REMEDIAL INVESTIGATION REPORT

Feb 2001

Xtra Oil Company
Service Station
1701 Park Street
Alameda, California

Alisto Project No. 10-210

February 2001

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Xtra Oil Company Service Station
1701 Park Street
Alameda, California

Project No. 10-210-13-005

Prepared for:

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Prepared by:

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1.0 INTRODUCTION

Xtra Oil Company retained Alisto Engineering Group to perform remedial investigation activities at Xtra Oil Company service station, 1701 Park Street, Alameda, California, to comply with applicable regulations. A site vicinity map is shown on Figure 1, and a site plan is shown as Figure 2.

1.1 Purpose and Scope of Work

The scope of work for this remedial investigation was based on the requirements of the Alameda County Health Care Services Agency (ACHCSA) as set forth in a letter dated December 3, 1999. As presented in the corrective action plan prepared by Alisto Engineering dated October 14, 2000, air sparging and vapor extraction with thermal treatment were determined to be the most appropriate and applicable remedial action for the site. Specific tasks performed during this investigation included the following:

- Obtained necessary permits for well installation and field testing
- Installed seven air sparging points
- Performed air sparging and vapor extraction tests
- Evaluated the data and analytical results and prepared this report

1.2 Site Location and Description

The Xtra Oil Service Station is on the north corner of the intersection of Park Street and Buena Vista Avenue, Alameda, California. The site is at an elevation of approximately 20 feet above mean sea level and encompasses an area of approximately 0.5 acre. The operating retail fuel station has three (two 10,000-gallon and one 7,000-gallon) underground fuel storage tanks installed in 1994. The site layout and features and the locations of the underground storage tanks and existing groundwater monitoring wells are shown on Figure 2.

The Xtra Oil property is surrounded by residential and commercial properties. Adjacent to and northwest of the site is a residential property, and to the south, north and southeast are commercial properties.

1.3 Project Background

In April 1994, the Xtra Oil Service Station underwent a major renovation to expand into the adjoining property to the northwest. Three underground gasoline storage tanks and an underground diesel storage tank were removed and replaced with three double-walled storage tanks. One underground storage tank, which was used to store home heating oil, was also removed from the adjoining property. Analysis of soil samples collected from the sidewalls of the fuel tank cavity and below the former dispenser islands detected petroleum hydrocarbons in the vicinity of the tank area. No petroleum hydrocarbons, however, were detected above the reported detection limits in the soil samples collected from beneath the former fuel oil tank (Alisto, 1994).

To assess the nature and extent of petroleum hydrocarbons in soil and groundwater, a preliminary site assessment was conducted at the site in November 1994. The assessment involved drilling three onsite boreholes, B-1, B-2 and B-3, near the property line to the east, south, and west of the former underground fuel storage tanks and dispenser islands. These borings were subsequently converted into Monitoring Wells MW-1, MW-2, and MW-3. Results of the preliminary investigation revealed the presence of detectable concentrations of petroleum hydrocarbons in the soil samples collected from the borings for Wells MW-1 and MW-2 at 7.0 to 8.0 feet below grade, which is within the capillary fringe. Analysis of a soil sample collected from the boring for Well MW-3 did not detect petroleum hydrocarbons above the reported detection limits (Alisto 1995a).

At the request of the ACHCSA, an additional site investigation was performed in April 1997. The investigation involved drilling an exploratory soil boring (SB-1) and installing a monitoring well (MW-4) north of the former underground storage tanks and dispenser islands. Analysis of the soil samples collected during drilling of Well MW-4 detected petroleum hydrocarbons and total organic carbon (TOC) in soil boring SB-1 (Alisto, 1997c).

A quarterly groundwater level measurement and sampling program was initiated at the site in November 1994. The groundwater gradient direction, as interpreted for each sampling event, has ranged from northeasterly to southeasterly. Since the beginning of the monitoring program, liquid-phase petroleum hydrocarbons have been observed in Well MW-2 at a thickness of up to 0.21 feet. Weekly product removal has reduced the hydrocarbon thickness to approximately 0.13 feet in March 1999. Dissolved-phase petroleum hydrocarbons have been detected consistently in Wells MW-1, MW-2, and MW-4 and periodically in MW-3 (Alisto 1995b, c, d; 1996a, b, c; 1997a,b; 1998a, b, c; and 1999a, b, c).

In February 1995, the files of the ACHCSA were reviewed to identify offsite properties with confirmed releases of petroleum hydrocarbons to the subsurface. The file review revealed seven sites within a ¼-mile radius of the site, each of which has on- and off-site groundwater monitoring wells associated with the reported release. Approximately 100 feet northeast of the Xtra Oil site is an Exxon service station with approximately 18 monitoring wells and an operating groundwater and soil vapor extraction system.

In June 1996, review of subsurface utility records at the City of Alameda Public Works Department revealed the presence of a 10-inch-diameter sanitary sewer along the centerline of Park Street at a depth of approximately 11 feet below grade and a 6-inch-diameter sanitary sewer along the centerlines of Buena Vista Avenue and Eagle Avenue (Alisto, 1997c). Since the depth to groundwater at the site varies from 6 to 9 feet below grade, the trench and backfill material for the sanitary sewer pipe in Park Street may be influencing the lateral migration of petroleum hydrocarbons from the site towards Park Street.

A remedial feasibility study and corrective action plan dated October 14, 1999 was prepared to address the residual petroleum hydrocarbons in the soil and groundwater at the site. Based on detailed evaluation of technical feasibility, cost, ease of implementation, overall protection of public health and the environment, and regulatory agency and community acceptance, air sparging and vapor extraction with thermal treatment was determined to be the preferred remedial action for the site (Alisto, 1999).

2.0 FIELD METHODS

Prior to performing field activities, permit for air sparing point installation was obtained from the Alameda County Public Works Department. A copy of the permit is included in Appendix A. The methods and procedures used during the field activities are described in the following sections.

2.1 Air Sparging Point Installation

On April 5, 1999, air sparging points, ASP-1 through ASP-7, were installed onsite at the locations shown on Figure 2. Air sparging points were installed by Vironex of Hayward, California, using a direct push rig equipped with 1-1/2-inch-diameter stainless steel casing. The casings were advanced to a depth of between 26 and 30 feet while collecting soil samples continuously to the total depths of the borings for soil description. No soil samples were collected for laboratory analysis of constituents of concern. After advancing to the desired depths, the air sparging points were installed using ¾-inch-diameter PVC blank casing and pre-pack screened interval for the bottom two feet. The pre-pack screened interval for the air sparging points was manufactured by GeoInsight, which is described in the product literature included in Appendix B. A neat cement slurry was installed as a surface seal from the bottom of the vaults to depths of between 22 to 26 feet below grade.

Soil samples were described in general accordance with the Unified Soils Classification System, including color, moisture, density and consistency. The soil boring logs, including air sparging point construction details, are included in Appendix C.

2.2 Air Sparging Test

An air-sparging test was performed on October 13, 2000 to determine the applicability of this technology at the site. Air Sparging Point ASP-3 was used for air injection, and MW-1 and MW-4 were used as observation wells to monitor the influence of air injection on groundwater elevation and on the concentrations of hydrocarbons in soil vapor and groundwater during the testing. The horizontal distances of Wells MW-1 and MW-4 from the ASP-3 are 28 and 42 feet, respectively.

Before beginning the air-sparging test, groundwater samples were collected from MW-1 and MW-4 using standard purge-and-sample techniques. Following sampling, the groundwater levels were allowed to stabilize before beginning the air sparging test.

The test was conducted by injecting air into Air Sparging Point ASP-3 and measuring changes in differential pressure at Monitoring Wells MW-1 and MW-4. A portable 5-horsepower air compressor equipped with flow monitoring and control devices was used to supply compressed air during the test. Non-petroleum based oil was used in the air compressor, and the air passed through an oil filter before injection. A flexible hose, attached to the compressor and sealed at the ASP-3 wellhead, was used to inject the compressed air. The pressure of air required to displace water is 0.43 pound per square inch (psi) per foot of groundwater column above the air outlet (i.e., the screened interval of air sparging point). In addition, up to 20 psi may be required to achieve initial breakthrough of air into the formation, depending on well construction and the nature of the subsurface soil. The test was started with a low air pressure that was gradually increased until the air pressure was greater than the static head. After

Which is the west line (along ASP-5, -6, and -7)?

breakthrough into the formation was achieved, the air pressure was increased to maximum values that were safe for the equipment and well construction features under evaluation.

A Magnehelic™ differential pressure gauge was connected to the top Monitoring Wells MW-1 and MW-4 with an airtight seal. The pressure gauge was used to determine if the injected air was entering the monitoring wells. The Magnehelic™ differential pressure gauges used in the test had a scale from 0.0 to 5.0 inches of water column (in. WC) with 0.05-in. increment (1.0 in. WC = 0.036 psi; 0.05 in. WC = 0.0018 psi).

