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Environmental Health

December 15, 2010

Jerry Wickham, CEG
Senior Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: **Sunol Tree Gas**
3004 Andrade Road, Sunol
Fuel Leak Case No. RO0002448

Dear Mr. Wickham:

Enclosed is the *Draft Corrective Action Plan* for the subject LUFT site submitted in response to your directive dated July 15, 2010. In compliance with state and local regulations, electronic submittals of this document have been uploaded to the Geotracker database and the Alameda County ftp website.

I declare under penalty of perjury that the information and/or recommendations contained in the attached report are true and correct to the best of my knowledge.

Please call Tim Cook at Cook Environmental Services at (925) 478-8390 if you have questions or comments in regards to the technical content of this report.

Very truly yours,

Khan Petroleum, Inc.

Obaid Abdullah
President

cc: Jennifer Rice, Esq
Tim Cook, Cook Environmental Services, Inc.

Draft Corrective Action Plan

PROJECT SITE:
Sunol Tree Gas Station
3004 Andrade Rd.
Sunol, California 94586-9453

PREPARED FOR:

Khan Petroleum Inc.
3004 Andrade Road
Sunol, California 94586-9453

SUBMITTED TO:
Alameda County Department of Environmental Health
Environmental Health Services,
Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

PREPARED BY:
Cook Environmental Services, Inc.
1485 Treat Blvd, Suite 203A
Walnut Creek, California 94597

Project No. 1024

December 15, 2010

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Draft Corrective Action Plan

Sunol Tree Gas Station
3004 Andrade Rd.
Sunol, California 94586-9453

By: Cook Environmental Services, Inc.

Project No. 1024
December 15, 2010

Cook Environmental Services, Inc. prepared this document under the professional supervision of the person whose seal and signature appears hereon. No warranty, either expressed or implied, is made as to the professional advice presented herein. The analysis, conclusions and recommendations contained in this document are based upon site conditions at the time of the investigation, which are subject to change.

The conclusions presented in this document are professional opinions based solely upon visual observations of the site and vicinity, and interpretation of available information as described in this report. The limited scope of services performed in execution of this investigation may not be appropriate to satisfy the needs, or requirements of other regulatory agencies, or of other users. Any use or reuse of this document or its findings, conclusions or recommendations presented herein is at the sole risk of said user.

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY D. COOK
No. C054036
Exp. 12-31-11
CIVIL
STATE OF CALIFORNIA

Tim Cook, P.E.
Principal Engineer

INTRODUCTION

Cook Environmental Services, Inc. (CES) prepared this Draft Corrective Action Plan (CAP) on behalf of Kahn Petroleum, Inc. to address subsurface gasoline-related contamination associated with a historical underground storage tank (UST) release at the Sunol Tree Gas Station (Site) located at 3004 Andrade Road in Sunol, California.. The CAP was prepared in response to a directive from Alameda County Environmental Health (ACEH) dated July 15, 2010 (**Appendix A**). Originally, the deadline for submittal of the Draft CAP was October 27, 2010; however, CES requested a deadline extension to December 15, 2010. This extension was granted by Mr. Jerry Wickham of ACEH in an email dated October 25, 2010.

As noted in the ACEH letter, CAP requirements for leaking UST sites are provided in the California Code of Regulations (CCR), Title 13, Division 3, Chapter 16, Article 11, Section 2725. Elements to be included in a CAP listed in Section 2725, subsection (d) are: (1) an assessment of the impacts listed in subsection (e); a feasibility study, in accordance with subsection (f), and applicable cleanup levels, in accordance with subsection (g). This document has been prepared to comply with requirements for CAPs identified in CCR Title 23, Division 3, Chapter 16, Article 11, Section 2725 (b) – (g).

The owner of the Site, Kahn Petroleum, Inc. authorized Cook Environmental Services, Inc. (CES) to conduct this work. ACEH is the lead oversight program (LOP) administering this investigation on behalf of the State of California.

Site Identification

a) Site Address: Sunol Tree Gas
3004 Andrade Road
Sunol, CA 94586

b) Current Site Use: Active Gasoline Station/Retail Store

c) Assessor's Parcel No.: 96-1-7-7

d) Property Owner: Kahn Petroleum, Inc.

e) Responsible Party: Kahn Petroleum, Inc.
3004 Andrade Road
Sunol, CA 94586

f) Consultant: Cook Environmental Services, Inc.
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Walnut Creek, CA 94597

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(j) ACEH Case No.: RO0002448

(k) SFBRWQCB Case No.: 01-3506

(l) Geotracker Global ID: T0600114064

The Site is located near the intersection of Andrade Road and Athenour Way, just south of Interstate 680, in Sunol, California (**Figure 1**). The site is currently an active retail gasoline station with a mini-mart. Active gasoline dispensing components at the Site include two 20,000-gallon USTs containing regular unleaded gasoline, two 20,000-gallon USTs containing diesel fuel, one 20,000-gallon UST containing premium unleaded gasoline, and one 20,000-gallon split UST containing 12,000 gallons of regular unleaded gasoline, 4,000 gallons of 100 octane racing fuel and 4,000 gallons of 110 octane racing fuel. The system has twelve fuel dispensers.

The USTs are located in the southwest corner of the site and the dispensers are located north of the USTs. The mini-mart is located in the center of the site. The Site is approximately 280 feet above mean sea level (amsl) and local topography slopes gently to the east northeast (USGS, 1981).

SUMMARY OF SITE CHARACTERIZATION

The following discussion summarizes our present understanding of environmental Site conditions.

Regional Geology and Hydrogeology

The subject site is situated in the southwestern portion of the Sunol Groundwater Basin. The Sunol Valley is a structural trough surrounded by Diablo Range hills. Unconsolidated surface soils are mapped as water-bearing Quaternary alluvial deposits (Qal). Underlying the shallow alluvial deposits is the Plio-Pleistocene Livermore formation (Tio), the significant water-bearing strata for the region. Both of these aquifers are composed primarily of sand and gravel with discontinuous layers of clay. This same shale and sandstone deposits underlie the Livermore formation and are exposed in the bordering highlands.

The Livermore and Sunol region is offset by a number of faults, including the nearby Sinbad fault, which is buried beneath Alameda Creek deposited alluvium approximately 2,000 feet northwest of the Site.

The general direction of regional groundwater flow is from the upland areas toward Alameda Creek and then westward toward the outlet of the basin. The principal surface water drainage in the Sunol basin is the northwest flowing Alameda Creek. Locally, groundwater is reported to be both confined and unconfined and flows to the northwest. Recharge to regional aquifers occurs by direct precipitation and infiltration and by the infiltration of Alameda Creek into the underlying unconsolidated alluvial sediments.

The northwest trending Sinbad fault is likely to act as a barrier to the lateral movement of groundwater. Regional geologic cross-sections indicated the Site is on the upgradient side of this fault where groundwater elevations are higher than on the downgradient side of the fault.

Local Geology and Hydrogeology

Logs of water wells in the vicinity of the Site indicate the shallow unconsolidated aquifer is approximately 50 feet thick and is composed of sand and gravel with some clay. The total thickness of water-bearing sediments near the Site is less than 200 feet. Two nearby water wells encountered non-water bearing marine shale at a depth of approximately 140 feet.

A previous survey identified five water supply wells downgradient of the Site (Weber Hayes, November 2004). Samples were collected and analyzed from these five wells and the well at the Site in May 2003 following discovery of MtBE in the T-Bear Ranch well. Offsite wells are located between 550 and 1,700 feet downgradient of the Site. Results of the sampling found that the T-Bear Ranch well was the only well that was impacted by MtBE (130 ug/l). No driller's log is available for this well although a video log was conducted on June 29, 2004.

There are no documented pumping records for water production wells near the Site. Wells within the vicinity of the Site are from 150 to 250 feet deep and are screened in sandy gravel units. Transducer data suggests the T-Bear Ranch well obtains water from the shallow water-bearing zone. Based on this analysis, there is hydraulic connectivity between the shallow zone at 15-17 feet and a deeper zone at 42-44 feet. A downward vertical gradient was measured, which is typical for groundwater recharge areas.

It is uncertain if there is a clay aquiclude beneath the Site, although logs from nearby wells show a 30-50 thick clay unit at 90-100 feet below the surface.

The aquifer test on the T-Bear Ranch well indicates that the average daily water consumption of 5,100 gallons per day does not result in over-pumping the aquifer. The maximum drawdown at 7.5 gallons per minute (gpm) was consistently measured at 1.7 feet and the well recovered immediately after pump shutoff.

Pumping test results for the aquifer summarized by Weber Hayes are as follows:

- The transmissivity was calculated at 9.97 x 10^2 ft^2/day. Recovery of the shallow aquifer is relatively slow compared to the deeper aquifer.

- The hydraulic conductivity was calculated to be 30.6 ft/day (equivalent to a gravel soil type).

- The storativity was calculated to be 3.73 x 10^3 (indicative of an unconfined aquifer).

- The hydraulic gradient was calculated to be 0.008 in a southwesterly direction (based on August 2, 2004 data set).

- The groundwater flow velocity was calculated to be 1.08 ft/day (394.8 ft/yr).

Pumping test results for the deeper aquifer are summarized as follows:

- The transmissivity was calculated at 2.02 x 10^3 ft^2/day. Recovery of the deeper aquifer is relatively rapid compared to the shallow aquifer.

- The hydraulic conductivity was calculated to be 62,1 ft/day (also equivalent to a gravel soil type).

- The storativity was calculated to be 2.83 x 10^{-2} (indicative of a confined aquifer).

- The hydraulic gradient was calculated to be 0.0006 in a south to southeasterly direction (based on August 2, 2004 data set).

- The groundwater flow velocity was calculated to be 0.05 ft/day (20 ft/yr).

Analysis of the T-Bear water supply well is summarized as follows:

- The transmissivity was calculated at 2.81 x 10^2 ft^2/day.

- The hydraulic conductivity was calculated to be 111 ft/day (also equivalent to a gravel soil type).

- Average daily yield is nearly 6,000 gpm.

- The well does not have a consistent yield. Pumping is sporadic with varying duration cycles but the average pumping rate is 7.5 gpm.

- The well has limited drawdown, on the order of 1.7 feet, and recovers quickly (although this may be due to the absence of a check valve on the pump column).

- Transducer monitoring indicates this well is in connection with both the shallow and deeper aquifers.

Limited Receptor Survey

A limited potential receptor survey that included identifying adjacent property use, groundwater production wells, surface water bodies and sensitive wildlife habitats within one mile of the site is summarized in the following sections.

Adjacent Properties

The surrounding area contains residential properties and retail/commercial businesses. A golf driving range, bounds the site to the north and a horse boarding/training facility bounds the site to the east. The Sunol Valley Golf Course is located approximately 500 feet north of the Site on the north side of Interstate 680. A large sand and gravel operation is located approximately 1,600 feet southeast of the Site. This quarry has been mined below the water table in several locations and large pits filled with water remain. At present, the quarry mines sand and gravel located north of Interstate 680 and this material is transported to the processing unit by a conveyor belt. A plant nursery is located approximately 800 feet southwest of the Site. The San Antonio Reservoir, a storage reservoir for the Hetch Hetchy aqueduct, the principal water supply for the City of San Francisco, is located approximately 2 miles east of the Site. Open space, rangeland, various commercial and residential properties are also located in the Site vicinity.

Groundwater Production Wells

A groundwater production well survey (Weber Hayes, 2004) found that this rural area of Alameda County is completely dependent on individual water supply wells. Water supply from public utilities is unavailable. Likewise, there is no publically owned treatment works (POTW) to receive and process domestic sewage, thus sewage treatment is typically processed onsite in septic tanks and/or drainfields. The Site Conceptual Model (Weber Hayes, 2004) found that two downgradient production wells had been impacted by MtBE contamination from the Site. The T-Bear Ranch has been impacted with up to 130 ug/l of MtBE. MtBE was detected only once at 0.5 ug/l in a production well located at the adjacent golf driving range. The property is cross-gradient from the Site. Weber Hayes performed additional work to determine the mass discharge of source contamination, the capture zone for impacted production wells, and designed and installed a granular activated carbon (GAC) treatment system to remove MtBE from the T-Bear Ranch well. This treatment system remains in operation. Other downgradient wells were sampled by Weber Hayes and none yielded detectable concentrations of MtBE.

Surface Waters

Alameda Creek, the main surface water drainage in the Sunol basin, is located approximately 2,000 feet north of the Site and flows southwesterly. Sheridan Creek is a tributary to Alameda Creek and is located approximately 2,000 southeast of the Site.

Environmentally Sensitive Receptors

Based on information gathered from the U.S. Environmental Protection Agency (EPA) Interim Measures Bulletins website (http://www.cdpr.ca.gov/docs/es/colist.htm.) and USGS topographic maps, there are no terrestrial environmentally sensitive receptors located within a one-mile radius of the Site. Aquatic environmentally sensitive receptors may be within one-mile of the Site in Alameda and Sheridan Creeks, however, no documented biological evidence could be located to verify this claim.

PREVIOUS ENVIRONMENTAL INVESTIGATIONS

A fuel release was discovered at the Site on April 12, 2002, during the removal of five 15,000-gallon USTs. The USTs were reported to be in good condition as no holes or corrosion was observed. Clearwater Group, the environmental consultant at that time, noted hydrocarbon odor and soil staining in the UST excavation and soil stockpile. Ten sidewall soil samples and a water sample were collected from the excavation. The highest MtBE concentration detected in the sidewall samples was 0.25 milligrams per kilogram (mg/kg). MtBE was detected in the water sample at 84 ug/l. Twelve soil samples were collected from beneath the pump dispensers and three samples were collected from piping trenches. MtBE was detected in nine of fourteen samples at concentrations ranging from 0.0058 to 5.9 mg/kg. Total petroleum hydrocarbons as gasoline (TPH-g) and benzene, toluene ethylbenzene and total xylenes (BTEX) were detected at low concentrations. The only detection of total petroleum hydrocarbons as diesel (TPH-d) was from beneath the diesel dispenser (dispenser #7) at 1,300 mg/kg. Approximately 4,000 cubic yards of soil was excavated and stockpiled at the rear of the Site. Soil samples collected from the stockpile had low concentrations of TPH-d and no detections of TPH-g, BTEX or MtBE. During the installation of the new USTs, the excavation was dewatered by pumping 160,000 gallons of contaminated water into above-ground temporary storage tanks. Water samples collected from the temporary tanks yielded TPH-g concentrations up to 170 ug/l and MtBE concentrations up to 190 ug/l.

On June 27, 2002, ACEH directed the former owner, Murray Kelsoe, to submit a site investigation work plan to address soil and groundwater contamination related to the UST release.

On August 20, 2002, Clearwater Group collected a water sample from the water supply well at the Site. Hydrocarbon contaminants were not detected in this sample.

On August 23, 2002, Clearwater Group submitted a Preliminary Site Assessment (PSA) Workplan. The work plan was approved by ACEH on August 27, 2002 and the site investigation work was implemented from August to December 2002.

In November 2002, the Clearwater Group collected soil and groundwater samples from five borings advanced near the dispensers and former USTs. Groundwater was encountered at depths between 16 and 19 feet below grade. Hydrocarbon concentrations were relatively low in soil samples. The highest gasoline concentration detected in groundwater was 17,000 ug/l and the highest MtBE concentration was 42 ug/l.

On December 12, 2002, Clearwater Group commissioned a video log of the Site water production well. No driller's log could be located for this well. The total depth of this well was determined to be 153 feet and Mils Knife perforations were located at 60, 62, 67, 101 and 103 feet. A submersible pump was located at a depth of 100 feet. The depth to water was 20 feet.

On February 12, 2003, Washington Mutual Bank rejected a refinance of the T-Bear Ranch due to perceived financial liability associated with gasoline contamination at the Site.

On February 13, 2003, R.J. Lee Group collected a water sample from the T-Bear Ranch water supply well. MtBE was detected in this sample at 73 ug/l.

On February 27, 2003, Cerco Analytical retested the T-Bear Ranch well at the kitchen sink faucet. MtBE was detected in this sample at 87.3 ug/l.

On March 3, 2003, the Zone 7 Water District retested the T Bear Ranch well. MtBE was detected in this sample at 130 ug/l.

On March 14, 2003, Clearwater Group submitted a *PSA Summary Report* that included the data from the five onsite borings and recommended additional investigation to delineate the extent of the contaminant plume.

On March 20, 2003, the ACEH responded to the *PSA Summary Report* and issued a directive requiring the submittal of a work plan for an expedited site investigation by April 4, 2003. The ACEH requested the collection of water samples from water supply wells in the vicinity of the Site, removal and offsite disposal of 4,000 cubic yards of stockpiled soil from the Site, the development of a Site Conceptual Model by installing boring transects to a depth of 60 feet, the installation of wells to characterize the 3-dimensional extent of the contaminant plume, a survey of water supply wells and buried utilities in the vicinity of the Site, video logging of the T-Bear well and the submittal of a report.

On April 4, 2003, Clearwater Group requested an extension of the work plan due date.

On April 7, 2003, the ACEH granted an extension to the submittal of the work plan to April 25, 2003.

On May 6, 2003, Clearwater Group submitted a *Well Sampling Report* documenting the sampling of five water production wells located downgradient of the Site. Two of the five wells had detectable MtBE. MtBE was detected in the T Bear Ranch well at 120 ug/l and in a well on the golf driving range adjacent to the Site at 0.5 ug/l.

On May 8, 2003, Clearwater Group submitted a *Work Plan for Soil and Water Investigation (SWI)* to the ACEH.

On May 12, 2003, The California Underground Storage Tank Cleanup Fund (the Fund) rejected Murray Kelsoe's application for acceptance on the grounds that he failed to comply with UST permit requirements. If his application had been accepted by the Fund, he would have been eligible for reimbursement of up to $1.5 million for cost related to the investigation and cleanup of contamination from the USTs.

