BP OIL

BP Oil Company
Aetna Bldg., Suite 360
2868 Prospect Park Drive
Rancho Cordova, California 95670-6020
(916) 631-0733

August 23, 1991

Mr. Rafat Shahid
Alameda County Department of Health Services
80 Swan Way, Suite 200
Oakland, CA 94621

RE: **BP OIL FACILITY #11133**
2220 98 AVENUE
OAKLAND, CALIFORNIA

Dear Mr. Shahid,

Attached please find the Supplemental Site Investigation Study for the subject facility.

If you have any questions please call me at 916/631-6919.

Respectfully,

Peter J. DeSantis
Environmental Resource Management

PJD:lk

cc: Tom Callaghan - RWQCB, San Francisco Bay Region
J.R. Rocco - BP Oil, Cleveland
D.J. Baker - Mobil Oil Corporation
Site file

BP OIL

BP Oil Company
Aetna Bldg., Suite 360
2868 Prospect Park Drive
Rancho Cordova, California 95670-6020
(916) 631-0733

90 SEP 28 AM 10:45

September 25, 1990

Mr. Rafat Shahid
Alameda County Dept. of Health Services
80 Swan Way, #200
Oakland, CA 94621

RE: SUPPLEMENTAL SITE INVESTIGATION
BP OIL FACILITY #11133
2220 98TH AVENUE 94603
OAKLAND, CA

Aug 1991

Dear Mr. Shahid:

Please find enclosed the Supplemental Site Investigation Report on the subject facility.

Based on the results and findings of this study, BP Oil Company recommends the following to properly address the nature and extent of hydrocarbon contamination:

1. Conduct further investigation work to define the extent of hydrocarbon contamination in the ground water offsite. This shall include drilling soil borings; installing ground water monitoring wells; and conducting additional aquifer analysis.

2. Implement interim remediation measures to control further migration of free-floating product and dissolved phase hydrocarbons.

3. Conduct a remedial planning/feasibility study and implement a remedial action plan to address the hydrocarbon constituents in ground water.

4. Implement a quarterly ground water monitoring and sampling program in accordance with RWQCB requirements.

Feel free to contact me if you should have any further questions or concerns.

Respectfully,

Peter J. DeSantis
Environmental Coordinator

PDJ:dj

Enclosure

cc: Mr. Tom Callaghan, RWQCB, San Francisco Bay Region
Mr. Al Sevilla, Alton Geoscience, Inc.
J.R. Rocco, BP Oil Company

SUPPLEMENTAL SITE INVESTIGATION REPORT

BP Oil Service Station No. 11133

[redacted] Oakland, California 94603

AUG1990

Prepared For:

BP Oil Company
2868 Prospect Park Drive, Suite 360
Rancho Cordova, California 95670-6020

Alton Geoscience, Inc.

Project No. 30-080

August 27, 1990

SUPPLEMENTAL SITE INVESTIGATION REPORT

BP Oil Service Station No. 11133
2220 98th Avenue
Oakland, California

August 27, 1990

Project Number 30-080

This report was based on currently available data and was developed in accordance with current hydrogeologic and engineering practices.

This report was prepared by:

Erin Joerling for
Matthew Taylor
Staff Engineer

8/27/90
Date

Matthew Hopwood
Project Manager

8/27/90
Date

This report was reviewed by:

Al Sevilla
Registered Civil Engineer
No. 26392
Division General Manager

8/27/90
Date

REGISTERED PROFESSIONAL ENGINEER
ALBERTO SANCHEZ SEVILLA
26392
Exp. Date 3/31/91
CIVIL
STATE OF CALIFORNIA

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APPENDICES

1.0 INTRODUCTION AND BACKGROUND

BP Oil Company retained Alton Geoscience, Inc. to conduct a Supplemental Site Investigation Study related to petroleum hydrocarbon contamination at BP Service Station No. 11133, located at 2220 98th Avenue, Oakland, California. The site location is shown in Figure 1 and a site plan is shown in Figure 2.

1.1 Purpose and Scope

This supplemental site investigation study was performed to: (1) address the concerns of the San Francisco Bay Regional Water Quality Control Board (RWQCB) and the Alameda County Department of Environmental Health (ACDEH) regarding petroleum hydrocarbon contamination at the site; and (2) determine the nature and extent of hydrocarbon levels in the subsurface soil and ground water.

The scope of the investigative work included the following tasks:

1. Conduct a qualitative shallow ground water survey (QSGWS).
2. Install five soil borings for conversion into one onsite recovery well and one onsite and three offsite ground water monitoring wells.
3. Collect and analyze soil and ground water samples.
4. Analyze field data and laboratory results.
5. Prepare a report presenting the results, findings, and recommendations of the investigation.

The results of these tasks provide the basis for evaluating the need for further investigation and/or remediation.

1.2 Site Description

The site, a former Mobil Oil Corporation service station, is currently an operating BP Oil Company service station located on the southeast corner of the intersection of 98th Avenue and Bancroft Avenue, Oakland, California. The adjacent properties are a mixture of residential, commercial, and institutional developments. To the north of the site, across 98th Avenue, is a vacant lot which is a former Unocal service station presently on the San Francisco RWQCB list of fuel leak cases. Residential developments border the east and

south of the property while a school is located to the west across Bancroft Avenue.

The site is located at an elevation of approximately 40 feet above mean sea level. The location and layout of the underground storage tanks are shown in Figure 2.

1.3 Project Background

In June 1987, three underground gasoline storage tanks were removed from the site. Soil samples were collected from the soil below the tank excavation. Analysis of the soil samples detected total petroleum hydrocarbons (TPH) at levels ranging from 12 to 420 parts per million (ppm). In May 1988, a consultant was retained by Mobil Oil Corporation to conduct an initial investigation of the subsurface contamination. Three monitoring wells (MW-1, MW-2, and MW-3) were installed to assess ground water quality. Results of this initial investigation indicated that the ground water had been impacted by petroleum hydrocarbons.

1.4 Regional Geology and Hydrogeology

The topography of the surrounding area is characterized by valleys and gentle slopes. The underlying unit in this region consists of Undivided Quaternary deposits (QU). The QU unit's composition and physical properties vary, but consist predominantly of Temescal Formation, which probably includes covered or unrecognized San Antonio Formation and gravel, sand, and clay (Qg), as well as recent alluvium and colluvium and artificial fill.

The site is located in the 580-square-mile Alameda Bay Plain Ground Water Basin drained by the Guadalupe River and Alameda, Coyote, Redwood, and San Francisquito Creeks. The water-bearing material is comprised of younger and older alluvium. The nearest surface water drainage is San Leandro Creek, approximately 1-1/4 miles to the south, which drains into San Leandro Bay. According to the Alameda County Public Works Department, there are no domestic wells within a 1/2-mile of the site. Municipal or domestic water supply in the area is provided by the East Bay Municipal Utilities District which obtains its water from the Mokelumne River.

2.0 FIELD METHODS

The procedures and methods used during field activities were in accordance with applicable regulatory requirements and procedures, outlined in Appendices A, C, and D.

2.1 Qualitative Shallow Ground Water Survey

To determine the lateral extent of ground water contamination, a qualitative shallow ground water survey (QSGWS) was initially conducted. The survey is essentially a screening process to assist in determining the most appropriate locations of the additional monitoring wells necessary to define the lateral extent of hydrocarbon levels in the ground water. The procedure is based on the soil boring technique combined with temporary wells for ground water sampling.

On January 24 and 25, 1990, Alton Geoscience, Inc. supervised the drilling of eight soil borings to various depths, ranging from 16 to 35 feet below grade, depending on subsurface conditions. The borings were advanced 3 to 4 feet beyond the depth at which first ground water was encountered. Following drilling, the borings were converted into temporary wells (TW-1 through TW-8) by inserting clean, 2-inch-diameter, Schedule 40, polyvinyl chloride (PVC) casing with 0.020-inch slots. Prior to sampling, each temporary well was purged of 2 to 3 gallons of ground water. During sampling, ground water was inspected for the presence of free-floating product or sheen. The samples collected were then decanted into sterile volatile organic analysis (VOA) vials for transport to a state-certified laboratory for analysis under chain of custody documentation. During the QSGWS, free-floating product was encountered in one of the temporary wells, TW-4.

An interim report dated May 11, 1990 presents the results of the QSGWS. A copy of the interim report is included as Appendix A.

2.2 Soil Borings and Sampling

Based on the results of the QSGWS, the locations of the additional soil borings/monitoring wells were selected. On May 9, 1990, prior to commencement of drilling activities, Ground Water Protection Ordinance Permit 90277 was obtained from the Alameda County Flood Control and Water Conservation District. On May 16 and 17, 1990, Street Excavation Permit Nos. 9000938 and 9000939 were obtained from the City of Oakland's Department of Public Works. Copies of the ground water protection ordinance permit and street excavation permits are presented in Appendix B.

On May 17, 1990, Alton Geoscience supervised the drilling of two onsite soil borings which were converted into one 2-inch-diameter ground water monitoring well (AW-1) and one 6-inch-diameter recovery well (RW-1). The borings were drilled using 8-inch and 10-inch-diameter, hollow-stem augers

to total depths of approximately 40 feet below grade. During drilling, soil samples were collected from Monitoring Well AW-1 at 2 1/2-foot intervals and from Recovery Well RW-1 at 5-foot intervals.

On June 5 and 6, 1990, Alton Geoscience supervised the drilling of three offsite soil borings which were converted into 2-inch-diameter ground water monitoring wells (AW-2, AW-3, and AW-4). The borings were drilled using 8-inch-diameter, hollow-stem augers to total depths of approximately 35 and 40 feet below grade. During drilling, soil samples were collected from AW-2, AW-3, and AW-4 at 5-foot sampling intervals until the first ground water was encountered at depths of approximately 25 feet, 26 feet, and 23 feet below grade.

All drilling activities were performed by West Hazmat Drilling Corporation of Rancho Cordova, California using a truck mounted CME 75 drilling rig. The soil samples were collected using a split-spoon sampler lined with stainless steel tubes. The samples recovered for laboratory analysis were wrapped with aluminum foil, capped with polyurethane caps, labeled, wrapped with cellophane tape, and placed immediately in an iced cooler. A description of drilling procedures and soil sampling protocol and copies of boring logs are presented in Appendix C.

2.3 Ground Water Monitoring Well Construction

The soil borings were completed as Ground Water Monitoring Wells AW-1, AW-2, AW-3, and AW-4, and Recovery Well RW-1. All four monitoring wells were constructed of clean, 2-inch-diameter, flush-threaded, Schedule 40 PVC, blank casing and 15 to 20 feet of 0.020-inch, slotted casing to a total depth of approximately 35 to 40 feet below grade. Recovery Well RW-1 was constructed of clean, 6-inch-diameter, flush-threaded, Schedule 40 PVC, blank casing and 0.020-inch, slotted casing to a total depth of approximately 45 feet below grade. Well construction details are shown on the boring logs in Appendix C.

2.4 Monitoring Well Development and Sampling

Development, purging, and sampling of the monitoring wells were conducted on June 12, 1990. Prior to sampling, the ground water in the monitoring wells was purged by pumping approximately 19 gallons from AW-1 and AW-2, 11 gallons from AW-3 and AW-4, 4 gallons from MW-2, and 5.4 gallons from MW-3. Water samples were collected after stabilization of pH, conductivity, and temperature readings in the purged water was observed. Well development and sampling procedures

were conducted in accordance with RWQCB guidelines and the standard protocol described in Appendix D.

The water samples were decanted from the bailer into clean containers and transported in an iced cooler to a state-certified laboratory for analysis following proper chain of custody procedures. Water sampling field survey forms documenting field observations during well development/ purging and sampling are presented in Appendix D.

2.5 Ground Water Level Monitoring and Surveying

On July 5, 1990, the monitoring wells were surveyed to the nearest 0.01 foot in reference to AW-3 as the common datum with an assumed elevation of 100 feet above mean sea level (MSL). The purpose of the survey was to obtain relative top of casing elevations of the monitoring wells for use in calculating the ground water elevation at each well and determining the ground water flow direction and gradient at the site.

Ground water level monitoring and survey data collected on July 5, 1990 are presented in Table 1. A ground water elevation contour map based on interpretation of the monitoring data is shown in Figure 3.

3.0 ANALYTICAL METHODS

All laboratory analyses of soil and ground water samples were performed by a California state-certified analytical laboratory, using standard test methods of the U.S. Environmental Protection Agency (EPA) and the California Department of Health Services. The laboratory reports and chain of custody records are presented in Appendix E.

3.1 Qualitative Shallow Ground Water Analysis

All ground water samples collected from the temporary wells as part of QSGWS were analyzed for TPH-G with BTEX distinction using EPA Methods 5030 and 602. The results of the laboratory analyses of ground water samples are presented in Table 2 of Appendix A.

3.2 Soil Analysis

Soil samples from the five borings were analyzed for TPH-G with BTEX distinction using EPA Methods 5030 and 8020. The results of the laboratory analyses of the soil samples are presented in Table 2.

3.3 Water Analysis

Ground water samples collected from the monitoring wells were analyzed for TPH-G with BTEX distinction. The results of the laboratory analyses of ground water samples are presented in Table 4. TPH-G and benzene isoconcentration maps developed from analytical results of ground water samples are shown in Figures 4 and 5.

4.0 AQUIFER ANALYSIS

On July 13, 1990, an aquifer pump test was first attempted at the site to evaluate aquifer characteristics. Pressure-sensitive transducers were placed in Wells RW-1, MW-3, and AW-1, and a submersible pump was installed in RW-1. Ground water and product was pumped from RW-1 at a rate of 3 gallons per minute and placed into 55-gallon drums and stored onsite. At that pumping rate the recovery well went dry after a short time. However, ground water and product would immediately recharge the well and be pumped out. Approximately 100 gallons of water/product mixture were pumped from the recovery well during the test run. No drawdown was noted in the two observation wells, MW-3 and AW-1. Based on these initial results and the geologic characteristics at the site, it was determined that the rising head or "slug" test method is more appropriate to determine aquifer parameters.

4.1 Rising Head or "Slug" Test Method

Rising head or "slug" tests are used to determine the hydraulic conductivity of an unconfined aquifer by measuring the rate of water level rise in a well after a "slug" of water is removed. Hydraulic conductivity is a parameter that describes the rate at which a fluid can move through a media under a hydraulic gradient. It is dependent upon the porosity and permeability of the media and density and viscosity of the fluid.

In a rising head or "slug" test, hydraulic conductivity is calculated from the rise in water level over time. The results of this method are generally considered an appropriate means of estimating the hydraulic conductivity within an order of magnitude (Thompson, 1987).