Equipment was also used in the field to evaluate the relative concentrations of methane, total hydrocarbons, carbon dioxide, and oxygen in the vapor, which may have emitted from the monitoring wells. As discussed below, however, no field measurements of these constituents were obtained since no vapor emission was observed from the wells.

2.3 Vapor Extraction Test

On October 12, 2000, Alisto performed a soil-vapor extraction test to collect site-specific data for use in evaluating the characteristics of the vadose zone and the technical feasibility and applicability of vapor extraction at the site. The soil vapor extraction test was conducted after obtaining approval from the Bay Area Air Quality Management District (BAAQMD). The field procedures and test results are discussed below.

The equipment used to perform the vapor extraction test consisted of: (1) a 3.0-horsepower Rotron regenerative blower; (2) two vapor-phase activated carbon canisters connected in series; (3) instrumentation for measuring air velocity and vacuum pressure; (4) appurtenant fittings and wellhead connections; and (5) air sample collection equipment. The vacuum blower was used to induce airflow and vacuum in the vapor extraction lines during the test, and the activated carbon canisters were used to treat the off-gas before discharge to the atmosphere. Airflow velocity in the vapor extraction system was measured using a hot-wire anemometer.

Two separate extraction tests were performed, one each on the west and east sides of the vapor extraction line. As shown on Figure 2, the vapor extraction line is a 4-inch-diameter perforated pipe within a "U"-shaped trench, approximately 4 feet below grade. There is separate perforated horizontal piping for each half of the "U"-shaped trench. Monitoring Wells MW-1, MW-2, and MW-4 were used to observe the zone of influence during the vapor extraction test. The horizontal distance of the monitoring wells to the west extraction line ranged from 4 to 50 feet; and to the east line from 14 to 65 feet. Vacuum pressure changes were measured at each monitoring well using Magnehelic™ differential pressure gauges. The influent and effluent hydrocarbon concentrations in the vapor from the carbon canisters were measured using a photoionization detector (PID).

Near the end of the test on the west line, a vapor sample was collected for analysis of specific hydrocarbon constituents. The vapor sample was collected in a 6-liter Summa™ canister from the discharge line, after the blower and before the carbon canisters.

3.0 ANALYTICAL METHODS

The samples collected during this investigation were analyzed by a state-certified laboratory using standard test methods of the U.S. Environmental Protection Agency (USEPA). The field procedures for chain of custody documentation and the laboratory reports and chain of custody records are presented in Appendix D.

A soil vapor sample collected near the end of the test of the west line was analyzed by Air Toxics Ltd., a state-certified laboratory, for the following:

- Total petroleum hydrocarbons as gasoline (TPH-G) using EPA Method TO-3
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method TO-3
- Methyl tert-butyl ether (MTBE) using EPA Method TO-3

Groundwater samples collected from Wells MW-1 and MW-4 before and after the air sparging test were analyzed by McCampbell Analytical, Inc., a state-certified laboratory, for the following:

- TPH-Gusing EPA Methods 5030/8015
- BTEX using EPA Methods 5030/8020
- MTBE using EPA Methods 5030/8020

The laboratory results of the groundwater samples are presented in Table 1 and the results of analysis of vapor samples are presented in Table 2. The laboratory reports are presented in Appendix D.

4.0 SITE GEOLOGY AND HYDROGEOLOGY

The site is approximately 6000 feet northeast of San Francisco Bay and 1500 feet southwest of the Alameda Estuary in Alameda, California, and lies in the Coastal Range geomorphic province that is characterized by northwesterly trending mountains and valleys. San Francisco Bay occupies a Pliocene age structural depression and is underlain by Late Pliocene-Early Pleistocene alluvial sediment. The upper 500 feet of this coarse, poorly sorted sediment is derived mainly from the Sacramento-San Joaquin drainage system. The recent sediment load in this system has been greatly increased by hydraulic mining and farming. Bay mud, the youngest deposit in San Francisco Bay, is a soft, unconsolidated sediment generally consisting of 90 percent clay and silt-size detritus, and is prevalent in the area (Page, 1996). Soil types encountered while drilling during previous investigations consisted primarily of sand with some silt, probably of dune origin.

The shallow groundwater beneath the site, as measured on December 21, 2000, is at approximately 7 feet below ground surface. Review of groundwater elevations since groundwater monitoring began in 1994 revealed seasonal fluctuation of up to 2 feet. As interpreted from the monitoring data, groundwater flow has consistently been in a southeasterly direction with a gradient across the site ranging from 0.007 to 0.03.

5.0 DISCUSSION OF RESULTS

The results of this remedial investigation, based on field observations and laboratory analysis, are discussed below:

5.1 Air Sparging Test

Data collected during the air sparging test is presented in Table 3. The minimum air pressure at which air flow into the subsurface was detected was 30 psi. As pressure was increased to 40 psi, the air flow increased from 2.0 to 3.0 standard cubic feet per minute (scfm).

Pressure changes were not observed in MW-1 or MW-4 at levels above the minimum detectable increment of the field instrument (0.05 in. WC). After terminating the active sparging test, the two monitoring wells were continually observed for an additional hour with no detectable changes in pressure.

Following the test and after the airtight seal at the top of ASP-3 was disconnected, a significant amount of the injected air flowed out of the sparging well, indicating that a substantial amount of the injected air was trapped in or beneath the fine-grained, low permeability zone of the subsurface. Under such conditions and with a longer period for the field test, the radius of influence of the injected air may be significantly greater than as indicated by the results of the short-term test.

Analytical results for the groundwater samples collected from Wells MW-1 and MW-4 before and after the air sparging test are presented in Table 1. Analysis of the sample from MW-1 indicated no difference in the concentrations of dissolved-phase petroleum hydrocarbons before and after the test, and the analytical results for the sample from MW-4, which is approximately 14 feet farther from ASP-3 than MW-1, were inconclusive. The TPH-g and BTEX concentrations detected in the groundwater increased, whereas MTBE concentrations decreased before and after the test.

In summary, the results of field measurements and sample analysis of the short-term air sparging test indicate a radius of influence of less than 28 feet (the horizontal distance between ASP-3 and MW-1). The entrapment of injected air in the subsurface as observed near ASP-3 in combination with vapor extraction, however, could result in a greater radius of influence and enhance the removal of residual hydrocarbons in the groundwater.

5.2 Vapor Extraction Test

During testing of the western portion of the extraction line, soil vapor was extracted at rates of up to 120 scfm and a vacuum pressure of up to 40 in. WC. Vacuum pressure was measured at MW-1 at up to 2.4 in. WC (40 feet from the extraction line), and at higher than 5.0 in. WC (the maximum value of Magnehelic™ differential pressure gauge model used) at Well MW-2 (15 feet from the extraction line). No change in vacuum pressure was observed or measured at MW-4.

In testing the eastern portion of the vapor extraction line, soil vapor was extracted at rates of up to 122 scfm and a vacuum pressure of up to 30 in. WC. The highest vacuum pressure measured was 2.1 in. WC at MW-1 (23 feet from the extraction line) and 2.3 in. WC at MW-2 (50 feet from the extraction line). Similarly, no change in vacuum pressure was observed at MW-4.

Vacuum pressures were measured at observation Wells MW-1 and MW-2 within 10 minutes of the beginning of each test. Well MW-4, which is near the east line and where no change in vacuum pressure was observed during the two tests, differs in construction from the other onsite monitoring wells in that the 2-inch-diameter well casing was installed using direct-push technology. The results of the vapor extraction tests performed at the site are presented in Table 4.

In evaluating the radius of influence of a vapor extraction well, a measured vacuum pressure change of 0.1 to 0.25 in. WC is generally considered to be an indication of the limit or extent of effective soil vapor extraction. At this site, the subsurface vapor extraction system was constructed of horizontal 4-inch PVC perforated casing, surrounding and bisecting the dispenser island area rather than vertical wells. The relatively high pressure vacuum changes observed in the monitoring wells up to 50 feet from the vapor extraction lines indicates that vapor extraction is applicable to this site as remedial technology to address the residual hydrocarbons in the subsurface.

The analytical results of the vapor sample collected near the end of the extraction test of the west line are summarized in Table 2. The results indicate that hydrocarbon concentrations detected in the vapor samples reflect the relatively permeable nature of the subsurface soil and the amount of residual petroleum hydrocarbons in the subsurface soil and groundwater that can be removed by vapor extraction.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this remedial investigation, it is apparent that the **combination of air sparging and vapor extraction technologies is applicable at the site for the remediation of residual hydrocarbons in the subsurface.** With a properly designed vapor extraction and off-gas treatment unit, petroleum hydrocarbon vapors can be effectively removed from the subsurface within a radius of greater than 50 feet of the existing horizontal extraction lines. Air sparging technology in combination with vapor extraction can further enhance the removal of dissolved-phase hydrocarbons in the groundwater.

The results of field-testing and remedial investigation confirm the recommendations set forth in the corrective action plan submitted to the ACHSA in 1999. The recommended corrective action plan using air sparging and vapor extraction technologies should therefore be implemented to comply with the requirements of state and local regulatory agencies.