On June 13, 2003, the ACEH categorically rejected the *Work Plan for Soil and Water Investigation (SWI)* submitted by Clearwater Group due to "substantial deficiencies" and required the immediate re-submittal of an amended work plan. Specifically, the ACEH rejected Clearwater's proposal to provide water to the T-Bear Ranch from Kelsoe's well, located at the gas station, due to concerns regarding pulling the fuel release downward to Kelsoe's well. The ACEH also cited inadequate presentation of a Site Conceptual Model to justify selecting locations for additional borings and monitoring wells, nested well construction deficiencies, and the omission of the removal of the soil stockpile.

On July 3, 2003, Murray Kelsoe's attorney submitted a letter appealing the Funds rejection of his application.

On August 2, 2003, the Fund rejected his appeal.

On November 6, 2003, a "non-standard" granular activated carbon (GAC) filtration system was installed on the T Bear Ranch well to remove MtBE. Initial breakthrough of MtBE through the first GAC vessel occurred after 89 days (January 27, 2004) when MtBE was detected at 0.63 ug/l. Initial breakthough of MtBE through the second GAC vessels occurred after 202 days (May 5, 2004) when MtBE was detected at 1.6 ug/l. The GAC vessels were changed after 221 days (May 25, 2004).

In November 2004 Murray Kelsoe declared bankruptcy and ownership of the Site was transferred to Sunol Andrade Investors LLP, which is one of many real estate LLPs incorporated by Daniel J. Shaw of Los Gatos, California. Sunol Andrade Investors LLP is currently not active.

On November 16, 2006, the present owner, Kahn Petroleum Inc. was assigned as the responsible party for the Site cleanup.

The GAC system on the T-Bear Ranch well has been operating from 2003 to present and is monitored quarterly. MtBE concentrations in the influent (i.e., untreated groundwater) to the GAC system from February 2009 to September 2010 have varied between less than the detection limit (<0.5 ug/l) to 1.2 ug/l. The groundwater cleanup goal is 5 ug/l.

Semi-annual groundwater monitoring continues in downgradient monitoring wells. During the last monitoring event in April 2010, MtBE concentrations in groundwater increased at nine sampling points and decreased at ten sample points. The most dramatic change was observed in well CMT-7, where concentrations in the intermediate water-bearing zone decreased from 400 ug/L to 170 ug/L.

The MtBE contaminant plume is delineated on the north by CMT-8. MtBE was not detected in this well in all three water-bearing zones. The lateral extent of the plume is not defined to the south. MtBE was detected in the intermediate water-bearing zone of the most southerly well, CMT-1, at 12 ug/L. The plume is delineated on the west by onsite wells CMT-11 and CMT-12. The lateral extent of the plume is not defined to the east. Although MtBE was not detected in wells PZ-3a, PZ-3b, or PZ-2b, it was detected in well PZ-2a (shallow water-bearing zone) at 22 ug/L. This well is located approximately 43 feet upgradient of the T-Bear water supply well.

On July 20, 2007, Murray Kelso was successful in his appeal of the Funds rejection of his claim application. In *Murray Kelsoe v. California State Water Resources Control Board*, the first appellate court first addressed the circumstances under which the permit waiver provisions applied to pre-1990 compliance. According to the court, any claimant who did not have a UST permit before January 1, 1990 is nonetheless eligible for the Fund provided (i) the claimant did not know about the permit requirements before 1990 and there was no intention to avoid the permit requirements or payment of fees; and (ii) at the time of submitting the claim, the claimant has complied with financial responsibility requirements and secured any required permits; and (iii) at the time of submitting the claim, the claimant has paid all applicable fees, interest, and penalties. The court went on to hold, however, that the permit waiver provisions also apply to permits required after January 1, 1990, provided the claimant establishes eligibility for pre-1990 compliance. The result of the *Murray Kelsoe* decision is that claimants are not barred from the Fund simply because they failed to secure a UST permit by 1990. Claimants may qualify for the Fund if they secure a permit at any time prior to submitting a claim and otherwise satisfy the permit waiver conditions. As a result Murray Kelsoe claim is valid and is eligible for reimbursement of payments for site investigation and remediation work related to the cleanup of the release from the former USTs.

ASSESSMENT OF IMPACT

The purpose of this section is to (1) list the contaminants of concern (COCs) identified at the Site; (2) discuss the chemical, physical, toxicological and environmental fate/transport characteristics of the identified COCs; and (3) describe the extent of COC impact to soil, groundwater, and soil vapor below and near the site as required by CCR Title 23, Division 3, Chapter 16, Article 11, Section 2725 (e), subsections (1) and (4).

Contaminants of Concern

Available information regarding past and present UST operations at the site indicates that the USTs were used for storing gasoline. Accordingly, laboratory analytical test methods used during the site assessment activities addressed gasoline-related hydrocarbons and additives. Laboratory analysis of soil and groundwater samples collected during assessment identified MtBE as the principal COC at the site. Gasoline-related COCs that have been identified during the site investigation include TPH-g, BTEX, and MTBE.

Historical soil analytical results are summarized in **Table 1** and historical groundwater analytical results are summarized in **Table 2**.

Contaminant Characteristics

MtBE is a colorless liquid that has historically been used in gasoline as an octane booster and to reduce hazardous emissions from vehicles. Later formulations of gasoline contained higher percentages of MtBE as an oxygenate to promote cleaner burning of gasoline and reduction of carbon monoxide and ozone in the atmosphere. MtBE was approved by the U.S. Environmental Protection Agency (USEPA) as a blending component in gasoline in 1979, and was present in fuels as about 11 to 15% by volume by 1992. The general use of MtBE in gasoline in California was phased out in 2003.

MTBE is flammable in liquid and vapor states, and vapors may flash if an ignition source is present. Long term exposure to MTBE may cause damage to the kidneys and has been proven to be a carcinogen in animals. California considers MTBE a suspect carcinogen based on carcinogenic effects observed in experiments on animals (CA-OEHHA, 1999). The primary maximum contaminant level (MCL) for MtBE, based on toxicity, is 13 μg/L. The secondary MCL for MtBE, based on taste and odor, is 5 μg/L.

Fate, Transport and Persistence of COCs in the Environment

Chemical fate and transport in the environment is dependent on a variety of factors relating to the physical and chemical properties of the substance(s) released and the subsurface conditions at the release site. A full fate and transport analysis is beyond the scope of this document. As discussed in the previous section, MtBE is classified by California as a carcinogen and therefore represents a potential risk to human health and the environment. Therefore, discussion of fate and transport and persistence in the environment will focus on MtBE. Benzene, toluene, ethylbenzene, xylene isomers and tert-butyl ether (tBA) have been detected but at concentrations below acceptable health risks (i.e., ESLs). Benzene, toluene, ethylbenzene, and xylene isomers behave similarly in the environment while tBA behaves more like MtBE with the exception that tBA is more readily biodegradable under aerobic conditions.

MtBE is approximately 24 times more soluble in water than benzene and has a lower soil sorption coefficient (KoC). Therefore, when released into the environment MtBE is more likely to reach groundwater, and when in groundwater is more readily transported.

Biodegradation and chemical oxidation commonly occur in the subsurface and acts to reduce COC concentrations over time. Biodegradation occurs when microorganisms in the subsurface consume a chemical under aerobic or anaerobic conditions. The extent of biodegradation that occurs is dependent on the types of microorganisms that are present, site specific environmental conditions, and the presence of sufficient nutrients to support the microorganisms. Benzene is readily biodegradable under aerobic conditions, which is why dissolved benzene plumes in groundwater do not typically migrate more than 300 feet downgradient from the source. MtBE, on the other hand, is not easily biodegradable and it is not uncommon for MtBE plumes to extend more than 600 feet downgradient from the source area. The T-Bear Ranch well is approximately 600 feet downgradient from the former UST source area.

Extent of Hydrocarbons in Soil

The following discussion focuses on "on-site" soil contamination. "Onsite soil" refers to the Sunol Tree Gas station and the area behind the station extending east to the property line (**Figure 2**). A review of historical data did not find "off-site" soil data related to the contaminant plume investigation. "Off-site" soil data refers to subsurface conditions east of the property line with the T-Bear Ranch property.

To properly evaluate and describe the distribution of all phases of petroleum hydrocarbon contamination in the subsurface, as required in CCR Title 23, Division 3, Chapter 16, Article 11, Section 2725(e), and to prepare a CAP that is representative of current site conditions, the results from the most recent groundwater sampling event conducted on October 16, 2010 should be reviewed. However, in order to submit this Draft CAP in a timely manner, this data was not reviewed. This data will be included in the Quarterly Monitoring Report for the fourth quarter 2010, which will be submitted to ACEH by January 15, 2011.

The historical soil analytical data is not representative of the subsurface conditions currently beneath the Sunol Tree Gas station since it is highly likely that natural attenuation processes have decreased hydrocarbon concentrations. Nevertheless, CES evaluated the distribution of hydrocarbons in soils using the historical assessment data, which may not be indicative of current site conditions.

Soil samples were collected from onsite soils during two sampling events. The first was during the removal of USTs on April 10, 2002 when 10 soil samples (S1 through S10) were collected from the UST excavation. These soil data are summarized in **Table 1**. The highest contaminant concentrations were detected in sample S5 collected from the bottom of the excavation where 9.5 mg/kg of TPH-g, 2.6 mg/kg TPH-d and 0.04 xylenes were detected. This was the only soil sample from the UST excavation that had detectable TPH-g. The only other soil sample with detectable TPH-d was S3 where 1.1 mg/kg was detected. The only other soil sample with detectable hydrocarbon constituents of any kind were detected was S9 where MtBE was detected at 0.0058 mg/kg.

The second soil sampling event was on November 27, 2002 when five borings (B-1 through B-5) were advanced. These soil data are also summarized in **Table 1**. Soil boring locations for this sampling event are shown on **Figure 2**. Soil samples were collected from five distinct horizons, 4, 8, 12, 16 and 20 feet below grade. The highest contaminant concentrations were detected in boring B3, where 250 mg/kg of TPH-g, 50 mg/kg of TPH-d, 0.034 mg/kg of toluene, 1.30 mg/kg of ethylbenzene, 9.50 mg/kg of total xylenes and 1.20 mg/kg of MtBE were detected at a depth of 12 feet below grade. Lower concentrations of hydrocarbons were detected in this same boring at 16 feet below grade and none of these same contaminants were detected in this boring at 20 feet below grade. This boring was located next to the former pump dispensers.

Extent of Hydrocarbon Impact in Groundwater

Groundwater assessment and monitoring activities have been in progress at the Site since 2002. A network of 12 multiple completion monitoring wells (CMT-1 through CMT-12) and six piezometers (PZ-1 through PZ-3) are currently in place to define and monitor groundwater at and downgradient of the Site. Monitoring well locations are shown on **Figure 2**. Cumulative groundwater monitoring data through April 19, 2010 are presented in **Table 2**. A map summarizing the April 19, 2010 MtBE concentrations in groundwater for the shallow water-bearing zone are presented on **Figure 3**. MtBE concentrations in groundwater for the intermediate water-bearing zone are presented on **Figure 4**. MtBE concentrations in groundwater for the deep water-bearing zone are presented on **Figure 5**. A cross-section of MtBE concentrations along the monitoring well network immediately downgradient of the Site (Transect A-A') is presented on **Figure 6**.

Separate phase product has never been observed in the UST excavation or in Site monitoring wells. Only six of the monitoring wells in the network (CMT-1, CMT-3, CMT-6, CMT-7, CMT-10 and PZ-2-a) have consistently yielded detectable MtBE concentrations. Due to natural attenuation processes and/or the previous remediation activities the level of hydrocarbon impact in Site monitoring wells has decreased substantially since the first set of groundwater monitoring wells were installed in July 2004. Based the April 19, 2010 groundwater monitoring data, the dissolved hydrocarbon plume is limited primarily to wells CMT-1, CMT-2, CMT-3, CMT-4 CMT-5, CMT-6, CMT-7, PZ-1a, PZ-1b and PZ-2a. The remaining wells contain low to non-detectable MtBE concentrations. MtBE concentrations from the April 19, 2010 sampling event were as follows:

- 12 μg/L in the intermediate water-bearing zone of well CMT-1;
- 19 μg/L in the intermediate water-bearing zone of well CMT-2;
- 19 μg/L in the intermediate water-bearing zone of well CMT-3;

- 180 µg/L in the intermediate water-bearing zone of well CMT-4;
- 40 µg/L in the deep water-bearing zone of well CMT-4;
- 11 µg/L in the shallow water-bearing zone in well CMT-5;
- 140 µg/L in the intermediate water-bearing zone in well CMT-5;
- 88 µg/L in the shallow water-bearing zone in well CMT-6;
- 25 µg/L in the deep water-bearing zone in well CMT-6;
- 13 µg/L in the shallow water-bearing zone in well CMT-7;
- 170 µg/L in the intermediate water-bearing zone in well CMT-7;
- 23 µg/L in the shallow water-bearing zone in well PZ-1a;
- 63 µg/L in the deep water-bearing zone in well PZ-1b; and
- 22 µg/L in the shallow water-bearing zone in well PZ-2a.

Groundwater data indicates the extent of the MtBE plume has been adequately delineated to the north using well CMT-8, to the west using wells CMT-11 and CMT-12, to the east using wells PZ-2a, PZ-2b, PZ-3a and PZ-3b. To the south the extent of MtBE contamination in the shallow and deep water-bearing zones is delineated using well CMT-3. However, the extent of MtBE contamination to the south in the intermediate zone remains undefined since MtBE is present in the southernmost well (CMT-1) at 12 µg/L. CES has not yet determined whether or not this data gap needs to be filled south of CMT-1 since the MtBE detected in this well is so close to the cleanup goal of 5 µg/L.

Extent of Hydrocarbon Impact in Soil Vapor

Soil vapor data has not been collected since site investigation activities originated in 2002. The principal factor in conducting a soil vapor survey would be to assess the potential for soil vapor intrusion into the mini-mart. In Section 2.7.1, of *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*, San Francisco Bay Regional Water Quality Control Board, Interim Final November 2007 (revised May 2008), the following approach is recommended to evaluate and compare Site groundwater data to ESLs to determine if there is a risk for vapor intrusion into buildings:

1. Compare groundwater data to appropriate screening levels for vapor intrusion concerns (see Table E-1a). For sites with significant contamination proceed directly to Step 2.

2. For areas where groundwater screening levels are approached or exceeded or sites where significant releases to the vadose zone have occurred, collect shallow soil gas samples immediately beneath (preferred) or adjacent to buildings and compare results to soil gas screening levels (Table E or Table E-2).

3. At buildings where soil gas screening levels for vapor intrusion concerns are approached or exceeded, further evaluate the need to carry out an indoor air study (Section 2.8.3).

Table E-1 of this document lists the groundwater screening level for MtBE where vapor intrusion is a concern is 24,000 µg/L. This is more than two orders of magnitude higher than the highest MtBE concentrations detected in the April 19, 2010 sampling event. It is safe to say there is no need to study the risk from MtBE in groundwater on vapor intrusion into nearby buildings.

Potential for Hydrocarbon Migration Due to Subsurface Utilities

Man-made pathways for potential COC migration are located near the Site vicinity would include subsurface utilities for sewer, water, gas, electrical and telecommunications. However, in the vicinity of the site there are no public water systems other that private water production wells, electrical and telephone lines are above grade, this is no pipeline distribution system for natural gas, and there is no sanitary or storm water sewer pipeline distribution system. Therefore, it is highly unlikely that buried utilities would act as a migration pathway for hydrocarbons in groundwater.

Exposure Pathways

Based on existing conditions, potentially complete exposure pathways for the subject Site are:

- Ingestion, inhalation of, or dermal contact with contaminated groundwater from wells downgradient of the Site; and
- Ingestion, inhalation of, or dermal contact with impacted soil and dust during construction activities within the contaminant plume; and

Groundwater ingestion as a potential exposure pathway is most likely at the T-Bear Ranch water supply well were historic MtBE concentration have been as high as 130 µg/l (sampled by Zone 7 Water District on March 3, 2003). A groundwater treatment system was installed on the T-Bear Ranch well in November 2003. More recent untreated groundwater samples from the T-Bear had MtBE concentrations that ranged from less than detection limits (<0.5 µg/l) on February 13, 2009, May 7, 2009 and January 8, 2010 to a high of 1.2 µg/l on July 9, 2009 (Weber Hayes, September 2010). The water quality goal for MtBE is 5.0 µg/l. Based on the water quality goal and the fact that MtBE has not been detected in treated water from the T-Bear Ranch well eliminates this well as an exposure pathway to humans. The only other well to report detectable concentrations of MtBE from the Site is the golf driving range well adjacent to the Site where MtBE was detected only once at 0.5 µg/l on March 4, 2003 (Zone 7 Water District). This well was re-sampled by the Clearwater Group on April 11, 2003 and MtBE was not detected above the laboratory detection limit of 0.5 µg/l. This well is used for irrigation only and is not a drinking water source.

Construction activities that involve excavating soil or dewatering within the contaminant plume downgradient of the source area should be monitored. A site specific health and safety plan in accordance with 29 CFR 1910.120 should address hazards associated with exposure to COCs, identify personal protective equipment, procedures to safely conduct work, monitoring requirements and other issues to satisfy all applicable Cal-OSHA requirements.

DETERMINATION OF APPLICABLE CLEANUP LEVELS

Soil vapor, soil and groundwater cleanup goals are provided in this section that are protective of human health, safety and the environment as required by CCR Title 23, Division 3, Chapter 16, Article 11, Section 2725, subsections (f)(1) and (g).