The following assumptions were made in order to perform "slug" test calculations:

1. The change in water level is "instantaneous" so that no cone of depression is generated around the well and only horizontal flow into the well occurred.

2. The well was constructed such that neither the screen nor the filter pack inhibited the rate of ground water flow into the well.

The cessation of pumping was considered to be time zero, the time at which the rising ground water level measurements began. The subsequent rise in water level over time was recorded with a pressure-sensitive transducer and the data logger. Readings were recorded by the data logger at 0.5 second intervals.

4.2 Analysis of Aquifer Parameters

A computer program was used to statistically analyze the test data using regression analysis and calculate the hydraulic conductivity of the aquifer. The results of the computer analysis are presented graphically in Appendix F.

The hydraulic conductivity (K) of the aquifer using the Bouwer and Rice method was calculated to be 4.0×10^{-4} foot per minute or 0.6 foot per day. Assuming an aquifer thickness (b) of 15 feet, the transmissivity (T) of the aquifer ($T = Kb$) is 9.0 $foot^2/day$.

The linear velocity (v) of the ground water at the site can be estimated by using the hydraulic conductivity (K) based on the "slug" test data and the calculated overall gradient (i) at the site ($v = Ki$). Linear velocity is a value representing the horizontal rate at which a fluid moves through the pore spaces between specific points within the aquifer. The overall hydraulic gradient at the site was measured to be 0.01 ft/ft. Based on the aquifer test results and the hydraulic gradient, the onsite linear velocity is 6.0×10^{-3} foot per day or 2.2 feet per year.

5.0 SITE GEOLOGY AND HYDROGEOLOGY

A brief description of the pertinent information on the site geology and hydrogeology is presented below.

5.1 Site Geology

The soil borings drilled as part of this supplemental investigation indicate a relatively consistent stratigraphy at the site. Silty clay was encountered in each boring in the first 15 feet below grade, with the exception of RW-1, where clayey silt with sand was encountered from 15 to 20 feet below grade. Clayey silt was encountered in AW-1 from 17.5 to approximately 22.5 feet below grade. Clayey sand was the predominant soil type in the lowest portion of

each boring. The soil types encountered during this study were generally consistent with the results of the previous investigation.

5.2 Site Hydrogeology

As presented in Table 1, the ground water elevations in the monitoring wells ranged from 70 to 84 above MSL (assuming AW-3 at 100 feet above MSL), indicating a relatively complex hydrogeologic characteristic at the site. Based on the ground water elevations of onsite wells, there appears to be a depression in the ground water table in the vicinity of the southernmost pump island (at RW-1) but rising towards the east of the tank cavity (at MW-1). Because of this wide variation in water table elevation and the relative complexity of the site hydrogeology, only the ground water elevations for offsite Monitoring Wells AW-2, AW-3, and AW-4, as measured on July 5, 1990, were used to develop the ground water elevation contour map shown in Figure 3. The data indicates that the ground water flow direction is generally to the southwest, with an average gradient of approximately 0.01 foot per foot.

There are no known or reported ground water production wells in use as a domestic or municipal water supply source within the immediate vicinity or a 1/2-mile radius of the site (personal communication, City of Oakland Public Works Department).

6.0 DISCUSSION OF RESULTS

The results of the field activities and laboratory analysis of soil and ground water samples collected during this investigation are presented in Tables 2 and 3 and are discussed below.

6.1 Qualitative Shallow Ground Water Survey

A total of 10 water samples were collected for analysis during the QSGWS, including water samples from Monitoring Wells MW-2 and MW-3. The samples from MW-1 and TW-4 contained free-floating product and were not analyzed. Chemical analysis of water samples revealed TPH-G levels ranging from nondetectable to 720,000 ppb. A summary of analytical results and the TPH-G and benzene isoconcentration maps based on the QSGWS are presented in Appendix A.

6.2 Soil

A total of 18 soil samples were collected and analyzed as part of this site investigation study to assess the nature and extent of subsurface soil contamination. The analytical results are summarized in Table 2 and discussed below.

- Only low levels of TPH-G and BTEX constituents (up to 33 ppm) were detected in the soil samples collected onsite.
- Petroleum hydrocarbon constituents were detected in the soil from offsite Borings AW-1 and AW-3 (northeast and southeast of the site) from 20 feet below grade to the capillary fringe.
- The hydrocarbons detected in the samples from offsite borings south of the property may have migrated from the service station. However, the potential source of hydrocarbon constituents in the soil samples from the borings northeast and upgradient of the site cannot be determined at this time.

6.3 Ground Water

Results of the field survey and laboratory analysis of ground water samples collected from the monitoring wells were used to assess the nature and extent of ground water contamination. The results of the laboratory analysis are summarized in Table 4 and discussed below.

- During the ground water sampling event on July 5, 1990, free-floating product was encountered in Monitoring Wells MW-1 and RW-1. The product thickness in MW-1 and RW-1 was 0.22 foot and 1.21 feet, respectively.
- Ground water samples from Monitoring Wells MW-2, MW-3, and AW-2 had no detectable TPH-G or BTEX constituents, while samples from Monitoring Wells AW-1, AW-3, and AW-4 contained 66 ppb, 88 ppb, and 38,000 ppb of benzene, respectively.
- The sample from Monitoring Well AW-4, a downgradient offsite monitoring well, had the highest concentrations of dissolved-phase TPH-G and BTEX constituents.

6.4 Hydrogeologic Characteristics

The aquifer analysis and calculations were based on the assumption that the porous media is isotropic and homogeneous. These conditions, however, seldom exist in the natural subsurface environment. The aquifer located beneath the site is neither isotropic nor homogeneous. It exhibits variations in physical properties both vertically and horizontally. Therefore, the hydraulic conductivity determined by the aquifer test data should only be considered accurate within an order of magnitude of actual values at the specific point within the porous media. Based on the calculated hydraulic conductivity of 0.6 foot per day, the actual hydraulic conductivity could range from 0.06 to 6.0 foot per day. This range of hydraulic conductivity values is typical for loam soils composed of a mixture of clay, silt, sand, and organic matter, which is consistent with the silty clay, clayey sand, and sandy clay encountered at the site.

It should be noted that plume migration does not necessarily occur at the same rate as ground water movement. Darcy's Law governing ground water flow does not consider the hydrodynamic processes of adsorption and dispersion that are involved in the transport of contaminants in ground water.

7.0 FINDINGS AND CONCLUSIONS

The findings and conclusions of this site investigation study are summarized below:

1. Soil types encountered at the site during drilling generally consisted of silty clay, clayey silt, clayey sand, and sandy clay.

2. The extent of total petroleum hydrocarbons as gasoline (TPH-G) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents detected in the soil samples appears to be limited onsite to the area south of the service station's convenience store and offsite to the areas northeast and south of the site.

3. The hydrocarbon constituents detected in the soil samples from Boring AW-3 could possibly have originated from another offsite source, based on current ground water flow direction.

4. The ground water elevations in the monitoring wells ranged from about 70 to 84 feet above MSL (assuming AW-3 at 100 feet above MSL). Based on this variation

in ground water elevation and location of the wells, the hydrogeologic characteristics at the site appear to be relatively complex. The site hydrogeologic setting cannot be adequately defined at this time.

5. The ground water elevation contour map, developed from selected water level and survey data, indicates an overall southwesterly ground water flow direction beneath the site, with a gradient of approximately 0.01 foot per foot.

6. Based on the rising head test method, the transmissivity, hydraulic conductivity, and linear velocity of the aquifer material onsite were calculated to be 9.0 ft^2/day, 0.6 ft/day, and 6.0 x 10^{-3} ft/day, respectively. These values are representative of low permeable soil encountered at the site.

7. The free-floating product plume present in the shallow ground water beneath the site (detected in MW-1 and RW-1) appears to be limited to the product tank area. As an interim measure, about 10 gallons of product have been recovered to date.

8. TPH-G and BTEX constituents were detected in water samples from Monitoring Well AW-3, an offsite well upgradient from the site. The hydrocarbon constituents could have originated from an offsite source.

9. Results of the previous sampling events indicated the continued presence of dissolved-phase petroleum hydrocarbon constituents in ground water onsite and offsite, the extent of which cannot be defined at this time based on presently available data.

10. Based on the locations of the monitoring wells and the level of hydrocarbon constituents detected, it appears that the dissolved-phase hydrocarbon contaminant plume has migrated offsite in a southerly direction from the property. This is consistent with the general flow direction of the shallow ground water.

11. There are no documented existing domestic water supply wells in use in the immediate vicinity or within a 1/2-mile radius of the site.

12. Based on the combined results of the QSGWS and laboratory analysis of monitoring well samples, it appears that there may be two dissolved-phase hydrocarbon plumes at the site, one at the northern portion and one towards the south of the property.

TABLE 1

SURVEY AND WATER LEVEL MONITORING DATA
July 1990

Well Number	Well Elevation (feet)*	Depth to Water (feet)	Free Product Thickness (feet)	Ground Water Elevation (feet)*
MW-1	97.33	13.31	0.22	84.02**
MW-2	96.36	23.15	----	73.21
MW-3	97.40	23.06	----	74.34
AW-1	98.99	26.87	----	72.12
AW-2	97.69	24.88	----	72.81
AW-3	100.00	24.75	----	75.25
AW-4	99.96	27.29	----	72.67
RW-1	98.60	27.93	1.21	70.67***

Note:

* Elevation in feet relative to a common datum (AW-3) with an assumed elevation of 100 feet above mean sea level, as measured on July 5, 1990 by Alton Geoscience.

** Elevation adjusted assuming 0.75 specific gravity of free product.

*** Not an accurate elevation due to the presence of over 0.25 foot of free product.

TABLE 2

RESULTS OF
LABORATORY ANALYSIS OF SOIL SAMPLES
June 1990

Boring	Sample Depth (ft)	TPH-G	B	T	E	X
		(concentrations in parts per million)				
AW-1	5.0	ND	ND	ND	ND	ND
AW-1	10.0	ND	0.011	ND	ND	ND
AW-1	15.0	ND	0.007	ND	ND	ND
AW-1	20.0	1.2	0.470	ND	ND	ND
AW-1	25.0	ND	0.013	ND	ND	ND
AW-1	30.0	ND	ND	ND	ND	ND
AW-2	21.0	ND	ND	ND	ND	ND
AW-2	26.0	ND	ND	ND	ND	ND
AW-3	21.0	ND	0.074	0.027	0.010	0.049
AW-3	26.0	ND	0.083	0.010	0.004	0.018
AW-4	11.0	ND	ND	ND	ND	ND
AW-4	16.0	ND	0.170	0.010	0.024	0.045
AW-4	21.0	1.0	0.150	0.013	0.040	0.090
RW-1	5.0	ND	ND	ND	ND	ND
RW-1	10.0	ND	0.006	ND	ND	ND
RW-1	15.0	ND	0.031	ND	ND	ND
RW-1	20.0	ND	0.230	0.088	0.010	0.040
RW-1	25.0	33.0	1.000	0.710	ND	2.300

Notes:

TPH-G = Total Petroleum Hydrocarbons as Gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
ND = Not Detected at Method Detection Limit
(refer to Appendix E Official Laboratory Reports)

TABLE 3

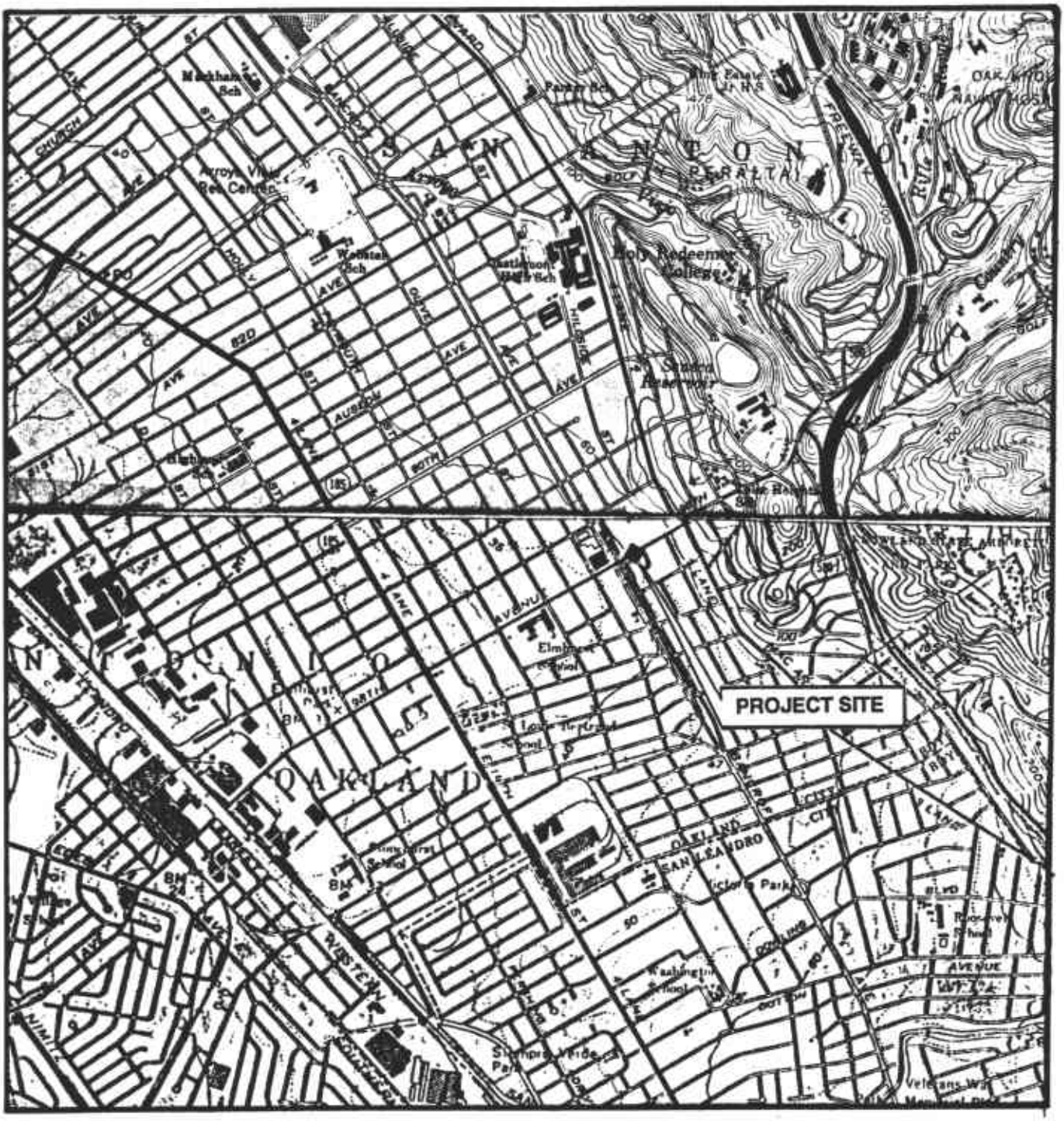
RESULTS OF
LABORATORY ANALYSIS OF GROUND WATER SAMPLES
June 1990

Monitoring Well	TPH-G	B	T	E	X
	(concentrations in parts per billion)				
MW-1	--	--	--	--	--
MW-2	ND	ND	ND	ND	ND
MW-3	ND	ND	ND	ND	ND
AW-1	66	1.0	ND	ND	ND
AW-2	ND	ND	ND	ND	ND
AW-3	88	1.9	ND	ND	42.0
AW-4	38,000	18,000	2,300	1,500	2,000
RW-1	--	--	--	--	--

Notes:

TPH-G = Total Petroleum Hydrocarbons as Gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
ND = Not Detected at method detection limit (refer to Appendix E, Official Laboratory Reports)
-- = No sample collected due to the presence of free-floating product

Source: U.S.G.S. Map, San Leandro, California
Quadrangle 7.5 minute Series.