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Table 1 - Summary of Results of Groundwater Sample Analysis Before and After the Air Sparging Test
Xtra Oil Company Service Station
1701 Park Street, Alameda California

Alisto Engineering Group Project No. 10-210

Monitoring Well	Date of Sampling	Before/ After Test	TPH-G (µg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)
MW-1	10/13/00	Before	77000	3200	15000	3000	13000	ND<200
MW-1	10/13/00	After	75000	3400	14000	2800	13000	ND<200
MW-4	10/13/00	Before	18000	370	910	1100	4200	9300
MW-4	10/13/00	After	49000	680	2400	2000	12000	2000

ABBREVIATIONS:

TPH-G	Total petroleum hydrocarbons as gasoline using EPA Methods 5030/8015
B	Benzene using EPA Methods 5030/8020
T	Toluene using EPA Methods 5030/8020
E	Ethylbenzene using EPA Methods 5030/8020
X	Total xylenes using EPA Methods 5030/8020
MTBE	Methyl tert-butyl ether using EPA Methods 5030/8020
µg/L	Micrograms per liter

Table 2 - Summary of Results of Vapor Sample Analysis
Xtra Oil Company Service Station
1701 Park Street, Alameda California

Alisto Engineering Group Project No. 10-210

Sample Name	Date of Sampling	TPH-G (µg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)
10-210-13-004	10/12/00	120,000	3,100	380	580	720	970

NOTE:

Sample 10-210-13-004 was collected from the untreated effluent near the end of the vapor extraction test performed at the west-side vapor extraction line.

ABBREVIATIONS:

TPH-G	Total petroleum hydrocarbons as gasoline using EPA Methods 5030/8015
B	Benzene using EPA Methods 5030/8020
T	Toluene using EPA Methods 5030/8020
E	Ethylbenzene using EPA Methods 5030/8020
X	Total xylenes using EPA Methods 5030/8020
MTBE	Methyl tert-butyl ether using EPA Methods 5030/8020
µg/L	Micrograms per liter

Table 3 - Summary of Results of Air Sparging Test
Xtra Oil Company Service Station
1701 Park Street, Alameda California

Alisto Engineering Group Project No. 10-210

Date	Time (hr:min)	Elapsed Time (hr:min)	Wellhead Pressure at ASP-3 (psi)	Air-Sparging Test Flow Rate (scfm)	Differential Pressure at MW-1 (in. WC)	Differential Pressure MW-4 (in. WC) (a)	Notes
10/13/00	13:40	0	5.0	ND<1.5	ND<0.05	ND<0.05	
	13:50	0:10	7.5	ND<1.5	ND<0.05	ND<0.05	
	13:57	0:17	10.0	ND<1.5	ND<0.05	ND<0.05	
	14:03	0:23	12.5	ND<1.5	ND<0.05	ND<0.05	
	14:08	0:28	15.0	ND<1.5	ND<0.05	ND<0.05	
	14:11	0:31	17.5	ND<1.5	ND<0.05	ND<0.05	
	14:18	0:38	20.0	ND<1.5	ND<0.05	ND<0.05	
	14:22	0:42	22.5	ND<1.5	ND<0.05	ND<0.05	
	14:25	0:45	25.0	ND<1.5	ND<0.05	ND<0.05	
	14:31	0:51	30.0	2.0	ND<0.05	ND<0.05	
	14:34	0:54	32.5	2.5	ND<0.05	ND<0.05	
	14:36	0:56	35.0	2.8	ND<0.05	ND<0.05	
	14:42	1:02	40.0	3.0	ND<0.05	ND<0.05	
	14:46	1:06	40.0	3.0	ND<0.05	ND<0.05	
	14:50	1:10	40.0	3.0	ND<0.05	ND<0.05	
	14:54	1:14	40.0	3.0	ND<0.05	ND<0.05	
	14:58	1:18	40.0	3.0	ND<0.05	ND<0.05	(b)
	15:10	1:30	0.0	0.0	ND<0.05	ND<0.05	
	15:30	1:50	0.0	0.0	ND<0.05	ND<0.05	
	16:00	2:20	0.0	0.0	ND<0.05	ND<0.05	

Notes:

hr:min	hours:minutes
psi	pounds per square inch
scfm	standard cubic feet per minute
in. WC	inches of water column (a unit of pressure/vacuum measurement)
(a)	1.0 inch of Water Column equals approximately 0.036 psi.
(b)	Pressure Gauge at wellhead broke; air injection was discontinued.

Table 4 - Summary of Results of Vapor Extraction Test
Xtra Oil Company Service Station
1701 Park Street, Alameda California

Alisto Engineering Group Project No. 10-210

Date	Time (hr:min)	Elapsed Time (hr:min)	Applied Vacuum (in. WC) (a)	Blower Effluent Pressure (in. WC) (b)	Flowrate Velocity (fpm)	Calculated Flowrate (scfm)	Measured Hydrocarbon Concentration (ppmv)	Differential Pressure Changes MW-1 (in. WC)	MW-2 (in. WC)	MW-4 (in. WC)
10/12/00	West Side Vapor Extraction Line									
	13:06	0	34	26	6,400	140 (c)	105	< 0.05	< 0.05	< 0.05
	13:10	0:04	40	26	5,600	122 (d)	130	2.0	4.5	< 0.05
	13:16	0:10	40	26	5,400	118	128	2.3	> 5.0	< 0.05
	13:26	0:20	40	26	5,700	124	133	2.4	> 5.0	< 0.05
	13:38	0:32	40	26	5,200	113	138	2.4	> 5.0	< 0.05
	13:45	0:39	39	27	5,200	113	140	2.3	> 5.0	< 0.05
10/12/00	East Side Vapor Extraction Line									
	14:00	0	30	34	5,600	122 (d)	189	< 0.05	< 0.05	< 0.05
	14:10	0:10	30	33	5,300	116	197	2.1	2.3	< 0.05
	14:20	0:20	30	33	5,400	118	208	2.1	2.3	< 0.05
	14:30	0:30	30	33	5,200	113	210	2.1	2.3	< 0.05

Notes:

hr:min Hours:minutes
in. WC Inches of water column (a unit of pressure/vacuum measurement)
fpm Feet per minute
ppmv Parts per million by volume
scfm Standard cubic feet per minute

(a) 1.0 inch of Water Column equals approximately 0.036 psi.
(b) Blower effluent pressure is the pressure in the blower effluent line prior to the first carbon treatment vessel.
(c) Ambient air inlet open.
(d) Ambient air inlet closed.

SOURCE:
USGS MAP, OAKLAND WEST AND EAST QUADRANGLE,
7.5 MINUTE SERIES. 1959.
PHOTOREVISED 1980.

N

0 1000' 2000'

