2307 Pacific Ave.
Alameda, CA 94552
Phone: 510-865-9503
Fax: 510-865-1889
E-Mail: xtraoil@sbcglobal.net

# Xtra Oil Company



October 25, 2007

Mr. Steven Plunkett
Alameda County Health Agency
Dept. of Environmental Health
1131 Harbor Bay Pkwy.
Alameda, CA 94502

SUBJECT: REMEDIAL ACTION WORK PLAN CERTIFICATION
County Case # RO 191
Xtra Oil Company
1701 Park Street
Alameda, CA

Dear Mr. Plunkett:

P&D Environmental, Inc. has prepared the following document:

- Remedial Action Work Plan dated October 24, 2007 (document 0058.W2).

I declare under penalty of perjury that the contents and conclusions in the document are true and correct to the best of my knowledge.

Should you have any questions, please do not hesitate to contact me at (510) 865-9503.

Sincerely,

Keith Simas
Operations Supervisor

0058.L18

# P&D ENVIRONMENTAL, INC.

**55 Santa Clara Avenue, Suite 240**
**Oakland, CA 94610**
**(510) 658-6916**


October 24, 2007
Work Plan 0058.W2

Mr. Steven Plunkett
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

SUBJECT: REMEDIAL ACTION WORK PLAN
County Case # RO 191
Xtra Oil Company
1701 Park Street
Alameda, CA

Dear Mr. Plunkett:

P&D Environmental, Inc. (P&D) is pleased to present this work plan for soil and groundwater remeidation at the subject site. This work is proposed in accordance with the results of Alisto Engineering Group's (Alisto) February 2001 Remedial Investigation Report, a directive from the Alameda County Department of Environmental Health (ACDEH) dated August 17, 2001 to implement the recommendations by Alisto, and recommendations set forth in P&D's Subsurface Investigation Report (B3 Through B7) dated March 6, 2007 (document 0058.R2). Soil vapor extraction piping and air sparging points are already present at the site.

The following proposed remedial activities will be performed to augment and operate the existing vapor extraction and air sparging system and are summarized as follows.

- Installation of four additional air sparge points (ASP8 through ASP11), five extraction wells (EW1 through EW5) and two observation wells (OW1 and OW2).
- Installation of a positive displacement blower and an air pollution control device (APCD) for vapor extraction, an air compressor for air sparging, and groundwater extraction pumps and granular activated carbon (GAC) for groundwater extraction and treatment.
- Connection of the remediation equipment to the vapor extraction piping, air sparging points and extraction wells.
- Operation of the vapor extraction system, air sparging point and extraction well remediation system.
- Remediation system and water quality monitoring.

A Site Location Map (Figure 1) and Site Vicinity Map (Figure 2) are attached with this report. The existing soil vapor extraction trench and the seven existing air sparging points at the subject site are shown on Figures 2 and 3. In addition, proposed air sparge wells, ASP 8 through ASP11, proposed observation wells OW1 and OW2 and proposed extraction wells EW1 through EW5 are shown on Figures 2 and 3.

## BACKGROUND

The subject site is presently used as a retail gasoline station. In April 1994, the Xtra Oil Company site was expanded onto the adjacent property at 2329 Buena Vista Avenue. Three gasoline underground storage tanks (USTs) and one diesel UST were removed from the property. The UST volumes and construction details are unknown. The USTs were replaced with two 10,000 gallon and one 7,000 gallon double walled USTs. One UST, which had been used to store heating oil, was removed from 2329 Buena Vista Avenue. At the time of the UST removals in April and May 1994, Alisto Engineering Group (Alisto) personnel collected 12 soil samples from the former UST pit and dispenser island excavations. Petroleum hydrocarbons were detected in the soil at the time of tank removal. According to Alisto's Additional Investigation Report dated December 19, 2001 documentation of the UST removal and associated sample results are provided in Alisto's Tank Closure Report dated July 5, 1994.

Alisto performed a subsurface investigation in November 1994 to assess the nature and extent of petroleum hydrocarbons in soil and groundwater at the site. Soil borings B1, B2 and B3 were drilled onsite to a total depth of 20 feet, and later converted into monitoring wells MW-1, MW-2 and MW-3, respectively.

Laboratory analytical results indicated the presence of petroleum hydrocarbons in the soil from between 7 and 8 feet below grade (fbg) at the locations of wells MW-1 and MW-2. Total Petroleum Hydrocarbons as Gasoline (TPH-G) were detected at concentrations of up to 12,000 milligrams per kilogram (mg/kg), Total Petroleum Hydrocarbons as Diesel (TPH-D) were detected at concentrations of up to 6,700 mg/kg, and benzene was detected at concentrations of up to 70 mg/kg in the soil. According to Alisto's Additional Investigation Report dated December 19, 2001, documentation of the subsurface investigation and associated sample results are provided in Alisto's Preliminary Site Assessment Report dated January 13, 1995.