N

0 1000 2000

SCALE IN FEET

FIGURE 1

SITE VICINITY MAP

B P SERVICE STATION NO. 11133
2220 98TH AVENUE
OAKLAND, CALIFORNIA

PROJECT NO. 30 - 080

ALTON GEOSCIENCE
1000 Burnett Ave., Ste 140
Concord, CA 94520

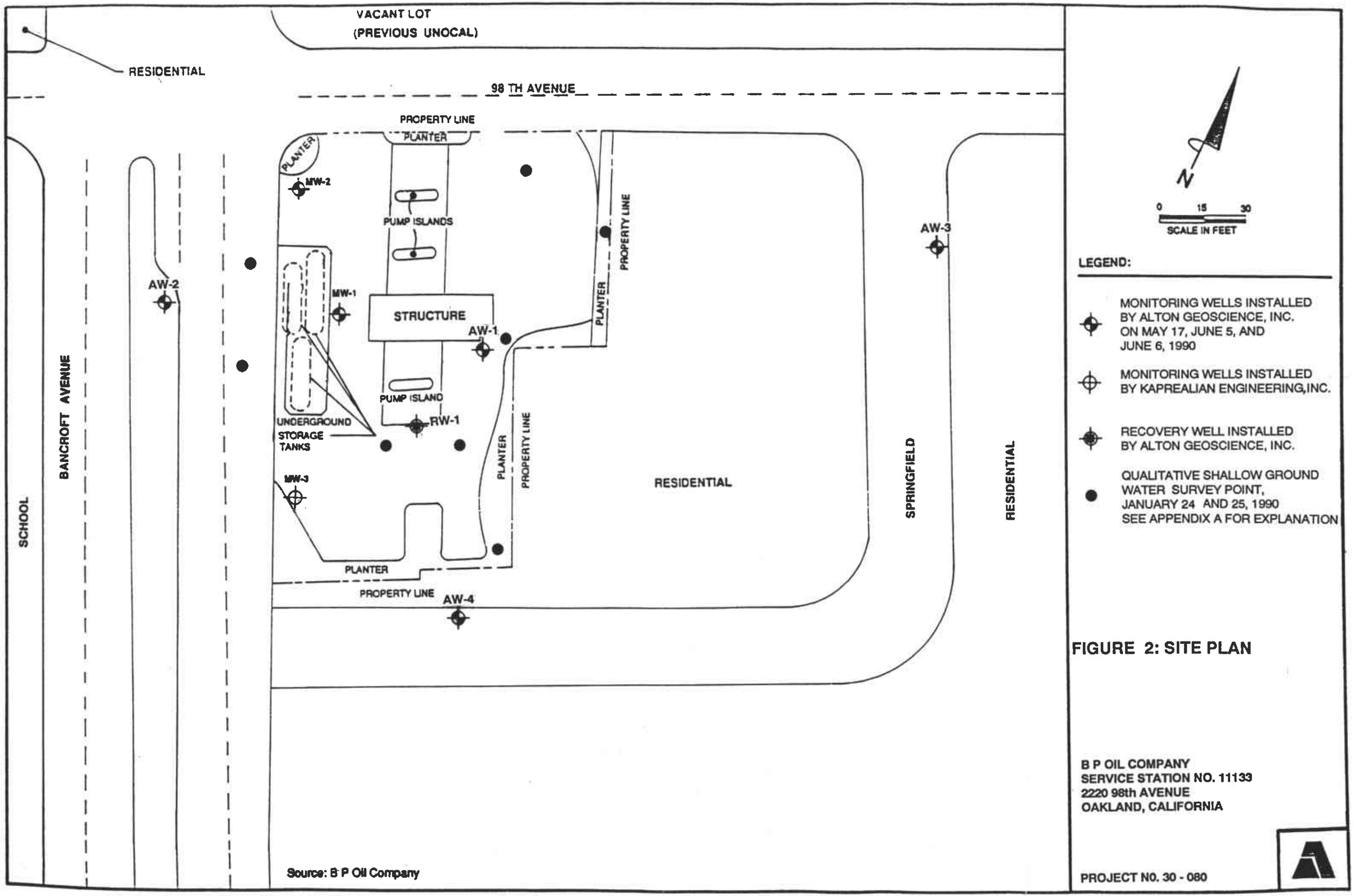


FIGURE 2: SITE PLAN

B P OIL COMPANY
SERVICE STATION NO. 11133
2220 98th AVENUE
OAKLAND, CALIFORNIA

PROJECT NO. 30 - 080

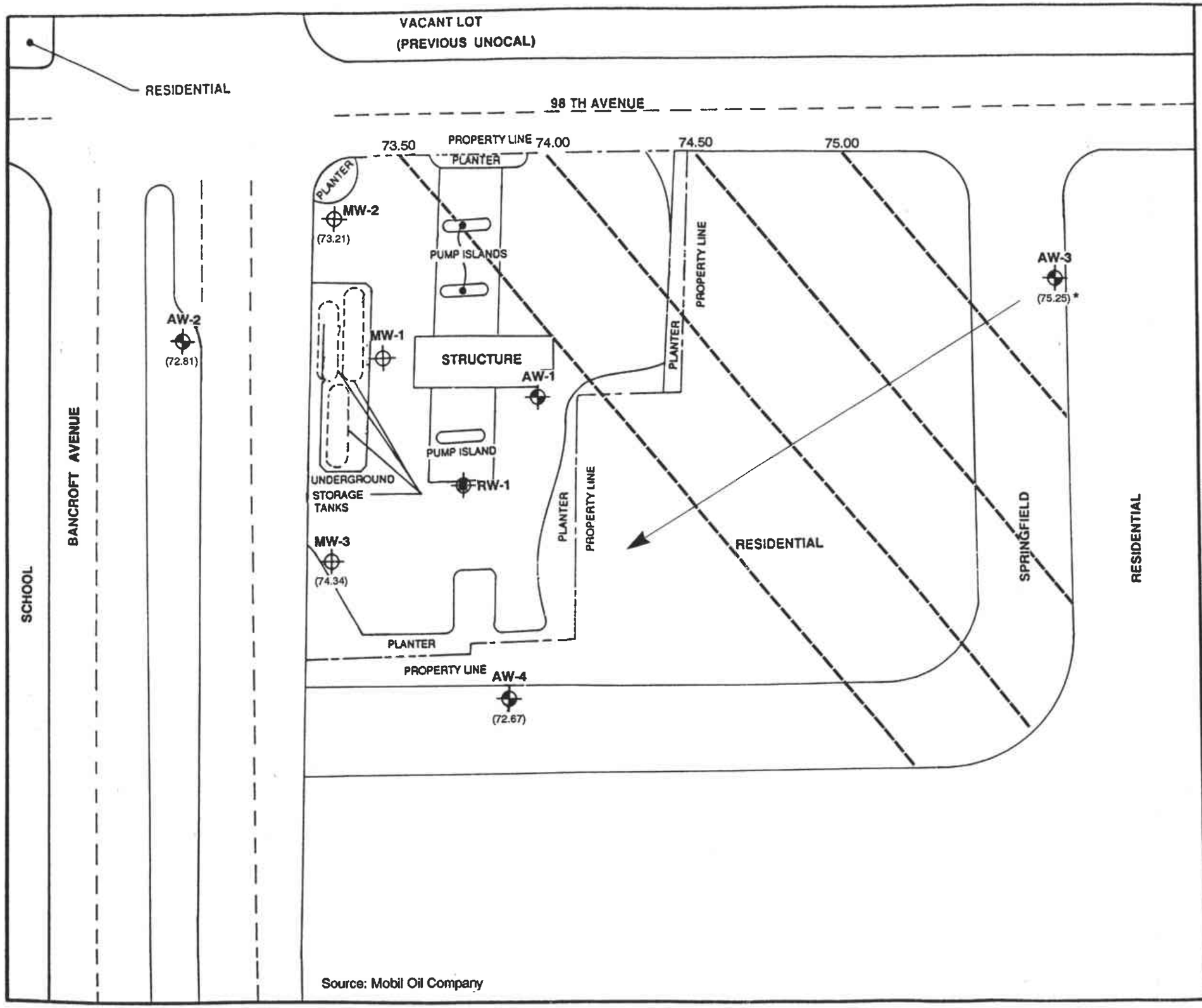
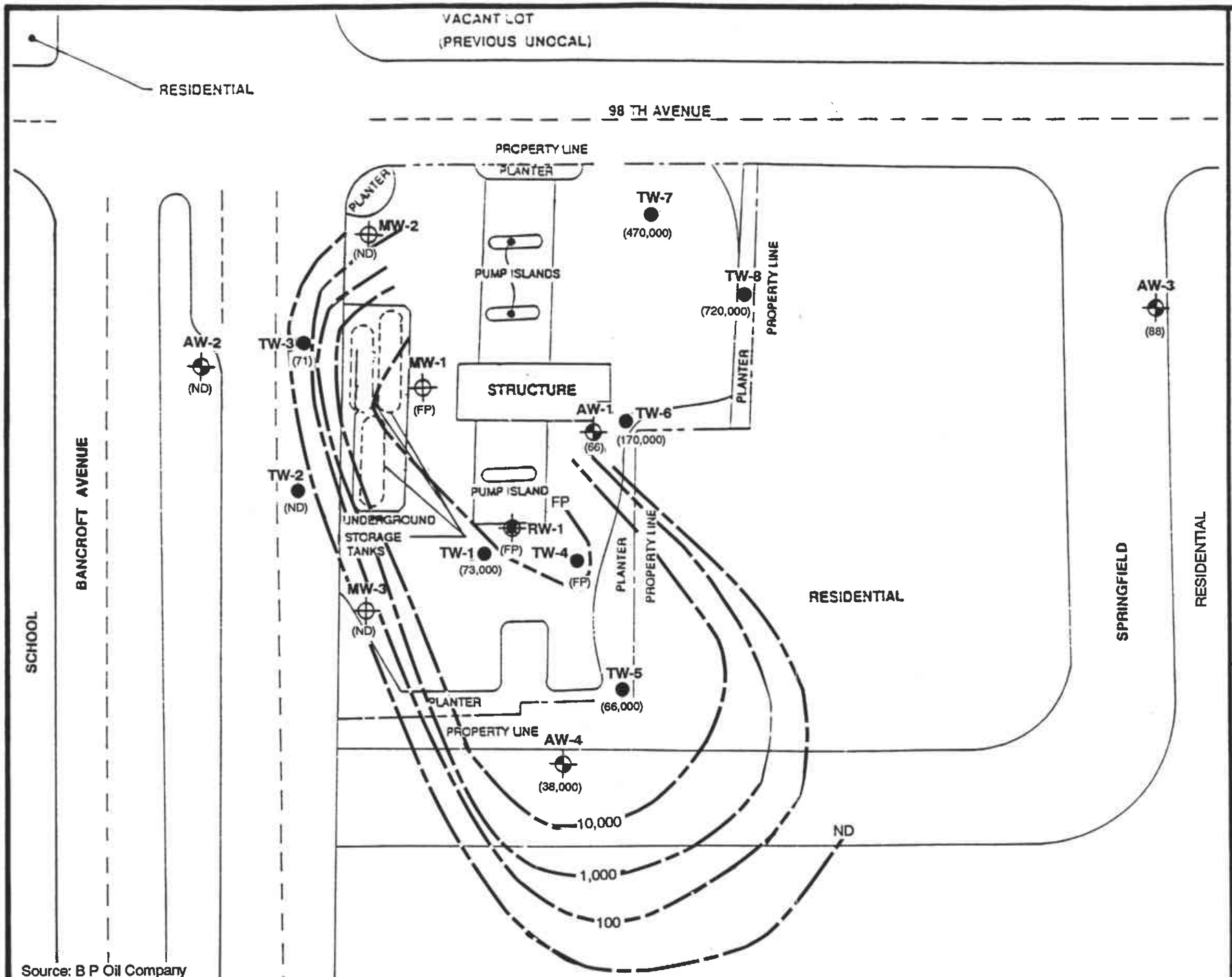