QUADRANGLE LOCATION

FIGURE 1

SITE VICINITY MAP

XTRA OIL COMPANY SERVICE STATION
1701 PARK STREET
ALAMEDA, CALIFORNIA

PROJECT NO. 10-210

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

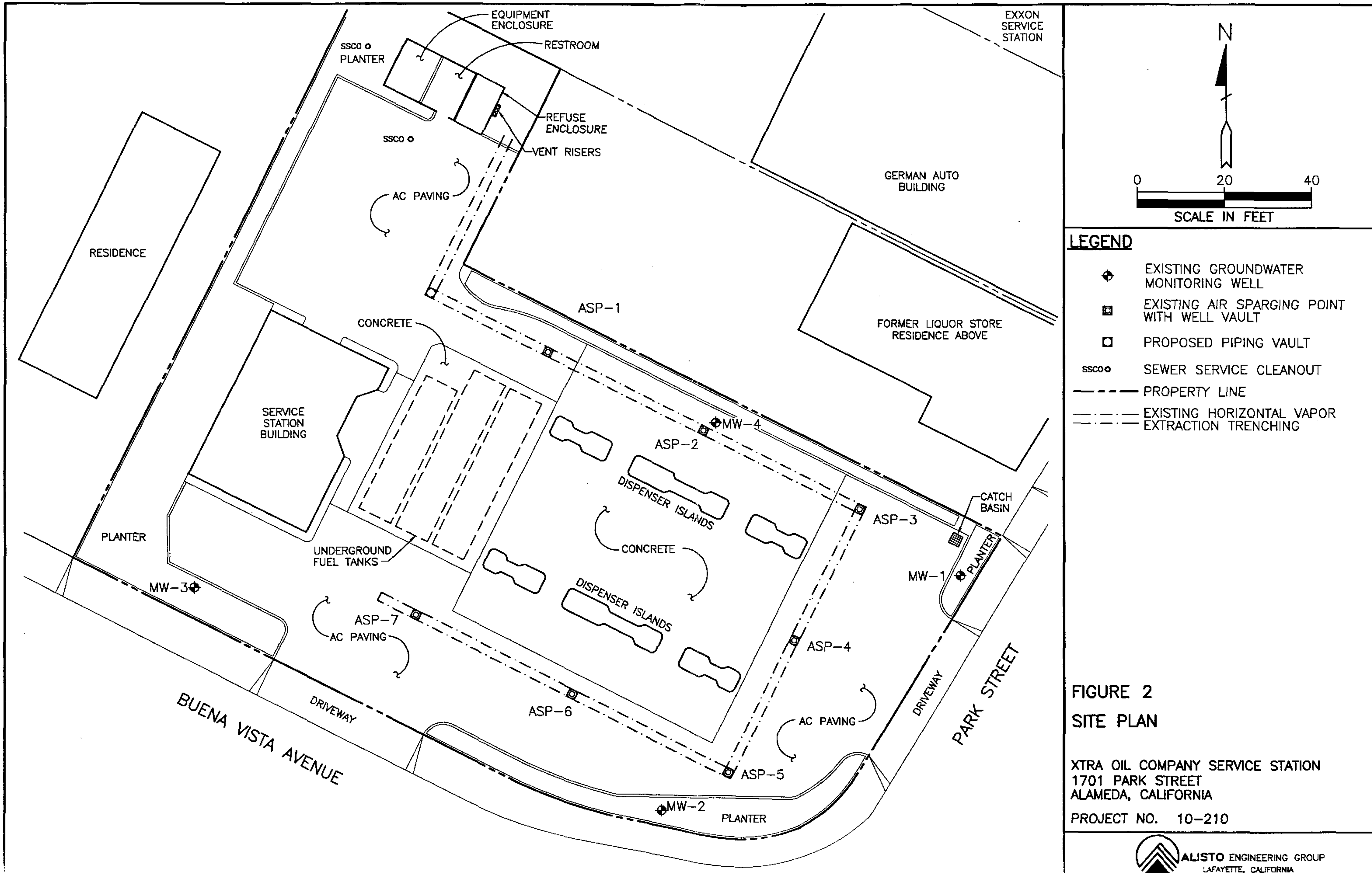


FIGURE 2

SITE PLAN

XTRA OIL COMPANY SERVICE STATION
1701 PARK STREET
ALAMEDA, CALIFORNIA

PROJECT NO. 10-210

ALISTO ENGINEERING GROUP
LAFAYETTE, CALIFORNIA

PUBLIC WORKS
Transportation · Buildings · Water Resources

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 Elmhurst St.
Hayward, Ca 94544
510)670-5554
FAX-510)782-1939

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 1701 Park St
Alameda, CA

California Coordinates Source ~~_____~~ ft. Accuracy ± ~~_____~~ ft.
CCN ~~_____~~ ft. CCE ~~_____~~ ft.
APN ~~_____~~

CLIENT
Name Xtra Oil Company
Address 2307 Pacific Ave Phone
City Alameda, CA Zip 94501

APPLICANT
Name Alisto Engineering
Address 1575 Treat Blvd #[illegible] Fax 925 295-1823
City Walnut Creek CA Phone 925 295 1650 Zip 94598

TYPE OF PROJECT
Well Construction
Cathodic Protection ☐
Water Supply ☐
Monitoring ☐
Air sparging point ☒
Geotechnical Investigation
General ☐
Contamination ☐
Well Destruction ☐

PROPOSED WATER SUPPLY WELL USE
New Domestic ☐
Municipal ☐
Industrial ☐
Replacement Domestic ☐
Irrigation ☐
Other ______ ☐

DRILLING METHOD:
Mud Rotary ☐
Cable ☐
Air Rotary ☐
Auger ☐
Other ☒ Direct Push

DRILLER'S LICENSE NO. C57-705927

WELL PROJECTS
Drill Hole Diameter 2 in.
Casing Diameter 3/4 in.
Surface Seal Depth 25 ft.
Maximum Depth 30 ft.
Number 7

GEOTECHNICAL PROJECTS
Number of Borings ______
Hole Diameter ______ in.
Maximum Depth ______ ft.

ESTIMATED STARTING DATE 4/5/00
ESTIMATED COMPLETION DATE 4/6/00

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE [signature] DATE 3/29/00

FOR OFFICE USE

PERMIT NUMBER W00-145
WELL NUMBER ______
APN ______

PERMIT CONDITIONS

Circled Permit Requirements Apply

A. GENERAL
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
2. Submit to ACPWA within 60 days after completion of permitted work the original Department of Water Resources Well Completion Report.
3. Permit is void if project not begun within 90 days of approval date.

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. GEOTECHNICAL
Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

E. CATHODIC
Fill hole above anode zone with concrete placed by tremie.

F. WELL DESTRUCTION
See attached.

G. SPECIAL CONDITIONS

APPROVED [signature] DATE 4-4-00

APPENDIX B

LITERATURE OF AIR SPARGING POINT PRE-PACK CONSTRUCTION

INTRODUCTION

The use of direct push technology for subsurface investigations has increased dramatically over the last decade. When geologic conditions permit, direct push has become the preferred method for conducting site assessments. Direct push methods provide rapid, inexpensive collection of groundwater, soil gas, and soil samples. The non-intrusive process also generates little or no drilling waste, greatly reducing disposal costs.

Direct push water sampling was formerly used mainly for one time, discrete interval sampling. Recent emphasis on monitored natural attenuation for groundwater remediation has sparked a great deal of interest in the advantages of direct push installation of long term monitoring devices. At the same time, a wide array of small diameter sampling tools and instrumentation has become available, making the use of small diameter sampling points more feasible for an expanding range of applications.

The GeoInsight Advantage

The products in this catalog are designed from the bottom up to provide superior tools for long term monitoring and remediation using direct push methods.

During development, we did not try to satisfy traditional monitoring well requirements. Mostly derived from production well and geotechnical drilling specifications, these require a large diameter hole (no problem with a drill rig!) and focus on optimizing well yield, pump efficiency, and sand control.

Instead, we focused on delivering the best direct push sample point possible, making sample quality the number one priority. Our sole objective was to create a system that will provide groundwater samples representative of *in situ* conditions with minimal disturbance to the subsurface environment.

Benefits of this approach include:

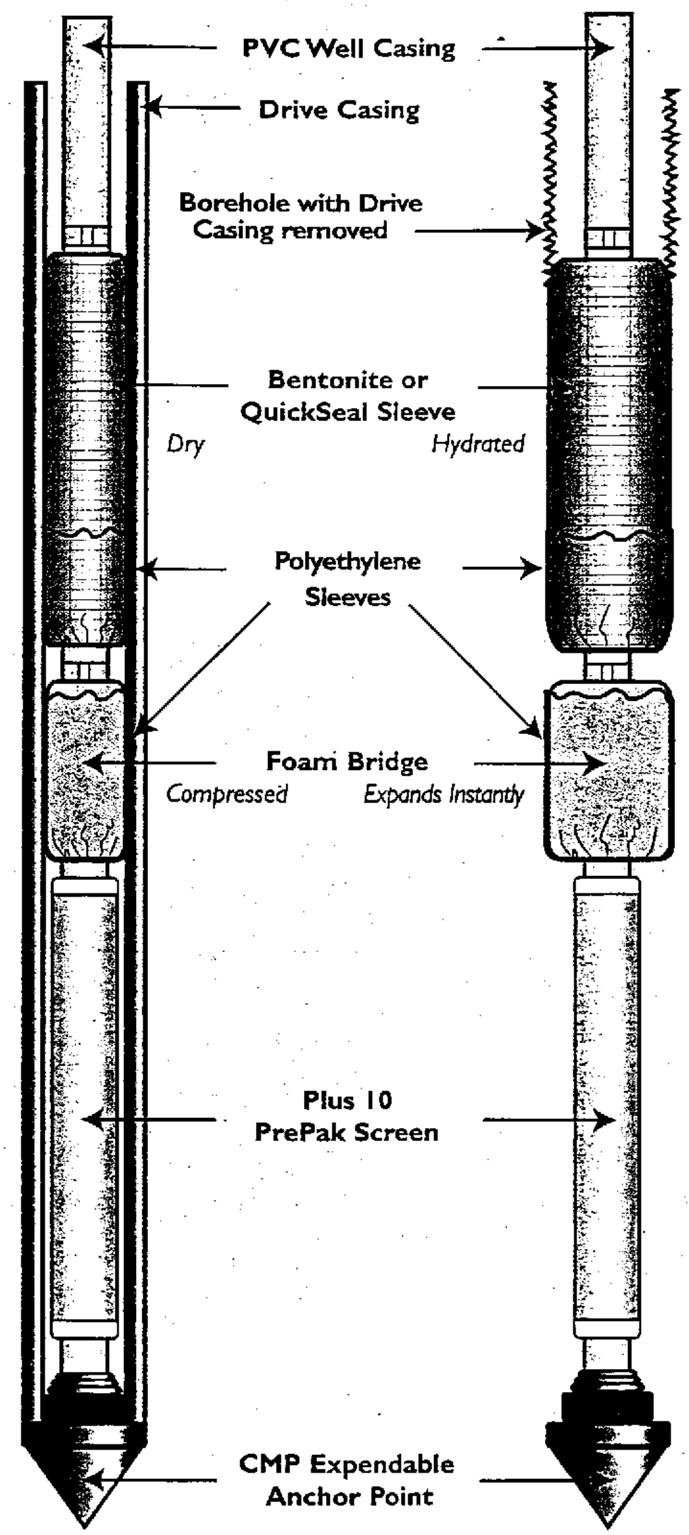
- Extremely high open area (>20%) improves communication with the aquifer and upgrades performance in low-flow or passive sampling and/or low yield wells.
- Availability of ultra-fine sand pack lowers turbidity by orders of magnitude and retards or eliminates sample point siltation.
- Small annular space between the casing and the hole is easily sealed using expanding seals attached to the casing.
- Compatibility with almost all direct push equipment without expensive special adapters.