Soil Vapor Cleanup Levels

Based on known subsurface conditions the soil vapor COCs that may pose a significant risk to human health and safety are MtBE and tBA. Soil vapor cleanup goals are contained in Table E-1 of *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*, SFBRWQCB, Interim Final November 2007 (revised May 2008). The listed cleanup goal for MtBE in soil vapor is 9,400 $\mu g/m^3$. Since tBA is not considered to be a carcinogen, there is no ESL established for this constituent in soil vapor.

As discussed in the previous section, groundwater results from the April 2010 sampling event indicate that MtBE concentrations in groundwater are not high enough to pose a potential health risk to occupants of buildings via the vapor intrusion and inhalation exposure route.

Soil Cleanup Levels

The proposed soil cleanup goals need to be protective against the future potential of residential and commercial vapor intrusion and also low enough to not pose an ongoing source of groundwater contamination. CES proposes the use of Region 2 RWQCB ESLs for shallow (<3 meters) with residential land use where groundwater is a current drinking water resource (Table A). The listed cleanup goal for MtBE in shallow soil is 0.023 mg/kg while the ESL for tBA is 0.075 mg/kg.

Groundwater Cleanup Levels

The designated beneficial uses of surface water at the Site listed in the Region 2 RWQCB Basin Plan are recreational, industrial, navigation, commercial, wildlife, rare species, marine, and spawning beneficial uses. It is important to note that there is no surface water within ¼ mile of the Site, thus, these beneficial uses are unlikely to be impacted in the immediate vicinity of the Site.

Groundwater is in use for drinking water as most residential, industrial and agricultural uses of water in the vicinity of the site rely on deep wells for their water supply. Based on historic data trends in groundwater quality in Site monitoring wells, the plume appears to be stable and natural attenuation mechanisms are responsible for the reduced concentrations of constituents of concern. CES proposes the use of Region 2 RWQCB ESLs for groundwater with residential land use where groundwater is a current drinking water resource (Table F-1a). The listed cleanup goal for MtBE in groundwater is 5 μg/L while the ESL for tBA is 12 μg/L.

REMEDIAL FEASIBILITY STUDY

The purpose of this section is to meet the requirements of CCR Title 23, Division 3, Chapter 16, Article 11, Section 2725, subsection (f) which states that "the responsible party shall conduct a feasibility study to evaluate alternatives for remedying or mitigating the actual or potential adverse effects of the unauthorized release. Each alternative shall be evaluated for cost-effectiveness, and the responsible party shall propose to implement the most cost-effective corrective action." Based on these requirements the following site-specific remedial objectives have been developed for the proposed remedial alternatives:

- Mitigate any potential vapor intrusion of gasoline-related hydrocarbon vapors from impacted soil and/or groundwater into nearby residential and commercial structures;

- Reduce the source mass of gasoline-related hydrocarbons in soil below the site to levels that are protective of future human health and safety, and beneficial groundwater uses; and

- Reduce the concentration of gasoline-related dissolved-phase hydrocarbons in shallow groundwater below the Site to levels that are protective of current and future beneficial groundwater uses in the area.

Remedial Technology Screening

A list of proven remedial technologies was screened for applicability at the site. Site-specific conditions that involve impact to soil and groundwater were considered for the initial screening of corrective action technologies. Technologies that passed the initial screening are listed below:

- Bioventing – a soil treatment technology;
- Enhanced Bioremediation – a soil and/or groundwater treatment technology;
- Chemical Oxidation – a soil and/or groundwater treatment technology;
- Soil Flushing – a soil treatment technology;
- Soil Vapor Extraction (SVE) – a soil treatment technology;
- Excavation with Off-Site Treatment and/or Disposal – a soil treatment technology;
- Monitored Natural Attenuation (MNA) – a soil and/or groundwater treatment technology;
- Air Sparging (AS) – a groundwater treatment technology;

- Dual-Phase Extraction (DPE) – a groundwater treatment technology;
- Passive/Reactive Treatment Walls – a groundwater treatment technology;
- Groundwater Extraction (GWE) - a groundwater treatment technology; and
- Physical Barriers – a groundwater and soil vapor containment technology.

Remedial Alternatives

The remedial technologies that passed the initial screening were used to develop four Site-specific remedial alternatives that can technically and cost-effectively achieve the remedial objectives. These alternatives are described below.

Alternative 1 – Air Sparging and Soil Vapor Extraction

This alternative uses on- and off-site soil vapor extraction (SVE) to address shallow hydrocarbon-contaminated soil and soil vapor above the groundwater surface (approximately 9 feet bgs) and air sparging (AS) combined with SVE to address contaminated groundwater below the Site property. A layout of the proposed AS/SVE system is shown on **Figure 7**. The SVE remediation process for soil and soil vapor cleanup has been discussed earlier in this document. Groundwater remediation by air sparging (AS) is a well documented and widely used process that consists of injecting air under pressure into the impacted groundwater zone. The air stream moves upward through the contaminated groundwater causing dissolved and/or adsorbed volatile hydrocarbons to partition into the passing air streams. The air stream containing VOCs move above the groundwater table where they are recovered through a network of SVE wells for vapor treatment prior to being discharged to the atmosphere. The combined AS/SVE system will remove and destroy hydrocarbon contamination from the impacted groundwater. The injection of air into the subsurface also increases the dissolved oxygen concentrations in groundwater, thereby enhancing the natural aerobic biodegradation of contaminants.

The SVE and AS wells will be connected to an on-site equipment compound by below grade piping. The extracted soil vapor will initially be treated using a catalytic oxidation system. As hydrocarbon concentrations in the soil vapor drop, granular activated carbon canisters will be used for vapor treatment to reduce energy consumption at the site. Treated soil vapor will be discharged to the atmosphere under a permit issued by the Bay Area Air Quality Management District. AS/SVE has been used successfully at many sites with similar contaminants, geology and hydrogeology. However, a site-specific AS pilot test should be conducted to fully evaluate this remedial alternative.

The disadvantages of the AS/SVE alternative are the cost of designing, permitting and pilot testing the system, the capital cost of installing air sparge and soil vapor extraction wells, underground piping, the blower and the compressor equipment, the disruption to the surrounding community (especially the livestock at the T-Bear Ranch) during construction and maintenance activities, the high utility cost associated with active remediation systems, the noise of the blower and compressor, and the uncertainty that AS/SVE will remove the hydrocarbon mass from low permeability soil at this Site.

To implement the AS/SVE system is expected to require approximately six months for pilot testing, test evaluation and reporting, AS/SVE system design, public notification, planning and permitting followed by approximately three months of construction activities. The construction will consist mainly of the installation of the AS/SVE well network, below grade piping, the installation of the SVE system, including an air compressor skid to the AS/SVE equipment compound. It is expected that this alternative will achieve the risk-based cleanup goals in two years, but for estimating purposes a range of two to three years of AS/SVE system operation is used to account for data gaps.

Once the AS/SVE system consistently reaches a point of diminishing returns or soil, groundwater, and soil vapor concentrations meet the risk-based cleanup goals the unit will be shut down and post-remedial monitoring will be performed to evaluate post-remediation subsurface conditions and to document the ability of RNA to further reduce any remaining residual contamination to background conditions. The estimated cost range for this alternative is $470,000 to $701,000 (see **Table 3**).

Alternative 2–In-Situ Chemical Oxidation

This alternative uses ozone gas injection to chemically oxidize shallow hydrocarbon-contaminated soil and groundwater insitu. A layout of the ten proposed ozone injection points and the ozone equipment pad is presented on **Figure 8**.

Ozone injection is a well documented groundwater remediation process by which ozone is introduced into the groundwater and chemically reacts with hydrocarbons to break them down at the molecular level. The proposed ozone injection process would involve injection of ozone into sparge wells to chemically oxidize dissolved and adsorbed hydrocarbons in groundwater below the site. The chemical oxidation process converts the hydrocarbon contaminants to carbon dioxide and water. Ozone injection has been used successfully at sites with similar contaminants, geology and hydrogeology. Ozone has a distinct advantage at this site as it will not require air or wastewater discharge permitting as all treatment takes place insitu. A site-specific ozone sparge pilot test is recommended to fully evaluate this remedial alternative.

The disadvantages of the insitu chemical oxidation alternative are the capital cost of installing ozone sparge wells, underground piping, the ozone generator and oxygen concentrator equipment, the disruption to the surrounding community (especially the livestock at the T-Bear Ranch) during construction and maintenance activities, the high utility cost associated with active remediation systems, the noise of the compressor, the potential for forming toxic by-products from the injection of ozone gas (such as the formation of Cr^{+6} from Cr^{+3} and the formation of bromate from the bromide ion), and the uncertainty that ozone sparging will remove the hydrocarbon mass from low permeability soil at this Site.

The design, public notification, procurement, installation, pilot testing and evaluation and reporting are expected to require six to nine months followed by approximately three months of startup activities. Construction will consist of the installation of ten sparge wells, below grade piping, electrical power, an equipment pad and an ozone generator and oxygen concentrator.

The system will operate until the cleanup goals are achieved in nearby monitoring wells or contaminant concentrations reach a point of diminishing returns. The system will then be shut down and post-remedial monitoring will evaluate further reduction of remaining residual contamination. The estimated cost range for this alternative is $330,000 to $499,000 (see **Table 4**).

Alternative 3 – Dual-Phase Extraction

This alternative uses dual phase extraction (DPE) to remove shallow hydrocarbon-contaminated soil vapor and groundwater beneath the Site and immediately downgradient of the Site. A layout of the proposed DPE system is shown on **Figure 9**.

DPE simultaneously extracts hydrocarbon vapor and groundwater from the subsurface and addresses both soil and groundwater contamination. By removing both phases simultaneously, the water table is depressed, which allows the vapor extraction portion to treat previously saturated soil. The success of DPE depends on the ability to depress the groundwater and expose the saturated soil to vapor extraction. An additional complication at this site is that treated groundwater would be injected into a series of upgradient injection wells. These injection wells would provide an induced groundwater gradient that would flush contaminants toward the DPE extraction wells.

The DPE wells would be connected to an on-site equipment compound by below-grade piping. At the surface, the liquid and vapor phases would be separated in a centrifugal knockout tank. The vapor stream would pass through a catalytic oxidation system to destroy hydrocarbon contaminants. The water stream would pass through granular activated carbon to remove dissolved hydrocarbons prior to reinjection. Treated soil vapor will be discharged to the atmosphere under a permit issued by the Bay Area Air Quality Management District. Treated groundwater would be re-injected into the aquifer under a waste discharge requirement (WDR) permit obtained from the RWQCB.

DPE has been used previously at many sites with similar contaminants, geology and hydrogeology. If this method were to be implemented a site-specific DPE pilot test should be conducted to fully evaluate this remedial alternative.

The disadvantages of the DPE alternative are the cost of designing, permitting and pilot testing the system, the capital cost of installing dual phase extraction and treated groundwater re-injection wells, underground piping, the blower equipment, the disruption to the surrounding community (especially the livestock at the T-Bear Ranch) during construction and maintenance activities, the high utility cost associated with active remediation systems, the high maintenance costs associated with DPE systems (changing bag filters, cleaning sediment from the knockout tank, air sampling, and maintenance of re-injection wells), the noise of the blower, and the uncertainty that DPE will depress the groundwater table enough to remove the hydrocarbon mass from soil at this Site.

To implement this alternative is expected to require approximately 9 to 15 months for design, public notification, permitting, DPE and injection well installation, equipment installation, pilot testing, test evaluation and reporting. Construction will consist of the installation of the DPE well network, the injection well network, below-grade piping, the connection of the DPE and injection wells to the treatment system, construction of the equipment compound, the installation of groundwater treatment equipment, the installation of the soil vapor and groundwater treatment equipment.

It is expected that this alternative can achieve the cleanup goals in two years, but for estimating purposes a range of two to three years is used to account for data gaps. The DPE system will be shut off once cleanup goals are consistently achieved or contaminant concentrations consistently reach a point of diminishing returns. The system will then be shut down and post-remedial monitoring will evaluate further reduction of remaining residual contamination. The estimated cost range for this alternative is $536,000 to $799,000 (see **Table 5**).

Alternative 4 – Monitored Natural Attenuation

Natural attenuation relies on natural processes to clean up or *attenuate* pollution in soil and groundwater. Natural attenuation occurs at most contaminated sites. However, the right conditions must exist to reach cleanup goals in a reasonable time period. Pre-determined parameters are used to monitor Site conditions to make sure natural attenuation is working. This is called monitored natural attenuation (MNA).

MNA works in four ways:

1. Microbes that live in soil and groundwater metabolize contaminants for food. When they completely digest the contaminants, they alter them into water and harmless gases such as carbon dioxide.

2. Contaminants are adsorbed to soil particles. This does not reduce the contaminant mass, but it prevents the contaminants from dissolving into groundwater and moving downgradient to a receptor.

3. As contaminants move through soil and groundwater, they mix with clean water. This dilutes the contaminant concentration.

4. Some contaminants, like hydrocarbons, can evaporate, which means they change from liquids to gases within the soil. If these gases escape to the air at the ground surface, sunlight may destroy them or they will be diluted in fresh air.

MNA works best where the pollution “hot spots” been removed and contaminant concentrations are near the cleanup goals. This is true for this Site. MNA removes residual contamination in soil and groundwater. The soil and groundwater are monitored regularly to ensure MNA is proceeding. We propose monitoring the progress of MNA at this Site using the reduced semi-annual monitoring schedule already approved by ACEH.

MNA is a safe process if used properly. No costs are incurred to excavate or treat contaminants. MNA is not a “do nothing” alternative to site remediation. Regular monitoring is needed to make sure pollution doesn’t leave the site. This ensures that people and the environment are protected during cleanup. Depending on the site, MNA may work just as well and almost as fast as other remedial alternatives. Because MNA takes place in-situ with existing microbes, digging and construction are not needed. As a result, there is no waste to dispose of in landfills, is less disruptive to the neighborhood and the environment and it avoids contaminant contact with cleanup laborers. MNA requires less equipment and labor than most methods. Therefore, it can be cheaper. Monitoring for many years may be costly, but it may cost less than other methods.

The disadvantages of the MNA alternative are the cost associated with monitoring groundwater, and the extended time period to achieve cleanup goals in comparison with active remediation systems.

We estimate this alternative will take four to seven years to achieve cleanup goals. MNA will be discontinued once cleanup goals are consistently achieved or contaminant concentrations consistently reach a point of diminishing returns. The estimated cost range for this alternative is $79,000 to $139,000 (see **Table 6**).

Evaluation of Remedial Alternatives

An evaluation of the remedial alternatives was performed that followed the requirements contained within CCR Title 23, Division 3, Chapter 16, Article 11, Section 2725. Per Title 23 each recommended remedy shall be evaluated using the following criteria:

1. Each recommended remedy must mitigate nuisance conditions and risk of fire or explosion;

2. Each remedy must adequately protect human health, safety and the environment;

3. Each remedy must restore or protect current or potential beneficial uses of water; and

4. Each alternative shall be evaluated for cost-effectiveness, and the responsible party shall propose to implement the most cost-effective corrective action.

All four of the remedies selected for further evaluation are capable of meeting the cleanup goals described previously in a reasonable time period.

An evaluation matrix ranking the four remedial alternatives is presented as **Table 6**. Based on this table and using the evaluation criteria contained in Title 23 Remedial Alternative 4 is recommended as a final remedy.

Alternatives (1 through 4) have similar abilities to reach soil and groundwater cleanup goals in a reasonable period of time (two to three years for Alternatives 1 through 3 and four to seven years for Alternative 4). Alternatives 1 and 2 have similar estimated costs. Alternative 3 has the highest estimated cost. Alternative 4 has the lowest estimated cost and would take the longest to reach cleanup goals. Alternatives 1, 2, and 3 would involve short-term disruptions to residents and businesses while construction of the selected on-site remedial alternative takes place. In addition the remedial equipment for Alternatives 1, 2, and 3 will operate for two to three years and will have some noise and traffic impacts due to operation of the remediation equipment, and performance of various operation, maintenance, and monitoring activities. Of the three active remediation alternatives (Alternatives 1, 2 and 3); Alternative 3 (dual-phase extraction) has the highest cost range, has a high level of complexity due to the extraction, treatment, discharge and re-injection of groundwater, and has a potential risk of spills and discharge of partially treated groundwater. There is a risk that Alternatives 1 (AS/SVE) and 3 (DPE) will not successfully remediate contaminated soil in the target area due to its low permeability.

Selection of Optimal Remedial Alternative

Alternative 4 – Monitored Natural Attenuation is selected as the optimal remedial alternative because:

1. It affords a level of protection of human health, the environment and beneficial uses of water that is equivalent to the other three alternatives.

2. It will reduce the residual mass of hydrocarbons in groundwater, soil and soil vapor.

3. It is the easiest alternative to implement.

4. It is the most cost-effective alternative.

5. It can be implemented in compliance with regulatory guidelines.

6. Cleanup goals can be achieved within a reasonable time period (4 to 7 years).

7. Implementation of this alternative will have the least impact on surrounding businesses and residences.

PUBLIC NOTIFICATION

Public participation is a requirement for the Correction Action Plan process. Upon ACEH approval of the Draft CAP, ACEH will notify potentially affected members of the public who live or own property in the surrounding area of the Site. This public notification program will include distribution of Public Notices to adjacent local businesses and residences. The public notice will describe the proposed CAP and invite interested parties to review the Draft CAP. There will be a 30-day period for the public to review the draft CAP and to comment directly to the ACEH. Based on the public and ACEH comments, a Final CAP will be prepared and submitted to ACEH.