FIGURE: 3: GROUND WATER ELEVATION CONTOUR MAP

B P OIL COMPANY
SERVICE STATION N0. 11133
2220 98th AVENUE
0AKLAND, CALIFORNIA

PROJECT NO. 30 - 080



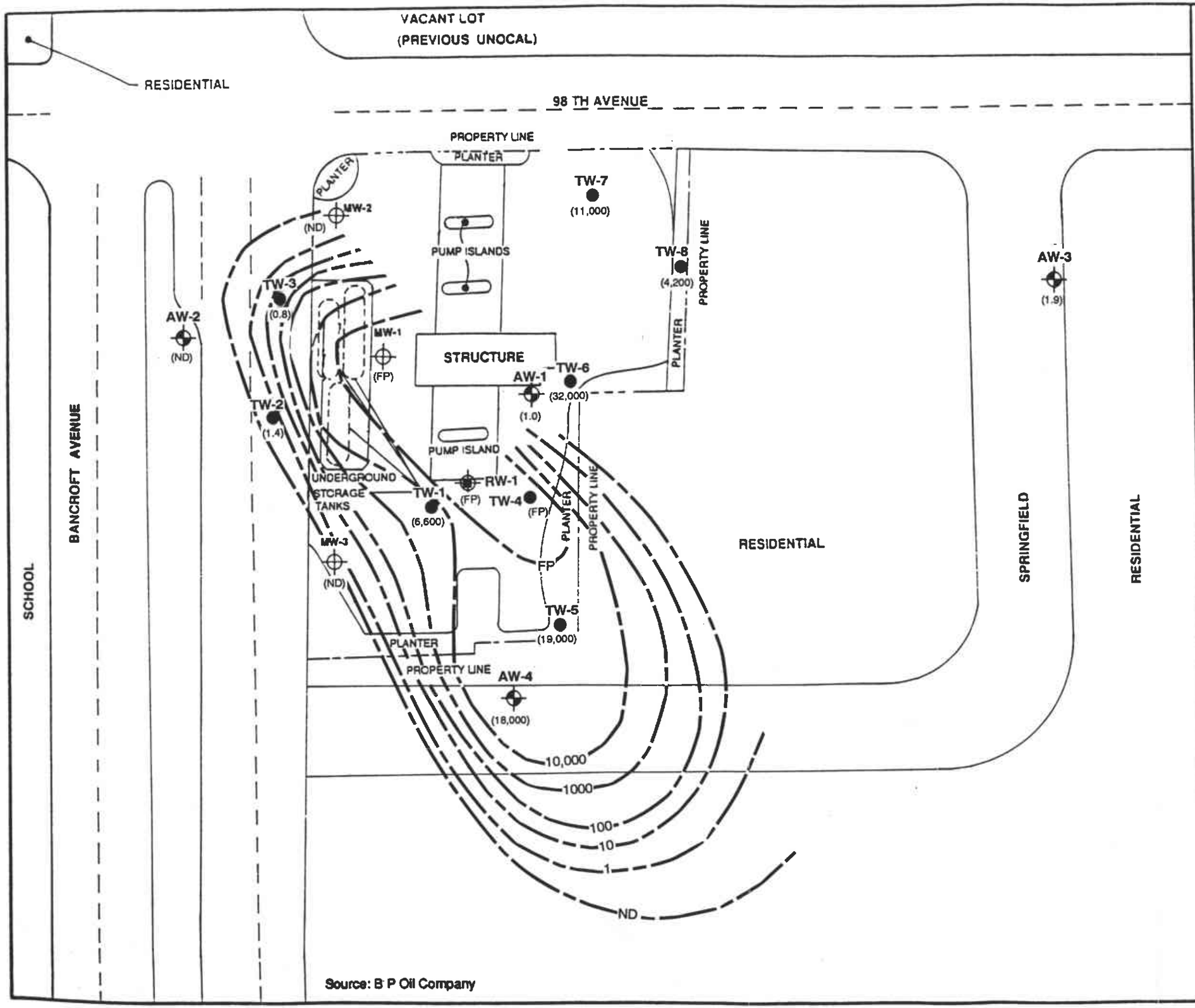
LEGEND:

- MONITORING WELLS INSTALLED BY ALTON GEOSCIENCE, INC.
- MONITORING WELLS INSTALLED BY KAPREALIAN ENGINEERING, INC.
- RECOVERY WELL INSTALLED BY ALTON GEOSCIENCE, INC.
- QUALITATIVE SHALLOW GROUND WATER SURVEY POINT, JANUARY 24 AND 25, 1990. SEE APPENDIX A FOR EXPLANATION
- (88) TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) IN PARTS PER BILLION (ppb)
- 100 TPH-G ISOCONCENTRATION LINE
- FP FREE PRODUCT
- ND NONDETECTED

FIGURE 4: TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) ISOCONCENTRATION MAP

B P OIL COMPANY
SERVICE STATION NO. 11133
2220 98TH AVENUE
OAKLAND, CALIFORNIA

PROJECT NO. 30 - 080



Source: B P Oil Company

FIGURE 5: BENZENE ISOCONCENTRATION MAP

B P OIL COMPANY
SERVICE STATION N0. 11133
2220 98TH AVENUE
OAKLAND, CALIFORNIA

PROJECT N0. 30 - 080

REFERENCES

Bouwer, H., and Rice, R. C., A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells; Water Resources Research, Volume 12, 1976, pp. 423-428.

Bouwer, H., Groundwater Hydrology; McGraw-Hill, New York, 1979.

Cedergren, H. R., Seepage, Drainage, and Flownets; John Wiley, 1977.

Freeze, R. A., and Cherry, J. A., Groundwater; Prentice-Hall, 1979.

Thompson, D. B., A Microcomputer Program for Interpreting Time-Lag Permeability Tests; Ground Water, Vol. 25, 1987, pp. 212-218.

APPENDIX A

INTERIM REPORT
QUALITATIVE SHALLOW GROUND WATER SURVEY

ALTON GEOSCIENCE, INC.

May 11, 1990

Mr. William J. Hollis
BP Oil Company
2868 Prospect Park Drive, Suite 360
Rancho Cordova, California 95670-6020

30-080

Subject: Interim Report - Preliminary Results of
Qualitative Water Survey, Sampling, and Monitoring
BP Service Station No. 11133
2220 98th Avenue
Oakland, California

Dear Mr. Hollis:

This interim report presents the results of the investigative work completed to date at BP Oil Service Station No. 11133, located at 2220 98th Avenue, Oakland, California. All activities were performed in accordance with the regulations and guidelines of the San Francisco Bay Regional Water Quality Control Board (RWQCB) and the Alameda County Department of Environmental Health (ACDEH).

SCOPE OF WORK

The scope of work performed to date by Alton Geoscience included the following tasks:

- Survey, monitoring, and sampling of three existing onsite monitoring wells.
- Installation, sampling, and destruction of eight temporary wells for qualitative survey.
- Analysis of 11 water samples by a state-certified analytical laboratory.
- Preparation of this letter report.

SITE DESCRIPTION AND HISTORY

The site is currently an operating BP Oil service station located on the northwestern corner of the intersection of Bancroft Avenue and 98th Avenue, Oakland, California. The site elevation is approximately 40 feet above mean sea level

where regional topography slopes to the west. The nearest surface water drainage is San Leandro Creek, approximately 1-1/4 miles to the south, which drains into San Leandro Bay.

In June 1987, three underground gasoline storage tanks were removed from the site. Soil samples were collected from the soil below the tank excavation. Analysis of the soil samples indicated total petroleum hydrocarbon (TPH) contamination at levels ranging from 12 parts per million (ppm) to 420 ppm. In May 1988, a consultant was retained by Mobil Oil Corporation to install three monitoring wells to assess ground water quality. The most recent round of sample collection and analysis indicated the presence of free product in at least one monitoring well, MW-1.

FIELD METHODS

The procedures and methods used during field activities were in accordance with regulatory requirements of the RWQCB and ACDEH.

Wellhead Survey

On December 12, 1989, the wells were surveyed to an arbitrary datum (MW-1) with an assumed elevation of 40 feet above mean sea level. The wells were also monitored as to depth to water, free-floating product, and sheen. During this survey and monitoring, approximately 0.2 foot of free product was observed in MW-1. Table 1 presents the well survey data.

Qualitative Ground Water Sampling

On January 24 and 25, 1990, eight soil borings were completed to various depths, ranging from 16 to 35 feet below grade, depending on subsurface conditions, at the locations shown in Figure 1, Site Plan. The borings were advanced 3 to 4 feet beyond the depth at which ground water was encountered. Following drilling, the borings were converted into temporary wells (TW-1 through TW-8) by inserting clean, 2-inch-diameter, Schedule 40, PVC casing with .020-inch slots. The ground water level was allowed to stabilize in the wells. Depth to water measurements (as measured from the ground surface) in the temporary wells varied by as much as 22 feet across the site.

Prior to sampling, each temporary well was purged of 2 to 3 gallons of ground water. During sampling, ground water was inspected for the presence of free-floating product or sheen,

and then decanted into sterile volatile organic analysis (VOA) containers for transport to a state-certified analytical laboratory for analysis under chain of custody documentation.

Following sample collection, the temporary casing was removed from the boring and steam cleaned. Soil borings were then backfilled with grout slurry and capped with asphalt.

Well Monitoring and Sampling

On January 24, 1990, Monitoring Wells MW-1, MW-2, and MW-3 were inspected for depth to water and the presence of sheen or free-floating product. Depth to water and product thickness were measured using an electronic sounder.

Ground water samples were collected from the three existing monitoring wells, following RWQCB guidelines and procedures for well purging and sampling.

ANALYTICAL METHODS AND RESULTS

Nine of the ground water samples were submitted to a state-certified laboratory for analysis. Two samples were not analyzed because of the presence of 0.2 foot of free-floating product in MW-1 and product sheen in TW-4. All laboratory analysis of ground water samples was performed using standard test methods of the U.S. EPA and the California Department of Health Services (DHS).

Analytical methods used were EPA Method 8015 for total petroleum hydrocarbons as gasoline (TPH) and EPA Method 602 for benzene, toluene, ethylbenzene, and total xylenes (BTEX). Table 2 presents the laboratory results, while the official laboratory report is included as Attachment A.

DISCUSSION OF RESULTS

The depth to water measurements in the three monitoring wells varied by 7 feet within a short distance, indicating that the wells may intersect different water-bearing zones. The difference in water depths in the temporary wells may be due to the difference in surface elevations and to the fact that the temporary wells were not developed or allowed to equilibrate properly. The temporary wells probably intersected different water-bearing zones.

Samples from Monitoring Well MW-1 and Temporary Well TW-2 had 0.2 foot of free product and sheen. Samples from the other monitoring and temporary wells contained levels of dissolved TPH as gasoline and hydrocarbon constituents (BTEX) ranging from nondetectable (ND) to 470,000 parts per billion (ppb). The high levels of dissolved-phase TPH may be due to emulsification of product during drilling of the temporary well borings. Figure 2, Site Plan, shows the isoconcentration map for TPH. It appears that the contaminant plume in the ground water has migrated offsite towards the east and offsite of the property.

RECOMMENDATIONS

Based on the results of this qualitative ground water survey, and in accordance with our agreement, we recommend the following:

1. Install three confirmation/monitoring wells offsite.

2. Install a large-diameter recovery well and an automatic recovery system (ARS) onsite to control the migration of the contaminant plume and remove the free-floating product from the ground water.

3. Perform aquifer tests to determine hydrogeologic properties of the aquifer below the site as well as an interim remedial measure.

If you have any questions, please contact either of the undersigned at (415) 682-1582.

Sincerely,

ALTON GEOSCIENCE, Inc.

Matthew J. Hopwood
Project Geologist

Al Sevilla
Division General Manager

TABLE 1

MONITORING AND SURVEY DATA

Well	Depth to Water (Feet)	Product Thickness (Feet)	TOC Elevation (Feet)	Ground Water Elevation (Feet)
		January 24, 1990		
MW-1	18.07	0.2	40.00	21.93
MW-2	25.65	---	39.96	14.31
MW-3	24.16	---	38.97	14.81

TOC = Top of Casing

*A 0.8 conversion factor is used to determine water table depression due to the presence of free-floating product interpreted from Levorson, 1967.

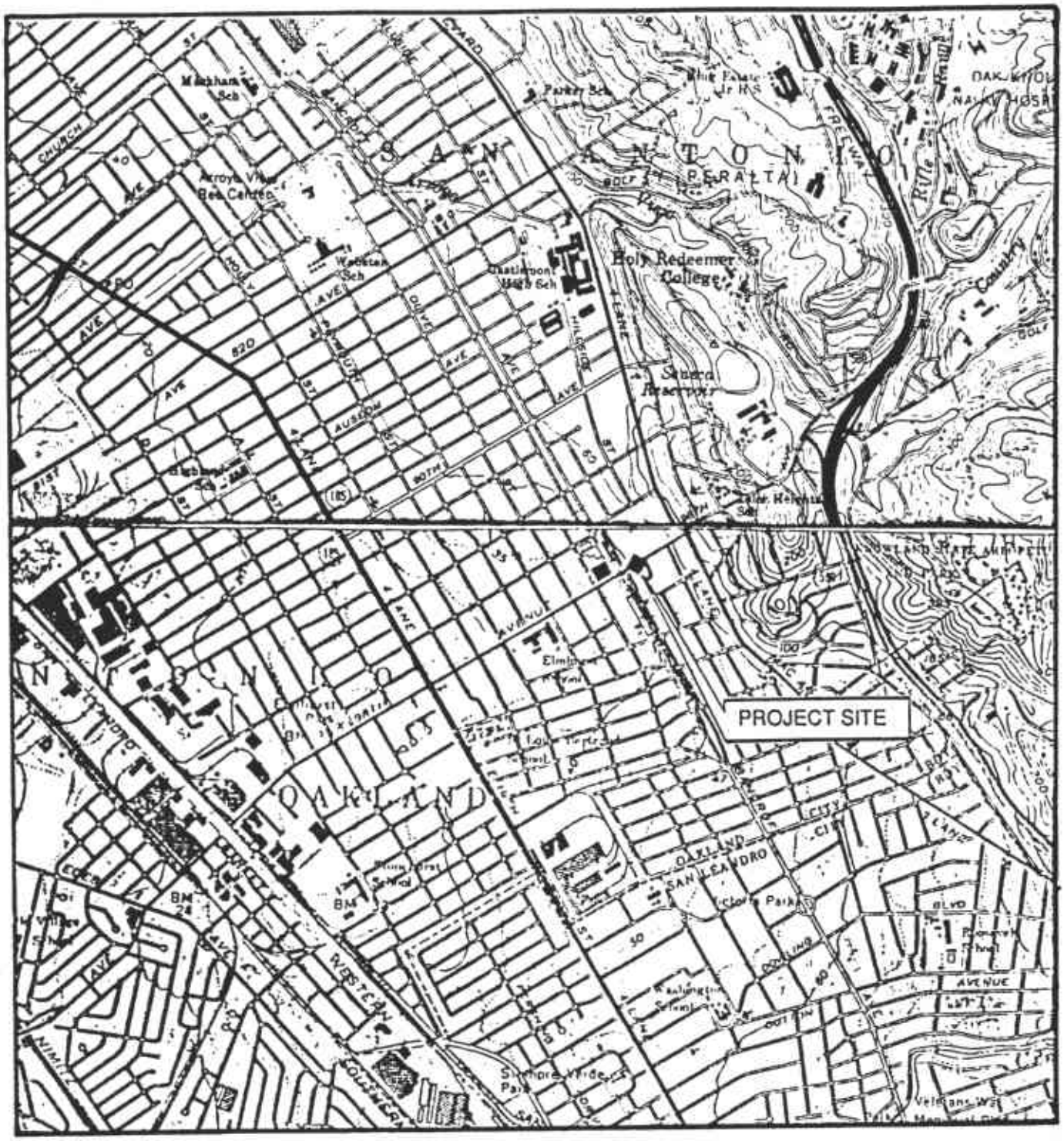
TABLE 2

RESULTS OF ANALYSIS
GROUND WATER SAMPLES

Well	TPH (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)
MW-1	FP	---	---	---	---
MW-2	ND <50	ND <0.5	ND <0.5	ND <0.5	ND <0.5
MW-3	ND <50	ND <0.5	ND <0.5	ND <0.5	ND <0.5
TW-1	77,000	6,600	5,500	2,900	1,500
TW-2	ND <50	1.4	1.4	0.6	5.0
TW-3	72,000	0.80	2.3	1.4	11
TW-4	FP	---	---	---	---
TW-5	66,000	19,000	15,000	1,800	8,600
TW-6	170,000	32,000	41,000	4,500	24,000
TW-7	470,000	11,000	29,000	9,700	48,000
TW-8	720,000	4,200	38,000	12,000	71,000

ND = Nondetectable
FP = Free Product
ppb = parts per billion
MW = Monitoring Well
TW = Temporary Well

Source: U.S.G.S. Map, San Leandro, California
Quadrangle 7.5 minute Series.