GeoInsight tools work with almost all probe, cone penetrometer, and drill rigs. All our 3/4" sampling equipment will fit inside readily available 2-1/8" or 2" O.D. direct push drive casing used with probing and CPT rigs. 1-1/4" models fit inside 2.5" I.D. casing, and 2" models fit inside 2.875" I.D. casing.

These simple modular tools save time and money while increasing sample quality and repeatability.

GeoInsight Groundwater Access Port

During installation (left) — After retracting drive casing (right)



APPENDIX C

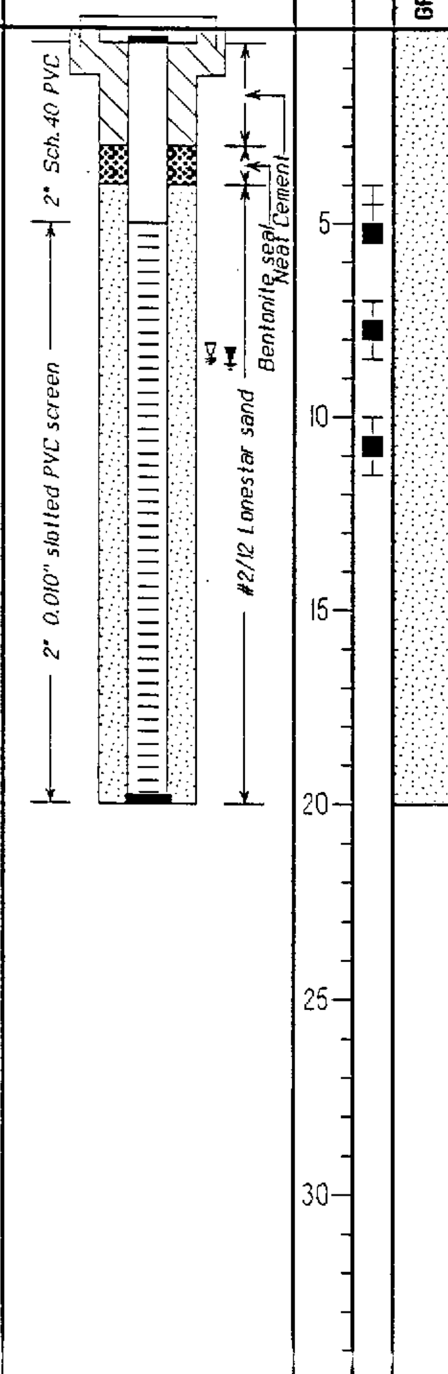
BORING LOGS AND AIR SPARGING POINT CONSTRUCTION DETAILS

LOG OF BORING MW-1

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

SEE SITE PLAN

ALISTO PROJECT NO: 10-210-03	DATE DRILLED: 10/20/94
CLIENT: Xtra Oil Company	
LOCATION: 1701 Park Street, Alameda, California	
DRILLING METHOD: Hollow Stem Auger (8")	
DRILLING COMPANY: Soils Exploration Services	CASING ELEVATION: 19.49 'MSL
LOGGED BY: John DeGeorge	APPROVED BY: Al Sevilla



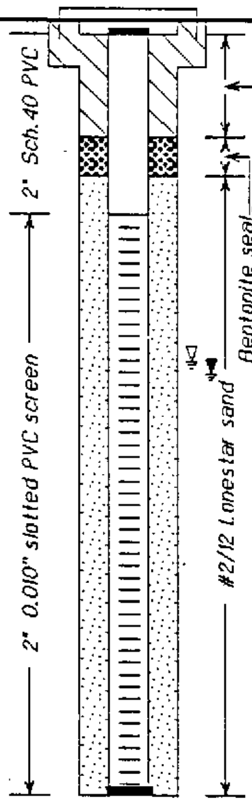
BLOWS/6 IN.	PID VALUES	DEPTH feet	SOIL CLASS	GEOLOGIC DESCRIPTION
			SP	Planter-Topsoil
				SAND: brown, moist, medium dense; very fine- to fine-grained sand; trace silt.
9,12,15	18	5		
7,7,9	684			Same: dark green, very moist.
21,27,30	245	10		Same: wet to saturated, very dense.

LOG OF BORING MW-2

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

SEE SITE PLAN

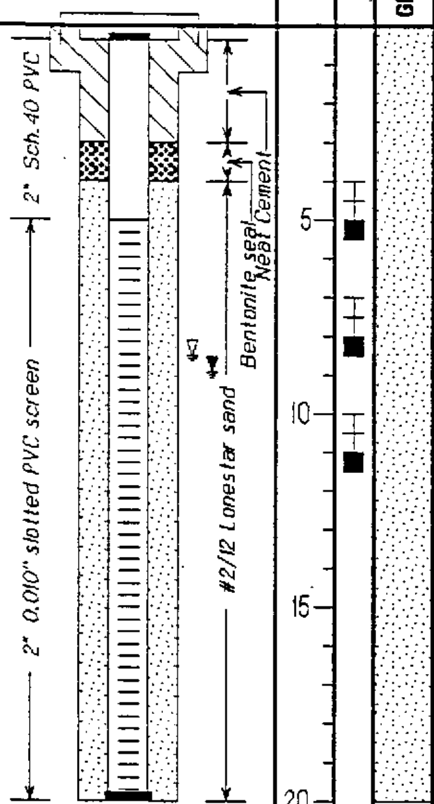
ALISTO PROJECT NO: 10-210-03 DATE DRILLED: 10/20/94
CLIENT: Xtra Oil Company
LOCATION: 1701 Park Street, Alameda, California
DRILLING METHOD: Hollow Stem Auger (8")
DRILLING COMPANY: Soils Exploration Services CASING ELEVATION: 20.29 'MSL
LOGGED BY: John DeGeorge APPROVED BY: Al Sevilla

BLOWS/6 IN.	PID VALUES	WELL DIAGRAM	DEPTH feet	SAMPLES	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						SP	Planter-Topsoil
							SAND: olive/green, moist, medium dense; very fine- to fine-grained sand; trace silt.
10,14,18	87		5				
13,20,19	559						Same: dense.
20,24,26	153		10				Same: light brown, wet to saturated.
			15				
			20				
			25				
			30				

ALISTO ENGINEERING GROUP WALNUT CREEK, CALIFORNIA	LOG OF BORING MW-3	Page 1 of 1

SEE SITE PLAN

ALISTO PROJECT NO: 10-210-03	DATE DRILLED: 10/20/94
CLIENT: Xtra Oil Company	
LOCATION: 1701 Park Street, Alameda, California	
DRILLING METHOD: Hollow Stem Auger (8")	
DRILLING COMPANY: Soils Exploration Services	CASING ELEVATION: 20.58 'MSL
LOGGED BY: John DeGeorge	APPROVED BY: Al Sevilla



BLOWS/6 IN.	PID VALUES	DEPTH feet	SOIL CLASS	GEOLOGIC DESCRIPTION
		0	SP	Planter-Topsoil
				SAND: brown, moist, medium dense; very fine- to fine-grained sand; tree roots present.
14,10,9	0	5		
10,15,18	0			Same: moist to wet; silt to 10-15%.
10,14,29	0	10		Same: light brown, wet to saturated, little or no fines.
		15		
		20		
		25		
		30		

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

LOG OF WELL MW-4

SEE SITE PLAN

ALISTO PROJECT NO: 10-210-07 DATE DRILLED: 04/23/97

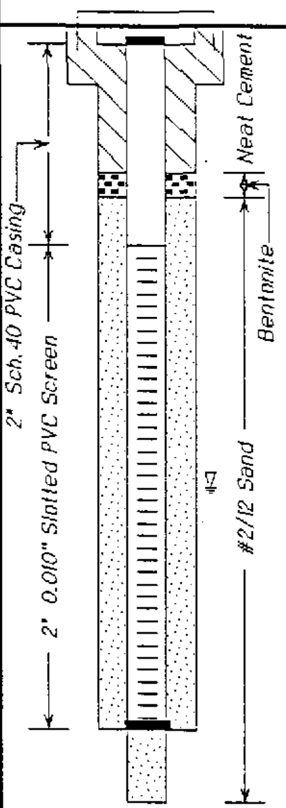
CLIENT: Xtra Oil Company Service Station

