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July 6, 2015

RECEIVED
By Alameda County Environmental Health 9:43 am, Jul 07, 2015

Ms. Karel Detterman
Alameda County Environmental Health Department
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

SUBJECT: WELL INSTALLATION AND OZONE SPARGING WORK PLAN CERTIFICATION
County Case # RO 191
Xtra Oil Company
1701 Park Street
Alameda, CA

Dear Ms. Detterman**:**

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

- Well Installation and Ozone Sparging Work Plan dated July 6, 2015 (document 0058.W7).

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) 865-9506.

Sincerely,
Xtra Oil Company

Keith Simas

0058.L59

P&D ENVIRONMENTAL, INC.

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

July 6, 2015
Work Plan 0058.W7

Ms. Karel Detterman
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

SUBJECT: WELL INSTALLATION AND OZONE SPARGING WORK PLAN (IW1)
County Case # RO 191
Xtra Oil Company
1701 Park Street
Alameda, CA

Dear Ms. Detterman:

P&D Environmental, Inc. (P&D) has prepared this work plan for the installation of one ozone injection well designated as IW1 and the resumption of In Situ Chemical Oxidation (ISCO) using ozone sparging at the subject site. This work plan is prepared in accordance with an email from Ms. Karel Detterman of the Alameda County Department of Environmental Health (ACDEH), and recommendations set forth in P&D's Post-Sparging Pilot Test Rebound Evaluation Report dated November 13, 2014 (document 0058.R27).

This proposed work will be performed as implementation of the Corrective Action Plan (CAP) prepared by P&D dated October 11, 2010 (document 0058.W3). The CAP was approved by the ACDEH in an e-mail dated February 11, 2011. The continued use of ozone is recommended based on the successful reduction of petroleum hydrocarbons in groundwater associated with the ozone sparging pilot test performed in 2014.

The proposed work scope includes the installation of one ozone injection well and the resumption of ozone sparging, with ozone sparging to occur at multiple wells. A Site Location Map is attached as Figure 1, and a Site Plan showing the proposed ozone injection well is attached as Figure 2. All work will be performed under the direct supervision of a California professional geologist.

BACKGROUND

A detailed discussion of the site background, historical monitoring and sampling, and historical investigations are provided in P&D's Remedial Action Work Plan (RAWP) dated October 24, 2007 (document 0058.W2), P&D's Corrective Action Plan (CAP) dated October 11, 2010 (document 0058.W3), and P&D's Site Conceptual Model Report dated October 8, 2010 (document 0058.R10). As an interim step for implementation of the CAP, P&D prepared a Groundwater Extraction Feasibility Work Plan dated April 15, 2011 (document 0058.W4) to verify the feasibility of groundwater extraction at the site with a selected number of wells identified in the RAWP. On May 18 and 19, 2011 P&D oversaw the installation of dual phase extraction wells EW2, EW4, and EW5 and observation well OW2 at the subject site. The wells

were installed in accordance with procedures identified in P&D's October 24, 2007 RAWP and P&D's April 15, 2011 Groundwater Extraction Feasibility Work Plan. P&D subsequently provided a Chemical Oxidation Injection Feasibility Test Work Plan (document 0058.W5) dated December 19, 2011 for injection of the oxidizer Regenox for evaluation of cost-effective remedial alternatives to the previously proposed remedial solutions.

Based on subsequent comparison of historical investigation results for the site with the SWRCB 2012 Low Threat Closure Policy (LTCP), it is P&D's opinion that the general criteria for case closure have been satisfied. However, the groundwater-specific criteria of benzene concentrations less than 3,000 micrograms per Liter (ug/L) and MTBE concentrations less than 1,000 ug/L have not been met. In addition, LTCP Table 1 direct contact and outdoor air exposure criteria have not been met in the vicinity of the former UST pit for residential, commercial/industrial, or utility worker exposure for benzene and ethylbenzene, and naphthalene analysis was not performed for the soil samples at the time of UST removal.