TABLES

Table 1
Historical Soil Analytical Results
Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Sample-ID	Date	Depth (feet bgs)	TPH-g	TPH-d	benzene	toluene	ethyl-benzene	xylenes	MtBE	tBA	ETBE	DIPE	TAME
S1	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	0.026	<0.005	<0.005	<0.005
S2	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	0.0081	<0.005	<0.005	<0.005
S3	04/10/02	15	<1.0	1.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
S4	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
S5	04/10/02	15	9.5	2.6	<0.005	<0.005	<0.005	0.04	**0.04**	<0.005	<0.005	<0.005	<0.005
S6	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	**0.25**	<0.005	<0.005	<0.005	<0.005
S7	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
S8	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
S9	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	0.0058	<0.005	<0.005	<0.005	<0.005
S10	04/10/02	15	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-1-8	11/27/02	8	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005
B-1-12	11/27/02	12	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	0.0056	<0.005	<0.005	<0.005	<0.005
B-1-16	11/27/02	16	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-1-20	11/27/02	20	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-2-4	11/27/02	4	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-2-8	11/27/02	8	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-2-12	11/27/02	12	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-2-16	11/27/02	16	<1.0	1.9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-2-20	11/27/02	20	<1.0	2.3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-3-4	11/27/02	4	18	59	<0.005	<0.005	0.0095	0.021	<0.005	<0.005	<0.005	<0.005	<0.005
B-3-8	11/27/02	8	<1.0	6.9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-3-12	11/27/02	12	**250**	50	<0.005	0.034	1.3	**9.5**	**1.2**	**1.0**	<0.025	<0.025	<0.025
B-3-16	11/27/02	16	1.3	16	<0.005	<0.005	0.0093	0.26	**0.12**	**0.12**	<0.005	<0.005	<0.005
B-3-20	11/27/02	20	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-4-4	11/27/02	4	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-4-8	11/27/02	8	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-4-12	11/27/02	12	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-4-16	11/27/02	16	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	0.0073	<0.005	<0.005	<0.005	<0.005
B-4-20	11/27/02	20	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-4-24	11/27/02	24	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Environmental Screening Levels (ESLs)			83	83	0.044	2.9	2.3	2.3	0.023	0.075	NE	NE	NE

Table 1
Historical Soil Analytical Results
Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Sample-ID	Date	Depth (feet bgs)	TPH-g	TPH-d	benzene	toluene	ethyl-benzene	xylenes	MtBE	tBA	ETBE	DIPE	TAME
B-5-4	11/27/02	4	<1.0	13	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-5-8	11/27/02	8	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-5-12	11/27/02	12	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-5-16	11/27/02	16	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-5-20	11/27/02	20	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Environmental Screening Levels (ESLs)			83	83	0.044	2.9	2.3	2.3	0.023	0.075	NE	NE	NE

BOLD = Bold Print indicates concentrations are above ESLs.

MtBE = Methyl-tert-Butyl ether

TAME = Tert-amyl methyl ether

ETBE = Ethyl tert-butyl ether

DIPE = Di-isopropyl either

tBA - tert butyl alcohol

TPH-g - total petroleum hydrocarbons as gasoline

TPH-d- total petroleum hydrocarbons as diesel

MTBE detections are confirmed by EPA Method #8260.

concentrations are miligrams per kilogram (mg/kg)

ESLs are from San Francisco Bay RWQCB residential land use where groundwater is a drinking water resource.

Table 2
Historical Groundwater Analtyical Results
Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Well- ID	Date	Depth (feet, bgs)	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	TBA	ETBE	DIPE	TAME	Ethanol	Comments
B-1-W	11/27/02	15	**260**	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	NS	Shallow
B-2-W	11/27/02	15	**500**	<0.5	<0.5	<0.5	0.76	0.68	<5	<0.5	<0.5	<0.5	NS	
B-3-W	11/27/02	15	**670**	**1.1**	<0.5	6.6	**20**	**43**	<5	<0.5	<0.5	<0.5	NS	
B-4-W	11/27/02	15	**17,000**	<2.5	<2.5	**350**	**84**	4.7	<25	<2.5	<2.5	<2.5	NS	
B-5-W	11/27/02	15	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	NS	
CMT-1-1	12/29/04	21	< 25	< 0.5	< 0.5	< 0.5	< 0.5	**15** (Dup @ **14**)	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	07/13/05	21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	08/15/06	21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	04/19/10	21	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-1-2	12/29/04	41	< 25	< 0.5	< 0.5	< 0.5	< 0.5	1.2	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	07/13/05	41	ND	ND	ND	ND	ND	2.7	ND	ND	ND	ND	ND	
	08/15/06	41	ND	ND	ND	ND	ND	**6.5**	ND	ND	ND	ND	ND	
	10/26/06	41	ND	ND	ND	ND	ND	**7.9**	ND	ND	ND	ND	ND	
	04/19/10	41	<50	<0.5	<0.5	<0.5	<0.5	**12**	<2.0	<0.5	<0.5	<0.5	<50	
CMT-1-3	12/29/04	51	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	07/13/05	51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	08/15/06	51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	04/19/10	51	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-2-1	12/29/04	22	< 25	< 0.5	0.58 *Dup* <0.5	< 0.5	< 0.5	**13** (Dup @ **14**)	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	07/13/05	22	ND	ND	ND	ND	ND	**13**	ND	ND	ND	ND	ND	
	08/15/06	22	ND	ND	ND	ND	ND	2.3	ND	ND	ND	ND	ND	
	10/26/06	22	ND	ND	ND	ND	ND	2.7	ND	ND	ND	ND	ND	
	04/19/10	22	<50	<0.5	<0.5	<0.5	<0.5	0.61	<2.0	<0.5	<0.5	<0.5	<50	
CMT-2-2	12/29/04	42	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	07/13/05	42	ND	ND	ND	ND	ND	4.6	ND	ND	ND	ND	ND	
	08/15/06	42	ND	ND	ND	ND	ND	**14**	ND	ND	ND	ND	ND	
	10/26/06	42	56	ND	0.70	ND	1.1	**14**	ND	ND	ND	ND	ND	
	04/19/10	42	<50	<0.5	<0.5	<0.5	<0.5	**19**	<2.0	<0.5	<0.5	<0.5	<50	
CMT-2-3	12/29/04	52	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	07/13/05	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	08/15/06	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	52	39	ND	0.52	ND	0.96	ND	ND	ND	ND	ND	ND	
	04/19/10	52	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
Environmental Screening Levels (ESLs)			100	1.0	40	30	20	5.0	12	NE	NE	NE	NE	
Practical Quantitation Limit (PQLs)			25	0.5	0.5	0.5	0.5	1.0	10	5.0	5.0	5.0	100	

Table 2
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Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Well- ID	Date	Depth (feet, bgs)	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	TBA	ETBE	DIPE	TAME	Ethanol	Comments
CMT-3-1	01/18/05	22	< 25	< 0.5	< 0.5	< 0.5	< 0.5	**15**	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	07/13/05	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	08/16/06	22	ND	ND	ND	ND	ND	1.2	ND	ND	ND	ND	ND	
	10/27/06	22	37	ND	1.2	0.53	2.9	1.5	ND	ND	ND	ND	ND	
	04/19/10	21	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-3-2	01/18/05	42	**190**	< 2.5	< 2.5	< 2.5	< 2.5	**190**	< 50	< 25	< 25	< 25	< 500	Intermediate
	07/13/05	42	55	ND	ND	ND	ND	**69**	ND	ND	ND	ND	ND	
	08/16/06	42	36	ND	ND	ND	ND	**27**	ND	ND	ND	ND	ND	
	10/27/06	42	39	ND	0.90	ND	2.4	**28**	ND	ND	ND	ND	ND	
	04/19/10	41	<50	<0.5	<0.5	<0.5	<0.5	**19**	<2.0	<0.5	<0.5	<0.5	<50	
CMT-3-3	01/18/05	52	< 25	< 0.5	< 0.5	< 0.5	< 0.5	4.9	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	07/13/05	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	08/16/06	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/27/06	52	ND	ND	ND	ND	1.8	ND	ND	ND	ND	ND	ND	
	04/19/10	51	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-4-1	01/11/05	13.5	< 25	< 0.5	< 0.5	< 0.5	< 0.5	**15**	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	07/12/05	13.5	ND	ND	ND	ND	ND	**5.3**	ND	ND	ND	ND	ND	
	08/16/06	13.5	ND	ND	ND	ND	ND	2.0	ND	ND	ND	ND	ND	
	10/27/06	13.5	ND	ND	ND	ND	0.76	2.1	ND	ND	ND	ND	ND	
	04/19/10	13	<50	<0.5	<0.5	<0.5	<0.5	0.54	<2.0	<0.5	<0.5	<0.5	<50	
CMT-4-2	01/11/05	42	35	< 0.5	< 0.5	< 0.5	< 0.5	**29**	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	07/12/05	42	60	ND	ND	ND	ND	**66**	ND	ND	ND	ND	ND	
	08/16/06	42	**110**	ND	ND	ND	ND	**110**	ND	ND	ND	ND	ND	
	10/27/06	42	**140**	< 1.0	< 1.0	< 1.0	< 1.0	**140**	< 20	< 10	< 10	< 10	< 200	
	04/19/10	42	<50	<5.0	<5.0	<5.0	<5.0	**180**	<20	<5.0	<5.0	<5.0	<500	
CMT-4-3	01/11/05	52	29	< 0.5	< 0.5	< 0.5	< 0.5	**27**	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	07/12/05	52	ND	ND	ND	ND	ND	**11**	ND	ND	ND	ND	ND	
	08/16/06	52	ND	ND	ND	ND	ND	**11**	ND	ND	ND	ND	ND	
	10/27/06	52	ND	ND	ND	ND	0.53	**16**	ND	ND	ND	ND	ND	
	04/19/10	52	<50	<1.0	<1.0	<1.0	<1.0	**40**	<4.0	<1.0	<1.0	<1.0	<100	
Environmental Screening Levels (ESLs)			100	1.0	40	30	20	5.0	12	NE	NE	NE	NE	
Practical Quantitation Limit (PQLs)			25	0.5	0.5	0.5	0.5	1.0	10	5.0	5.0	5.0	100	

Table 2
Historical Groundwater Analtyical Results
Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Well- ID	Date	Depth (feet, bgs)	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	TBA	ETBE	DIPE	TAME	Ethanol	Comments
	12/29/04	21	< 25	< 0.5	0.7	< 0.5	< 0.5	**19**	< 10	< 5.0	< 5.0	< 5.0	< 100	
	07/12/05	21	ND	ND	ND	ND	ND	**12**	ND	ND	ND	ND	ND	
CMT-5-1	08/16/06	21	ND	ND	ND	ND	ND	4.7	ND	ND	ND	ND	ND	Shallow
	10/27/06	21	46	ND	ND	ND	0.87	3.6	ND	ND	ND	ND	ND	
	04/19/10	22	<50	<0.5	<0.5	<0.5	<0.5	**11**	<2.0	<0.5	<0.5	<0.5	<50	
	12/29/04	42	< 25	< 0.5	0.54	< 0.5	< 0.5	3.5	< 10	< 5.0	< 5.0	< 5.0	< 100	
	07/12/05	42	31	ND	ND	ND	ND	**37**	ND	ND	ND	ND	ND	
CMT-5-2	08/16/06	42	88	ND	ND	ND	ND	**89**	ND	ND	ND	ND	ND	Intermediate
	10/27/06	42	**130**	< 1.0	< 1.0	< 1.0	< 1.0	**92**	< 20	< 10	< 10	< 10	< 200	
	04/19/10	43	<50	<5.0	<5.0	<5.0	<5.0	**140**	<20	<5.0	<5.0	<5.0	<500	
	12/29/04	52	< 25	< 0.5	0.52	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	
	07/12/05	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
CMT-5-3	08/16/06	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Deep
	10/27/06	52	ND	ND	ND	ND	0.67	ND	ND	ND	ND	ND	ND	
	04/19/10	52	<50	<0.5	<0.5	<0.5	<0.5	0.57	<2.0	<0.5	<0.5	<0.5	<50	
	01/11/05	22	40	< 0.5	< 0.5	< 0.5	< 0.5	**41**	< 10	< 5.0	< 5.0	< 5.0	< 100	
	07/12/05	22	64	ND	ND	ND	ND	**79**	ND	ND	ND	ND	ND	
CMT-6-1	08/16/06	22	71	ND	ND	ND	ND	**71**	ND	ND	ND	ND	ND	Shallow
	10/27/06	22	**110**	< 1.0	< 1.0	< 1.0	1.3	**84**	< 20	< 10	< 10	< 10	< 200	
	04/19/10	22	<50	<2.5	<2.5	<2.5	<2.5	**88**	<10	<2.5	<2.5	<2.5	<250	
	01/11/05	43	< 25	< 0.5	< 0.5	< 0.5	< 0.5	**8.7**	< 10	< 5.0	< 5.0	< 5.0	< 100	
	07/12/05	43	ND	ND	ND	ND	ND	**15**	ND	ND	ND	ND	ND	
CMT-6-2	08/16/06	43	ND	ND	ND	ND	ND	**12**	ND	ND	ND	ND	ND	Intermediate
	10/27/06	43	40	ND	ND	ND	0.76	**19**	ND	ND	ND	ND	ND	
	04/19/10	43	<50	<0.5	<0.5	<0.5	<0.5	**18**	<2.0	<0.5	<0.5	<0.5	<50	
	01/11/05	57	< 25	< 0.5	< 0.5	< 0.5	< 0.5	4.5	< 10	< 5.0	< 5.0	< 5.0	< 100	
	07/12/05	57	ND	ND	ND	ND	ND	4.7	ND	ND	ND	ND	ND	
CMT-6-3	08/16/06	57	25	ND	0.77	ND	ND	**5.5**	ND	ND	ND	ND	ND	Deep
	10/27/06	57	38	ND	ND	ND	0.68	**7.7**	ND	ND	ND	ND	ND	
	04/19/10	57	<50	<0.5	<0.5	<0.5	<0.5	**25**	<2.0	<0.5	<0.5	<0.5	<50	
Environmental Screening Levels (ESLs)			100	1.0	40	30	20	5.0	12	NE	NE	NE	NE	
Practical Quantitation Limit (PQLs)			25	0.5	0.5	0.5	0.5	1.0	10	5.0	5.0	5.0	100	

Table 2
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Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Well- ID	Date	Depth (feet, bgs)	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	TBA	ETBE	DIPE	TAME	Ethanol	Comments
CMT-7-1	01/11/05	13.5	< 25	< 0.5	0.52	< 0.5	< 0.5	2.5	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	07/13/05	13.5	ND	ND	ND	ND	ND	3.7	ND	ND	ND	ND	ND	
	08/16/06	13.5	42	ND	ND	ND	ND	**27**	ND	ND	ND	ND	ND	
	10/27/06	13.5	50	ND	2.2	ND	2.7	**37**	ND	ND	ND	ND	ND	
	04/19/10	13	<50	<0.5	<0.5	<0.5	<0.5	**13**	<2.0	<0.5	<0.5	<0.5	<50	
CMT-7-2	01/10/05	43	< 25	< 0.5	< 0.5	< 0.5	< 0.5	**7.4**	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	07/13/05	43	**230**	< 2.5	< 2.5	< 2.5	< 2.5	**320**	< 50	< 25	< 25	< 25	< 500	
	08/16/06	43	**400**	< 2.5	< 2.5	< 2.5	< 2.5	**390**	< 50	< 25	< 25	< 25	< 500	
	10/27/06	43	**490**	< 5.0	< 5.0	< 5.0	< 5.0	**400**	< 100	< 50	< 50	< 50	< 1,000	
	04/19/10	43	<50	<2.5	<2.5	<2.5	<2.5	**170**	<10	<2.5	<2.5	<2.5	<250	
CMT-7-3	01/10/05	57	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	07/13/05	57	ND	ND	ND	ND	ND	1.1	ND	ND	ND	ND	ND	
	08/16/06	57	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/27/06	57	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	04/19/10	57	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-8-1	01/14/05	22	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	08/16/06	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	22	26	ND	0.78	ND	1.4	ND	ND	ND	ND	ND	ND	
	04/19/10	22	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-8-2	01/14/05	43.5	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	08/16/06	43.5	ND	ND	ND	ND	ND	ND	**80**	ND	ND	ND	ND	
	10/26/06	43.5	ND	ND	0.81	ND	1.2	ND	**80**	ND	ND	ND	ND	
	04/19/10	42	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-8-3	01/14/05	52	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	08/16/06	43.5	ND	ND	ND	ND	ND	< 1.0	**80**	ND	ND	ND	ND	
	10/26/06	43.5	ND	ND	0.70	ND	1.1	ND	**80**	ND	ND	ND	ND	
	04/19/10	52	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
Environmental Screening Levels (ESLs)			100	1.0	40	30	20	5.0	12	NE	NE	NE	NE	
Practical Quantitation Limit (PQLs)			25	0.5	0.5	0.5	0.5	1.0	10	5.0	5.0	5.0	100	