A quarterly groundwater monitoring and sampling program was initiated by Alisto in November of 1994. The groundwater flow direction has historically ranged from northeasterly to southeasterly. Free product was observed in well MW-2 from the initiation of quarterly monitoring until the July 2000 event with a maximum thickness of 0.21 feet detected in May 1997 and August 1999. From November 1994 to June 2004, the depth to water at the site ranged from 3.51 to 9.12 feet below grade (fbg). TPH-G has been detected in the wells at a maximum concentration of 100,000 micrograms per liter (µg/l) in MW-1 (September 1997), TPH-D at a maximum concentration of 6,700,000 µg/l in MW-2 (free product in May 1997), benzene at a maximum concentration of 22,000 µg/l in MW-1 (November 1995), and MTBE at a maximum concentration of 19,000 µg/l in MW-1 (June 1996).

In June 1996, Alisto performed a review of utility records at the County of Alameda Public Works Agency. A 10-inch diameter sanitary sewer was determined to be located in the center of Park Street at approximately 11 fbg. Due to groundwater depths of less than 11 fbg at the site, Alisto determined that the sanitary sewer trench may act as a preferential pathway for petroleum hydrocarbons migrating from the site toward Park Street. The report did not address site vicinity stratigraphy with respect to utility depths.

Alisto performed an additional subsurface investigation in April 1997. The investigation included the installation of monitoring well MW-4 and the drilling of soil boring SB-1. The soil collected at the location of well MW-4 contained 5,300 mg/kg of TPH-G, 1,100 mg/kg of TPH-D and 15 mg/kg of methyl tertiary-butyl ether (MTBE). Total Organic Carbon (TOC) was detected in the soil at the location of boring SB-1 at a concentration of 830 mg/kg. According to Alisto's Additional Investigation Report dated December 19, 2001, documentation of the utility record review is provided in Alisto's Additional Investigation Report dated June 27, 1997.

In October 1999, Alisto prepared a Corrective Action Plan (CAP) to evaluate alternatives for site remediation and to develop a plan to address impacted soil and groundwater at the site. The CAP included a description of the soil types encountered during previous investigations at the site. Silty to gravelly clays predominate from the ground surface to approximately 8 fbg and are underlain by sandy silt and sandy clay to the total explored depth of 20 fbg. Alisto recommended a remediation plan that included air sparging and vapor extraction followed by thermal treatment of the extracted soil gas. Alisto also recommended performing vapor extraction and air sparging pilot tests to confirm the feasibility of the recommended remedial methods. Details of the plan are presented in Alisto's October 14, 1999 Corrective Action Plan.

On April 5, 2000, Alisto installed air sparging wells ASP-1 through ASP-7 to depths of between 26 and 30 fbg. The air sparging well locations are shown on Figure 2. A soil vapor extraction test was performed on October 12, 2000 using an existing slotted horizontal vapor extraction pipe located at a depth of four feet in a trench at the site. Figure 2 shows that the trench surrounds the UST pit and dispenser islands on the northeast, southeast and southwest. The trench was installed at the time of site reconstruction in 1994. Vacuum pressure changes in monitoring wells MW-1, MW-2, and MW-4 were observed to determine the zone of influence during the test. An air sparging pilot test was performed on October 13, 2000 using wells MW-1 and MW-4 to monitor the influence of air injected air sparging wells on groundwater elevations and hydrocarbon concentrations in soil vapor and groundwater. Alisto concluded from the results of the tests that a combination of air sparging and vapor extraction can be effective in removing petroleum hydrocarbons from the subsurface materials. Documentation of the field activities and sample results are presented in Alisto's Remedial Investigation Report, dated February 8, 2001.

In November 2001, Alisto hand augered offsite borings TW-1, TW-2, and TW-3 to further assess the horizontal extent of petroleum hydrocarbon impact to soil and groundwater in the vicinity of the site. The locations of the borings are shown in Figure 2.

Soil samples were collected at a depth of 7 fbg in each boring. The borings were subsequently converted into temporary groundwater monitoring wells and sampled. No TPH-G, TPH-D, benzene, toluene, ethylbenzene, xylenes, or MTBE were detected in any of the soil samples collected. Only MTBE at a concentration of 7.8 µg/l in TW-2 was detected in the groundwater samples. Based on the results of the soil and groundwater sampling, Alisto concluded that the extent of petroleum hydrocarbon impact is limited to within 80 feet of the property. Documentation of the field activities and sample results are presented in Alisto's Additional Investigation Report, dated December 19, 2001.

Petroleum hydrocarbon subsurface investigation and remediation have historically been performed at the former Exxon station (presently operated as a Valero station) at 1725 Park Street, located approximately 100 feet northeast of the subject site. ERI provided the results of their sensitive receptor and well survey in their Sensitive Receptor Survey Update Report for the Exxon/Valero site at 1725 Park Street, dated August 2, 2002. Eight utility vaults and two catch basins were identified adjacent to the site. For surface water bodies, a tidal canal was identified 1,000 feet away. Within 1,000 feet, three basements were identified upgradient from the site. No wells were located within 2,000 feet and no tunnels or subways were located within 1,000 feet.