LOCATION: 1707 Park Street, Alameda, California

DRILLING METHOD: Hand auger/Direct push (6"/3"); 2 split spoon

DRILLING COMPANY: Precision Sampling, Inc. CASING ELEVATION:

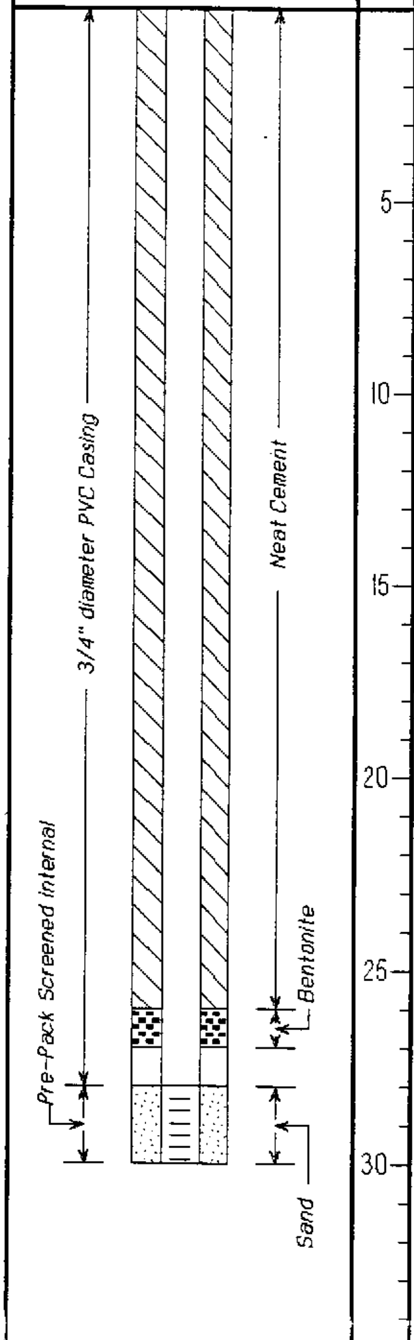
LOGGED BY: Brady Nagle APPROVED BY: Al Sevilla

PID VALUES	WELL DIAGRAM	DEPTH feet	SAMPLES	GEOLOGIC DESCRIPTION
				Planted area: import to 1 foot, some gravel at 1/2 foot.
				Sand with Silt: light brown, damp.
		4		
109			■	Color change to olive-gray at 5.5'.
		8		Same: increase in clay content.
603				Same: moisture change to wet at 9.5'.
		12	■	Color change to light brown at 12.5'.
		16		Boring terminated at 16 feet.
		20		
		24		

ALISTO ENGINEERING GROUP LAFAYETTE, CALIFORNIA	LOG OF WELL ASP-1	*Page 1 of 0*

SEE SITE PLAN		
	ALISTO PROJECT NO: *10-210*	DATE DRILLED: *04/05/00*
	CLIENT: *Xtra Oil Company.*	
	LOCATION: *1701 Park St. Alameda.*	
	DRILLING METHOD: *Direct-push using 1-1/2" diameter Casing*	
	DRILLING COMPANY: *Vironex*	CASING ELEVATION: *N/A*
	LOGGED BY: *B. Nagle*	*APPROVED BY: Al Sevilla*

WELL DIAGRAM	DEPTH feet	GEOLOGIC DESCRIPTION



Constructed in existing utility vault

Clayey to silty sand, gray green, moist, fine grained sand.

Wet at 8 feet.

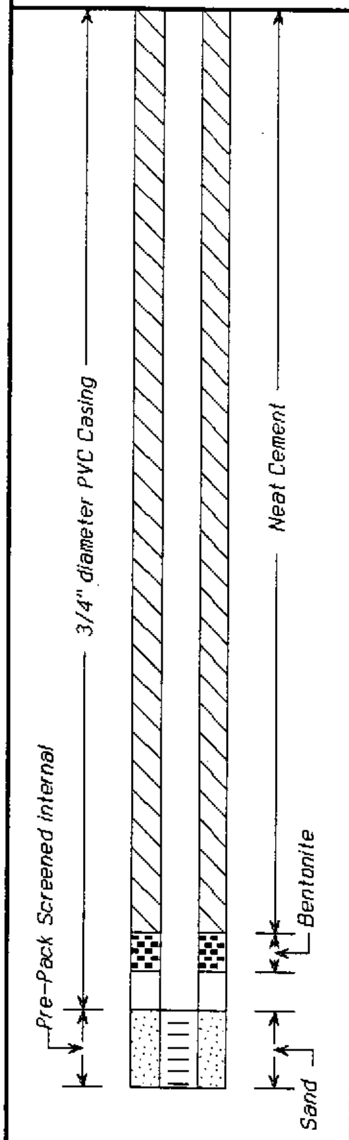
ALISTO ENGINEERING GROUP
LAFAYETTE, CALIFORNIA

LOG OF WELL ASP-2

SEE SITE PLAN

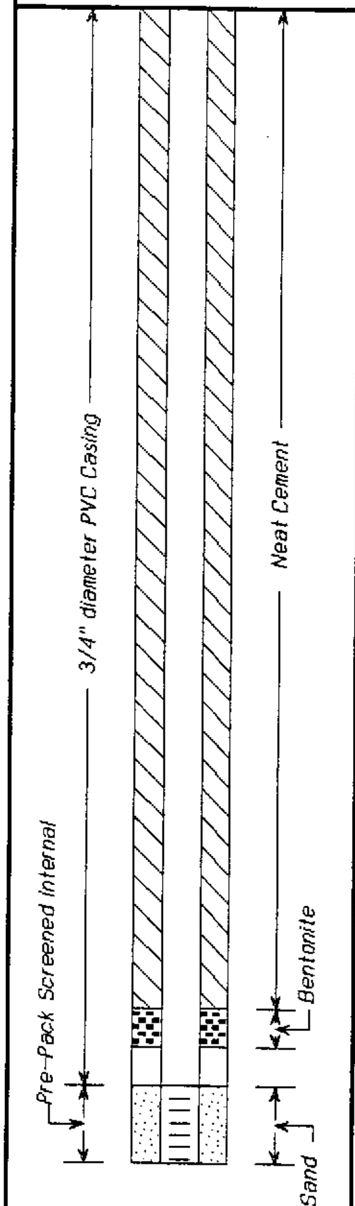
ALISTO PROJECT NO: *10-210*	DATE DRILLED: *04/05/00*
CLIENT: *Xtra Oil Company.*	
LOCATION: *1701 Park St. Alameda.*	
DRILLING METHOD: *Direct-push using 1-1/2" diameter Casing*	
DRILLING COMPANY: *Vironex*	CASING ELEVATION: *N/A*
LOGGED BY: *B. Nagle*	APPROVED BY: *Al Sevilla*

WELL DIAGRAM	DEPTH feet	GEOLOGIC DESCRIPTION
		Constructed in existing utility vault
	5	Clayey to silty sand, gray green, moist, fine grained sand.
		Wet at 8 feet.
	10	
	15	
	20	
	25	
	30	



ALISTO ENGINEERING GROUP LAFAYETTE, CALIFORNIA	# LOG OF WELL ASP-3	*Page 1 of 0*

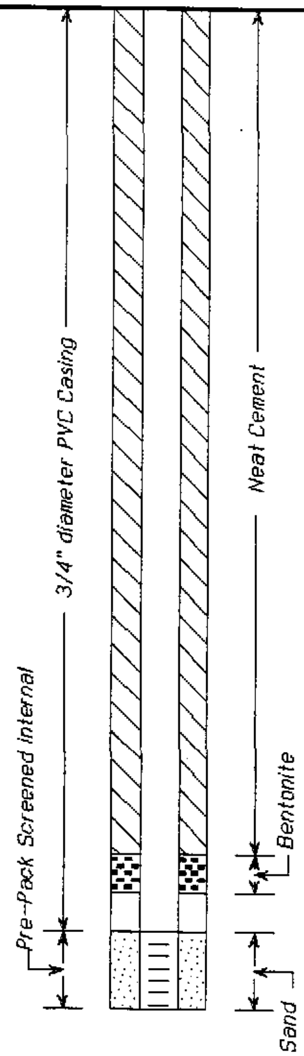
SEE SITE PLAN	
	ALISTO PROJECT NO: *10-210* DATE DRILLED: *04/05/00*
	CLIENT: *Xtra Oil Company.*
	LOCATION: *1701 Park St. Alameda.*
	DRILLING METHOD: *Direct-push using 1-1/2" diameter Casing*
	DRILLING COMPANY: *Vironex* CASING ELEVATION: *N/A*
	LOGGED BY: *B. Nagle* APPROVED BY: *Al Sevilla*