N

0 1000 2000

SCALE IN FEET

FIGURE 1

SITE VICINITY MAP

B P SERVICE STATION NO. 11133
2220 98TH AVENUE
OAKLAND, CALIFORNIA

PROJECT NO. 30 - 080

ALTON GEOSCIENCE
1000 Burnett Ave., Ste 140
Concord, CA 94520

VACANT LOT
(PREVIOUS UNOCAL)

RESIDENTIAL

98 TH AVENUE

ND

PROPERTY LINE

100

PLANTER

PLANTER

MW-2
(ND)

TW-7
(470)

PUMP ISLANDS

TW-8
(720)

PROPERTY LINE

TW-3
(0.072)

MW-1
(FP)

STRUCTURE

TW-6
(170)

PLANTER

TW-2
(ND)

PUMP ISLAND

UNDERGROUND
STORAGE
TANKS

TW-1
(73)

TW-4
(FP)

PROPERTY LINE

PLANTER

MW-3
(ND)

100

TW-5
(66)

ND

PLANTER

PROPERTY LINE

SCHOOL

BANCROFT AVENUE

RESIDENTIAL

SPRINGFIELD

RESIDENTIAL

Source: B P Oil Company

N

0 15 30
SCALE IN FEET

LEGEND:

- MONITORING WELLS
- PROPOSED MONITORING WELLS
- TEMPORARY WELLS
- PROPOSED RECOVERY WELL
- ND — TPH ISOCONCENTRATION CONTOUR LINE (ppm)
- (FP) FREE PRODUCT
- (ND) NONDETECTABLE

FIGURE 2 SITE PLAN

B P SERVICE STATION NO. 11133
2220 98TH AVENUE
OAKLAND, CALIFORNIA

PROJECT NO. 30 - 080

ATTACHMENT A

LABORATORY REPORTS AND
CHAIN OF CUSTODY FORMS

MOBILE CHEM LABS INC.

1678 Rellez Valley Road
Lafayette, CA 94549 • (415) 945-1266

Alton Geoscience
1170 Burnett Ave. Suite S
Concord, CA. 94520
Attn: Matthew Hopwood

Date Sampled:01-25-90
Date Received:01-25-90
Date Reported:01-25-90

Sample Number	Sample Description
B010176	Project # 30-080 98th Ave. BP MW-2 WATER

ANALYSIS

	Detection Limit	Sample Results
	ppb	ppb
Total Petroleum Hydrocarbons as Gasoline	50	<50
Benzene	0.5	<0.5
Toluene	0.5	<0.5
Xylenes	0.5	0.9
Ethylbenzene	0.5	<0.5

Note: Analysis was performed using EPA methods 5030 and TPH LUFT with method 602 used for BTX distinction.

MOBILE CHEM LABS

Ronald G. Evans
Lab Director

MOBILE CHEM LABS INC.

1678 Rellez Valley Road
Lafayette, CA 94549 • (415) 945-1266

Alton Geoscience
1170 Burnett Ave. Suite S
Concord, CA. 94520
Attn: Matthew Hopwood

Date Sampled:01-25-90
Date Received:01-25-90
Date Reported:01-25-90

Sample Number	Sample Description
B010177	Project # 30-080 98th Ave. BP MW-3 WATER

ANALYSIS

	Detection Limit	Sample Results
	ppb	ppb
Total Petroleum Hydrocarbons as Gasoline	50	<50
Benzene	0.5	0.6
Toluene	0.5	<0.5
Xylenes	0.5	1.1
Ethylbenzene	0.5	<0.5

Note: Analysis was performed using EPA methods 5030 and TPH LUFT with method 602 used for BTX distinction.

MOBILE CHEM LABS

Ronald G. Evans
Lab Director

MOBILE CHEM LABS INC.

1678 Rellez Valley Road
Lafayette, CA 94549 • (415) 945-1266

Alton Geoscience
1170 Burnett Ave. Suite S
Concord, CA. 94520
Attn: Matthew Hopwood

Date Sampled:01-25-90
Date Received:01-25-90
Date Reported:01-25-90

Sample Number	Sample Description
B010178	Project # 30-080 98th Ave. BP TW-1 WATER

ANALYSIS

	Detection Limit	Sample Results
	ppb	ppb
Total Petroleum Hydrocarbons as Gasoline	50	77,000
Benzene	0.5	6,600
Toluene	0.5	5,500
Xylenes	0.5	15,000
Ethylbenzene	0.5	2,900

Note: Analysis was performed using EPA methods 5030 and TPH LUFT with method 602 used for BTX distinction.

MOBILE CHEM LABS

Ronald G. Evans
Lab Director

MOBILE CHEM LABS INC.

1678 Rellez Valley Road
Lafayette, CA 94549 • (415) 945-1266

Alton Geoscience
1170 Burnett Ave. Suite S
Concord, CA. 94520
Attn: Matthew Hopwood
Project Manager

Date Sampled:01-25-90
Date Received:01-25-90
Date Reported:01-25-90

Sample Number	Sample Description
B010179	Project # 30-080 98th Ave. - Oakland TW-2 WATER

ANALYSIS

	Detection Limit	Sample Results
	ppb	ppb
Total Petroleum Hydrocarbons as Gasoline	50	<50
Benzene	0.5	1.4
Toluene	0.5	1.4
Xylenes	0.5	5.0
Ethylbenzene	0.5	0.6

Note: Analysis was performed using EPA methods 5030 and TPH LUFT with method 602 used for BTX distinction.

MOBILE CHEM LABS

Ronald G. Evans
Lab Director

MOBILE CHEM LABS INC.

1678 Rellez Valley Road
Lafayette, CA 94549 • (415) 945-1266

Alton Geoscience
1170 Burnett Ave. Suite S
Concord, CA. 94520
Attn: Matthew Hopwood
Project Manager

Date Sampled:01-25-90
Date Received:01-25-90
Date Reported:01-25-90

Sample Number	Sample Description
B010180	Project # 30-080 98th Ave. - Oakland TW-3 WATER

ANALYSIS

	Detection Limit	Sample Results
	ppb	ppb
Total Petroleum Hydrocarbons as Gasoline	50	72
Benzene	0.5	0.8
Toluene	0.5	2.3
Xylenes	0.5	11
Ethylbenzene	0.5	1.4

Note: Analysis was performed using EPA methods 5030 and TPH LUFT with method 602 used for BTX distinction.

MOBILE CHEM LABS

Ronald G. Evans
Lab Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 80497
CLIENT: Alton Geoscience
CLIENT JOS NO.: 30-080

DATE RECEIVED: 01/29/90
DATE REPORTED: 02/05/90

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 5030 and 8015

LAB #	Sample Identification	Concentration (mg/L) Gasoline Range
1	TW-5	66
2	TW-6	170
3	TW-7	470
4	TW-8	720

mg/L - parts per million (ppm)

Method Detection Limit for Gasoline in Soil: 1.0 mg/kg
Method Detection Limit for Gasoline in Water: 0.1 mg/L

QA/QC Summary:

Daily Standard run at 2mg/L; RPD Gasoline = 10%
MS/MSD Average Recovery = 96%; Duplicate RPD = 5%

Edward R. Morales

Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 80497
CLIENT: Alton Geoscience
CLIENT JOB NO.: 30-080

DATE RECEIVED: 01/29/90
DATE REPORTED: 02/05/90

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ug/L) Benzene	Toluene	Ethyl Benzene	Xylenes
1	TW-5	19000	15000	1800	8600
2	TW-6	32000	41000	4500	24000
3	TW-7	11000	29000	9700	48000
4	TW-8	4200	32000	12000	71000

ug/L - parts per billion (ppb)
ug/kg - parts per billion (ppb)

Method Detection Limit in Soil: 3 ug/kg
Method Detection Limit in Water: 0.3 ug/L

QAQC Summary:

Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 96 %: Duplicate RPD = <2%

Edward R. Morales
Laboratory Manager

ALTON GEOSCIENCE
1170 BURNETT AVE., STE S
CONCORD, CA 94520

CHAIN of CUSTODY RECORD

PAGE 1 of 1

DATE: 1/25
RESULTS DUE BY: ASAP

PROJECT NUMBER: 30-081
PROJECT NAME AND ADDRESS: [redacted]
PROJECT MANAGER: [redacted]
SAMPLER'S SIGNATURE: [redacted]
LABORATORY: Mobile

REMARKS OR SPECIAL INSTRUCTIONS:

Sgv Rpts - Call w/ [redacted]
[redacted] 25-[redacted]

NOTE: PLEASE INDICATE VERBAL REQUESTS FOR ADDITIONAL ANALYSES IN THIS BOX.

SAMPLE NUMBER	SAMPLE DATE/TIME	LOCATION/ DESCRIPTION	SAMPLE MATERIAL	SAMPLE TYPE: GRAB	SAMPLE TYPE: COMP.	NUMBER OF CONTAINERS	SAMPLE PREP.: TPH-G w/ [redacted]
[redacted]	[redacted]		[redacted]	X		3	X
[redacted]	[redacted]		"	"		3	X
[redacted]			"	"		3	X

Column groups: SAMPLE PREP. | SOIL ANALYSIS | WATER ANALYSIS

TOTAL NO. OF CONTAINERS: 9

RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:	
[redacted]	[redacted]	[redacted]	1/25 10:55	METHOD OF SHIPMENT:
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:	SHIPPED BY:
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:	COURIER:

ALTON GEOSCIENCE
1170 BURNETT AVE., STE S
CONCORD, CA 94520

CHAIN of CUSTODY RECORD

PAGE of

DATE: 1/25
RESULTS DUE BY: ASAP

PROJECT NUMBER: 30.080
PROJECT NAME AND ADDRESS: 98th Ave Oakland
PROJECT MANAGER: Hopwood
SAMPLER'S SIGNATURE:
LABORATORY: Mobile

REMARKS OR SPECIAL INSTRUCTIONS:

Super Rush phone w/ Results
Page 975-1449

NOTE: PLEASE INDICATE VERBAL REQUESTS FOR ADDITIONAL ANALYSES IN THIS BOX.

SAMPLE NUMBER	SAMPLE DATE/TIME	LOCATION/ DESCRIPTION	SAMPLE MATERIAL	SAMPLE TYPE: GRAB	SAMPLE TYPE: COMP.	NUMBER OF CONTAINERS	SAMPLE PREP.	SOIL ANALYSIS	WATER ANALYSIS: TPH-G/BTEX
TW-2	1/25		Water	X		3			X
TW-3	1/25		"	X		3			X

TOTAL NO. OF CONTAINERS: 6

RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:	METHOD OF SHIPMENT:
	1/25	Carol R Harris	1/25 11:00	
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:	SHIPPED BY:
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:	COURIER:

ALTON GEOSCIENCE
1170 BURNETT AVE., STE. S
CONCORD, CA. 94520 (415) 682-1582

CHAIN of CUSTODY RECORD

PAGE 1 of 1

DATE: 1/29/90 DUE BY: 2/6/90
LABORATORY: Superior

PROJECT NUMBER / MANAGER: 30-080 M. Hopwood
SAMPLERS SIGNATURE: William B. Hipp
PROJECT NAME / ADDRESS: BP 98th Ave. Oakland
REMARKS OR SPECIAL INSTRUCTIONS:

SAMPLE NUMBER	SAMPLE DATE/TIME	LOCATION/ DESCRIPTION	SAMPLE MATRIX	SAMPLE TYPE: GRAB	SAMPLE TYPE: COMP.	TYPE & NUMBER OF CONTAINERS	ANALYSIS	WATER ANALYSIS						
											TPH as Gas / BTEX			
TW-5	1/26/90	TW-5	Water	X		3 x 40 ml					X			
TW-6	1/25/90	TW-6	"	X		3 x 40 ml					X			
TW-7	1/26/90	TW-7	"	X		3 x 40 ml					X			
TW-8	1/26/90	TW-8	"	X		3 x 40 ml					X			

CHAIN OF CUSTODY

	SIGNATURE	INCLUSIVE DATES/TIMES			SIGNATURE	INCLUSIVE DATES/TIMES	
1.	William B. Hipp	1/29/90	3:30 pm	4.			
2.	Branch Laboratories	1/29/90	3:30 pm	5.			
3.				6.			

APPENDIX B

PERMITS

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT 2220 98TH Ave
OAKLAND CA

(2) CLIENT
Name BP OIL : Darlene Jacobson
Address 2868 Prospect Park Phone 916 631 6918
City Rancho Cordova Zip 95670 - 6020

(3) APPLICANT
Name AITON Geoscience, Inc.
Address 1000 Burnett Ave Phone 682 - 6582
City Concord Zip 94520

(4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical Investigation
Cathodic Protection ___ General ___
Well Destruction ___ Contamination ___

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring X Other ___

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. C57-554979

WELL PROJECTS
Drill Hole Diameter 8 in. Maximum
Casing Diameter 4 in. Depth 40 ft.
Surface Seal Depth 15 ft. Number 3

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

(7) ESTIMATED STARTING DATE 5/18
ESTIMATED COMPLETION DATE 5/19

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

APPLICANT'S SIGNATURE Matthew A. Tong Date 5/3/90

FOR OFFICE USE

PERMIT NUMBER 90277
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
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, irrigation, and monitoring wells unless a lesser depth is specially approved.

C. 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.

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

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 4 May 90
Wyman Hong

21989

[redacted] X900151

BP OIL Facility #11133

STRINGFIELD ST.

CITY OF OAKLAND

PERMIT TO EXCAVATE IN STREETS OR OTHER WORK AS SPECIFIED

BP OIL COMPANY
2868 Prospect Park Dr. SUITE 360
RANCHO CORDOVA, CA 95670

LOCATION: 2220 98th Avenue (street or address) BETWEEN 98th Ave. (street) AND Bancroft (street)

EXCV 105.00
SUBTL 105.00
CHECK 105.00
ITEM 1CL 7705 11:01

NATURE OF WORK: 2 monitoring wells in the street (Springfield St)

APPLICANT: Alton Geoscience, Inc.