Table 2
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Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Well- ID	Date	Depth (feet, bgs)	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	TBA	ETBE	DIPE	TAME	Ethanol	Comments
CMT-9-1	01/14/05	22	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	08/16/06	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	22	ND	ND	0.72	ND	1.0	ND	ND	ND	ND	ND	ND	
	04/19/10	22	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-9-2	01/14/05	43.5	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	08/16/06	43.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	43.5	ND	ND	0.77	ND	1.2	ND	ND	ND	ND	ND	ND	
	04/19/10	43	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-9-3	01/14/05	52	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	08/16/06	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	52	ND	ND	0.57	ND	0.94	ND	ND	ND	ND	ND	ND	
	04/19/10	52	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-10-1	01/14/05	22	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	07/13/05	22	ND	ND	ND	ND	ND	3.8	ND	ND	ND	ND	ND	
	08/15/06	22	ND	ND	ND	ND	ND	1.6	ND	ND	ND	ND	ND	
	10/26/06	22	ND	ND	0.8	ND	1.5	2.4	ND	ND	ND	ND	ND	
	04/19/10	Well Not Accessible												
CMT-10-2	01/14/05	42	< 25	< 0.5	< 0.5	< 0.5	< 0.5	2.6	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	07/13/05	42	ND	ND	ND	ND	ND	4.8	ND	ND	ND	ND	ND	
	08/15/06	22	ND	ND	ND	ND	ND	1.6	ND	ND	ND	ND	ND	
	10/26/06	22	35	ND	1.2	ND	2.3	4.9	ND	ND	ND	ND	ND	
	04/19/10	Well Not Accessible												
CMT-10-3	01/14/05	52	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	07/13/05	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	08/15/06	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	52	ND	ND	0.9	ND	1.6	ND	ND	ND	ND	ND	ND	
	04/19/10	Well Not Accessible												
Environmental Screening Levels (ESLs)			100	1.0	40	30	20	5.0	12	NE	NE	NE	NE	
Practical Quantitation Limit (PQLs)			25	0.5	0.5	0.5	0.5	1.0	10	5.0	5.0	5.0	100	

Table 2
Historical Groundwater Analtyical Results
Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Well- ID	Date	Depth (feet, bgs)	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	TBA	ETBE	DIPE	TAME	Ethanol	Comments
CMT-11-1	01/10/05	22.5	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	08/15/06	22.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	22.5	25	ND	1.2	ND	1.8	ND	ND	ND	ND	ND	ND	
	04/19/10	22	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-11-2	01/10/05	32	< 25	< 0.5	< 0.5	< 0.5	< 0.5	1.3	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	08/15/06	32	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	32	31	ND	0.83	ND	1.6	ND	ND	ND	ND	ND	ND	
	04/19/10	32	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-11-3	01/10/05	53	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	08/15/06	53	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	53	26	ND	0.64	ND	1.2	ND	ND	ND	ND	ND	ND	
	04/19/10	53	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-12-1	01/10/05	22.75	< 25	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	08/15/06	22.75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	22.75	ND	ND	0.56	ND	0.93	ND	ND	ND	ND	ND	ND	
	04/19/10	22	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
CMT-12-2	01/10/05	38.25	< 25	< 0.5	< 0.5	< 0.5	< 0.5	1.4	< 10	< 5.0	< 5.0	< 5.0	< 100	Intermediate
	08/15/06	38.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	38.25	ND	ND	1.0	ND	1.9	ND	ND	ND	ND	ND	ND	
	04/19/10	38	<50	<0.5	<0.5	<0.5	<0.5	**23**	<2.0	<0.5	<0.5	<0.5	<50	
CMT-12-3	01/10/05	57.25	< 25	< 0.5	< 0.5	< 0.5	< 0.5	1.7	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	08/15/06	57.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	57.25	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	04/19/10	57	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
Environmental Screening Levels (ESLs)			100	1.0	40	30	20	5.0	12	NE	NE	NE	NE	
Practical Quantitation Limit (PQLs)			25	0.5	0.5	0.5	0.5	1.0	10	5.0	5.0	5.0	100	

Table 2
Historical Groundwater Analtyical Results
Sunol Tree Gas Station
3004 Andrade Road, Sunol, CA

Well- ID	Date	Depth (feet, bgs)	TPH-g	benzene	toluene	ethyl-benzene	xylenes	MtBE	TBA	ETBE	DIPE	TAME	Ethanol	Comments
PZ-1a	12/03/04	10.5	**180**	< 1.0	< 1.0	< 1.0	< 2	**190**	< 20	< 10	< 10	< 10	< 200	Shallow
	08/16/06	17	**440**	ND	ND	ND	ND	**57**	ND	ND	ND	ND	ND	
	10/27/06	17	**130**	ND	ND	ND	ND	**52**	ND	ND	ND	ND	ND	
	04/19/10	17	<50	<0.5	<0.5	<0.5	<0.5	**23**	<2.0	<0.5	<0.5	<0.5	<50	
PZ-1b	12/03/04	14.3	38	< 0.5	< 0.5	< 0.5	< 1	**28**	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	08/16/06	46.5	51	ND	ND	ND	ND	**38**	ND	ND	ND	ND	ND	
	10/27/06	46.5	58	ND	ND	ND	0.79	**50**	ND	ND	ND	ND	ND	
	04/19/10	46	<50	<2.5	<2.5	<2.5	<2.5	**63**	<10	<2.5	<2.5	<2.5	<250	
PZ-2a	12/03/04	6.5	**270**	< 2.5	< 2.5	< 2.5	< 5	**280**	< 50	< 25	< 25	< 25	< 500	Shallow
	07/12/05	29	**120**	< 1.0	< 1.0	< 1.0	< 1.0	**110**	< 20	< 10	< 10	< 10	< 200	
	08/15/06	17	**100**	ND	ND	ND	ND	**92**	ND	ND	ND	ND	ND	
	10/26/06	29	68	ND	ND	ND	ND	**56**	ND	ND	ND	ND	ND	
	04/19/10	29	<50	<0.5	<0.5	<0.5	<0.5	**22**	<2.0	<0.5	<0.5	<0.5	<50	
PZ-2b	12/03/04	8	**160**	< 1.0	< 1.0	< 1.0	< 2	**150**	< 20	< 10	< 10	< 10	< 200	Deep
	07/12/05	49	ND	ND	ND	< 1.0	ND	**15**	ND	ND	ND	ND	ND	
	08/15/06	49	ND	ND	ND	ND	ND	**17**	ND	ND	ND	ND	ND	
	10/26/06	49	43	ND	ND	ND	ND	**17**	ND	ND	ND	ND	ND	
	04/19/10	49	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
PZ-3a	12/03/04	9	29	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Shallow
	08/16/06	21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	21	27	< 0.5	1.8	< 0.5	2.9	ND	ND	ND	ND	ND	ND	
	04/19/10	21	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
PZ-3b	12/03/04	11	< 25	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 5.0	< 100	Deep
	08/16/06	49	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	10/26/06	49	ND	ND	0.54	ND	0.88	ND	ND	ND	ND	ND	ND	
	04/19/10	49	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<50	
Environmental Screening Levels (ESLs)			100	1.0	40	30	20	5.0	12	NE	NE	NE	NE	
Practical Quantitation Limit (PQLs)			25	0.5	0.5	0.5	0.5	1.0	10	5.0	5.0	5.0	100	

BOLD = Bold Print indicates concentrations are above ESLs.
< # = Detection limit elevated due to sample dilution.
ND = Not detected at or above the lab's practical quantitation limit.
NS= Not sampled
MTBE detections are confirmed by EPA Method #8260.
concentraqtions are micrograms per liter (ug/L)
ESLs are from San Francisco Bay RWQCB where groundwater is a drinking

MTBE = Methyl-tert-Butyl ether
TAME = Tert-amyl methyl ether
ETBE = Ethyl tert-butyl ether
DIPE = Di-isopropyl either
tBA - tert butyl alcohol
TPH-g - total petroleum hydrocarbons as gasoline

Table 3. Cost Estimate for Alternative 1 AS/SVE
Kahn Petroleum, Sunol, California

	Lower Estimate	Upper Estimate
Duration	2 years	3 years
Install AS/SVE System		
Design System	$ 5,000	$ 10,000
Procure/Rent Materials	$ 35,000	$ 50,000
Permitting	$ 8,000	$ 15,000
Install AS/SVE Wells	$ 15,000	$ 20,000
Pilot Testing	$ 10,000	$ 15,000
Project Management and Reporting	$ 15,000	$ 20,000
Subtotal	$ 88,000	$ 130,000
Operation of AS/SVE System		
O&M Labor, Utilities, Sampling, Analysis, Reporting, Expenses ($7,500/mo)	$ 180,000	$ 270,000
Monitoring and Reporting		
Quarterly GW Gauging, Sampling, Analysis, Reporting, Expenses (16 sampling points, $8,000/qtr)	$ 64,000	$ 96,000
AS/SVE System Decommissioning and Well Abandonment	$ 50,000	$ 75,000
Total Cost	$ 470,000	$ 701,000

Table 4. Cost Estimate for Alternative 2 - Insitu Chemical Oxidation
Kahn Petroleum, Sunol, California

	Lower Estimate	Upper Estimate
Duration	2 years	3 years
Install Ozone Sparge System		
Design System	$ 3,000	$ 7,000
Procure/Rent Materials	$ 32,000	$ 50,000
Permitting	$ 3,000	$ 5,000
Install Sparge Wells	$ 12,000	$ 15,000
Pilot Testing	$ 10,000	$ 15,000
Project Management and Reporting	$ 15,000	$ 20,000
Subtotal	$ 75,000	$ 112,000
Operation of AS/SVE System		
O&M Labor, Utilities, Reporting, Expenses ($4,000/mo)	$ 96,000	$ 144,000
Monitoring and Reporting		
Quarterly GW Gauging, Sampling, Analysis, Reporting, Expenses (16 sampling points, $8,000/qtr)	$ 64,000	$ 96,000
Ozone System Decommissioning and Well Abandonment	$ 20,000	$ 35,000
Total Cost	$ 330,000	$ 499,000

Table 5. Cost Estimate for Alternative 3 - DPE
Kahn Petroleum, Sunol, California

	Lower Estimate	Upper Estimate
Duration	2 years	3 years
Install DPE System		
Design System	$ 8,000	$ 15,000
Procure/Rent Materials	$ 45,000	$ 65,000
Permitting	$ 12,000	$ 20,000
Install DPE Wells	$ 15,000	$ 20,000
Pilot Testing	$ 15,000	$ 25,000
Project Management and Reporting	$ 20,000	$ 25,000
Subtotal	$ 115,000	$ 170,000
Operation of DPE System		
O&M Labor, Utilities, Sampling, Analysis, Reporting, Expenses ($8,000/mo)	$ 192,000	$ 288,000
Monitoring and Reporting		
Quarterly GW Gauging, Sampling, Analysis, Reporting, Expenses (16 sampling points, $8,000/qtr)	$ 64,000	$ 96,000
DPE System Decommissioning and Well Abandonment	$ 50,000	$ 75,000
Total Cost	$ 536,000	$ 799,000

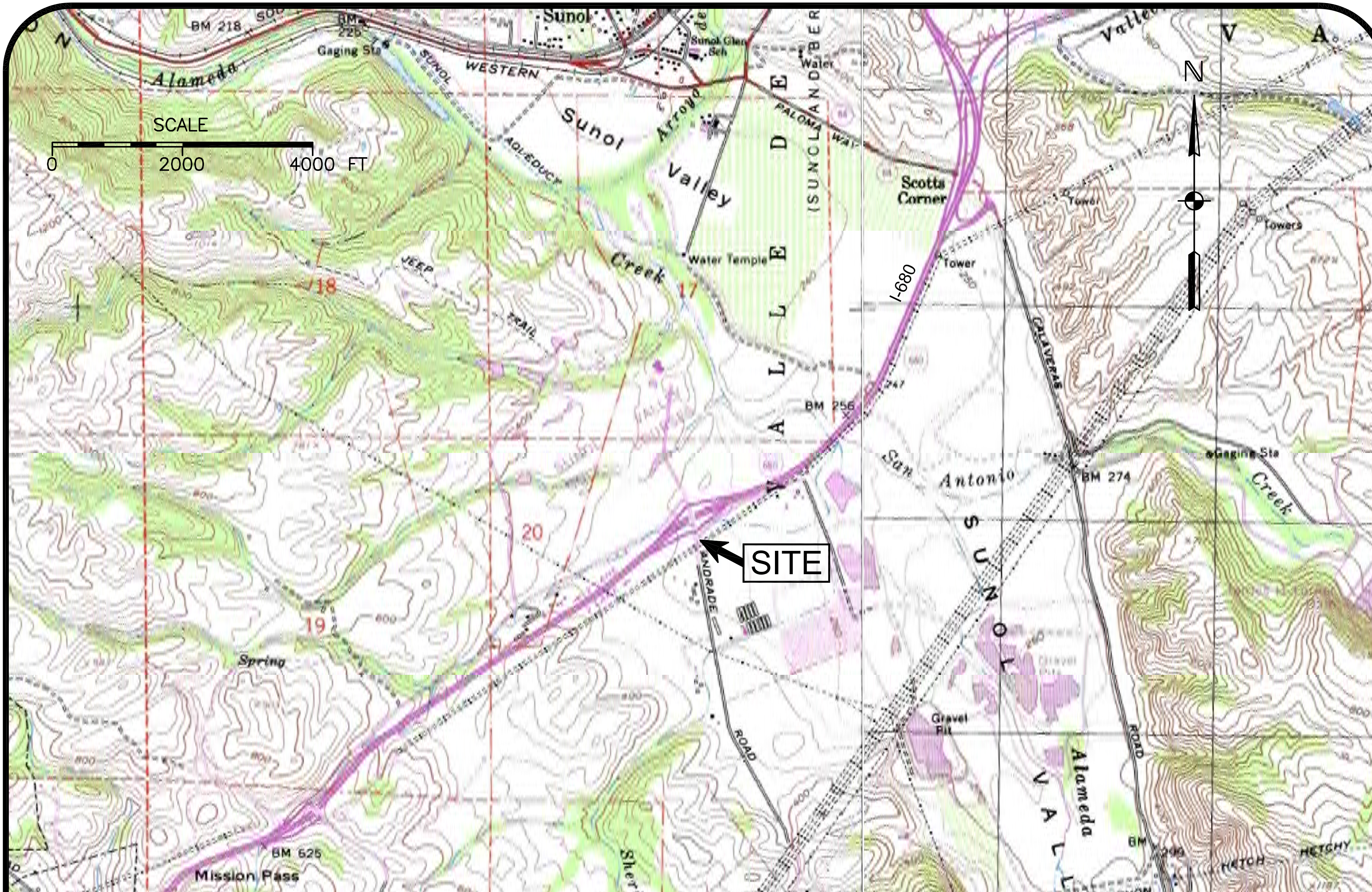
Table 6. Cost Estimate for Alternative 4 - MNA
Kahn Petroleum, Sunol, California

	Lower Estimate	Upper Estimate
Duration	4 years	7 years
Monitoring and Reporting		
Semi-Annual GW Gauging, Sampling, Analysis, Reporting, Expenses (16 sampling points, $16,000/yr)	$ 64,000	$ 112,000
Well Abandonment	$ 15,000	$ 25,000
Total Cost	$ 79,000	$ 137,000

Table 7. Evaluation of Remedial Alternatives
Khan Petroleum, Sunol, California

Evaluation Criteria	Alt 1 Air Sparge Soil Vapor Extraction	Alt 2 Insitu Chemical Oxidation	Alt 3 Dual Phase Extraction	Alt 4 Monitored Natural Attenuation
1. Description of Alternative	SVE used to extract hydrocarbons from soil and soil vapor, AS used to assist SVE and promote insitu bioremediation	Ozone sparging will be used to oxidize residual hydrocarbons insitu	DVE will be used to extract hydrocarbons from soil, soil vapor and groundwater	MNA will monitor the degradation of hydrocarbons by native microbes
2. Level of Protection of Human Health, the Environment and Beneficial Uses of Water	All 4 alternatives are equal for this criterion	All 4 alternatives are equal for this criterion	All 4 alternatives are equal for this criterion	All 4 alternatives are equal for this criterion
3. Reduction of Hydrocarbon Mass	Good for reduction of mass in soil and soil vapor, poor for reduction of mass in groundwater	Very good for reduction in groundwater mass, fair for soil and soil vapor	Good for reduction of mass in soil, soil vapor and groundwater.	Good for reduction of mass in soil, soil vapor and groundwater.
4. Ease of Implementation and Operation	Rank = 3 Moderately difficult to implement	Rank = 2 Moderately difficult to implement	Rank = 4 Very difficult to implement due to permitting treated effluent discharge (NPDES or WDRs)	Rank = 1 Easy to implement
5. Cost - Effectiveness	Rank = 3 $470,000 to $700,000	Rank = 2 $330,000 to $500,000	Rank = 4 $536,000 to $800,000	Rank = 1 $79,000 to $137,000
6. Compliance with Regulatory Guidelines	Can be implemented within regulatory guidelines	Can be implemented within regulatory guidelines	Can be implemented within regulatory guidelines	Can be implemented within regulatory guidelines
7. Short-term Effectiveness	Rank = 3 This alternative would address soil contamination quickly, groundwater contamination slowly	Rank = 1 This alternative would address site contamination quickly	Rank = 1 This alternative would address site contamination quickly	Rank = 4 This alternative would address site contamination slowly
8. Long-term Effectiveness	All 4 alternatives are equal for this criterion	All 4 alternatives are equal for this criterion	All 4 alternatives are equal for this criterion	All 4 alternatives are equal for this criterion
9. Impacts to Community and Environment	Rank = 3 disruption during construction and removal, blower noise during operation phase	Rank = 2 disruption during construction and removal, compressor noise during operation phase	Rank = 3 disruption during construction and removal, blower noise during operation phase	Rank = 1 no impact
10. Impacts on Water Conservation	Rank = 1 no impact	Rank = 1 no impact	Rank = 1 no impact, if groundwater is removed and discharged to surface water under WDRs	Rank = 1 no impact