WELL DIAGRAM	DEPTH feet	GEOLOGIC DESCRIPTION
		Constructed in existing utility vault
	5	Clayey to silty sand, gray green, moist, fine grained sand.
		Wet at 8 feet.
	10	
	15	
	20	
	25	
	30	

ALISTO ENGINEERING GROUP
LAFAYETTE, CALIFORNIA

LOG OF WELL ASP-4

SEE SITE PLAN	ALISTO PROJECT NO: *10-210* DATE DRILLED: *04/05/00*
	CLIENT: *Xtra Oil Company.*
	LOCATION: *1701 Park St. Alameda.*
	DRILLING METHOD: *Direct-push using 1-1/2" diameter Casing*
	DRILLING COMPANY: *Vironex* CASING ELEVATION: *N/A*
	LOGGED BY: *B. Nagle* APPROVED BY: *Al Sevilla*

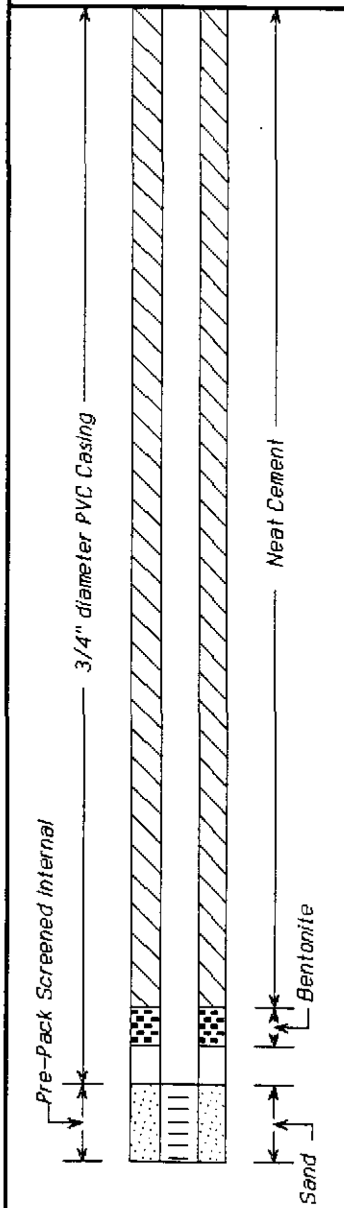
WELL DIAGRAM	DEPTH feet	GEOLOGIC DESCRIPTION
		Constructed in existing utility vault
	5	Clayey to silty sand, gray green, moist, fine grained sand.
		Wet at 8 feet.
	10	
	15	
	20	
	25	
	30	

ALISTO ENGINEERING GROUP
LAFAYETTE, CALIFORNIA

LOG OF WELL ASP-5

SEE SITE PLAN

ALISTO PROJECT NO: 10-210	DATE DRILLED: 04/05/00
CLIENT: Xtra Oil Company.	
LOCATION: 1701 Park St. Alameda.	
DRILLING METHOD: Direct-push using 1-1/2" diameter Casing	
DRILLING COMPANY: Vironex	CASING ELEVATION: N/A
LOGGED BY: B. Nagle	APPROVED BY: Al Sevilla

WELL DIAGRAM	DEPTH feet	GEOLOGIC DESCRIPTION
		Constructed in existing utility vault
	5	Clayey to silty sand, gray green, moist, fine grained sand.
		Wet at 8 feet.
	10	
	15	
	20	
	25	
	30	

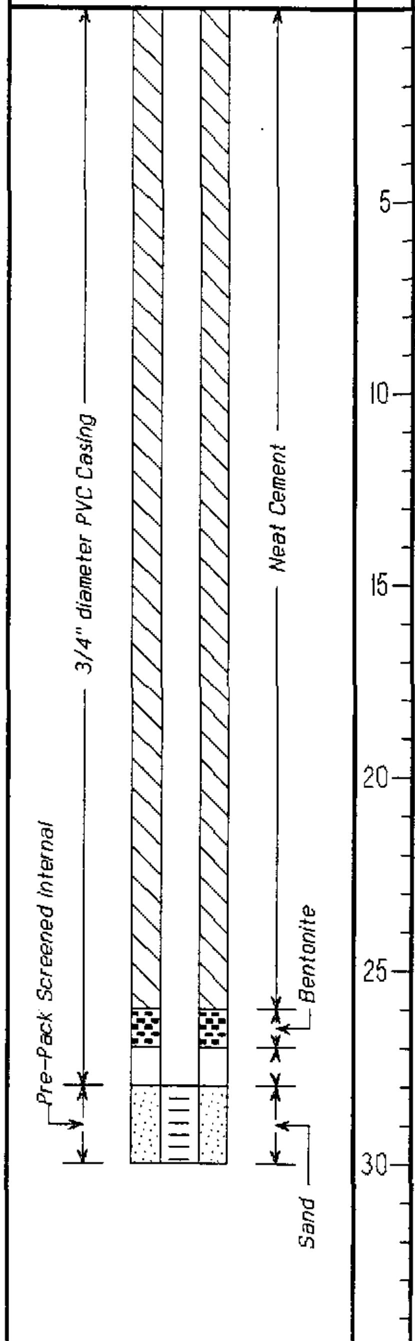
ALISTO ENGINEERING GROUP
LAFAYETTE, CALIFORNIA

LOG OF WELL ASP-6

ALISTO PROJECT NO: *10-210*	DATE DRILLED: *04/05/00*
CLIENT: *Xtra Oil Company.*	
LOCATION: *1701 Park St. Alameda.*	
DRILLING METHOD: *Direct-push using 1-1/2" diameter Casing*	
DRILLING COMPANY: *Vironex*	CASING ELEVATION: *N/A*
LOGGED BY: *B. Nagle*	APPROVED BY: *Al Sevilla*

SEE SITE PLAN

WELL DIAGRAM | **DEPTH feet** | **GEOLOGIC DESCRIPTION**



Constructed in existing utility vault

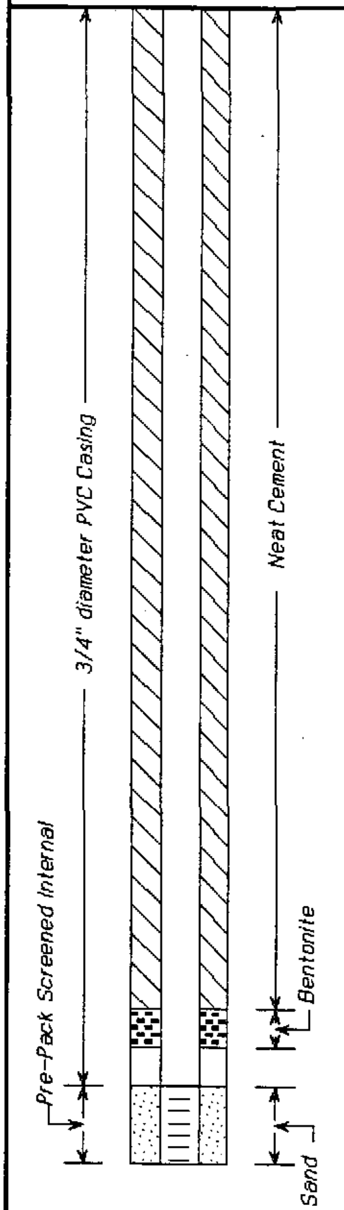
Clayey to silty sand, gray green, moist, fine grained sand.

Wet at 8 feet.

Same, some yellow-brown mottling.

ALISTO ENGINEERING GROUP LAFAYETTE, CALIFORNIA	LOG OF WELL ASP-7	*Page 1 of 0*

SEE SITE PLAN	ALISTO PROJECT NO: *10-210*	DATE DRILLED: *04/05/00*
	CLIENT: *Xtra Oil Company.*	
	LOCATION: *1701 Park St. Alameda.*	
	DRILLING METHOD: *Direct-push using 1-1/2" diameter Casing*	
	DRILLING COMPANY: *Vironex*	CASING ELEVATION: *N/A*
	LOGGED BY: *B. Nagle*	*APPROVED BY: Al Sevilla*

WELL DIAGRAM	DEPTH feet	GEOLOGIC DESCRIPTION
		Constructed in existing utility vault
	5	Clayey to silty sand, gray green, moist, fine grained sand.
		Wet at 8 feet.
	10	
	15	
	20	
	25	
	30	

APPENDIX D

FIELD PROCEDURES FOR CHAIN OF CUSTODY DOCUMENTATION, LABORATORY REPORTS, AND CHAIN OF CUSTODY RECORDS

FIELD PROCEDURES
FOR
CHAIN OF CUSTODY DOCUMENTATION

Samples were handled in accordance with the California Department of Health Services' guidelines. Each sample was labeled in the field and groundwater samples were immediately stored in an iced cooler for transport to a state-certified laboratory for analysis.

A chain of custody record accompanied the samples and included the site and sample identification, date of collection, analysis requested, and the name and signature of the sampling technician. When transferring possession of the samples, the transferee signed and dated the chain of custody record.