ADDRESS: 1000 Burnett Ave., Suite 140

CITY: Concord STATE: CA ZIP: 94520

PHONE: (415) 682-1582

OWNER/BUILDER

I hereby affirm that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law Chapter 9 (commencing with Sec. 7000) of Division 3 of the Business and Professions Code, or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than $500):

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale).

☐ I, as owner of the property, am exempt from the sale requirements of the above due to: (1) I am improving my principal place of residence or appurtenances thereto, (2) the work will be performed prior to sale, (3) I have resided in the residence for the 12 months prior to completion of the work, and (4) I have not claimed exemption in this subdivision on more than two structures more than once during any three-year period. (Sec. 7044, Business and Professions Code).

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law).

☐ I am exempt under Sec. ______ B&PC for this reason ______

Signature ______ Date ______

WORKER'S COMPENSATION

I hereby affirm that I have a certificate of consent to self insure, or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3800, Lab. C.).

Policy # WP89-469257-02 Company Name Fremont Indemnity

☒ Certified copy is hereby furnished.

☐ Certified copy is filed with the city building inspection department.

Signature ______ Date ______

This section need not be completed if the permit is for one hundred dollars ($100) or less.

I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California.

Signature ______ Date ______

NOTICE TO APPLICANT: If, after making this Certificate of Exemption, you should become subject to the Workers' Compensation provisions of the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked.

CONTRACTOR

I hereby affirm that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, and my license is in full force and effect.

LICENSE # AND CLASS: 519422 C57 CITY BUSINESS TAX #: 59626

Approximate Starting Date DATE 5/16/90

Approximate Completion Date DATE 5/19/90

LIMITED OPERATION AREA YES ______ NO ______

DATE STREET LAST RESURFACED DATE ______

24-HOUR EMERGENCY PHONE NUMBER 916 - 9 7276

Telephone 273-3668 Forty-eight (48) HOURS BEFORE ACTUAL CONSTRUCTION. This Permit Void 90 Days From Issue.

ATTENTION

State law requires that contractor/owner call Underground Service Alert two working days before excavating to have below-ground utilities located. This permit is not valid unless applicant has secured an inquiry identification number issued by Underground Service Alert.

Call Toll Free: 800-642-2444

This permit issued pursuant to all provisions of Chapter 6, Article 2 of the Oakland Municipal Code.

This permit is granted upon the express condition that the permittee shall be responsible for all claims and liabilities arising out of work performed under the permit or arising out of permittee's failure to perform the obligations with respect to street maintenance. The permittee shall, and by acceptance of the permit agrees to, defend, indemnify, save and hold harmless the City, its officers and employees, from and against any and all suits, claims or actions brought by any person for or on account of any bodily injuries, disease or illness or damage to persons and/or property sustained or arising in the construction of the work performed under the permit or in consequence of permittee's failure to perform the obligations with respect to street maintenance.

X [signature] Date 5/1/90

Signature of Contractor Owner or Agent

☐ Agent for ☒ Contractor ☐ Owner

OFFICIAL USE ONLY

UTILITY COMPANY REPORT

Supervisor ______

Completion Date ______

CITY INSPECTOR'S REPORT

	BACKFILL	PAVING
Initials		
Hours		
Date		
Concrete		
Asphalt		
Sidewalk		

Size of Cut: Sq. Ft. ______ Inches ______

Paved by ______ Type ______

Bill No. ______

Charges Backfill ______

Paving ______

Paving Insp. ______

APPROVED

Engineering Services ______ Date ______

Field Services ______ Date ______

Construction ______ Date ______

Traffic Engineering ______ Date ______

Electrical Department ______ Date ______

APPROVED BY DIRECTOR OF PUBLIC WORKS

PER [initials]

Date 5/7/90

CITY OF OAKLAND

PERMIT TO EXCAVATE IN STREETS OR OTHER WORK AS SPECIFIED

BANCROFT AVE.

BP OIL FACILITY #11133

LOCATION: 2220 98th Avenue (street or address) BETWEEN 98th Ave. (street) AND Bancroft (street)

BP OIL COMPANY
2868 PROSPECT PARK DR. SUITE 360
RANCHO CORDOVA, CA 95670

NATURE OF WORK: 1 monitoring well in the median of Bancroft Ave.

APPLICANT: Alton Geoscience, Inc.

ADDRESS: 1000 Burnett Ave., Suite 140

CITY: Concord STATE: CA ZIP: 94520

PHONE: (415) 682-1582

I hereby affirm that I am exempt from the Contractor's License Law for the following reason: Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law Chapter 9 (commencing with Sec. 7000) of Division 3 of the Business and Professions Code, or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than $500).

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code. The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale).

☐ I, as owner of the property, am exempt from the sole requirements of the above due to: (1) I am improving my principal place of residence or appurtenances thereto, (2) the work will be performed prior to sale, (3) I have resided in the residence for the 12 months prior to completion of the work, and (4) I have not claimed exemption in this subdivision on more than two structures more than once during any three-year period. (Sec. 7044, Business and Professions Code).

☑ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law).

☐ I am exempt under Sec. _____ B&PC for this reason _____

Signature _____ Date _____

OWNER/BUILDER

I hereby affirm that I have a certificate of consent to self-insure, or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3800, Lab. C.).

Policy No. WP89-469257-02 Company Name Fremont Indemnity

☒ Certified copy is hereby furnished.

☐ Certified copy is filed with the city building inspection department.

Signature _____ Date _____

(This section need not be completed if the permit is for one hundred dollars ($100) or less.)

I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California.

Signature _____ Date _____

WORKERS' COMPENSATION

IMPORTANT TO APPLICANT: If after making this Certificate of Exemption, you should become subject to the Workers' Compensation provisions of the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked.

CONTRACTOR

I hereby affirm that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, and my license is in full force and effect.

LICENSE # AND CLASS C57- 559979 CITY BUSINESS TAX # 496025

Approximate Starting Date DATE 5/16/95

Approximate Completion Date DATE 5/19/95

LIMITED OPERATION AREA YES _____ NO _____

DATE STREET LAST RESURFACED DATE _____

24-HOUR EMERGENCY PHONE NUMBER 916 638 7256

Telephone 273-3668 Forty-eight (48) HOURS BEFORE ACTUAL CONSTRUCTION
This Permit Void 90 Days From Issue.

ATTENTION

State law requires that contractor/owner call Underground Service Alert two working days before excavating to have below-ground utilities located. This permit is not valid unless applicant has secured an inquiry identification number issued by Underground Service Alert.

Call Toll Free: 800-642-2444

This permit issued pursuant to all provisions of Chapter 6, Article 2 of the Oakland Municipal Code.

This permit is granted upon the express condition that the permittee shall be responsible for all claims and liabilities arising out of work performed under the permit or arising out of permittee's failure to perform the obligations with respect to street maintenance. The permittee shall, and by acceptance of the permit agrees to defend, indemnify, save and hold harmless the City, its officers and employees, from and against any and all suits, claims or actions brought by any person for or on account of any bodily injuries, disease or illness or damage to persons and/or property sustained or arising in the construction of the work performed under the permit or in consequence of permittee's failure to perform the obligations with respect to street maintenance.

X _____ Date _____
Signature of Contractor Owner or Agent

☐ Agent for ☒ Contractor ☐ Owner

OFFICIAL USE ONLY

UTILITY COMPANY REPORT

Supervisor _____

Completion Date _____

CITY INSPECTOR'S REPORT

	BACKFILL	PAVING
Initials		
Hours		
Date		
Concrete		
Asphalt		
Sidewalk		

Size of Cut: Sq. Ft. _____ Inches _____

Paved by _____ Type _____

Bill No. _____

Charges Backfill _____
Paving _____
Paving Insp. _____

APPROVED

Engineering Services _____ Date _____

Field Services _____ Date _____

Construction _____ Date _____

Traffic Engineering _____ Date _____

Electrical Department _____ Date _____

APPROVED BY DIRECTOR OF PUBLIC WORKS

PER _____

Date 5/17/95

APPENDIX C

GENERAL FIELD PROCEDURES AND BORING LOGS

GENERAL FIELD PROCEDURES

A description of general field procedures conducted during drilling activities is presented below.

Drilling and Soil Sampling

Soil borings/monitoring wells were drilled utilizing 10-inch-diameter, continuous-flight, hollow-stem augers. To avoid cross-contamination, the augers were steam-cleaned prior to drilling each boring.

Soil samples were obtained for soil description, field, and laboratory analysis. Soil samples collected at 5-foot intervals were retrieved ahead of the lead auger utilizing an 18-inch-long by 2-inch-diameter, split spoon sampler lined with 1.5-inch-diameter, stainless steel sample tube inserts. The sampler and sample tubes were washed with a sodium tripolyphosphate solution and rinsed before each sampling event. The sampler was driven by a 30-inch free fall of a 140-pound hammer. Blow counts were recorded for three successive 6-inch intervals.

Upon retrieval from the sampler, the sample tubes were removed and securely sealed with Teflon sheeting and polyurethane caps. The samples were labeled with sample identification, sample depth, geologist's initials, and date of collection. The soil samples were kept on ice prior to and during transport to a state-certified laboratory.

The soil recovered was described in accordance with the Unified Soil Classification System. For each soil type, field estimates of density/consistency, moisture, color, grading, and soil type were recorded on the boring logs.

Monitoring Well Installation and Construction Details

Included in this appendix are monitoring well installation and construction details for monitoring wells installed as part of this study.

Monitoring wells were constructed of 4-inch-diameter, flush-threaded, Schedule 40 PVC blank and screened (0.020-inch slot size) casing. The annular space surrounding the screened portion was backfilled with No. 3 Monterey sand (filter pack) to approximately 2 feet above the top of the screened section. A 1-foot-thick bentonite annular seal was placed above the filter pack and the remaining annulus was grouted

with neat cement to the surface. Utility boxes were installed slightly above grade to minimize infiltration of surface waters. Locking, watertight well caps were installed to ensure the integrity of the well.

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-1

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 98.99

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE SEE MONITORING WELL CONSTRUCTION DETAIL
CASING DATA
DRILLER WEST HAZMAT

WATER LEVEL: 26.87
DATE: JULY, 1990
TIME:

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			ASPHALT
			2				SILTY CLAY; moderately stiff, damp, light gray
			4	2" sch. 40 PVC Casing			
5,12,20			6		CL		SILTY CLAY; moderately stiff, damp, brown, some organic material
7,17,31			8				As above
8,23,45			10				As above
8,21,29			12				SILTY CLAY; brown, damp
11,17,28			14				As above, increasing sand
8,12,30	75		16				
8,13,24	ND		18				CLAYEY SILT; moderately stiff, damp
4,6,11	25		20	2" sch. 40 PVC .020 Slot	ML		As above, softer, very moist
4,6,10			22				
15,20,34			24		SC		CLAYEY SAND; very fine grained, saturated, moderately loose, tan
			26				
			28				SILTY CLAY; w/ sand, saturated, moderately stiff, brown w/ gray motlling
			30				

CONTINUED ON NEXT PAGE

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 5/17/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-1

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 INCH
SAMPLER TYPE
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL
DRILLER WEST HAZMAT

WATER LEVEL
DATE
TIME

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
11,23, 35			30				
			32		SC		CLAYEY SAND; very fine grained, very moist, moderately dense, tan to light brown
8,25, 33			34				As above, some coarse sand
			36	End Cap			BOREHOLE TERMINATED AT 35 FEET
			38				
			40				
			42				
			44				
			46				
			48				
			50				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 97.69

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE SEE MONITORING WELL CONSTRUCTION DETAIL
CASING DATA
DRILLER WEST HAZMAT

WATER LEVEL: 24.88
DATE : JULY, 1990
TIME:

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			Native soil
			2				SILTY CLAY; dark brown, damp, medium plasticity
			4	2" sch. 40 PVC Casing			
16, 20, 26			6				SILTY CLAY; brown, dry to damp, medium plasticity, hard
			8				
7, 7, 8			10				SILTY CLAY; w/ fine sand, reddish brown, damp, medium platicity, stiff
			12				
			14				
7, 10, 21			16		CL		SILTY CLAY; w/ slight gravels, brown, damp, high platicity, very stiff
			18				
			20				SILTY CLAY; brown, damp, low platicity, hard
9, 15, 23			22	2" sch. 40 PVC .020 Slot			
			24				▼ SILTY CLAY; sandy brown, moist, medium plasticity, very stiff
7, 10 20			26				
			28				
			30				

CONTINUED ON NEXT PAGE

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE SEE MONITORING WELL CONSTRUCTION DETAIL
CASING DATA
DRILLER WEST HAZMAT

WATER LEVEL
DATE
TIME

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
9, 17, 25			30		SC		SILTY SAND; brown, saturated, hard
			32				
17, 23 50/5			34	2" sch. 40 PVC .020 Slot	CL		SILTY CLAY; w/ fine sand, brown, dry to damp, low plasticity, hard
			36				
27, 39, 50/5			38				SILTY CLAY; brown, damp, low plasticity, hard
			40	End Cap			BOREHOLE TERMINATED AT 35 FEET
			42				
			44				
			46				
			48				
			50				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-3

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 100.00

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL
DRILLER WEST HAZMAT

WATER LEVEL: 24.75
DATE : JULY, 1990
TIME:

BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			ASPHALT
9, 9, 12			2				
			4	2" sch. 40 PVC Casing			SILTY CLAY; brown, damp, medium plastictity
			6				
			8				
11, 15, 21			10				SILTY CLAY; brown, damp, low plasticity, very stiff
			12				
			14				
9, 17, 32			16		CL		SILTY CLAY; brown, damp, low to medium plasticity, hard
			18				
27, 50/5			20				SILTY CLAY; gravelly, medium size gravel, moist, hard
			22	2" sch. 40 PVC .020 Slot			
			24				
21, 29, 39			26				SILTY CLAY; gravelly, reddish brown, saturated, hard
			28				
			30				

CONTINUED ON NEXT PAGE

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-3

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL
DRILLER WEST HAZMAT

WATER LEVEL
DATE
TIME

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
21, 25, 37			30		CL		SILTY CLAY; greyish brown, damp, medium plasticity, hard
			32				
			34				SILTY CLAY; brown, damp, medium to high plasticity, "very tight"
21, 37, 41			36	End Cap			BOREHOLE TERMINATED AT 35 FEET.
			38				
			40				
			42				
			44				
			46				
			48				
			50				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-4