Based on LTCP case closure criteria that have not been met for the site, P&D recommended that P&D's December 19, 2011 Chemical Oxidation Injection Feasibility Test Work Plan be approved to reduce benzene and MTBE concentrations in groundwater. P&D prepared a In Situ Chemical Oxidation Feasibility Test Work Plan dated February 7, 2014 (document 0058.W6) below to evaluate ozone injection as a cost-effective remedial solution. In response to a request of additional information from the ACDEH, P&D prepared a In Situ Chemical Oxidation Feasibility Test Work Plan Addendum (document 0058.W6A) dated June 9, 2014. In a letter from the ACDEH dated August 6, 2014 it was requested that the pilot test be performed for 30 days and that hexavalent chromium groundwater analysis be performed.

The semi-annual monitoring and sampling of the four historical groundwater monitoring wells (MW-1 through MW-4) and the four wells installed in 2011 for proposed site remediation (EW-2, EW-4, EW-5, and OW-2) was performed on June 19, 20, and 23 2014 for the reporting period of January through June 2014. At the time of the semi-annual monitoring event, the wells were also sampled for baseline water quality analysis in preparation for site remediation in accordance with P&D's In Situ Chemical Oxidation Feasibility Test Work Plan dated February 7, 2014 (document 0058.W6). Five air sparge points (ASP-2 through ASP-6) that had historically been installed for site remediation were also sampled during the June 2014 sampling event for baseline water quality determination in preparation for site remediation. In accordance with a letter from the ACDEH dated August 6, 2014 additional monitoring and sampling of all of the wells was performed on August 20 and 21, 2014 for hexavalent chromium analysis in preparation for site remediation. Documentation of the sampling and sampling results is provided in P&D's Semi-Annual Monitoring and Samplng (January Through June 2014) and Baseline Groundwater Quality Report (document 0058.R25) dated October 1, 2014.

Ozone sparging was initated at well MW-2 beginning August 27, 2014 and operated continuously until mid-day on September 26, 2014. As part of the periodic monitoring that was performed during the pilot test, air samples were collected from the head space of groundwater wells located in the vicinity of well MW-2 on September 5, 2014. Following completion of air sparging on September 26, 2014 post-sparging groundwater monitoring and sample collection was performed on October 2 and 3, 2014. Documentation of the ozone sparging system start up, monitoring, and

post-sparging groundwater sampling for a 30 day ozone sparging pilot test is provided in P&D's Ozone Sparging Pilot Test Report dated October 13, 2014 (document 0058.R26).

On November 3, 2014 P&D personnel purged and sampled groundwater well MW-2 to evaluate for rebound in groundwater quality since the stopping of ozone sparging at the subject site. Comparison of pre-sparging and post-sparging water quality data for well MW-2 in Table 2 showed that TPH-G, BTEX, and TBA concentrations remained substantially reduced, and that the dissolved hexavalent chromium concentration returned to the pre-sparging condition of not detected. In addition, the TPH-D groundwater concentration had rebounded to the pre-sparging concentration. TPH-D groundwater concentrations have historically been the highest at the site at well MW-2. Further discussion can be found in P&D's Post-Sparging Pilot Test Rebound Evaluation Report (document 0058.R27) dated November 13, 2014.

SCOPE OF WORK

Based on the results of the ozone injection feasibility testing and post-sparging results, P&D recommends the following scope of work.

- Prepare a health and safety plan, mark the proposed drilling location with white paint, and notify Underground Service Alert for buried utility location.
- Obtain a drilling permit from the Alameda County Public Works Agency (ACPWA).
- Install one 2-inch diameter groundwater well designated as IW1 to a depth of 25 feet below the ground surface (bgs) adjacent to air sparging point ASP-4.
- Develop the well.
- Purge and sample well IW1 using U.S. EPA low flow purge methods.
- Ozone generator installation and placement of a Teflon tube from the ozone generator into existing well EW2, MW2 and proposed well IW1.
- Ozone sparging at wells EW2, MW2, and proposed well IW1
- Perform ozone sparging performance monitoring.