McCAMPBELL ANALYTICAL INC.	110 2nd Avenue South, #D7, Pacheco, CA 94553-5560 Telephone : 925-798-1620 Fax : 925-798-1622 http://www.mccampbell.com E-mail: main@mccampbell.com

Alisto Engineering Group 3732 Mt. Diablo Blvd. Ste 270 Lafayette, CA 94549	Client Project ID: #10-210-13-004	Date Sampled: 10/13/00
		Date Received: 10/17/00
	Client Contact: Steve Brugee	Date Extracted: 10/17/00
	Client P.O:	Date Analyzed: 10/17/00

10/24/00

Dear Steve:

Enclosed are:

1). the results of 4 samples from your **#10-210-13-004** project,

2). a QC report for the above samples

3). a copy of the chain of custody, and

4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Alisto Engineering Group 3732 Mt. Diablo Blvd. Ste 270 Lafayette, CA 94549	Client Project ID: #10-210-13-004	Date Sampled: 10/13/00
		Date Received: 10/17/00
	Client Contact: Steve Brugee	Date Extracted: 10/17/00
	Client P.O:	Date Analyzed: 10/17/00

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g)+	MTBE	Benzene	Toluene	Ethyl-benzene	Xylenes	% Recovery Surrogate
50591	MW-4 Before	W	18,000,a	9300	370	910	1100	4200	101
50592	MW-4 After	W	49,000,a	2000	680	2400	2000	12,000	102
50593	MW-1 Before	W	77,000,a	ND<200	3200	15,000	3000	13,000	101
50594	MW-1 After	W	75,000,a	ND<200	3400	14,000	2800	13,000	99
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/L	5.0	0.5	0.5	0.5	0.5	
		S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

cluttered chromatogram; sample peak coelutes with surrogate peak

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

DHS Certification No. 1644

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.
110 2nd Ave. South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

QC REPORT

Date: 10/17/00 Matrix: Water

Extraction: N/A

Compound	Concentration: ug/L				%Recovery		RPD
	Sample	MS	MSD	Amount Spiked	MS	MSD	
SampleID: 101600					**Instrument: GC-12**		
Surrogate1	0.000	97.0	95.0	100.00	97	95	2.1
Xylenes	0.000	311.0	315.0	300.00	104	105	1.3
Ethyl Benzene	0.000	105.0	105.0	100.00	105	105	0.0
Toluene	0.000	102.0	102.0	100.00	102	102	0.0
Benzene	0.000	104.0	104.0	100.00	104	104	0.0
MTBE	0.000	100.0	97.0	100.00	100	97	3.0
GAS	0.000	940.2	812.0	1000.00	94	81	14.6
SampleID: 101700					**Instrument: MB-1**		
Oil & Grease	0.000	19.6	19.4	20.00	98	97	1.0
SampleID: 101700					**Instrument: GC-11 B**		
Surrogate1	0.000	119.0	120.0	100.00	119	120	0.8
TPH (diesel)	0.000	315.0	327.0	300.00	105	109	3.7

$$\% \text{ Recovery} = \frac{(MS - Sample)}{AmountSpiked} \cdot 100$$

$$RPD = \frac{(MS - MSD)}{(MS + MSD)} \cdot 2 \cdot 100$$

RPD means Relative Percent Deviation

ALISTO ENGINEERING GROUP
CHAIN OF CUSTODY

Project Information:
Project No: 10-210-13-004
Project Title:
Location: Park St. Alameda, CA
Sampler's Name: (print) Mike Wallace/Zac Leonard
Sampler's Signature:

Report To:
Consultant: Alisto Engineering Group
Address: 3732 Mt. Diablo Boulevard, Suite 270, Lafayette, CA 94549
Contact: ~~Brady Nagle~~ Steve Brusee
Phone: (925) 962-6970
Fax: (925) 962-6971

Bill To:
Consultant: Alisto Engineering
Address: 3732 Mt. Diablo Boulevard, Suite 270, Lafayette, CA 94549

Samples Submitted To:
Laboratory:
Address:
Contact:
Phone:
Fax:
Date Results Required:
Date Report Required:

TURN AROUND TIME
RUSH ☐ 24 Hour ☐ 48 Hour ☐ 5 Day ☒ Standard (10-14 days) ☐

Sampled on: 10/13/00

Sample ID.	~~Date~~ Time	# Containers	Matrix	TPH-G	BTEX	MTBE	COMMENTS Container / Preservative
MW-4 Before	1242	3	Water	X	X	X	50591
MW-4 After	1529	↓	↓	↓	↓	↓	50592
MW-1 Before	1249	↓	↓	↓	↓	↓	50593
MW-1 After	1525	↓	↓	↓	↓	↓	50594

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
M Wallace	10/17/00	345	Alva Venegas	10/17	3:45

SPECIAL INSTRUCTIONS:

VOAS | O&G | METALS | OTHER
ICE
PRESERVATION
GOOD CONDITION
APPROPRIATE
HEAD SPACE ABSENT
CONTAINERS

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0010421

Work Order Summary

CLIENT:	Mr. Pete Beaver Alisto Engineering Group 3732 Mt. Diablo Blvd. Suite 270 Lafayette, CA 94549	**BILL TO:**	Mr. Larry Buenvenida Alisto Engineering Group 3732 Mt. Diablo Blvd. Suite 270 Lafayette, CA 94549
PHONE:	925-962-6970	**P.O. #**	10-210-13-004
FAX:	925-962-6971	**PROJECT #**	10-210-13-004 Xtra Oil
DATE RECEIVED:	10/24/00		
DATE COMPLETED:	11/6/00		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	10-210-13-004	TO-3	5.0 "Hg
02A	Lab Blank	TO-3	NA

CERTIFIED BY: ______________________ DATE: 11/29/00
Laboratory Director

Certfication numbers: CA ELAP - 1149, NY ELAP - 11291, UT ELAP - E-217, AZ ELAP - AZ0567

180 BLUE RAVINE ROAD. SUITE B FOLSOM. CA - 95630
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LABORATORY NARRATIVE
TO-3
Alisto Engineering Group
Workorder# 0010421

One 6 Liter Summa Canister sample was received on October 24, 2000. The laboratory performed analysis via modified EPA Method TO-3 for Methyl tert-Butyl Ether (MTBE), Benzene, Toluene, Ethylbenzene, Xylenes and Total Petroleum Hydrocarbons (TPH). MTBE and BTEX were analyzed via GC/PID and TPH via GC/FID. The TPH results are calculated using the response of Gasoline. The method involves concentrating up to 200 mL of sample. The concentrated aliquot is then dry purged to remove water vapor prior to entering the chromatographic system. See the data sheets for the reporting limits for each compound.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.

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SAMPLE NAME: 10-210-13-004

ID#: 0010421-01A

EPA METHOD TO-3 GC/PID/FID

File Name:	**d102610**	**Date of Collection:**	**10/12/00**
Dil. Factor:	**6850**	**Date of Analysis:**	**10/26/00**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	6.8	22	950 M	3100 M
Toluene	6.8	26	100	380
Ethyl Benzene	6.8	30	130	580
Total Xylenes	6.8	30	160	720
TPH (C2+ Hydrocarbons) ref. to Gasoline	170	710	29000	120000
Methyl tert-Butyl Ether	6.8	25	260	970

M = Reported value may be biased due to apparent matrix interferences.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Fluorobenzene (PID)	118	75-125
Fluorobenzene (FID)	118	75-125

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SAMPLE NAME: Lab Blank

ID#: 0010421-02A

EPA METHOD TO-3 GC/PID/FID

File Name:	**d102606**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 10/26/00**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.0010	0.0032	Not Detected	Not Detected
Toluene	0.0010	0.0038	Not Detected	Not Detected
Ethyl Benzene	0.0010	0.0044	Not Detected	Not Detected
Total Xylenes	0.0010	0.0044	Not Detected	Not Detected
TPH (C2+ Hydrocarbons) ref. to Gasoline	0.025	0.10	Not Detected	Not Detected
Methyl tert-Butyl Ether	0.0010	0.0037	Not Detected	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Fluorobenzene (PID)	94	75-125
Fluorobenzene (FID)	93	75-125

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CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice
Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922

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Contact Person Steven J. Brussee
Company ALISTO ENGINEERING GROUP
Address 3732 mt. Diablo Blvd #270 City Lafayette State CA Zip 94549
Phone 925 962 6970 FAX 925 962 6971
Collected By: Signature [signature]

Project info:
P.O. # 10-210-13-004
Project # 10-120-13-004
Project Name Xtra Oil

Turn Around Time:
☒ Normal
☐ Rush ______ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
01A	10-210-13-004	10/12/00 1340	TPH-g, BTEX, MTBE	27"	5"	5" Hg

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Date/Time
[signature]	10/23/00 1345	to FEDEX	
		Aasha Amy AT	10/24/00 9:10

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By:	Temp. (°C)	Condition	Custody Seals Intact? Yes No None	Work Order #
	FEDEX	821423355537	AS	ambient	good	None	0010421

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