staining" beneath the waste oil tank. The county was the oversight agency at the time of removal and they were satisfied with the analytical data.

12. The Twain Harte Lodge property may be impacted by the release and there is no indication that the property owner has been notified.
    RESPONSE: Human health risks have NOT been identified at the Twain Harte Lodge property. The owner was notified of the release when access agreements were requested. The Twain Harte Lodge and other affected property owners, as well as water agencies, will be notified if the Site is considered for closure.

13. Unless the City or County has otherwise zoned this property for commercial use only, this property should be modeled for unrestricted land use.
    RESPONSE: The property is zoned for commercial use, but risks have been modeled for a more conservative residential use.

14. Due to the potential for impacted groundwater to surface, specifically through the skateboard park, the human health risk assessment should evaluate exposure pathways associated with a contaminated surface water body.
    RESPONSE: Groundwater cannot surface via the monitoring wells because they are equipped with water tight locking caps. Monitoring well MW-7 is located in a low lying area and the well vault is susceptible to collection of surface runoff which may provide an appearance that the groundwater has reached the surface. The reported spring has been graded and there is no historical data in the case record that indicates that water has ever been produced from the spring. There is no empirical evidence to suggest groundwater is actually surfacing.

15. The Policy is based on the understanding the contaminant plume that exceeds water quality objectives must be stable or decreasing in areal extent. As concentrations in the downgradient wells are increasing, this case does not comply with this requirement.
    RESPONSE: The concentrations in the well on the leading edge of the plume (MW-8) are decreasing demonstrating that the plume is stable in areal extent.

16. A new building (after 2010) has been built on the Twain Harte Lodge property. Given the information on the high levels of gasoline reported in soil gas at this location there is now a complete pathway for vapors to indoor air that should be evaluated. Additionally, Twain Harte Chevron is claiming that tanks were once operated on this property but has supplied no supporting documentation. Environmental work should be conducted by the Twain Harte Chevron until such time as their claims can be verified.
    RESPONSE: The soil gas concentrations in the vicinity of SGW-2 meet the Policy criteria for vapor intrusion and therefore do not warrant further investigation.

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: _____ 5-29-2013
Matthew Cohen — Date
Engineering Geologist

Reviewed By: _____ 5/29/2013
George Lockwood, PE No. 59556 — 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

- Site location: The intersection of Twain Harte Drive and Joaquin Gully Road in Twain Harte. The Site is a Real estate office.
- Surrounding Land Use: The Site is bounded by commercial and residential properties.
- Contaminants of Concern: Petroleum hydrocarbons only.
- Primary Source of Release: UST system.
- Discovery Date: 1989.
- Release Type: Petroleum[2].
- Investigation: Nine monitoring wells have been installed.
- Free Product: Not identified since 1989.

Table A. USTs:

Tank No.	Size	Contents	Status	Date
1	1,000	Gasoline	Removed	September 1989
2	1,000	Gasoline	Removed	September 1989
3	1,000	Gasoline	Removed	September 1989
4	1,000	Gasoline	Removed	September 1989
5	500	Waste Oil	Removed	September 1989

Receptors

- Groundwater Basin: Unnamed basin, Tuolumne River – Big Oak Flat Watershed.
- Groundwater Beneficial Uses: Municipal, Irrigation, Industrial, and Agricultural Supply.
- Designated Land Use: Commercial.
- Public Water System: Twain Harte Community Service District.
- Distance to Nearest Surface Waters: Twain Harte Creek ~ 500 southwest (downgraident).
- Distance to Nearest Supply Wells: Inactive capped supply well approximately 635 feet north (upgradient).

Geology/ Hydrogeology

- Average Groundwater Depth: Onsite ~17 feet below ground surface (bgs), Offsite ~3 feet bgs.
- Minimum Groundwater Depth: Onsite 10 bgs, Offsite 0 feet bgs.
- Groundwater Flow Direction: Southwesterly.
- Geology: Unconsolidated clays silts and sands to a depth of approximately 23 feet bgs underlain by severely weathered granitic bedrock.
- Hydrogeology: Groundwater at the Site occurs within shallow alluvial deposits. The groundwater has been reported to be unconfined with low transmissivity.

[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 & Safety Code, § 25299.2)

Corrective Actions

- 1989 – UST's, 210 cubic yards of oil, and 600 gallons of contaminated groundwater were removed.
- 2002 through 2009 – Periodic groundwater extraction events removed 16,250 gallons of impacted groundwater.
- 2005 through 2009 – A groundwater pump and treat system removed approximately 10 pounds of hydrocarbons and 2.5 million gallons of groundwater.
- 2010 – A mobile HVDPE system operated at the site for 53 consecutive days and removed 1 pound of dissolved phase and 1,000 pounds vapor phase hydrocarbons.