Each of these is discussed below in detail.

Health and Safety Plan Preparation, USA Notification and Permitting

Following ACDEH approval of this work plan, a health and safety plan will be prepared for the scope of work in this work plan. The proposed drilling location will be marked with white paint, and Underground Service Alert will be notified for buried utility location. A drilling permit will be obtained from the ACPWA. Notification of the scheduled field dates will be provided to the ACDEH and ACPWA prior to performing field work.

Well Installation

The borehole for well IW1 will be drilled to a depth of 25 feet bgs with a truck-mounted hollow stem auger drill rig and 8-inch outside diameter hollow stem augers. Soil samples will be collected at 5-foot intervals for lithologic logging purposes using a California modified split-spoon sampler driven by a 140 pound hammer falling 30 inches. Blow counts will be recorded

every 6 inches. The borehole will be logged in accordance with the Unified Soil Classified System and standard geologic field techniques. All of the samples will be evaluated with a photoionization detector equipped with a 10.0 eV bulb and calibrated using a 100 ppm isobutylene standard. No soil samples will be retained for laboratory analysis.

Well IW1 will be constructed to a total depth of 25 feet bgs using 2-inch diameter Schedule 40 PVC pipe with the bottom 10 feet of well pipe constructed of 0.020-inch factory slot screen. The well screen will be surrounded with #2/16 washed sack sand to a height of one foot above the top of the screen. Bentonite pellets will be placed in the borehole above the filter sand to a height of one foot above the sand. The remaining annular space will be filled with neat cement grout using a tremie pipe to approximately one foot below the ground surface.

The top of the well will be covered with a traffic-rated locking well vault. All drilling and sampling equipment will be steam cleaned or washed with an Alconox solution followed by a clean water rinse prior to use in each borehole. Soil and water generated during well installation will be stored in labeled 55-gallon steel drums and stored at the site pending appropriate disposal.

Well Development

At least 48 hours after construction of the well, the well will be developed by surging and overpumping until the water from the well is relatively clear. Prior to development, the depth to water in the well will be measured using an electric water level indicator to the nearest 0.01 feet. Water discharged from the well during development will be stored in drums at the site pending appropriate disposal.

Groundwater Sample Collection

At least 48 hours after well development, well IW1 will be purged using U.S. EPA low flow purge methods and sampled. Prior to sampling, the well will be purged for a minimum of 15 minutes at a flow rate of approximately 300 milliliters per minute using a peristaltic pump and new polyethylene tubing for each well. The intake for the tubing will be placed near the middle of the screened interval for the well. During purging operations, the field parameters of depth to groundwater, temperature, pH, electrical conductivity, turbidity, dissolved oxygen (DO), and oxidation/reduction potential (ORP) will be monitored and recorded on a groundwater monitoring/well purging data sheet. The indicator parameters collected during purging will be considered to be stabilized as follows: plus/minus 0.1 Standard Units (S.U.) for pH; plus/minus three percent for specific conductance; and plus/minus 10 percent for turbidity and DO. Once the field parameters are observed to stabilize for three consecutive readings and a minimum of 15 minutes of purging the well, a water sample will be collected.

The water sample will be collected directly from the pump polyethylene discharge tubing into 40-milliliter glass Volatile Organic Analysis (VOA) vials that will be sealed with Teflon-lined screw caps and other containers, as appropriate. The VOA vials will be overturned and tapped to ensure that no air bubbles were present. The VOA vials and bottles will then be labeled and transferred to a cooler with ice, pending transport to the laboratory. Chain of custody

documentation accompanied the samples to the laboratory. Records of the field parameters measured during well purging will be attached with the report documenting sample collection. Baseline water quality for the other groundwater monitoring wells at the site was evaluated during the most recent well sampling event at the site on June 18, 2015.