P&D submitted to the ACDEH a Subsurface Investigation Work Plan (document 0058.W1) dated September 1, 2006 for investigation of the horizontal extent of petroleum hydrocarbons in soil and groundwater in the vicinity of the subject site. In a letter dated September 22, 2006 titled, "Change In Consultant of Record" Xtra Oil Company identified P&D as the new consultant of record.

On September 8, 2006 Alisto performed quarterly monitoring and sampling of the wells at the subject site. The monitoring and sampling was performed in conjunction with monitoring and sampling by ERI at the 1725 Park Street Exxon/Valero site. Documentation of the monitoring and sampling is provided in Alisto's Third Quarter 2006 Groundwater Monitoring and Sampling Report dated November 3, 2006 (uploaded to GeoTracker on November 27, 2006). The fourth quarterly monitoring and sampling event for 2006 was performed by P&D on November 6, 2006.

Between November 3 and November 9, 2006, soil borings were drilled at five locations designated as B3 through B7 to evaluate stratigraphy and the subsurface distribution of petroleum hydrocarbons in the site vicinity. Documentation of the field activities and sample results are presented in P&D's Subsurface Investigation Report (B3 Through B7) dated March 6, 2007 (document 0058.R2).

In an e-mail request dated October 18, 2007 the ACDEH caseworker Mr. Steven Plunkett requested a work plan for remedial action at the subject site.

SCOPE OF WORK

The following tasks will be performed.

- Permitting for well installation, vapor extraction system operation, and groundwater discharge.
- Regulatory agency, client, subcontractor coordination and health and safety plan preparation.
- Installation oversight of four additional air sparge points, five onsite extraction wells, and two onsite observation wells. One soil sample will be collected at the capillary fringe from each borehole for laboratory analysis.
- Surveying of the well heads vertically and horizontally with respect to the existing monitoring wells and the proposed extraction wells at the subject site.
- Development of the proposed observation and extraction wells.
- Purging and sampling of all of the proposed observation and extraction wells.
- Arrange for soil and groundwater sample analysis for Total Petroleum Hydrocarbons as Diesel (TPH-D), Total Petroleum Hydrocarbons as Bunker Oil (TPH-BO), Total Petroleum Hydrocarbons as Gasoline (TPH-G), benzene, toluene, ethylbenzene and xylenes (BTEX), and fuel oxygenates and lead scavengers.
- Vapor extraction blower, APCD, air compressor, extraction well pump, and GAC installation.
- Remediation system start up and operation.
- Remediation system and groundwater quality monitoring.
- Report preparation documenting well installation, remediation system operation and remediation system and water quality monitoring.

Each of these is discussed below in detail.

Permitting and Health and Safety Plan Preparation

Following ACDEH approval of this work plan, permits will be obtained from the Bay Area Air Quality Management District (BAAQMD) for soil vapor extraction system operation, permits will be obtained from the East Bay Municipal Utility District (EBMUD) for discharge from the extraction wells to the sanitary sewer, permits will be obtained from the Alameda County Public Works Agency (ACPWA) for air sparge point and well installation, permits will be obtained from the City of Alameda Fire Department (COAFD) for APCD temporary make-up fuel propane tank installation, and 72 hour advance notification will be provided to the ACDEH of the scheduled field activities. In addition, a health and safety plan and a traffic control plan will be prepared, the proposed drilling locations will be marked with white paint, and Underground Service Alert will be notified for underground utility location. Existing underground utility maps will also be evaluated for underground utility location prior to the beginning of drilling.

Air Sparge Point Extraction Well and Observation Well Installation Oversight

A total of four onsite air sparge points (ASP8 through ASP11), five extraction wells (EW1 through EW5), and two observation wells (OW1 and OW2) will be installed to augment the existing remediation and monitoring system. The proposed locations are shown on Figures 2 and 3.

The rationale for the location of each of the proposed air sparge points is provided below.

- ASP8: To provide additional onsite air sparging at a location where benzene in groundwater exceeds 1,000 ug/L to the north of the existing horizontal vapor extraction pipe.
- ASP9: To provide additional onsite air sparging at a location where benzene in groundwater exceeds 1,000 ug/L to the south of the existing horizontal vapor extraction pipe.
- ASP10: To provide additional onsite air sparging at a location where benzene in groundwater exceeds 1,000 ug/L to the south of the existing horizontal vapor extraction pipe.
- ASP11: To provide additional onsite air sparging at a location where benzene in groundwater exceeds 1,000 ug/L to the south of the existing horizontal vapor extraction pipe.

The rationale for the location of each of the proposed extraction wells is provided below.