Table B. Concentrations of Petroleum Constituents in Soil

Constituent	Maximum 0-5 feet bgs (mg/kg)	Maximum 5-10 feet bgs (mg/kg)
Benzene	Not Analyzed	Not Detected
Ethylbenzene	Not Analyzed	Not Detected
Naphthalene	Not Analyzed	Not Analyzed
PAHs*	Not Analyzed	Not Analyzed

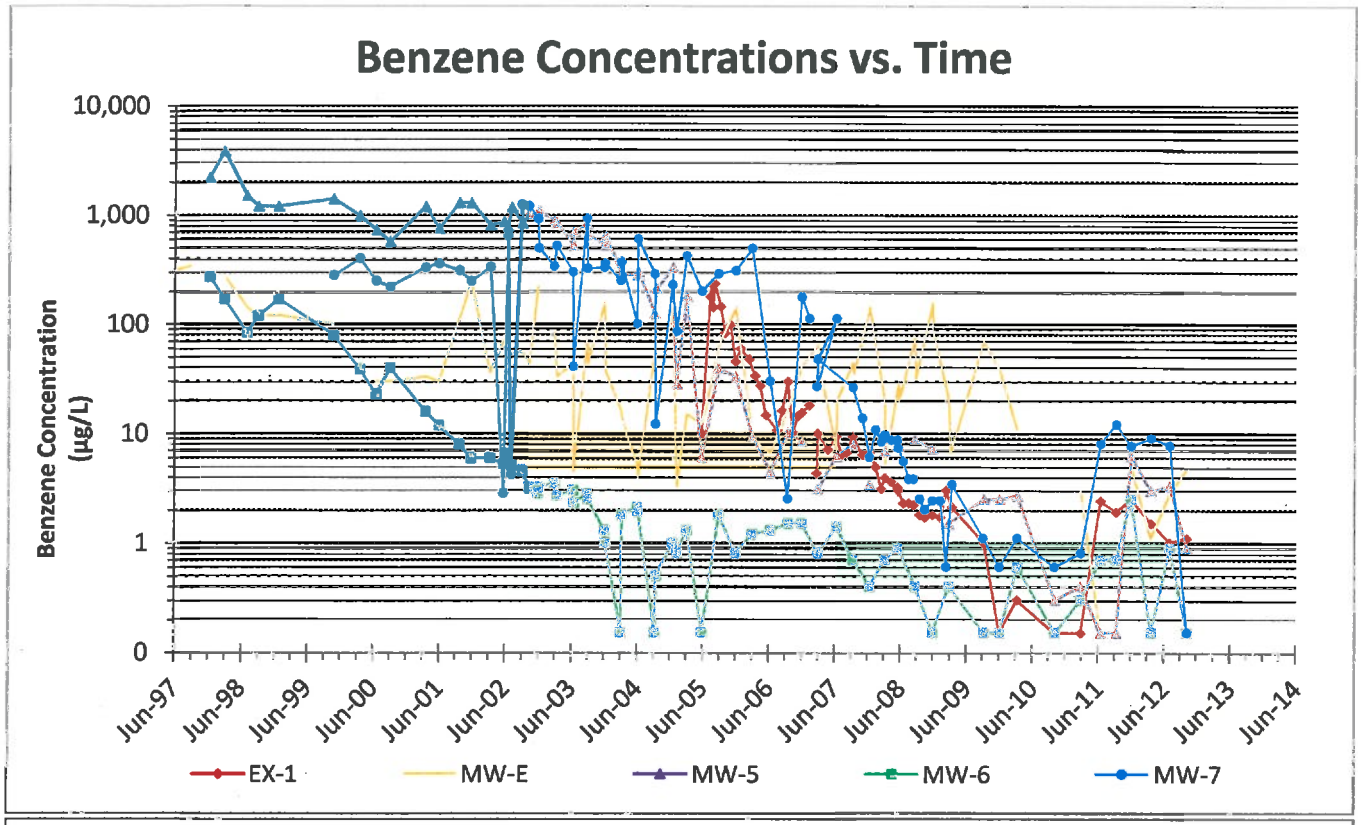
*Poly-aromatic hydrocarbons as benzo(a)pyrene toxicity equivalent