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 99.96

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL
DRILLER WEST HAZMAT

WATER LEVEL: 27.29
DATE : JULY, 1990
TIME:

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			ASPHALT
			2				
8, 12, 16			4	2" sch. 40 PVC Casing			CLAY w/ roots, dark brown, organic, damp, high plasticity
			6				SILTY clay w/ root fragments, greyish brown, damp, medium plastictity, no odor,very stiff
			8				
23, 50/5			10				SILTY CLAY; brown, damp, medium plasticity,no odor, hard
			12				
			14				
28, 36, 41			16		CL		SILTY CLAY; brown, moist, medium to high plasticity, no odor, hard
			18				
9, 17, 32			20				SILTY CLAY; brown, moist, low to medium plasticity, gas odor, hard
			22	2" sch. 40 PVC .020 Slot			
			24				
11, 15, 22			26				SILTY CLAY; brown, moist, medium plasticity, gas odor, hard
			28				
			30				

CONTINUED ON NEXT PAGE

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. AW-4

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL
DRILLER WEST HAZMAT

WATER LEVEL
DATE
TIME

BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
15, 19, 23			30				SILTY CLAY; brown, moist, low plasticity, gas odor, hard
			32		CL		
16,23,31			34				SILTY CLAY; brown, damp, high platicity, no odor, hard
			36	End Cap			BOREHOLE TERMINATED AT 35 FEET
			38				
			40				
			42				
			44				
			46				
			48				
			50				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets

sample
Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. RW-1

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 98.60

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL
DRILLER WEST HAZMAT

WATER LEVEL: 27.93
DATE : JULY, 1990
TIME:

BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			ASPHALT
			2				
4,6,11	ND		4	6" sch. 40 PVC Casing	CL		SILTY CLAY; w/ sand, damp, moderately stiff, tan w/ grey mottling
			6				
			8				
11, 23, 31	ND		10		ML		CLAYEY SILT; w/ slight sand, damp, moderately stiff,tan
			12				
			14				
7,11, 24	ND		16				As above, sand grains larger
			18	6" sch. 40 PVC .020 Slot			
7,16, 21	ND		20		SC		CLAYEY SAND; moderately dense, very moist, fine grained
			22				
			24				As above, less clayey , i.e., sand w/ slight clay
7, 11, 25	>500		26				
			28		SC		SANDY CLAY; stiff, damp tan to light brown, sand clasts to 3 mm, some dark organic matter
7, 13, 29			30				CONTINUED ON NEXT PAGE

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY

BORING NO.
WELL NO. RW-1

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 INCH
SAMPLER TYPE
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL
DRILLER WEST HAZMAT

WATER LEVEL
DATE
TIME

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
7, 13, 29			30				
			32				
			34	6" sch. 40 PVC .020 Slot	CL		As above, more sand, strong TPH odor
7, 11, 23			36				
			38				
			40				As above, some coarse sand
5, 11, 26				End Cap			BOREHOLE TERMINATED AT 40 FEET
			42				
			44				
			46				
			48				
			50				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval

APPENDIX D

WELL DEVELOPMENT AND WATER SAMPLING PROCEDURES AND FIELD SURVEY FORMS

WELL DEVELOPMENT AND WATER SAMPLING PROCEDURES

All purging and ground water sampling equipment was cleaned prior to use to minimize cross-contamination between wells. All equipment in contact with ground water was triple-rinsed prior to each sampling event in successive baths consisting of tripolyphosphate solution, tap water, and deionized water. Prior to sampling, the well was developed and purged in accordance with EPA protocol. During purging, pH, temperature, and conductivity were measured periodically until these parameters stabilized, indicating formation water had entered the well casing. The purged water was pumped into 55-gallon D.O.T.-approved drums prior to disposal or recycling at an appropriate waste disposal facility.

Ground water samples were collected by lowering a 4-inch-diameter, bottom-fill, Teflon bailer just below the water level in the well. The samples were carefully transferred from the check-valve-equipped Teflon bailer to zero-headspace 1-liter and 40-milliliter glass containers fitted with Teflon-sealed caps. All samples were inverted to ensure that entrapped air was not present. Each sample was labeled with sample number, well number, sample date, and engineer's/geologist's initials. The samples remained on ice prior to laboratory analysis.

Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave, Oakland Date: 6-12-90

Well: AW-1 Sampling Team: W. Shipp

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 38.20 feet Time: 4:16 Water level Before Pumping: 26.33

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
11.87 feet x	(0.16)	0.65	1.9	10	19

Depth Purging From: All feet. Time Purging Begins: 4:20

Notes on Initial Discharge: Clear

Time	Volume	pH	Conductivity X100	T	Notes
4:45	15	7.63	1.86	68.9	Brn, Turbid
4:47	15.5	7.40	1.89	68.7	" "
4:49	16	7.35	1.85	68.6	" "
4:52	16.5	7.39	1.84	68.7	" "
4:53	17	7.30	1.82	69.0	" "

Time Field Parameter Measurement Begins: 4:45

	Rep #1	Rep #2	Rep #3	Rep #4
pH	7.40	7.39	7.29	7.30
Conductivity	1.89	1.85	1.84	1.82
Temperature (F)	68.7	68.6	68.7	69.0

Presample Collection Gallons Purged: 17

Time Sample Collection Begins: 4:55

Time Sample Collection Ends: 5:00

Total Gallons Purged: 17.25

Comments: Purged well until dry (@15gals), Poor Recovery

Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave, Oakland Date: 6-12-90

Well: AW-2 Sampling Team: W. Shipp

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 36.75 feet Time: 12:53 Water level Before Pumping: 24.44

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
12.31	feet x	(0.16)	0.65	1.9	10	19

Depth Purging From: All feet. Time Purging Begins: 1:00

Notes on Initial Discharge: Brn, Silty

Time	Volume	pH	Conductivity (x1000)	T	Notes
1:22	15	7.47	0.28	72.3	Lt Brn, Turbid
1:24	16	7.35	0.27	72.0	" , Silty
1:27	17	7.31	0.25	71.7	" "
1:29	18	7.35	0.25	71.5	" "
1:31	19	7.38	0.23	71.8	" "

Time Field Parameter Measurement Begins: 1:22

	Rep #1	Rep #2	Rep #3	Rep #4
pH	7.35	7.31	7.35	7.38
Conductivity	0.27	0.25	0.25	0.23
Temperature (F)	72.0	71.7	71.5	71.8

Presample Collection Gallons Purged: 19

Time Sample Collection Begins: 1:39

Time Sample Collection Ends: 1:45

Total Gallons Purged: 19.25

Comments:

Well Development and Water Sampling Field Survey

Project # 30-080 Site: 98th Ave, Oakland Date: 6-12-90

Well: AW-3 Sampling Team: W. Shipp

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 53.65 feet Time: 2:53 Water level Before Pumping: 26.95

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
6.7	feet x	0.16	0.65	1.1	10	11

Depth Purging From: All feet. Time Purging Begins: 2:56

Notes on Initial Discharge: Lt. Brn, Cloudy

Time	Volume	pH	Conductivity x100	T	Notes
3:06	7	7.49	2.55	728	Lt. Brn, Cloudy
3:08	8	7.52	2.60	68.0	" "
3:09	9	7.53	2.54	68.2	" "
3:12	10	7.62	2.65	68.5	" "
3:15	11	7.61	2.64	69.1	" "

Time Field Parameter Measurement Begins: 3:06

	Rep #1	Rep #2	Rep #3	Rep #4
pH	7.52	7.53	7.62	7.61
Conductivity	2.60	2.54	2.65	2.64
Temperature (F)	68.0	68.2	68.5	69.1

Presample Collection Gallons Purged: 11

Time Sample Collection Begins: 3:18

Time Sample Collection Ends: 3:23

Total Gallons Purged: 11.25

Comments:

Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave, Oakland Date: 6-12-90

Well: AW-4 Sampling Team: W. Shipp

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 33.65 feet Time: 3:31 Water level Before Pumping: 26.95

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
6.7 feet x	(0.16)	0.65	1.1	10	11

Depth Purging From: All feet. Time Purging Begins: 3:37

Notes on Initial Discharge: Lt Brn, Turbid

Time	Volume	pH	Conductivity X100	T	Notes
3:45	7	7.01	2.18	68.8	Brn, Silty
3:48	8	6.98	2.08	66.4	" "
3:51	9	6.92	2.08	66.1	" "
3:53	10	6.97	2.06	65.8	" "
3:56	11	6.96	2.05	65.6	" "

Time Field Parameter Measurement Begins: 3:45

	Rep #1	Rep #2	Rep #3	Rep #4
pH	6.98	6.92	6.97	6.96
Conductivity	2.08	2.08	2.06	2.05
Temperature (F)	66.4	66.1	65.8	65.6

Presample Collection Gallons Purged: 11

Time Sample Collection Begins: 4:00

Time Sample Collection Ends: 4:06

Total Gallons Purged: 11.25

Comments:

Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave, Oakland Date: 6-12-90

Well: MW-2 Sampling Team: W. Shipp

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 31.30 feet Time: 1:59 Water level Before Pumping: 22.94

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
8.36 feet x	(0.16)	0.65	13	3	4

Depth Purging From: All feet. Time Purging Begins: 2:00

Notes on Initial Discharge: Lt. Brn, Turbid

Time	Volume	pH	Conductivity X100	T	Notes
2:04	2	8.64	0.91	73.9	Brn, Silty
2:05	2.5	8.79	0.65	69.9	" "
2:07	3	8.86	0.61	69.6	" "
2:09	3.5	8.78	0.70	70.0	" "
2:11	4	8.75	0.68	69.0	" "

Time Field Parameter Measurement Begins: 2:04

	Rep #1	Rep #2	Rep #3	Rep #4
pH	8.79	8.86	8.78	8.75
Conductivity	0.65	0.61	0.70	0.68
Temperature (F)	69.9	69.6	70.0	69.0

Presample Collection Gallons Purged: 4

Time Sample Collection Begins: 2:13

Time Sample Collection Ends: 2:16

Total Gallons Purged: 4.25

Comments:

Well Development and Water Sampling Field Survey

Project # 30-080 Site: 98th Ave, Oakland Date: 6-12-90

Well: MW-3 Sampling Team: W. Shipp

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 33.89 feet Time: 2:24 Water level Before Pumping: 22.56

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
11.32	feet x	(0.16)	0.65	1.8	3	5.4

Depth Purging From: All feet. Time Purging Begins: 2:29

Notes on Initial Discharge: Clear

Time	Volume	pH	Conductivity X100	T	Notes
2:32	3.4	7.85	0.95	71.2	Lt Brn, Turbid
2:34	3.9	7.60	0.80	69.1	" "
2:36	4.4	7.59	0.84	69.8	" "
2:37	4.9	7.60	0.87	69.5	" "
2:38	5.4	7.50	0.88	70.0	" "

Time Field Parameter Measurement Begins: 2:32

	Rep #1	Rep #2	Rep #3	Rep #4
pH	7.60	7.59	7.60	7.50
Conductivity	0.80	0.84	0.87	0.88
Temperature (F)	69.1	69.8	69.5	70.0

Presample Collection Gallons Purged: 5.4

Time Sample Collection Begins: 2:40

Time Sample Collection Ends: 2:45

Total Gallons Purged: 5.65

Comments:

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: MW-1 Sampling Team: Walls + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: ____ feet Time: 10:30 Water level Before Pumping: 13.31

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
____	feet x	0.16	0.65	____	____	____

Depth Purging From: ____ feet. Time Purging Begins: ____

Notes on Initial Discharge: ~ .22' free product

Time	Volume	pH	Conductivity	T	Notes
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____

Time Field Parameter Measurement Begins: ____

	Rep #1	Rep #2	Rep #3	Rep #4
pH	____	____	____	____
Conductivity	____	____	____	____
Temperature (F)	____	____	____	____

Presample Collection Gallons Purged: ____

Time Sample Collection Begins: ____

Time Sample Collection Ends: ____

Total Gallons Purged: ____

Comments: well bailed until no free product

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: MW-2 Sampling Team: Walls + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 31.30 feet Time: 10:30 Water level Before Pumping: 23.15

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
9.15	feet x	(0.16)	0.65	1.30		13

Depth Purging From: ____ feet. Time Purging Begins: 4:00

Notes on Initial Discharge: clear

Time	Volume	pH	Conductivity	T	Notes
		7.05	x100		
4:10	~~7~~ 9	~~7~~	~~0.32~~ 0.44	~~73~~	cloudy, mud
4:15	10	7.05	.45	72.0	
4:20	11	7.04	.45	72.1	
4:28	12	7.04	.41	72.0	
4:32	13	7.04	.43	70.5	

Time Field Parameter Measurement Begins: ____

	Rep #1	Rep #2	Rep #3	Rep #4
pH				
Conductivity				
Temperature (F)				

Presample Collection Gallons Purged: 13

Time Sample Collection Begins: 4:35

Time Sample Collection Ends: 4:40

Total Gallons Purged: 13.5

Comments:

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: MW-3 Sampling Team: Watts + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 33.88 feet Time: 10:30 Water level Before Pumping: 23.66

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
10.82 feet x	(0.16)	0.65	1.73	~~x3~~ x4	~~13~~ 7

Depth Purging From: ____ feet. Time Purging Begins: ____

Notes on Initial Discharge: ____

Time	Volume	pH	Conductivity x100	T	Notes
3:00	2	7.00	1.52	75.50	Brn
3:06	3	7.01	0.65	74.50	Brn, cldy
3:11	4	7.02	0.65	70.30	" "
3:16	5	7.03	0.60	70.00	" "
3:20	6	7.03	0.63	70.00	" "
3:26	7	7.04	0.63	69.80	

Time Field Parameter Measurement Begins: ____

	Rep #1	Rep #2	Rep #3	Rep #4
pH				
Conductivity				
Temperature (F)				

Presample Collection Gallons Purged: 7

Time Sample Collection Begins: 3:30

Time Sample Collection Ends: 3:35

Total Gallons Purged: 7.5

Comments: ____

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: AW-1 Sampling Team: Watts + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: ~~20.33~~ 38.20 feet Time: 10:30 Water level Before Pumping: 26.87

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
11.33	feet x	(0.16)	0.65	1.81	x4 ~~x80~~	~~7.25~~

Depth Purging From: ____ feet. Time Purging Begins: 6:45

Notes on Initial Discharge: Clear

Time	Volume	pH	Conductivity x100	T	Notes
7:00	5.0	7.01	1.28	68.7	cloudy, fine silt
7:04	6.5	7.00	1.21	67.9	"
7:06	6.0	7.00	1.19	~~7.7~~	"
7:10	7.0	7.00	1.26	67.4	"
7:12	7.5	6.99	1.26	67.2	"