FIGURES



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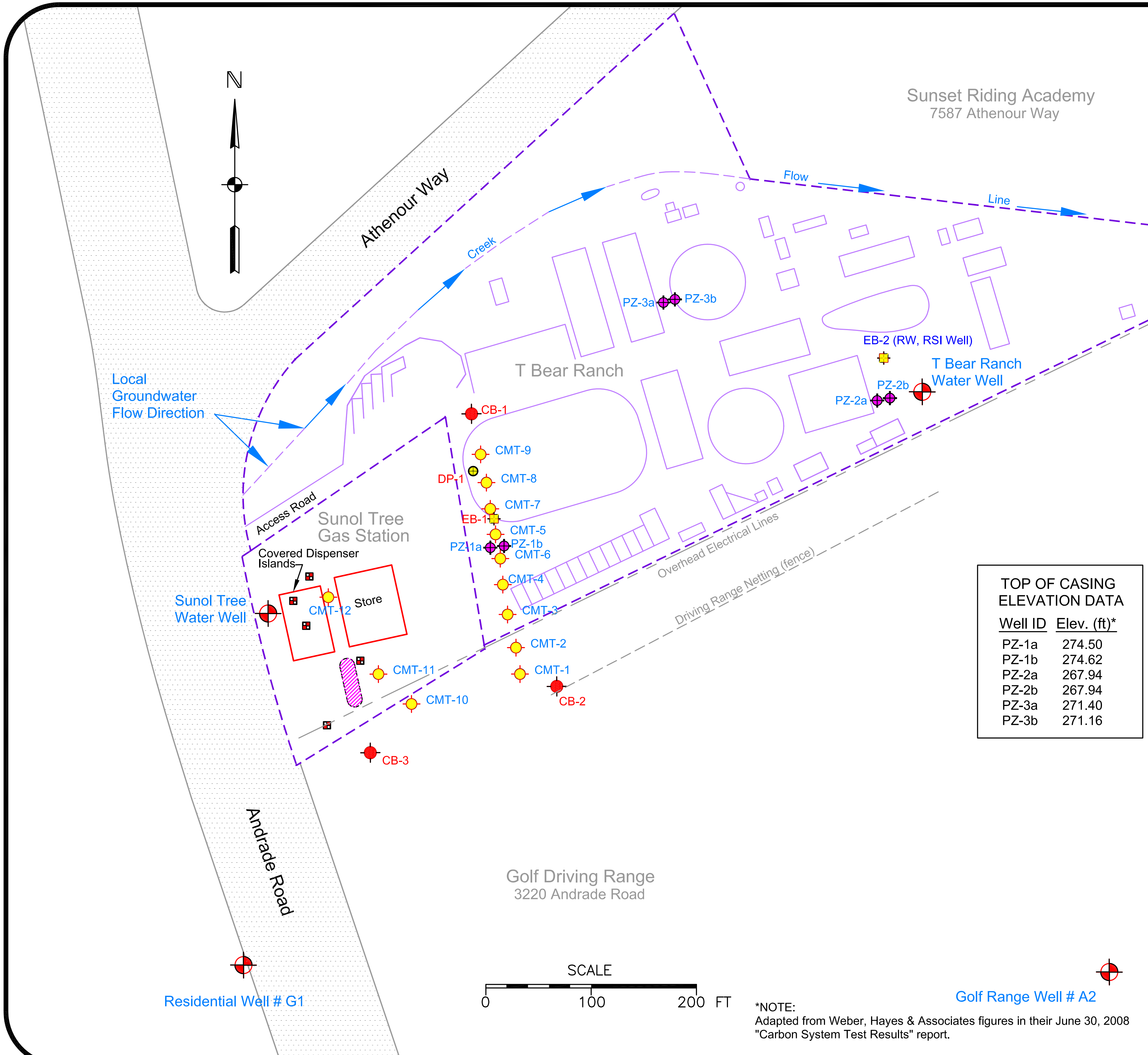
Sunol Tree Gas Station
Site Location Map

3004 Andrade Road
Sunol, CA 94586

Project: 1024	Figure: 1
Date: 12/15/10	
Scale: 1" = 2000 '	



TOP OF CASING
ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

LEGEND

- CB - Calibration Boring by Weber, Hayes & Associates
- CMT - Continuous Multi-Chamber Tubing Well (3 - 0.375" wells in one boring location) by Weber, Hayes & Associates
- EB - Exploratory Boring: Weber, Hayes & Associates
- DP - Driven Probe, July 2004: Weber, Hayes & Associates
- PZ - 1a: PZ - Driven Probe, converted to a shallow Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- PZ - 1b: PZ - Driven Probe, converted to a deep Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- Approximate location of water supply well
- Underground Fuel Storage Tank - source of release
- Previous Boring: Clearwater Consultants, 2002
- 22 MtBE Concentration (ug/L)

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946); PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

Sunol Tree Gas Station Monitoring Well and Soil Boring Locations

3004 Andrade Road
Sunol, CA 94586

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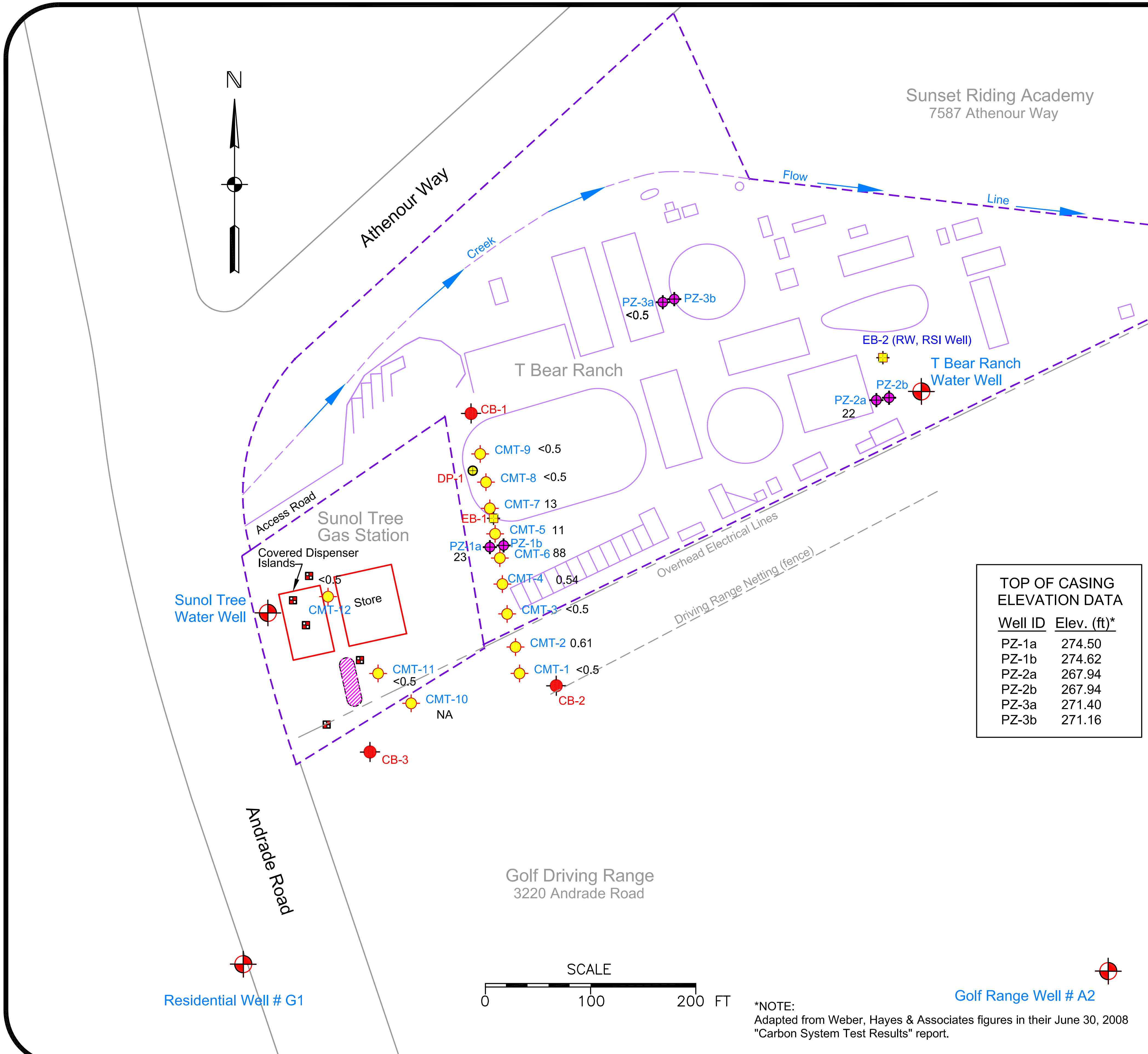
Figure: 2

Project: 1024
Date: 12/15/10
Scale: 1" = 100'



TOP OF CASING ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

LEGEND

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- CMT - Continuous Multi-Chamber Tubing Well (3 - 0.375" wells in one boring location) by Weber, Hayes & Associates
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- PZ - 1b: PZ - Driven Probe, converted to a deep Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- Approximate location of water supply well
- Underground Fuel Storage Tank - source of release
- Previous Boring: Clearwater Consultants, 2002
- 22: MtBE Concentration (ug/L)

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946);
PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

Figure: 3
Project : 1024
Date: 12/15/10
Scale: 1" = 100'

Sunol Tree Gas Station
MtBE Concentrations
Shallow Water-Bearing Zone
3004 Andrade Road
Sunol, CA 94586

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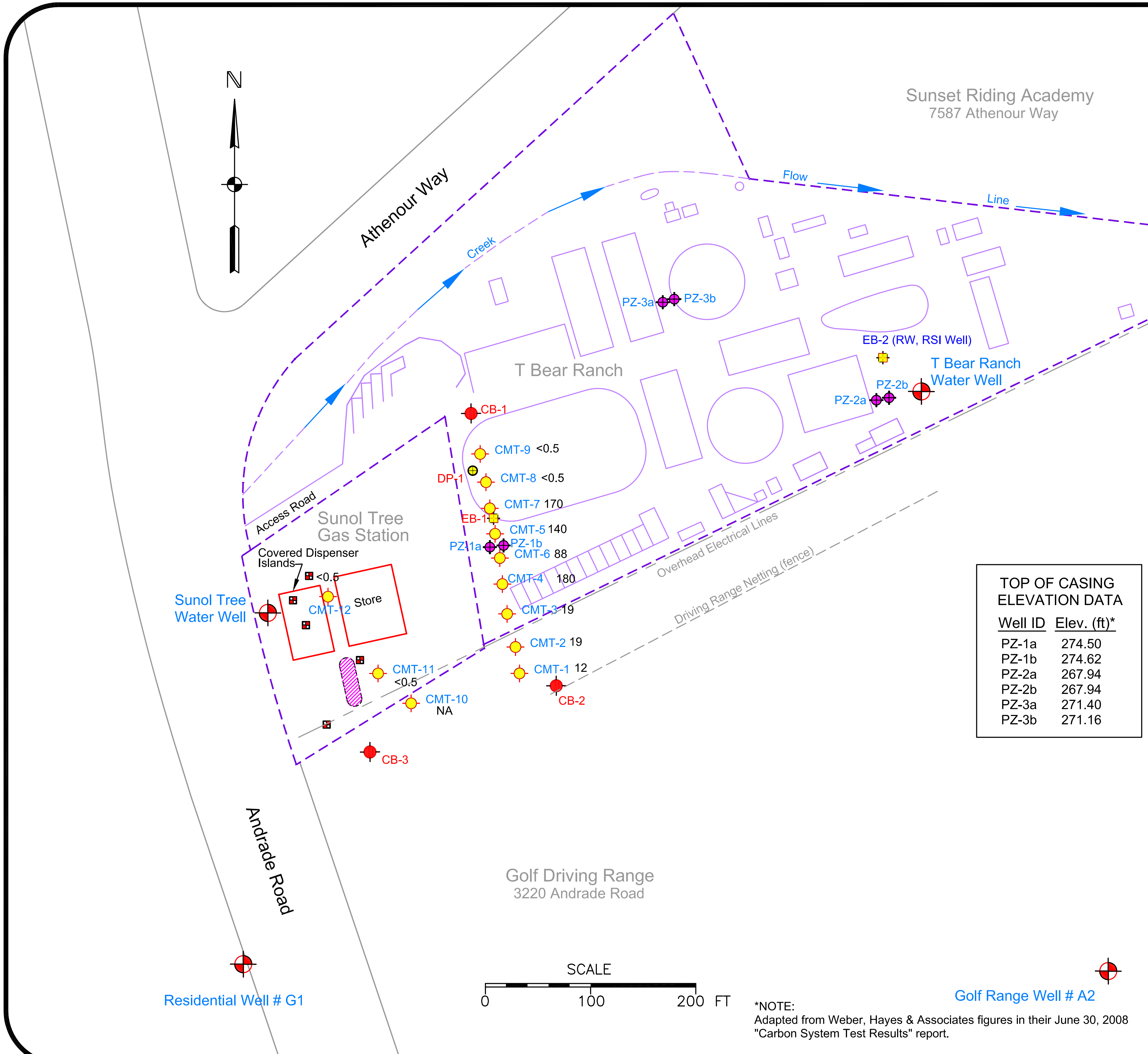

TOP OF CASING ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

LEGEND

- CB - Calibration Boring by Weber, Hayes & Associates
- CMT - Continuous Multi-Chamber Tubing Well (3 - 0.375" wells in one boring location) by Weber, Hayes & Associates
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- PZ - 1a: PZ - Driven Probe, converted to a shallow Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- PZ - 1b: PZ - Driven Probe, converted to a deep Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- Approximate location of water supply well
- Underground Fuel Storage Tank - source of release
- Previous Boring: Clearwater Consultants, 2002
- 22: MtBE Concentration (ug/L)

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946); PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

Sunol Tree Gas Station
MtBE Concentrations
Intermediate Water-Bearing Zone

3004 Andrade Road
Sunol, CA 94586

Figure: 4
Project : 1024
Date: 12/15/10
Scale: 1" = 100'

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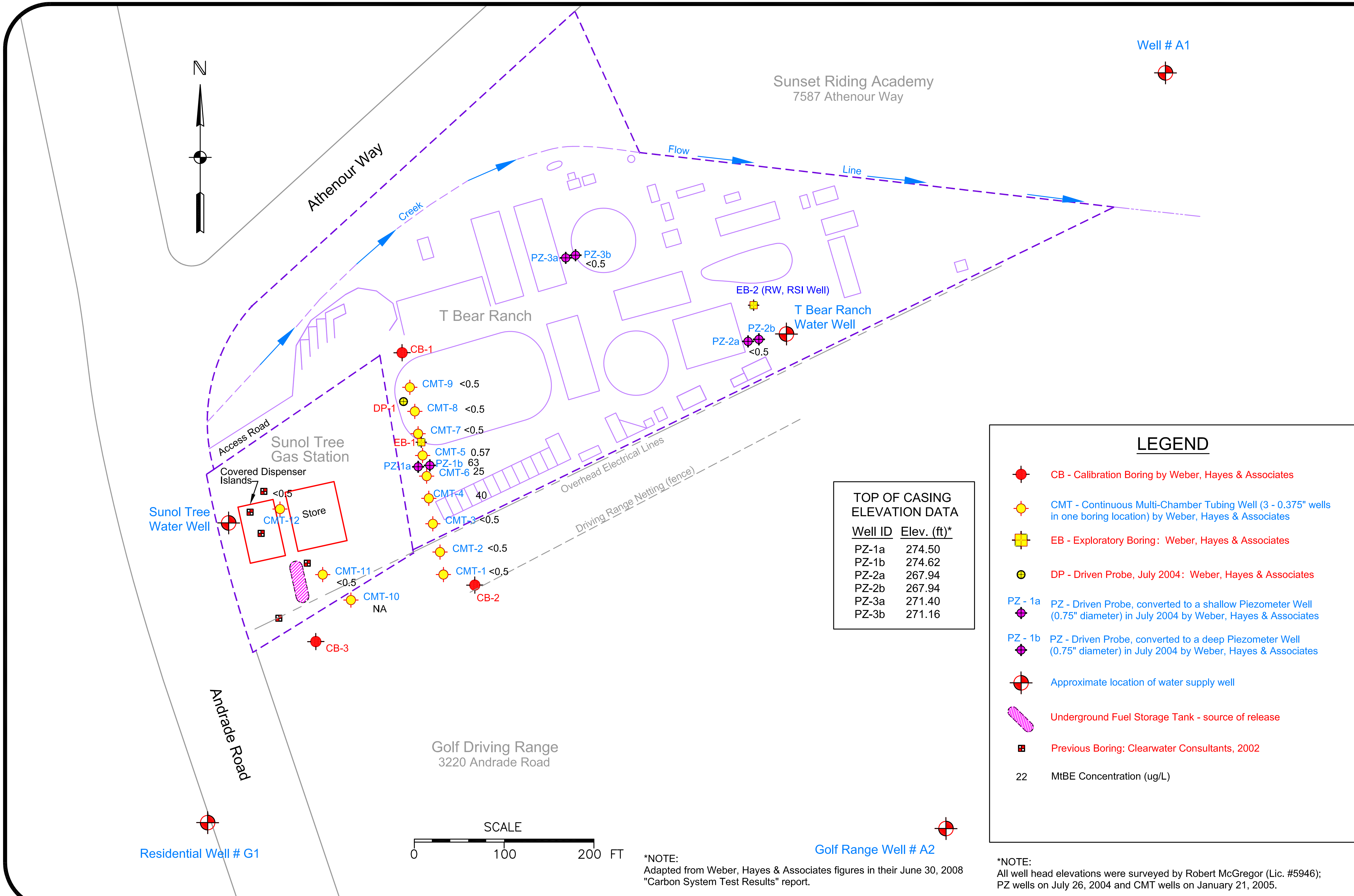

TOP OF CASING ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946); PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

Sunol Tree Gas Station
MtBE Concentrations
Deep Water-Bearing Zone
3004 Andrade Road
Sunol, CA 94586