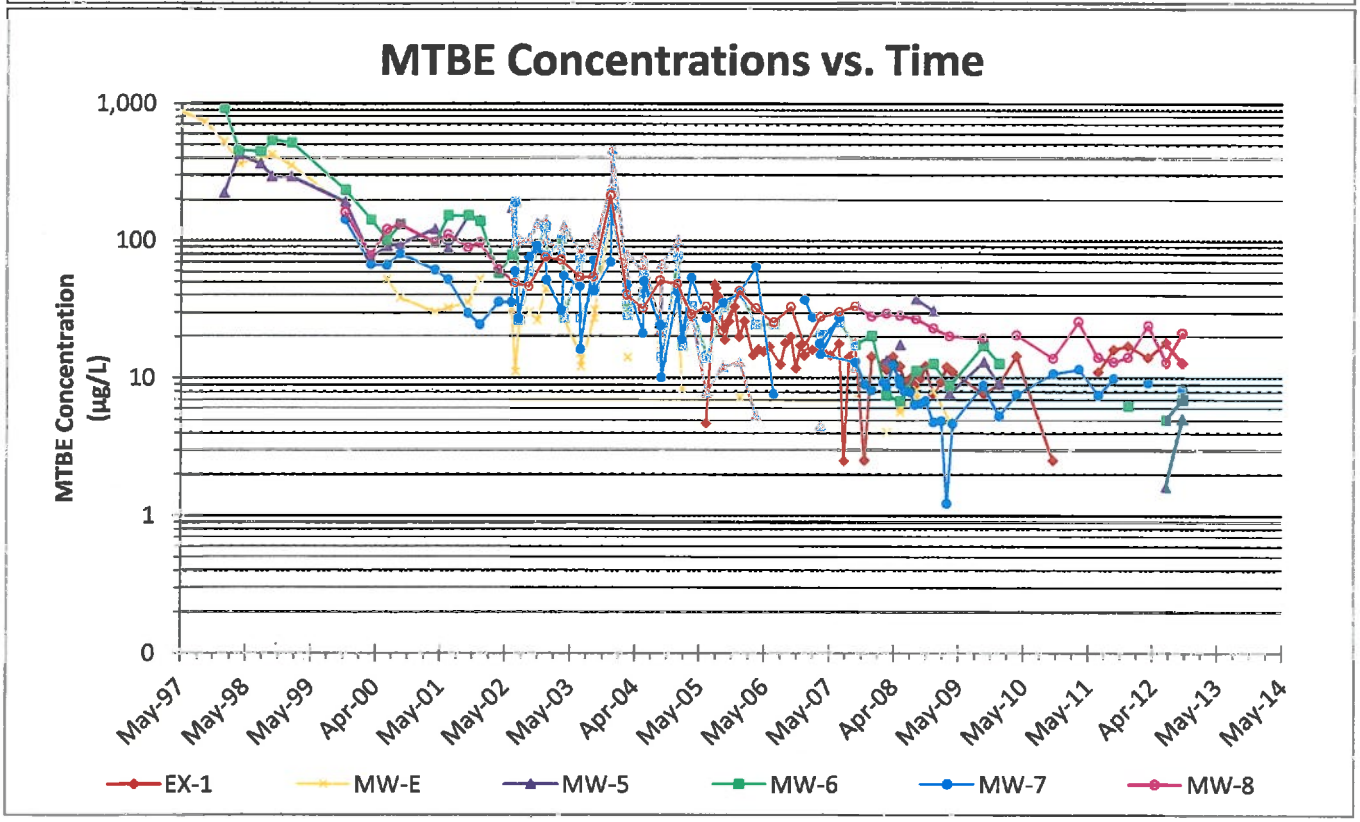
Table C. Concentrations of Petroleum Constituents in Groundwater (June 2012)

Sample	Sample Date	TPHg (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
EX-1	10/18/12	**110**	**1.1**	<0.3	<0.3	<0.6	**13**
MW-ER	10/18/12	**110**	**4.7**	**0.6**	**6**	**8.1**	<1.0
MW-1	10/18/12	<50	<0.3	<0.3	<0.3	<0.6	<1.0
MW-5	10/18/12	**810**	**0.9**	**0.7**	**7.1**	**8.9**	**5**
MW-6	10/18/12	**430**	<0.3	<0.3	**1.9**	**3.8**	**6.9**
MW-7	10/18/12	**340**	<0.3	<0.3	**1.1**	**1.4**	**8.2**
MW-8	10/18/12	<50	<0.3	<0.3	<0.3	<0.6	**21**
MW-9	10/18/12	<50	<0.3	<0.3	<0.3	<0.6	<1.0
WQOs	-	**50**	**1**	**150**	**300**	**1750**	**5**

Notes:
TPHg – Total petroleum hydrocarbons as gasoline
MTBE- Methyl tert-butyl ether
µg/L – micrograms per liter
"<" – indicates result is below the laboratory reporting limit

Groundwater Trends:

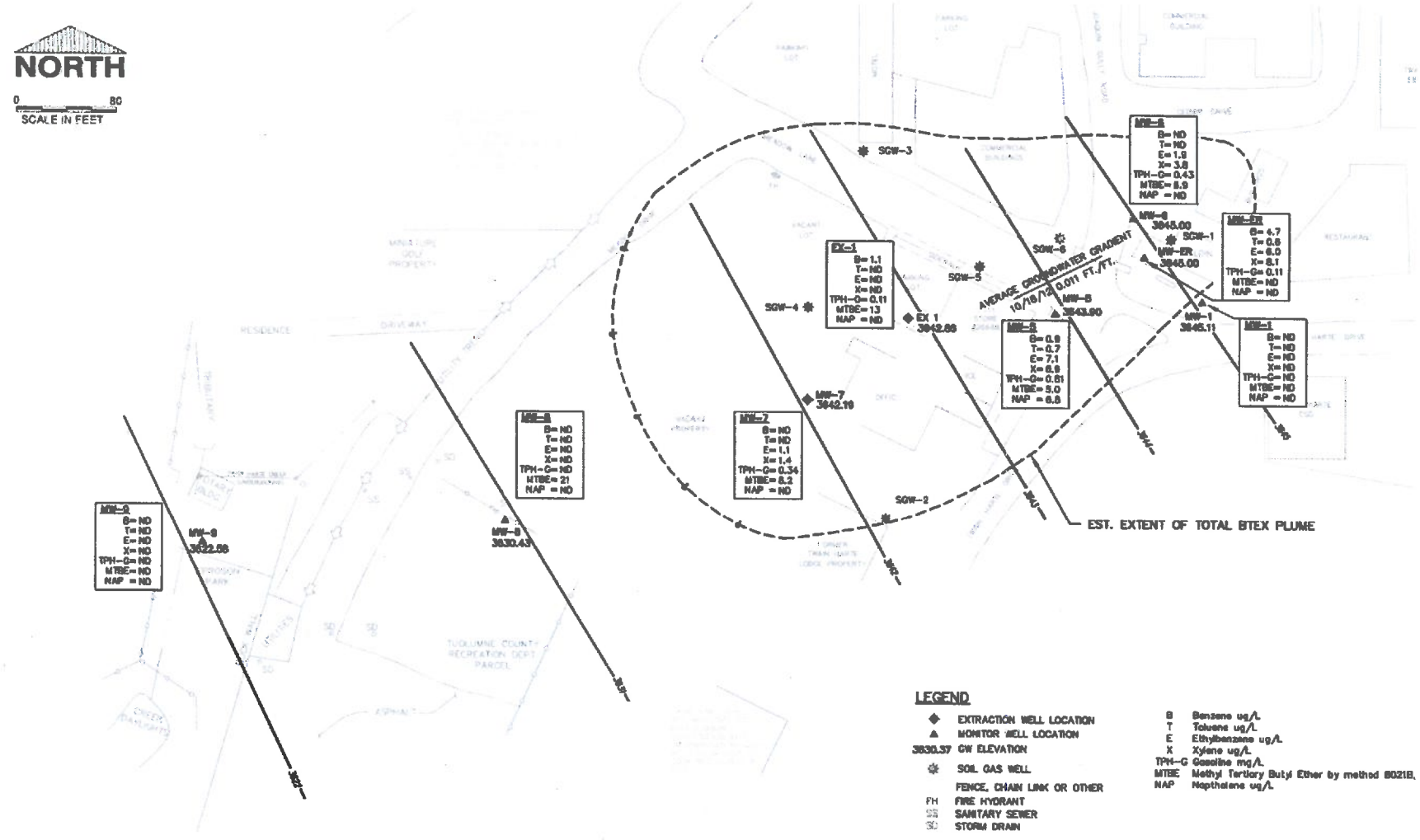




Evaluation of Risk Criteria

- Maximum Petroleum Constituent Plume Length above WQOs: The MTBE plume is approximately 600 feet in length.
- Petroleum Constituent Plume Determined Stable or Decreasing: Yes
- 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 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. – No significant soil contamination has been identified in the upper 10 feet..
- Residual Petroleum Constituents Pose Significant Direct Contact and Outdoor Air Exposure to Human Health: No – There are no soil samples 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 concentrations can be directly substituted for naphthalene concentrations with a safety factor of eight. Benzene concentrations from the Site are below the naphthalene thresholds in Table 1 of the Policy. Therefore, 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 the soil, if any, exceed the threshold.

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



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POTENTIOMETRIC SURFACE MAP WITH HYDROCARBON CONCENTRATIONS IN GROUNDWATER, 4th QUARTER 2012
FORMER TWAIN HARTE CHEVRON
TWAIN HARTE, TUOLUMNE COUNTY, CALIFORNIA

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