Groundwater Sample Analysis

All of the groundwater samples from the wells will be analyzed at McCampbell Analytical, Inc. in Pittsburg, California for the following analytes using the following analytical methods:

Chemicals of Potential Concern (COPC)

- Total Petroleum Hydrocarbons as Diesel (TPH-D) and Total Petroleum Hydrocarbons as Motor Oil (TPH-MO) using EPA Method 3510C and EPA Method 3630C in conjunction with EPA Method 8015B,
- Total Petroleum Hydrocarbons as Gasoline (TPH-G) using EPA Method 5030B in conjunction with modified EPA Method 8015B and EPA Method 8021B;
- Volatile Organic Compounds (VOCs) including benzene, toluene, ethylbenzene, total xylenes (BTEX), fuel oxygenates and lead scavengers including methyl tertiary-butyl ether (MTBE) and TBA using EPA Method 5030B in conjunction with modified EPA Method 8015B and EPA Method 8260B,

Electron Acceptors

- Inorganic anions nitrate as nitrogen and sulfate using EPA Method E300.1,
- Total and dissolved iron using EPA Method 200.8,
- Alkalinity as calcium carbonate using Standard Method 2320B.

Metabolic Products

- Dissolved gases methane, ethane, ethene, and carbon dioxide using method RSK 175.

Although TPH-MO is identified in the list of analytes for COPCs, TPH-MO-range compounds are considered to be aged TPH-D for the site.

Ozone Injection

Based the distribution of petroleum hydrocarbons in groundwater provided in P&D's In Situ Chemical Oxidation Feasibility Test Work Plan dated February 7, 2014 and based on the results of ozone injection documented in P&D's November 13, 2014 Post-Sparging Pilot Test Rebound Evaluation Report a 1 pound per day ozone generator will be installed at the site and operated continuously. The ozone will be delivered continuously from the ozone generator through a tube that is inserted to the bottom of each of wells EW2, MW2, and IW1 (see Figure 2) and that is fitted with a 2-foot long diffuser in each well. The total air flow rate will be approximately 2 to 3 standard cubic feet per minute for the entire ozone delivery system. The ozone generator will have

a telemetry system to provide notification if the system shuts down. Flow rates will be verified on a weekly basis using a rotometer during the first week of operation, and monthly thereafter.

Wells EW2, MW2 and EW1 will be sealed to prevent ozone from escaping from the well. A valve will be installed in the cap for each of the wells (MW1 through MW4, EW2, EW4, EW5, OW2, and IW1), and pressure will be monitored at the top of each well with a monometer during site visits to verify the ozone flow rate.

Contingencies will be implemented in accordance with procedures set forth in P&D's June 9, 2014 In Situ Chemical Oxidation Feasibility Test Work Plan Addendum (document 0058.W6A).

Report Preparation

A report will be prepared documenting well installation, development, sampling and sample results. The report will also document ozone system installation and startup.

Documentation of on-going site monitoring results will be provided in quarterly reports that will be submitted within one month of the end of each quarter.

All reports will be uploaded to the county ftp site and to GeoTracker.

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 12/31/15

Attachments:

Figure 1 – Site Location Map
Figure 2 – Site Plan Showing Groundwater Well and Air Sparging Point Locations