Project : 1024
Date: 12/15/10
Scale: 1" = 100'
Figure: 5

Cook Environmental Services, Inc.
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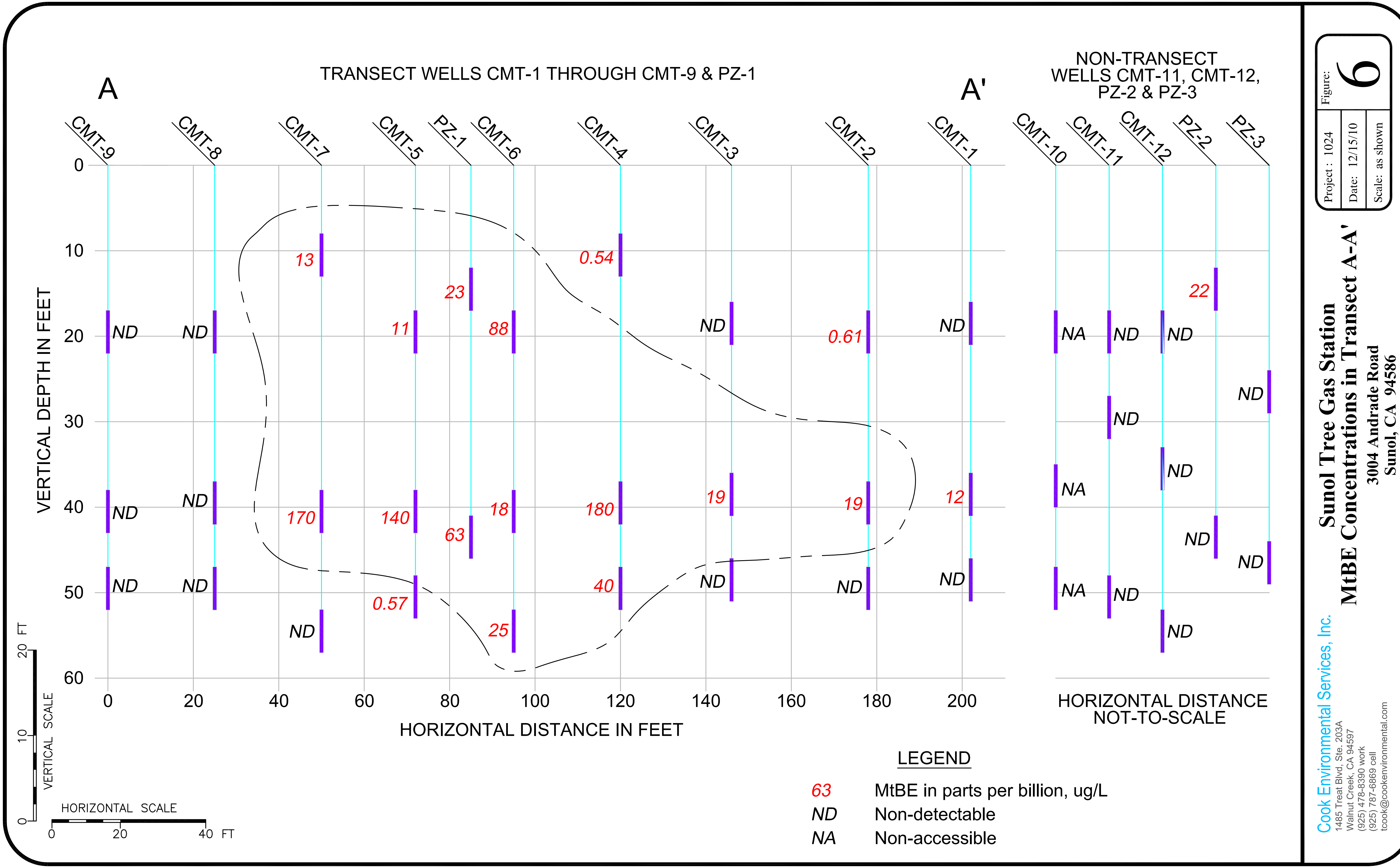
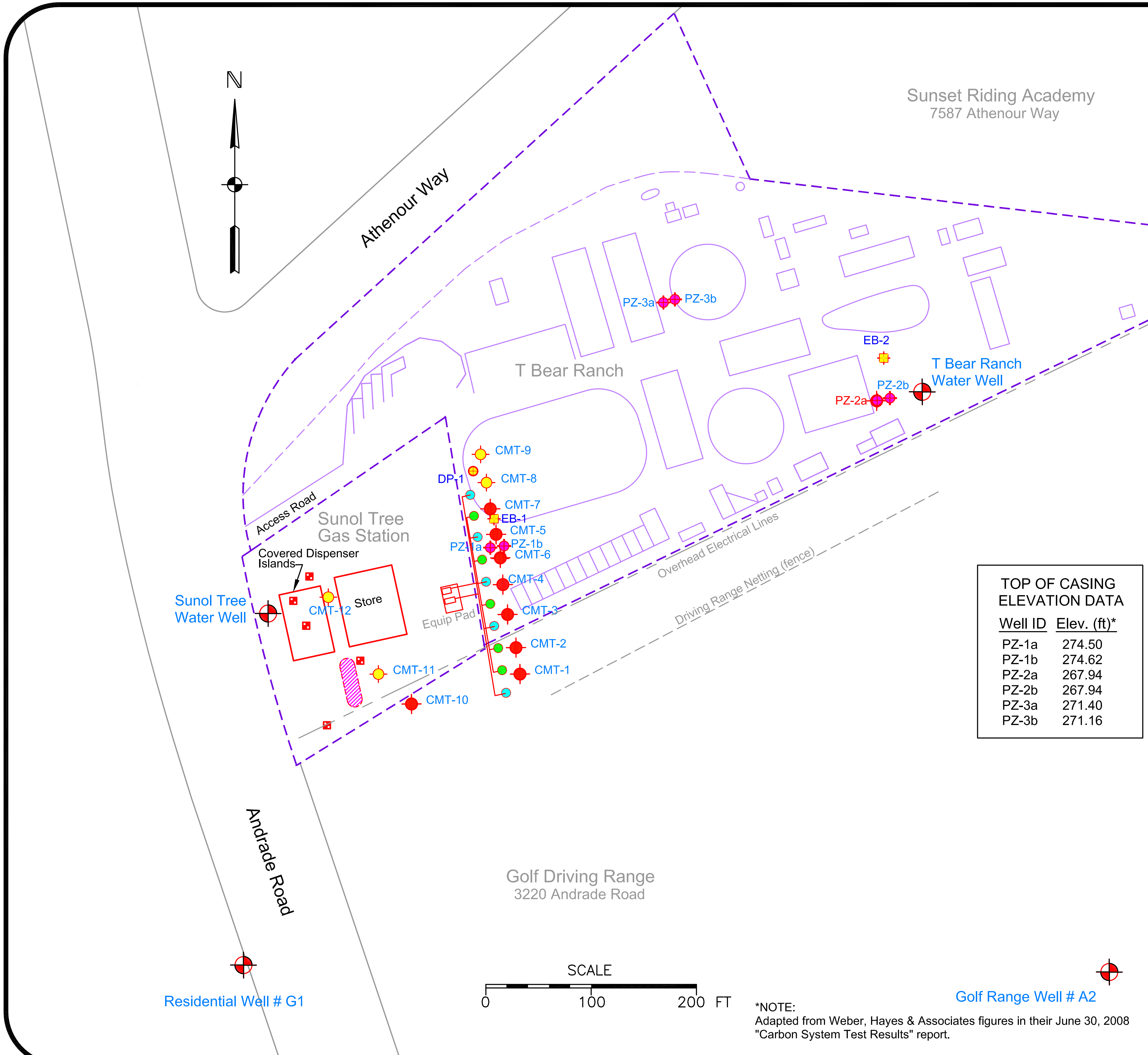

TRANSECT WELLS CMT-1 THROUGH CMT-9 & PZ-1
A
A'
NON-TRANSECT WELLS CMT-11, CMT-12, PZ-2 & PZ-3
CMT-9
CMT-8
CMT-7
CMT-5
PZ-1
CMT-6
CMT-4
CMT-3
CMT-2
CMT-1
CMT-10
CMT-11
CMT-12
PZ-2
PZ-3
VERTICAL DEPTH IN FEET
0
10
20
30
40
50
60
0
20
40
60
80
100
120
140
160
180
200
HORIZONTAL DISTANCE IN FEET
HORIZONTAL DISTANCE NOT-TO-SCALE
13
0.54
23
22
ND
11
88
0.61
NA
170
140
63
18
180
19
12
0.57
40
25
VERTICAL SCALE
20 FT
10
0
HORIZONTAL SCALE
0
20
40 FT
LEGEND
63 MtBE in parts per billion, ug/L
ND Non-detectable
NA Non-accessible
Figure: 6
Project : 1024
Date: 12/15/10
Scale: as shown
Sunol Tree Gas Station
MtBE Concentrations in Transect A-A'
3004 Andrade Road
Sunol, CA 94586
Cook Environmental Services, Inc.
1485 Treat Blvd, Ste. 203A
Walnut Creek, CA 94597
(925) 478-8390 work
(925) 787-6869 cell
tcook@cookenvironmental.com



TOP OF CASING ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

LEGEND

- CB - Calibration Boring by Weber, Hayes & Associates
- CMT - Continuous Multi-Chamber Tubing Well (3 - 0.375" wells in one boring location) by Weber, Hayes & Associates
- EB - Exploratory Boring: Weber, Hayes & Associates
- PZ - 1a — PZ - Driven Probe, converted to a shallow Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- PZ - 1b — PZ - Driven Probe, converted to a deep Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- Approximate location of water supply well
- Underground Fuel Storage Tank - source of release
- Previous Boring: Clearwater Consultants, 2002
- Monitoring Well with Significant MtBE Concentration
- Planned Air Sparge Well
- Planned Soil Vapor Extraction Well

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946); PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

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Walnut Creek, CA 94597
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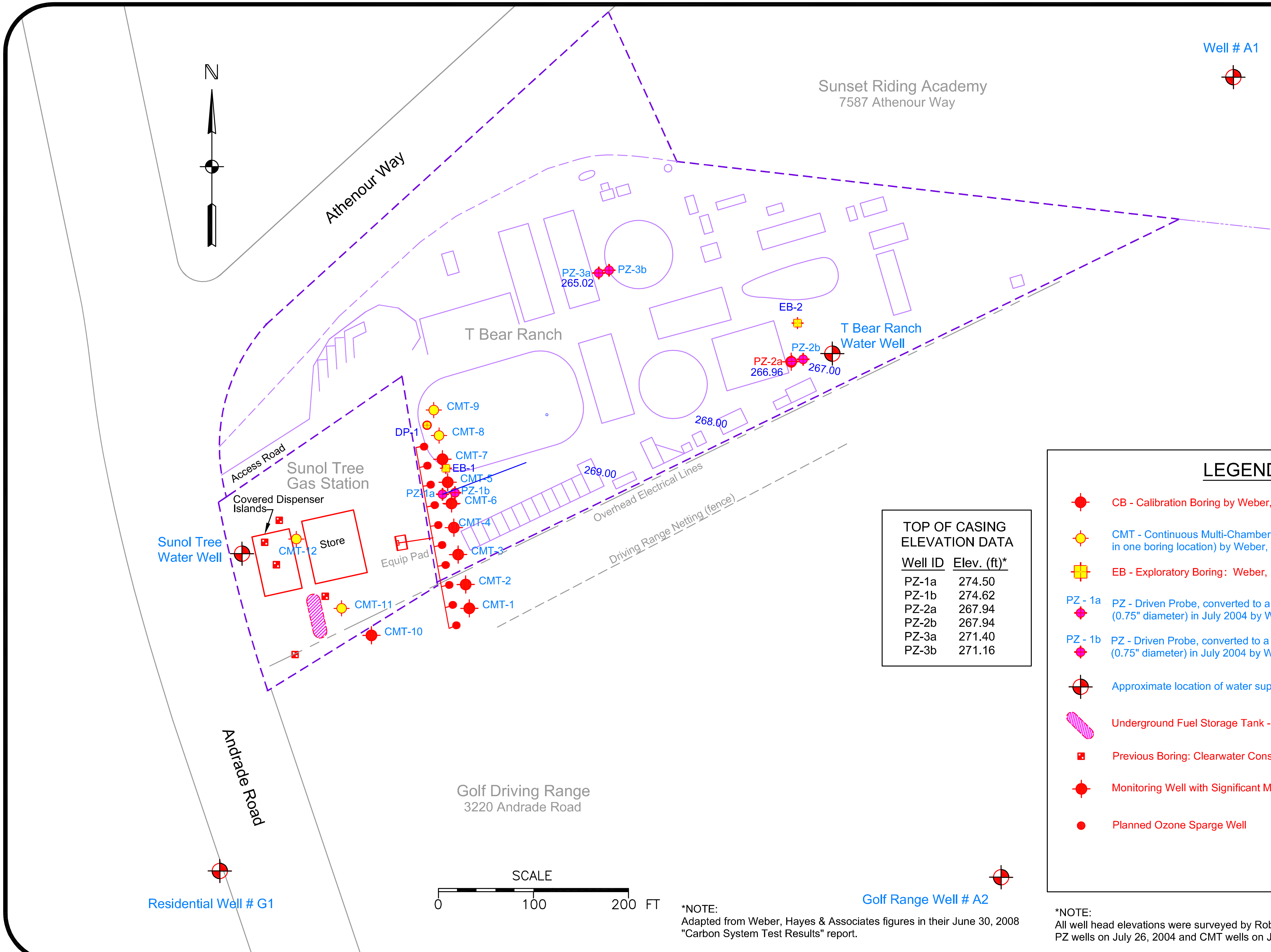
Sunol Tree Gas Station
Alternative 1 - AS/SVE System Layout
3004 Andrade Road
Sunol, CA 94586

Project : 1024
Date: 12/15/10
Scale: 1" = 100'
Figure: 7



TOP OF CASING ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

LEGEND

- CB - Calibration Boring by Weber, Hayes & Associates
- CMT - Continuous Multi-Chamber Tubing Well (3 - 0.375" wells in one boring location) by Weber, Hayes & Associates
- EB - Exploratory Boring: Weber, Hayes & Associates
- PZ - 1a: PZ - Driven Probe, converted to a shallow Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- PZ - 1b: PZ - Driven Probe, converted to a deep Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- Approximate location of water supply well
- Underground Fuel Storage Tank - source of release
- Previous Boring: Clearwater Consultants, 2002
- Monitoring Well with Significant MtBE Concentration
- Planned Ozone Sparge Well

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946); PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

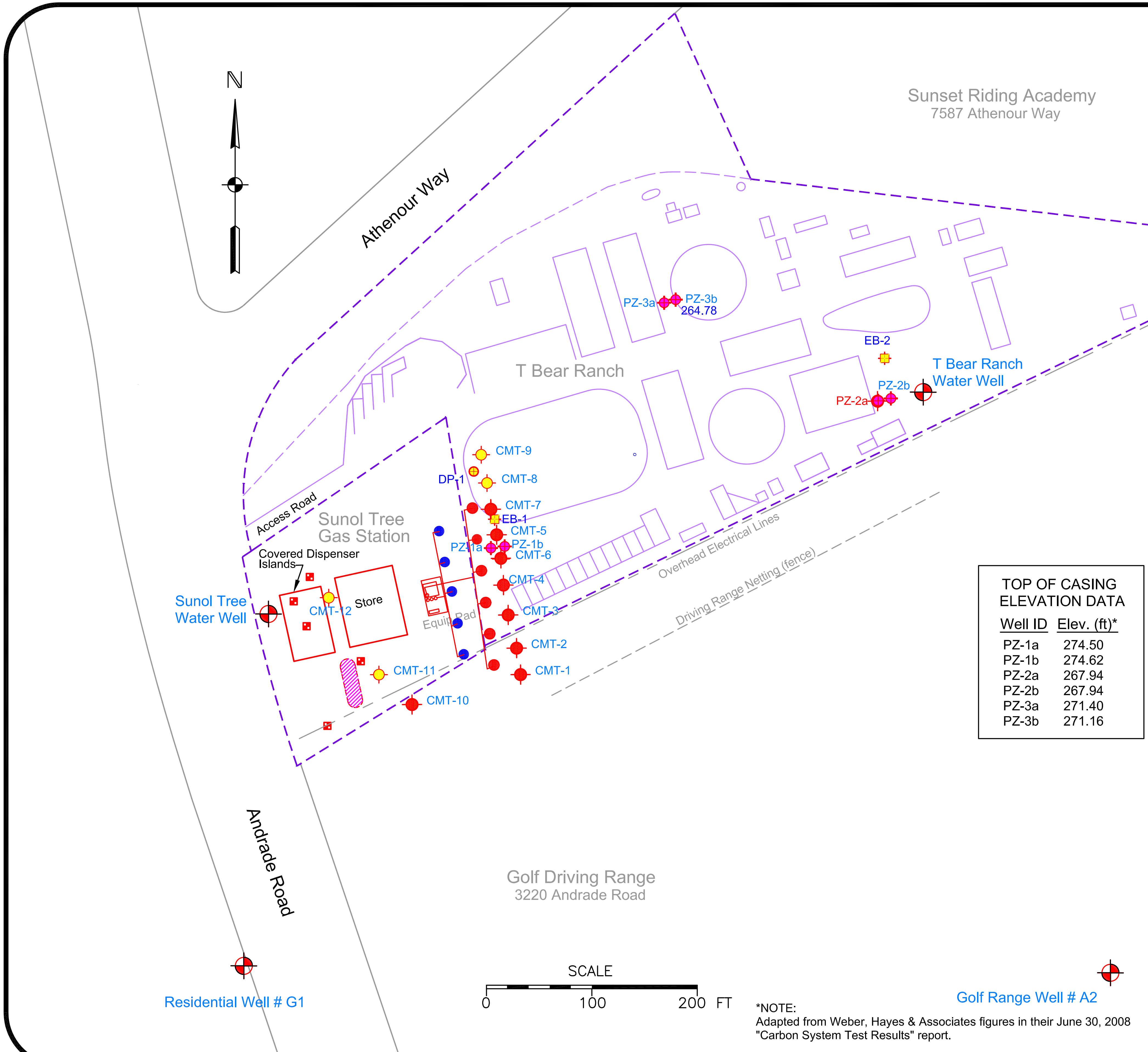
Sunol Tree Gas Station
Alternative 2 - Ozone Sparger Layout