- EW1: To remove petroleum-impacted water at a location where benzene in groundwater exceeds 1,000 ug/L and TPH-D exceeds 10,000 ug/L in groundwater, and to dewater petroleum-impacted subsurface materials to facilitate vapor extraction of the impacted materials.
- EW2: To remove petroleum-impacted water at a location where benzene in groundwater exceeds 1,000 ug/L and to dewater petroleum-impacted subsurface materials to facilitate vapor extraction of the impacted materials.
- EW3: To evaluate the effects of water table drawdown greater than previously evaluated and vapor extraction vacuum, flow, organic vapor concentration, and vacuum radius of influence at a dista To remove petroleum-impacted water at a location where benzene in groundwater exceeds 1,000 ug/L and to dewater petroleum-impacted subsurface materials to facilitate vapor extraction of the impacted materials.
- EW4: To remove petroleum-impacted water at a location where benzene in groundwater exceeds 1,000 ug/L and to dewater petroleum-impacted subsurface materials to facilitate vapor extraction of the impacted materials.
- EW5: To remove petroleum-impacted water at a location where benzene in groundwater exceeds 1,000 ug/L and to dewater petroleum-impacted subsurface materials to facilitate vapor extraction of the impacted materials.

The rationale for the location of each of the proposed observation wells is provided below.

- OW1: To evaluate the effects of air sparging and vapor extraction at a location where water quality presently exceeds ESL values and is peripheral to the center of the plume. Water quality data from the location can be used to evaluate changes in the size of the plume.

- OW2: To evaluate the effects of of air sparging and vapor extraction at a location where water quality presently exceeds ESL values and is peripheral to the center of the plume. Water quality data from the location can be used to evaluate changes in the size of the plume.

The air-sparge points will be installed with 8-inch outside diameter hollow stem augers and the extraction wells and observation wells will be installed with ten-inch or twelve-inch outside diameter hollow stem augers using a truck-mounted hollow stem auger drill rig. The hollow stem augers will be steam cleaned prior to use in each borehole. Soil samples will be collected from the boreholes into brass tubes at a maximum of five foot intervals, at changes in lithology and at any areas of obvious contamination using a California Modified split-spoon sampler lined with 2-inch diameter, 6-inch long stainless steel or brass tubes driven by a 140 pound hammer falling 30 inches. Blow counts will be recorded every six inches. The soil samples will be logged in the field in accordance with standard geologic field techniques and the Unified Soil Classification System. The soil samples will be evaluated in the field with a PID equipped with a 10.6 eV bulb and calibrated with a 100 ppm isobutylene standard.

One soil sample will be retained for laboratory analysis from the capillary fringe from each borehole in the following manner. The ends of the tube from the depth corresponding to the capillary fringe will be successively covered with aluminum foil and plastic endcaps.

The tubes will then be labeled, and stored in a cooler with ice pending delivery to a State-accredited hazardous waste testing laboratory. Chain of custody procedures will be observed for all sample handling.

All of the boreholes for the air sparge points will be drilled to a total depth of 30.0 fbgt, all of the boreholes for the observation wells will be drilled to a total depth of 20.0 fbg, and all of the boreholes for the extraction wells will be drilled to a total depth of 25.0 fbg. The air sparge points will be constructed using ¾-inch diameter PVC pipe with a pre-pack filter pack and slotted interval for the lowermost two feet of the pipe. The extraction wells will be constructed using 4-inch diameter Schedule 40 PVC pipe with the lowermost 20 feet of the well casing consisting of 0.020-inch width factory slotted pipe. The observation wells will be constructed using 4-inch diameter Schedule 40 PVC pipe with the lowermost 15 feet of the well casing consisting of 0.020-inch width factory slotted pipe. A screw-on cap will be placed on the bottom of each well. The annular space surrounding the screen for each observation and extraction well will be filled with Lonestar # 2/16 sack sand to a height of one foot above the top of the screen. A one-foot thick layer of bentonite pellets will be placed above the sand and hydrated. The remaining annular space will be filled with a neat cement grout (sanitary seal) to approximately one half foot below the ground surface.

The top of each air sparge point and each well will be secured with a locking expandable plug and enclosed in a water-tight, traffic-rated locking vault. The top of the vault will be set slightly above grade to inhibit the collection of water in the vault.

Soil and water generated during drilling will be stored at the subject site in DOT-approved 55-gallon drums pending appropriate disposal.

Surveying of the Wellhead Elevations and Locations

Following installation of the proposed wells, the top of the PVC well pipe for each air sparge point, extraction well and observation well will be surveyed vertically to the nearest 0.01 foot relative to a Mean Sea Level datum and horizontally relative to the site and the existing wells at the site. The surveyed location at the top of each well pipe will be marked to identify the surveyed location for use during future monitoring activities. All surveying will be performed by a State-licensed surveyor, and in accordance with GeoTracker requirements.

Observation and Extraction Well Development

At least 72 hours after the wells have been constructed, the extraction and observation wells will be developed by surging and overpumping. Prior to development, the wells will be monitored for depth to water and the presence of free product or sheen. The depth to water will be measured using an electric water level indicator and will be measured to the nearest 0.01 feet from a location marked at the top of the monitoring well. The presence of free product and sheen will be evaluated using a transparent bailer. Well development will continue until the water removed from the wells is relatively sediment-free. Water removed from the wells during development activities will be stored in DOT-approved 55-gallon drums at the subject site pending appropriate disposal.