PHK/sjc
0058.W7

FIGURES

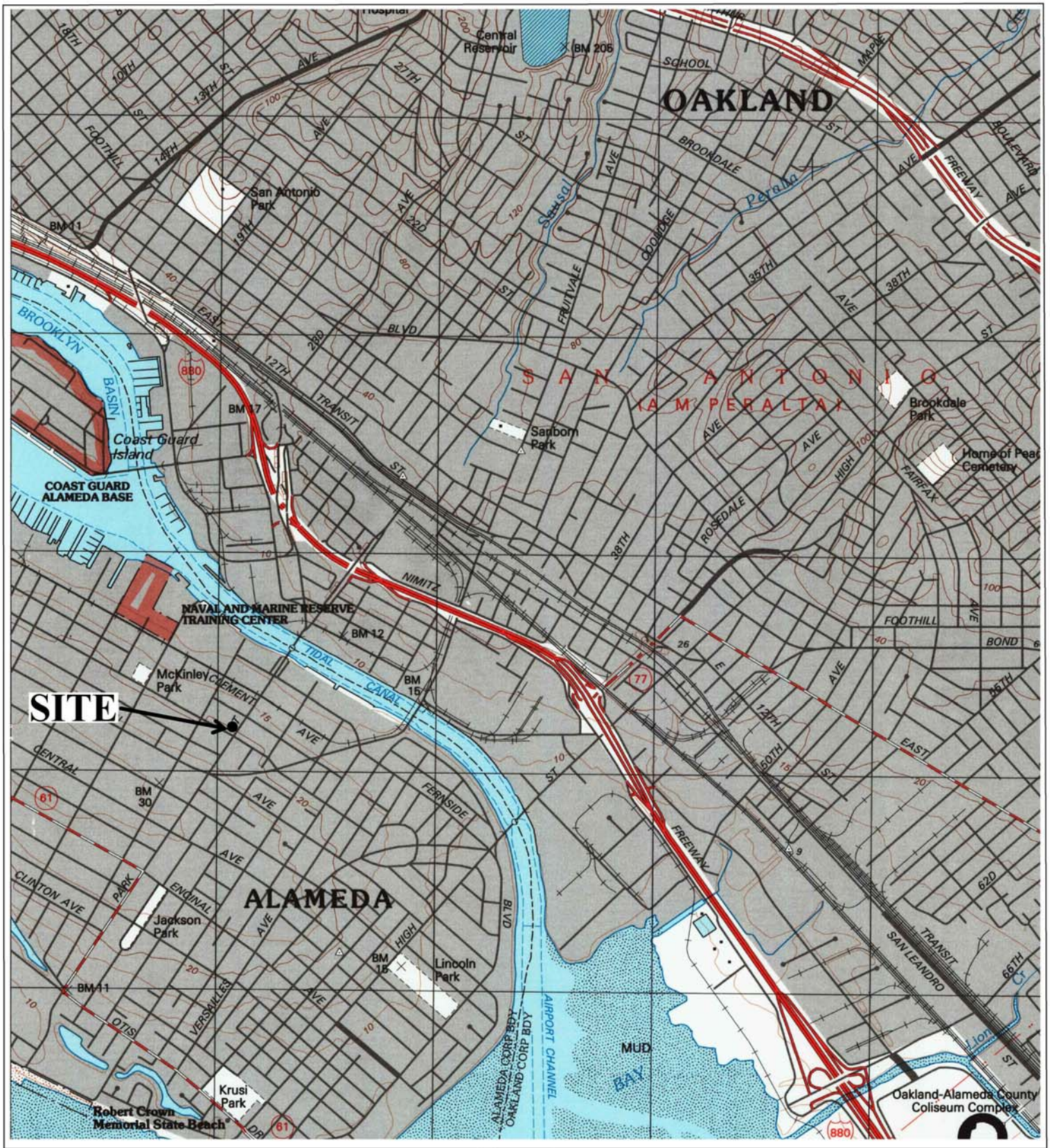


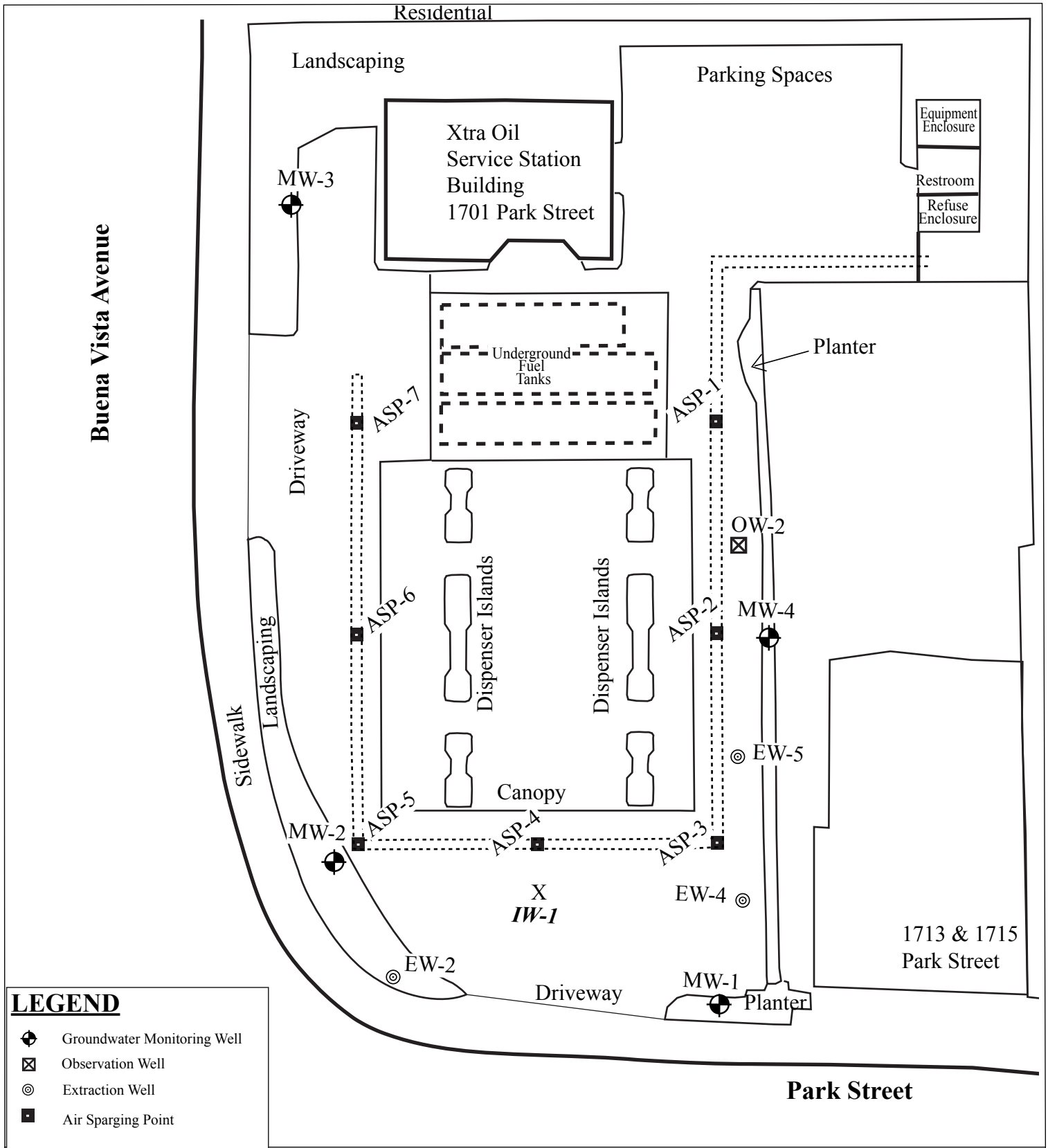
Figure 1
Site Location Map
Xtra Oil Company
1701 Park Street
Alameda, California

Basemap from:
U.S. Geological Survey
Oakland East, California
7.5-Minute Quadrangle, Map edited 1996

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

0 1,000 2,000
Approximate Scale in Feet

N



LEGEND

- Groundwater Monitoring Well
- Observation Well
- Extraction Well
- Air Sparging Point
- X Proposed Ozone Injection Well
- Horizontal Vapor Extraction Trenching
- Groundwater Surface Contour

Figure 2
Site Plan Showing Proposed Ozone Injection Well Location
Xtra Oil Company
1701 Park Street
Alameda, California

Basemap from: Alisto Engineering Group September 2005, and Google Earth October 2009

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

0 12.5 25
Approximate Scale in Feet

N