3004 Andrade Road
Sunol, CA 94586

Cook Environmental Services, Inc.
1485 Treat Blvd, Ste. 203A
Walnut Creek, CA 94597
(925) 478-8390 work
(925) 787-6869 cell
tcook@cookenvironmental.com

Figure: 8

Project: 1024
Date: 12/15/10
Scale: 1" = 100'



TOP OF CASING ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

LEGEND

- CB - Calibration Boring by Weber, Hayes & Associates
- CMT - Continuous Multi-Chamber Tubing Well (3 - 0.375" wells in one boring location) by Weber, Hayes & Associates
- EB - Exploratory Boring: Weber, Hayes & Associates
- PZ - 1a: PZ - Driven Probe, converted to a shallow Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- PZ - 1b: PZ - Driven Probe, converted to a deep Piezometer Well (0.75" diameter) in July 2004 by Weber, Hayes & Associates
- Approximate location of water supply well
- Underground Fuel Storage Tank - source of release
- Previous Boring: Clearwater Consultants, 2002
- Monitoring Well with Significant MtBE Concentration
- Planned Dual Phase Extraction Well
- Planned Injection Well

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946); PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

Sunol Tree Gas Station
Alternative 3 - DPE System Layout
3004 Andrade Road
Sunol, CA 94586

Figure: 9
Project : 1024
Date: 12/15/10
Scale: 1" = 100'

Cook Environmental Services, Inc.
1485 Treat Blvd, Ste. 203A
Walnut Creek, CA 94597
(925) 478-8390 work
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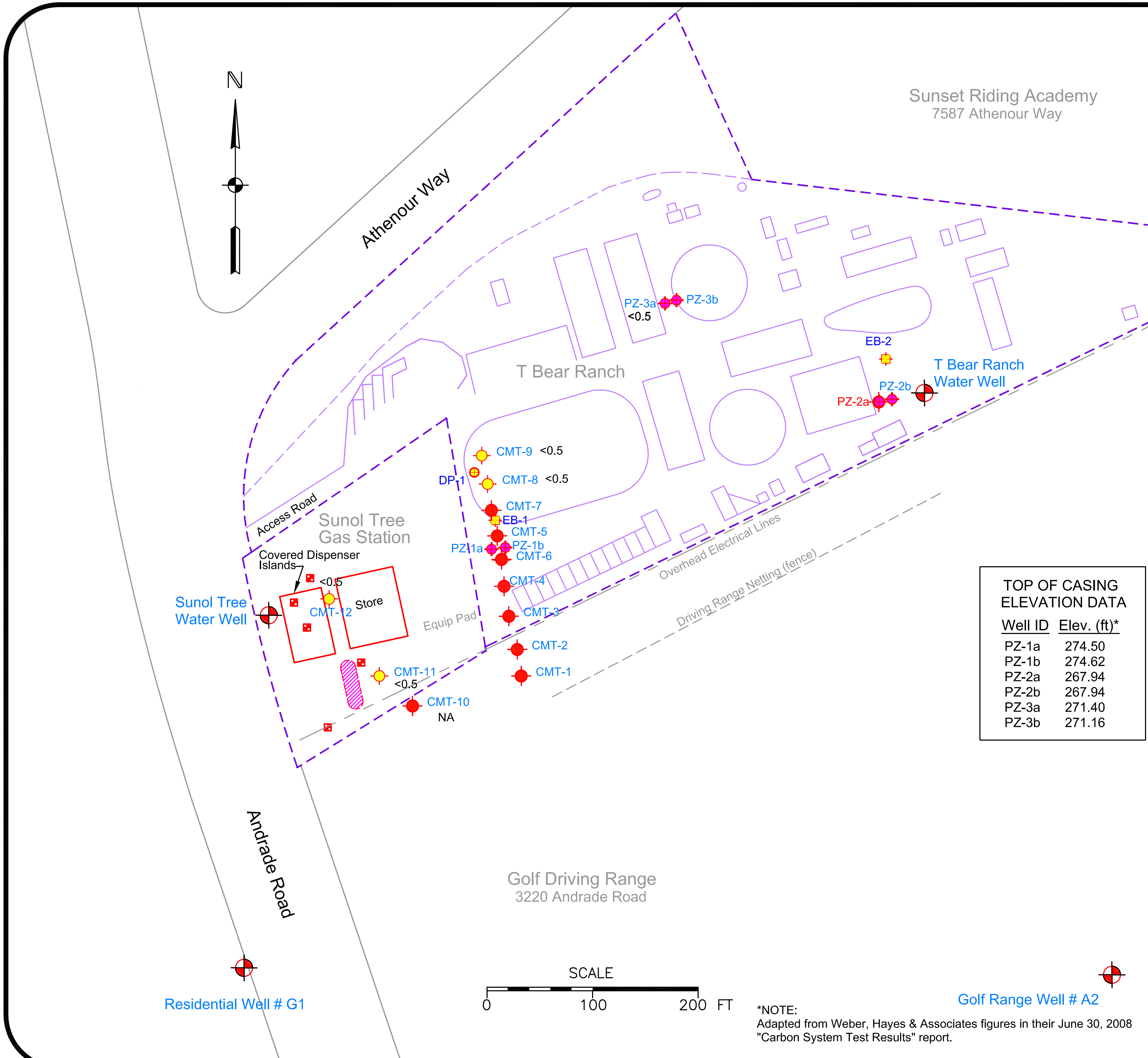
tcook@cookenvironmental.com



TOP OF CASING ELEVATION DATA

Well ID	Elev. (ft)*
PZ-1a	274.50
PZ-1b	274.62
PZ-2a	267.94
PZ-2b	267.94
PZ-3a	271.40
PZ-3b	271.16

*NOTE:
Adapted from Weber, Hayes & Associates figures in their June 30, 2008 "Carbon System Test Results" report.

*NOTE:
All well head elevations were surveyed by Robert McGregor (Lic. #5946); PZ wells on July 26, 2004 and CMT wells on January 21, 2005.

Figure: 10

Project : 1024
Date: 12/15/10
Scale: 1" = 100'

Sunol Tree Gas Station
Alternative 4 - MNA Wells
3004 Andrade Road
Sunol, CA 94586

Cook Environmental Services, Inc.
1485 Treat Blvd, Ste. 203A
Walnut Creek, CA 94597
(925) 478-8390 work
(925) 787-6869 cell
tcook@cookenvironmental.com

APPENDIX A
ACEH Letter dated July 15, 2010

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
ALEX BRISCOE, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

July 15, 2010

Mr. Murray Kelsoe
Sunol Tree Gas
C/o Jeffery Lawson
25 Metro Drive, #600
San Jose, CA 95110

Mr. Hedayat Fedhai
Khan Petroleum
3004 Andrade Road
Sunol, CA 94586

Mr. Obaid Abdullah
Khan Petroleum
5500 Gold Creek Drive
Castro Valley, CA 94552

Subject: Fuel Leak Case No. RO0002448 and Geotracker Global ID T0600114064, Sunol Tree Gas, 3004 Andrade Road, Sunol, CA 94586 – Notice to Comply

Dear Mr. Kelsoe, Mr. Fedhai, and Mr. Abdullah:

Alameda County Environmental Health (ACEH) staff has reviewed the fuel leak case file for the subject site including the most recent report entitled, "*Quarterly Groundwater Monitoring Report, Second Quarter 2010*," dated May 19, 2010. The Monitoring Report presents results from sampling of the on-site and off-site monitoring wells on April 19 and 23, 2010. In correspondence dated July 28, 2009 and March 18, 2010, ACEH requested that you sample the existing monitoring wells and conduct quarterly sampling of the well head carbon treatment system at the T Bear water supply well in order to assure that water quality is maintained for the T Bear water supply well. We also requested that you submit a report presenting a summary of the sampling methods and results for the T Bear water supply well from 2008 to the present.

The May 19, 2010 Monitoring Report did not include discussion of the T Bear water supply well sampling results or description of maintenance of the treatment system for the T Bear water supply well. As described in previous ACEH correspondence dated October 21, 2003, the responsible parties for your site are responsible for installation, operation, and system evaluation and reporting for the well head treatment system on the T Bear Ranch water supply well. Due to the missing information regarding the T Bear water supply well, your site is out of compliance with directives from this agency. In order for your site to return to compliance, we request that you submit a report presenting a summary of the sampling methods and results from 2008 to the present along with a log of the maintenance and operation of the wellhead treatment system for the T Bear water supply well **no later than September 8, 2010**.

Our previous directive letter dated March 18, 2010 requested that you sample the existing wells and present the results in a groundwater monitoring report. Thank you for completing this portion of the scope of work. Based on the groundwater monitoring results, the report was to include recommendations for future actions at the site, which may include additional investigation or corrective action. The May 19, 2010 Monitoring Report concluded that the MTBE plume is fairly defined and did not recommend additional site characterization. The only recommendation in the Monitoring Report was to reduce the frequency of groundwater monitoring.

The use of the T Bear Ranch water supply well as a pump and treat system is not an acceptable remedial strategy for the site. We request that you prepare a Draft Corrective Action Plan that screens remedial technologies and evaluates viable remedial alternatives for the site. Please see technical comment 1 below regarding the scope of the Corrective Action Plan.

We request that you address the technical comments below, perform the requested work, and send us the reports requested below.

TECHNICAL COMMENTS

1. **Corrective Action Plan.** We request that you prepare a Draft Corrective Action Plan (Draft CAP) that meets the provisions of section 2725 of the UST regulations (CCR, Title 23, Chapter 16, section 2600, et seq.) and includes the following minimum information:

   - Proposed cleanup goals and the basis for cleanup goals.
   - Summary of site characterization data.
   - Receptor information including likely future land use scenarios, adjacent land use and sensitive receptors, and potential groundwater receptors.
   - Evaluation of a minimum of three active remedial alternatives including discussion of feasibility, cost effectiveness, estimated time to reach cleanup goals, and limitations for each remedial alternative.
   - Detailed description of proposed remediation including confirmation sampling and monitoring during implementation.
   - Post-remediation monitoring.
   - Schedule for implementation of cleanup.

   Public participation is a requirement for the Corrective Action Plan process. Therefore, we request that you submit a Draft CAP for ACEH review. Upon ACEH approval of a Draft CAP, ACEH will notify potentially affected members of the public who live or own property in the surrounding area of the proposed remediation described in the Draft CAP. Public comments on the proposed remediation will be accepted for a 30-day period.

2. **Groundwater Monitoring.** The May 19, 2010 Groundwater Monitoring Report indicates that the next schedule sampling event will occur in October 2010. The proposed reduced groundwater monitoring schedule proposed in the May 19, 2001 Groundwater Monitoring Report is acceptable for the October 2010 sampling event. The groundwater monitoring schedule is to be reviewed and modified as appropriate based upon the Corrective Action Plan requested below.

TECHNICAL REPORT REQUEST

Please submit technical reports to Alameda County Environmental Health (Attention: Jerry Wickham), according to the following schedule:

- **September 8, 2010** – Summary Report of Sampling Methods and Results and Well Head Treatment for T Bear Water Supply Well
- **October 27, 2010** – Draft Corrective Action Plan
- **November 23, 2010** – Third Quarter 2010 Groundwater Monitoring Report

If you have any questions, please call me at (510) 567-6791 or send me an electronic mail message at jerry.wickham@acgov.org. Online case files are available for review at the following website: http://www.acgov.org/aceh/index.htm.

Sincerely,

Jerry Wickham, California PG 3766, CEG 1177, and CHG 297
Senior Hazardous Materials Specialist

Attachment: Responsible Party(ies) Legal Requirements/Obligations

Enclosure: ACEH Electronic Report Upload (ftp) Instructions

cc: Cheryl Dizon (QIC 8021), Zone 7 Water Agency, 100 North Canyons Pkwy, Livermore, CA 94551 (*Sent via E-mail to: cdizon@zone7water.com)*

Jennifer Rice, Law Offices of Jennifer Rice, 2175 North California Blvd., Suite 575, Walnut Creek, CA 94596,

Tim Cook, Cook Environmental Services, Inc., 1485 Treat Blvd., Suite 203A, Walnut Creek, CA 94597 (*Sent via E-mail to: tcook@cookenvironmental.com*)

Roy Tovani & Helen Hayes, P.O. Box 333, Sunol, CA 94586

Jeffery Lawson, Silicon Valley Law Group, 152 North Third Street, Suite 900, San Jose, CA 95112

Donna Drogos, ACEH (*Sent via E-mail to: donna.drogos@acgov.org*)
Jerry Wickham, ACEH
Geotracker, File

Attachment 1

Responsible Party(ies) Legal Requirements/Obligations

REPORT REQUESTS

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (LOP and SLIC) require submission of reports in electronic form. The electronic copy replaces paper copies and is expected to be used for all public information requests, regulatory review, and compliance/enforcement activities. Instructions for submission of electronic documents to the Alameda County Environmental Cleanup Oversight Program FTP site are provided on the attached "Electronic Report Upload Instructions." Submission of reports to the Alameda County FTP site is an addition to existing requirements for electronic submittal of information to the State Water Resources Control Board (SWRCB) GeoTracker website. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for all groundwater cleanup programs. For several years, responsible parties for cleanup of leaks from underground storage tanks (USTs) have been required to submit groundwater analytical data, surveyed locations of monitoring wells, and other data to the GeoTracker database over the Internet. Beginning July 1, 2005, these same reporting requirements were added to Spills, Leaks, Investigations, and Cleanup (SLIC) sites. Beginning July 1, 2005, electronic submittal of a complete copy of all reports for all sites is required in GeoTracker (in PDF format). Please visit the SWRCB website for more information on these requirements (http://www.swrcb.ca.gov/ust/electronic_submittal/report_rqmts.shtml.

PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 6835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, later reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

Alameda County Environmental Cleanup Oversight Programs (LOP and SLIC)	**ISSUE DATE:** July 5, 2005
	REVISION DATE: July 8, 2010
	PREVIOUS REVISIONS: December 16, 2005, October 31, 2005
SECTION: Miscellaneous Administrative Topics & Procedures	**SUBJECT:** Electronic Report Upload (ftp) Instructions

The Alameda County Environmental Cleanup Oversight Programs (LOP and SLIC) require submission of all reports in electronic form to the county's ftp site. Paper copies of reports will no longer be accepted. The electronic copy replaces the paper copy and will be used for all public information requests, regulatory review, and compliance/enforcement activities.

REQUIREMENTS

- Entire report including cover letter must be submitted to the ftp site as **a single portable document format (PDF) with no password protection**. (Please do not submit reports as attachments to electronic mail.)
- It is **preferable** that reports be converted to PDF format from their original format, (e.g., Microsoft Word) rather than scanned.
- Signature pages and perjury statements **must** be included and have either original or electronic signature.
- **Do not password protect the document**. Once indexed and inserted into the correct electronic case file, the document will be secured in compliance with the County's current security standards and a password. **Documents with password protection will not be accepted**.
- Each page in the PDF document should be rotated in the direction that will make it easiest to read on a computer monitor.
- Reports must be named and saved using the following naming convention:

  RO#_Report Name_Year-Month-Date (e.g., RO#5555_WorkPlan_2005-06-14)

Additional Recommendations

- A separate copy of the tables in the document should be submitted by e-mail to your Caseworker in **Excel** format. These are for use by assigned Caseworker only.

Submission Instructions

1) Obtain User Name and Password:
   a) Contact the Alameda County Environmental Health Department to obtain a User Name and Password to upload files to the ftp site.
      i) Send an e-mail to dehloptoxic@acgov.org

         Or

      ii) Send a fax on company letterhead to (510) 337-9335, to the attention of Teena Le Khan.
   b) In the subject line of your request, be sure to include **"ftp PASSWORD REQUEST"** and in the body of your request, include the **Contact Information, Site Addresses**, and the **Case Numbers (RO# available in Geotracker) you will be posting for**.

2) Upload Files to the ftp Site
   a) Using Internet Explorer (IE4+), go to ftp://alcoftp1.acgov.org
      (i) Note: Netscape and Firefox browsers will not open the FTP site.
   b) Click on Page on upper right side of browser, and then scroll down to Open FTP Site in Windows Explorer.
   c) Enter your User Name and Password. (Note: Both are Case Sensitive.)
   d) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
   e) With both "My Computer" and the ftp site open in separate windows, drag and drop the file(s) from "My Computer" to the ftp window.

3) Send E-mail Notifications to the Environmental Cleanup Oversight Programs
   a) Send email to dehloptoxic@acgov.org notify us that you have placed a report on our ftp site.
   b) Copy your Caseworker on the e-mail. Your Caseworker's e-mail address is the entire first name then a period and entire last name @acgov.org. (e.g., firstname.lastname@acgov.org)
   c) The subject line of the e-mail must start with the RO# followed by **Report Upload**. (e.g., Subject: RO1234 Report Upload) If site is a new case without an RO#, use the street address instead.
   d) If your document meets the above requirements and you follow the submission instructions, you will receive a notification by email indicating that your document was successfully uploaded to the ftp site.