Purging and Sampling of Extraction and Observation Wells

At least 48 hours after the wells have been developed, the extraction and observation wells will be monitored for depth to water and the presence of free product and sheen using methods described above. Each well will then be purged of a minimum of three casing volumes of water, or until the well is purged dry. During purging operations, the field parameters of pH, electrical conductivity and temperature will be monitored. Once the field parameters have been observed to stabilize and a minimum of three casing volumes has been purged or the well purged dry, a groundwater sample will be collected from the monitoring well using a Teflon bailer. All well purging and sampling equipment will be cleaned using an Alconox solution and clean water rinse prior to use.

The samples will be transferred from the bailer to 40-milliliter glass Volatile Organic Analysis (VOA) vials and 1-liter amber glass bottles which will be sealed with Teflon-lined screw caps. The VOA vials will be overturned and tapped to assure that no air bubbles are present. The sample bottles will then be labeled and placed into a cooler with ice pending delivery to the State-Certified hazardous waste testing laboratory. Chain of custody procedures will be observed for all sample handling. Water removed from the wells during purging activities will be stored in 55-gallon drums pending appropriate disposal.

Soil and Groundwater Sample Analysis

The soil and groundwater samples will be analyzed at McCampbell Analytical, Inc. of Pittsburg, California. McCampbell is a state-accredited hazardous waste testing laboratory.

The samples will be analyzed for TPH-D and TPH-BO using EPA Method 3550 for the soil samples and using EPA Method 3510 for the water samples in conjunction with Modified EPA 8015; TPH-G using EPA Method 5030 in conjunction with Modified EPA Method 8015; and for BTEX, fuel oxygenates and lead scavengers using EPA Method 8260B. TPH-BO is proposed instead of TPH-MO because the range of petroleum hydrocarbons evaluated with TPH-BO is more representative of residual fuels referenced in the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) Environmental Screening Levels (ESLs) than TPH-MO. In addition, the detection limit for TPH-BO is 50 ug/L rather than 250 ug/L for TPH-MO, resulting in a more complete comparison of sample results with the SFRWQCB residual fuel groundwater ESL.

Vapor Extraction Blower, APCD, Compressor, Extraction Well Pump and GAC Installation

Review of the February 8, 2001 Alisto Remedial Investigation Report shows that the existing buried horizontal vapor extraction pipe consists of a western portion and an eastern portion. A flow rate of approximately 120 standard cubic feet per minute (scfm) with a vacuum of approximately 40 inches of water column (in. WC) was reported for the western portion of the system, and a flow rate of approximately 120 scfm with a vacuum of approximately 30 in. WC was reported for the eastern portion of the system. Although Table 4 of the report identifies measured hydrocarbon concentrations of approximately 100 to 200 parts per million volumetrically (ppmv), review of the soil gas sample results for the sample collected during the vapor extraction feasibility evaluation and analyzed at a laboratory show a Total Petroleum Hydrocarbon as gasoline concentration of 29,000 ppmv. This reported laboratory concentration is consistent with expected vapor concentrations based on the elevated groundwater petroleum concentrations and the sandy subsurface materials.

The Alisto report identified all of the air sparging points as consisting of ¾-inch diameter PVC pipe with the lowermost two feet consisting of a pre-packed filter and slotted pipe. The total depth of all of the sparging points is 30 feet, except for ASP-2 and ASP-4 which extend to total depths 28 and 26 feet, respectively. Review of Table 3 of the report shows that a flow rate of 3.0 scfm was reported at air sparge point ASP-3 at a pressure of 40.0 pounds per square inch (psi).

A positive displacement blower capable of moving 250 standard cubic feet per minute (scfm) of air and providing vacuums of up to 110 in. WC with a thermal oxidation APCD will be installed at the site. In addition, a 7.5 horsepower rotary screw air compressor capable of moving 25 scfm air at up to 90 psi will be installed at the site. Filters will be placed in the system so that oil is not blown into the air sparging points. Piping will be connected from the soil vapor extraction blower to the two horizontal vapor extraction pipes and to the top of each of the proposed extraction wells.

One variable speed stainless steel submersible Grundfos pump will be installed in each of the proposed extraction wells for the purpose of pumping diesel-impacted groundwater and creating water table drawdown in the vicinity of the extraction wells to expose petroleum-impacted soil for vapor extraction and to induce the flow of petroleum-impacted groundwater towards the extraction wells. Two 2,000-pound GAC vessels arranged in series for groundwater treatment prior to discharge to satisfy EBMUD discharge permit requirements.

Prior to the beginning of pumping in the wells, pressure transducers will be installed in wells existing wells MW1 and MW2 and in proposed wells OW1 and OW2 to evaluate changes in water levels associated with groundwater pumping.

Remediation System Operation

Following receipt of BAAQMD Authority to Construct and Permit to Operate documents, the vapor extraction system will be operated by applying vacuum to both the western and eastern portions of the existing horizontal vapor extraction pipes. Initial vapor concentrations are anticipated to be approximately 30,000 ppmv, and flow rates are anticipated to be approximately 200 to 250 scfm. System vacuum, flow rate and vapor concentration at a location in the system prior to the APCD will be measured on an hourly basis during the first day of start up. Vacuum, flow rate and vapor concentration at a location in the system prior to the APCD will be measured on a weekly basis thereafter. Similarly, vacuum will be measured in groundwater monitoring wells MW1 through MW4 prior to start up of the vapor extraction system and on an hourly basis during the first day of start up. Vacuum will be measured in the onsite groundwater monitoring wells on a weekly basis thereafter. One soil vapor sample will be collected from each of the proposed extraction wells and existing wells MW1, MW2 and MW4 on the day of vapor extraction system start up prior to the start up of the system, and one vapor sample will be collected from the vapor extraction system at a location prior to the APCD after system start up for laboratory analysis. The samples will be collected into Tedlar bags and analyzed at a State-accredited hazardous waste testing laboratory within 72 hours of collection for TPH-G and MBTEX. using modified EPA Method 8015 and EPA Method 8021B.

At the time of vapor extraction system start up, groundwater pumping will also be started. Based on review of groundwater remediation information for the site at 1724 Park Street (case number RO 448) the anticipated volume of extracted groundwater is estimated to range from 1 to 3 gallons per minute (gpm). Changes in water levels at the site associated with groundwater pumping will be evaluated using pressure transducers installed in wells existing wells MW1 and MW2 and in proposed wells OW1 and OW2. In addition to evaluating drawdown in the vicinity of the extraction wells with the pressure transducers, water levels will be measured in the air sparging points prior to the beginning of pumping and on a daily basis for the first week of pumping using an electric water level indicator. Water levels will be monitored on a monthly basis thereafter until air sparging begins in the air sparging points.

Groundwater pumped from the wells will be routed through two 2,000-pound GAC vessels arranged in series prior to discharge to the sanitary sewer. Groundwater extraction treatment system startup monitoring and subsequent periodic monitoring of the groundwater treatment system will be performed in accordance with EBMUD discharge permit requirements.

How long the vapor concentrations will remain elevated is presently unknown, and the rate at which vapor concentrations will decrease is unknown. Once vapor concentrations decrease to 9,000 ppmv, soil vapor extraction flow rates will be reduced at the eastern and western horizontal pipes and vacuum will be applied to the proposed extraction wells. The 9,000 ppmv value is used based on propane fuel consumption and associated cost increase considerations.

Once vapor concentrations decrease to 9,000 ppmv at the proposed extraction wells, air sparging will begin at existing locations ASP2, through ASP6 and at proposed locations ASP8 through ASP11 at a flow rate of approximately 2.5 scfm. It is anticipated that once air sparging begins, vapor concentrations will increase for an unknown period of time. Once vapor concentrations have decreased below 3,500 ppmv the thermal oxidation APCD will be replaced with a catalytic oxidation APCD.

Air sparging and vapor extraction will continue until vapor concentrations from all vapor extraction locations are less than 100 ppmv. Groundwater pumping will continue at the extraction wells independent of the application of vacuum at the extraction wells and independent of the startup of air sparging. Continued groundwater pumping will be evaluated following review of the results of the first four quarterly groundwater monitoring and sampling events that follow groundwater pumping startup, or if quarterly groundwater monitoring and sampling results indicate that petroleum hydrocarbon conentrations in wells MW1 and MW2 have decreased to below applicable San Francisco Bay Regional Water Quality Control Board (SFRWQCB) Environmental Screening Levels.

Groundwater Quality Monitoring

Monitoring and sampling of wells MW1, MW2 and MW4 will be performed on a quarterly basis as a part of the existing on-going quarterly groundwater monitoring and sampling program for the site. Water quality results for wells MW1, MW3 and MW4 will be evaluated to determine groundwater remediation progress.

Report Preparation

A report will be prepared documenting drilling for the installation of the air sparging points, observation wells, and extraction wells. The report will document also procedures used for soil sample and groundwater sample collection and the laboratory analytical results. The report will include maps showing the drilling locations, boring logs, well construction diagrams, tables summarizing the laboratory results, depth-specific isoconcentration contour maps, and a discussion and recommendations based on the findings.
A report will be prepared documenting remediation system installation and startup Remediation system operation progress reports will be subsequently provided on a quarterly basis with the groundwater monitoring and sampling quarterly reports. Data collected during start up of vapor extraction at the proposed extraction wells and air sparging at the proposed air sparging points will be included in the quarterly reports. The reports will include information regarding radius of influence, organic vapor concentration, flow rates, and cumulative pounds of hydrocarbons removed from the subsurface.

DISTRIBUTION

In addition to the ACDEH website, a copy of this work plan was be uploaded to the GeoTracker database.

SCHEDULE

The following schedule addresses elements identified in this work plan.

| Activity | Calendar Days |
|---|---|
| Work plan submittal to ACDEH | Day 0 |
| Work plan approval by ACDEH | Day 30 |
| UST Fund pre-approval request submittal | Day 35 |
| UST Fund pre-approval response | Day 65 |
| Set drill date with driller | Day 70 |
| Permit application submittal to BAAQMD, EBMUD, ACPWA, COAFD | Day 80 |
| Permit application approval by ACPWA and COAFD | Day 90 |
| Well and air sparge point installation | Day 100 |
| Well development and surveying | Day 105 |
| Well sample collection | Day 135 |
| Permit application approval by BAAQMD and EBMUD | Day 140 |
| Remediation system installation | Day 150 |
| Submittal of draft drilling report to client for review | Day 165 |
| Remediation system start up | Day 170 |
| Submittal of final drilling report to ACDEH | Day 180 |
| Submittal of draft remediation system startup report to client for review | Day 230 |
| Submittal of final remediation system startup report to ACDEH | Day 245 |

Should you have any questions or comments, please do not hesitate to contact us at (510) 658-6916.

Sincerely,

P&D Environmental, Inc.

Paul H. King

Paul H. King
Professional Geologist #5901
Expires 12/31/07


Attachments: Figure 1: Site Location Map
Figure 2: Site Vicinity Map Showing Benzene in Groundwater At 12 Feet Below Surface and Proposed Drilling Locations
Figure 3: Site Vicinity Map Showing TPH-D in Groundwater At 12 Feet Below Surface and Proposed Drilling Locations

PHK
0058.W2

# FIGURES


FIGURE 1
Site Location Map
1701 Park Street
Alameda, CA

N

Base Map From:
USGS Topographic Map, 7.5 minute series, Oakland East, Calif. quadrangle, 1980

P&D Environmental, Inc.
55 Santa Clara Ave, Ste. 240
Oakland, CA 94610

0 1000 2000
SCALE IN FEET

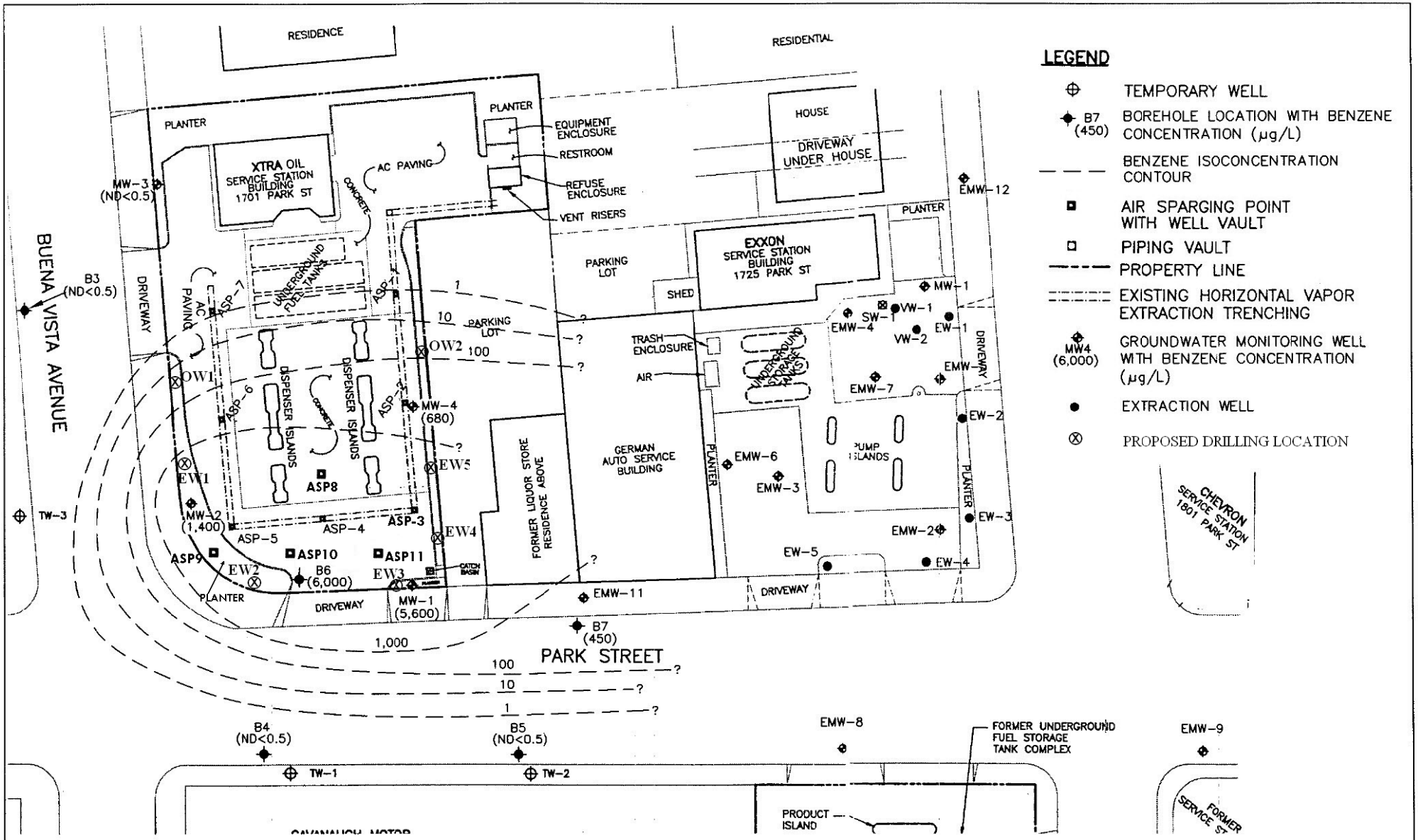


Figure 2
Site Vicinity Map Showing Benzene in Groundwater at 12 Feet Below Surface
and Proposed Drilling Locations
1701 Park Street
Alameda, CA

Base Map From:
Alisto Engineering Group, 9/23/2005
and Environmental Resources, Inc.,
6/15/2004

P&D Environmental, Inc.
55 Santa Clara Ave, Ste. 240
Oakland, CA 94610

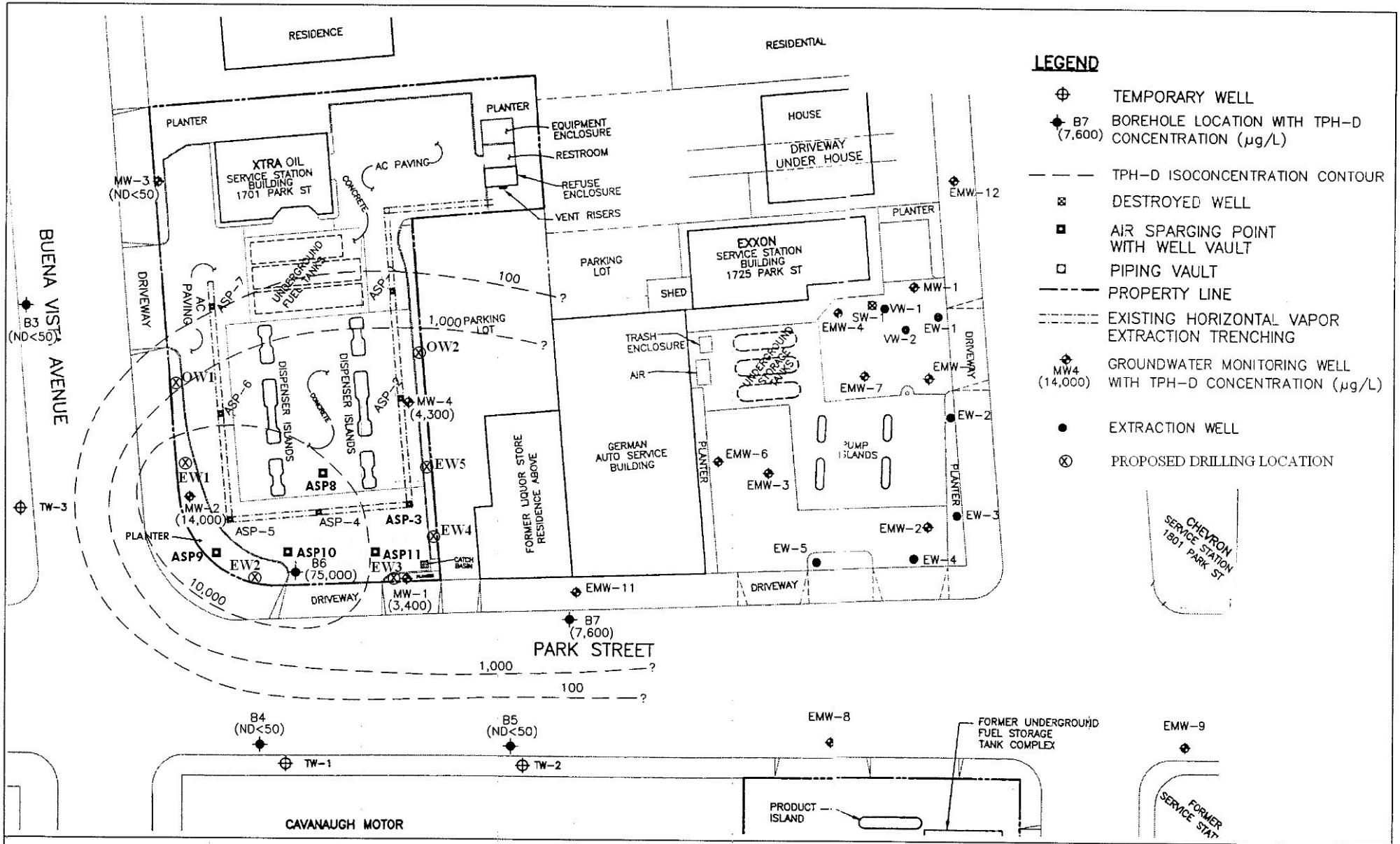


Figure 3

Site Vicinity Map Showing TPH-D in Groundwater At 12 Feet Below Surface
1701 Park Street
Alameda, CA

N

Base Map From:
Alisto Engineering Group, 9/23/2005
and Environmental Resources, Inc.,
6/15/2004

P&D Environmental, Inc.
55 Santa Clara Ave, Ste. 240
Oakland, CA 94610

0 50 100
Approximate Scale in Feet