Time Field Parameter Measurement Begins: ____

	Rep #1	Rep #2	Rep #3	Rep #4
pH				
Conductivity				
Temperature (F)				

Presample Collection Gallons Purged: 7.5

Time Sample Collection Begins: 7:17

Time Sample Collection Ends: 7:15

Total Gallons Purged: 8

Comments: ____

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: AW-2 Sampling Team: Watts + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: ~~26.77~~ 36.77 feet Time: 10:30 Water level Before Pumping: 24.88

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
11.87 feet x	0.16	0.65	1.89		19

Depth Purging From: ~27 feet. Time Purging Begins: ~~11:00~~

Notes on Initial Discharge:

Time	Volume	pH	Conductivity	T	Notes
11:10	5	6.70	2.59	65.7	brown, silty
11:14	10	7.10	3.33	65.7	"
11:20	15	7.~~35~~	3.19	68.4	"
11:32	20	7.40	2.57	66.9	"
11:45	25	7.35	2.80	66.4	"

Time Field Parameter Measurement Begins:

	Rep #1	Rep #2	Rep #3	Rep #4
pH				
Conductivity				
Temperature (F)				

Presample Collection Gallons Purged: 25

Time Sample Collection Begins: 2:20

Time Sample Collection Ends: 2:25

Total Gallons Purged: 25.5

Comments:

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: AW3 Sampling Team: Watts + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: ~~24.75~~
Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 35.41 feet Time: ____ Water level Before Pumping: 24.75

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
10.66	feet x	0.16	0.65	1.7	____	17

Depth Purging From: ____ feet. Time Purging Begins: [illegible]

Notes on Initial Discharge: Clear

Time	Volume	pH	Conductivity	T	Notes
3:50	5	7.80	7.45	64.1	Cloudy, lt. brn.
4:30	10	[illegible]	[illegible]	58.8	[illegible]
6:150	15	[illegible]	[illegible]	71.7	[illegible]
[illegible]	17	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	66.6	

Time Field Parameter Measurement Begins: ____

	Rep #1	Rep #2	Rep #3	Rep #4
pH				
Conductivity				
Temperature (F)				

Presample Collection Gallons Purged: 18

Time Sample Collection Begins: 6:25

Time Sample Collection Ends: 6:30

Total Gallons Purged: 18.5

Comments: ____

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: Aw-4 Sampling Team: Watts + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: ~~Bailer~~
Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 33.65 feet Time: _____ Water level Before Pumping: 27.29

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
6.36 feet x	0.16	0.65	1.04	10	10

Depth Purging From: ____ feet. Time Purging Begins: 1:00

Notes on Initial Discharge: ~~Cloudy + grey + odor~~

Time	Volume	pH	Conductivity x100	T	Notes
1:10	5	6.95	14.35	77.9	brown silty
1:16	7	7.11	5.62	67.2	"
1:22	9	7.57	5.57	61.4	" well dry in 4 ov
1:27	11	7.56	5.40	60.4	"
1:30	12	7.67	6.94	59.0	"

Time Field Parameter Measurement Begins: _____

	Rep #1	Rep #2	Rep #3	Rep #4
pH				
Conductivity				
Temperature (F)				

Presample Collection Gallons Purged: 12

Time Sample Collection Begins: 3:10 p

Time Sample Collection Ends: 3:15 p

Total Gallons Purged: 12.5

Comments: _____

ALTON GEOSCIENCE, INC.
Well Development and
Water Sampling Field Survey

Project # 30-080 Site: 98th Ave Oakland Date: 7/5/90

Well: RW-1 Sampling Team: Watts + Adkins

Well Development Method: Bailer

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: ____ feet Time: ____ Water level Before Pumping: 27.93

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
____ feet x	0.16	0.65	____	____	____

Depth Purging From: ____ feet. Time Purging Begins: ____

Notes on Initial Discharge: 1.21' free product by paste
~ 10" by bailer

Time	Volume	pH	Conductivity	T	Notes
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____

Time Field Parameter Measurement Begins: ____

	Rep #1	Rep #2	Rep #3	Rep #4
pH	____	____	____	____
Conductivity	____	____	____	____
Temperature (F)	____	____	____	____

Presample Collection Gallons Purged: ____

Time Sample Collection Begins: ____

Time Sample Collection Ends: ____

Total Gallons Purged: ____

Comments: ____

ALTON GEOSCIENCE, INC
1170 Burnett Ave., Ste. S
Concord, CA 94520

JOB NUMBER 30-080 TECHNICIAN Watts

JOB LOCATION Oakland 98th Ave DATE 7/5/90

PUMPOUT ☐ YES ☐ NO	DATE OF LAST PUMPOUT:			WEATHER: TIME: ~10:30		COMMENTS (Notes, conditions, etc.)
	HOLD	CUT	LEVEL			
WELL #	DEPTH TO WATER	DEPTH TO PRODUCT	PROD. THICKNESS (FT)	TOTAL DEPTH	DEPTH TO PUMP	
[illegible]	23.06					
AW-1	26.57					
AW-2	24.18					
AW-4	27.29					
MW-2	23.15					
MW-1	23.31		.22			
RW	27.93		1.21			
AW-3	24.75					

APPENDIX E

OFFICIAL LABORATORY REPORTS AND CHAIN OF CUSTODY RECORDS

ANAMETRIX INC
Environmental & Analytical Chemistry
1961 Concourse Drive Suite E. San Jose CA 95131
(408) 432-8192 • Fax (408) 432-8198

MAY 0 4 1990

REPORT

Matt Hopwood
Alton Geoscience
1000 Burnett Avenue
Suite 140
Concord, CA 94520

June 01, 1990
Anametrix W.O.#: 9005253
Date Received : 05/21/90
Project Number : 30-080

Dear Mr. Hopwood:

Your samples have been received for analysis. The REPORT SUMMARY lists your sample identifications and the analytical methods you requested. The following sections are included in this report: RESULTS.

NOTE: Amounts reported are net values, i.e. corrected for method blank contamination.

If there is any more that we can do, please give us a call. Thank you for using ANAMETRIX, INC.

Sincerely,

ANAMETRIX, INC.

Sarah Schoen, Ph.D.
Laboratory Manager

SRS/dmt

REPORT SUMMARY
ANAMETRIX, INC. (408) 432-8192

Client : Alton Geoscience
Address : 1000 Burnett Avenue
Suite 140
City : Concord, CA 94520
Attn. : Matt Hopwood

Anametrix W.O.#: 9005253
Date Received : 05/21/90
Purchase Order#: N/A
Project No. : 30-080
Date Released : 06/01/90

Anametrix I.D.	Sample I.D.	Matrix	Date Sampled	Method	Date Extract	Date Analyzed	Inst I.D.
RESULTS							
9005253-01	AW 1/5	SOIL	05/17/90	TPHg		05/29/90	N/A
9005253-02	AW 1/10	SOIL	05/17/90	TPHg		05/29/90	N/A
9005253-03	AW 1/15	SOIL	05/17/90	TPHg		05/29/90	N/A
9005253-04	AW 1/20	SOIL	05/17/90	TPHg		05/30/90	N/A
9005253-05	AW 1/25	SOIL	05/17/90	TPHg		05/29/90	N/A
9005253-06	AW 1/30	SOIL	05/17/90	TPHg		05/30/90	N/A
9005253-07	RW 1/5	SOIL	05/17/90	TPHg		05/30/90	N/A
9005253-08	RW 1/10	SOIL	05/17/90	TPHg		05/30/90	N/A
9005253-09	RW 1/15	SOIL	05/17/90	TPHg		05/29/90	N/A
9005253-10	RW 1/20	SOIL	05/17/90	TPHg		05/29/90	N/A
9005253-11	RW 1/25	SOIL	05/17/90	TPHg		05/26/90	N/A

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW 1/5
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/29/90

Anametrix I.D. : 9005253-01
Analyst : CB
Supervisor : DOG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	ND
108-88-3	Toluene	0.005	ND
100-41-4	Ethylbenzene	0.005	ND
1330-20-7	Total Xylenes	0.005	ND
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW 1/10
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/29/90

Anametrix I.D. : 9005253-02
Analyst : CR
Supervisor : ORG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	0.011
108-88-3	Toluene	0.005	ND
100-41-4	Ethylbenzene	0.005	ND
1330-20-7	Total Xylenes	0.005	ND
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW 1/15
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/29/90

Anametrix I.D. : 9005253-03
Analyst : CB
Supervisor : DDG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	0.007
108-88-3	Toluene	0.005	ND
100-41-4	Ethylbenzene	0.005	ND
1330-20-7	Total Xylenes	0.005	ND
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW 1/20
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/30/90

Anametrix I.D. : 9005253-04
Analyst : CS
Supervisor : DOG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.05	0.47
108-88-3	Toluene	0.05	ND
100-41-4	Ethylbenzene	0.05	ND
1330-20-7	Total Xylenes	0.05	ND
	TPH as Gasoline	1	1.2

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW 1/25
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/29/90

Anametrix I.D. : 9005253-05
Analyst : CK
Supervisor : OOG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	0.013
108-88-3	Toluene	0.005	ND
100-41-4	Ethylbenzene	0.005	ND
1330-20-7	Total Xylenes	0.005	ND
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 RW 1/5
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/30/90

Anametrix I.D. : 9005253-07
Analyst : CR
Supervisor : DDG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	ND
108-88-3	Toluene	0.005	ND
100-41-4	Ethylbenzene	0.005	ND
1330-20-7	Total Xylenes	0.005	ND
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 RW 1/10
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/30/90

Anametrix I.D. : 9005253-08
Analyst : VZ
Supervisor : DDG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	0.006
108-88-3	Toluene	0.005	ND
100-41-4	Ethylbenzene	0.005	ND
1330-20-7	Total Xylenes	0.005	ND
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 RW 1/15
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/29/90

Anametrix I.D. : 9005253-09
Analyst : CB
Supervisor : PDC
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	0.031
108-88-3	Toluene	0.005	ND
100-41-4	Ethylbenzene	0.005	ND
1330-20-7	Total Xylenes	0.005	ND
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 RW 1/20
Matrix : SOIL
Date sampled : 05/17/90
Date anl.TPHg: 05/29/90

Anametrix I.D. : 9005253-10
Analyst : KV
Supervisor : ODG
Date released : 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.005	0.23
108-88-3	Toluene	0.005	0.088
100-41-4	Ethylbenzene	0.005	0.010
1330-20-7	Total Xylenes	0.005	0.040
	TPH as Gasoline	1	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 30-080 RW 1/25	Anametrix I.D.	: 9005253-11
Matrix	: SOIL	Analyst	: TB
Date sampled	: 05/17/90	Supervisor	: DDG
Date anl.TPHg	: 05/26/90	Date released	: 06/01/90

CAS #	Compound Name	Detection Limit (mg/Kg)	Amount Found (mg/Kg)
71-43-2	Benzene	0.5	1.0
108-88-3	Toluene	0.5	0.71
100-41-4	Ethylbenzene	0.5	ND
1330-20-7	Total Xylenes	0.5	2.3
	TPH as Gasoline	10	33

ND - Not detected at or above the practical quantitation limit for the method.

TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.

BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANAMETRIX INC
Environmental & Analytical Chemistry
1961 Concourse Drive Suite E San Jose CA 95131
(408) 432-8192 • Fax (408) 432-8198

REPORT

Matt Hopwood
Alton Geoscience
1000 Burnett Avenue
Suite 140
Concord, CA 94520

June 29, 1990
Anametrix W.O.#: 9006190
Date Received : 06/15/90
Project Number : 30-080

Dear Mr. Hopwood:

Your samples have been received for analysis. The REPORT SUMMARY lists your sample identifications and the analytical methods you requested. The following sections are included in this report: RESULTS and QUALITY ASSURANCE.

NOTE: Amounts reported are net values, i.e. corrected for method blank contamination.

If there is any more that we can do, please give us a call. Thank you for using ANAMETRIX, INC.

Sincerely,

ANAMETRIX, INC.

Sarah Schoen

Sarah Schoen, Ph.D.
Laboratory Manager

SRS/lm

REPORT SUMMARY
ANAMETRIX, INC. (408) 432-8192

Client	: Alton Geoscience	Anametrix W.O.#:	9006190
Address	: 1000 Burnett Avenue Suite 140	Date Received :	06/15/90
		Purchase Order#:	N/A
City	: Concord, CA 94520	Project No. :	30-080
Attn.	: Matt Hopwood	Date Released :	06/29/90

Anametrix I.D.	Sample I.D.	Matrix	Date Sampled	Method	Date Extract	Date Analyzed	Inst I.D.
RESULTS							
9006190-01	MW-2	WATER	06/12/90	TPH		06/22/90	N/A
9006190-02	MW-3	WATER	06/12/90	TPH		06/22/90	N/A
9006190-03	AW-1	WATER	06/12/90	TPH		06/22/90	N/A
9006190-04	AW-2	WATER	06/12/90	TPH		06/22/90	N/A
9006190-05	AW-3	WATER	06/12/90	TPH		06/22/90	N/A
9006190-06	AW-4	WATER	06/12/90	TPH		06/26/90	N/A

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 MW-2
Matrix : WATER
Date sampled : 06/12/90
Date anl.TPHg: 06/22/90

Anametrix I.D. : 9006190-01
Analyst :06
Supervisor :DDG
Date released : 06/29/90

CAS #	Compound Name	Detection Limit (ug/l)	Amount Found (ug/l)
71-43-2	Benzene	0.5	ND
108-88-3	Toluene	0.5	ND
100-41-4	Ethylbenzene	0.5	ND
1330-20-7	Total Xylenes	0.5	ND
	TPH as Gasoline	50	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 MW-3
Matrix : WATER
Date sampled : 06/12/90
Date anl.TPHg: 06/22/90

Anametrix I.D. : 9006190-02
Analyst : CB
Supervisor : ODG
Date released : 06/29/90

CAS #	Compound Name	Detection Limit (ug/l)	Amount Found (ug/l)
71-43-2	Benzene	0.5	ND
108-88-3	Toluene	0.5	ND
100-41-4	Ethylbenzene	0.5	ND
1330-20-7	Total Xylenes	0.5	ND
	TPH as Gasoline	50	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW-1
Matrix : WATER
Date sampled : 06/12/90
Date anl.TPHg: 06/22/90

Anametrix I.D. : 9006190-03
Analyst : GV
Supervisor : [illegible]
Date released : 06/29/90

CAS #	Compound Name	Detection Limit (ug/l)	Amount Found (ug/l)
71-43-2	Benzene	0.5	1.0
108-88-3	Toluene	0.5	ND
100-41-4	Ethylbenzene	0.5	ND
1330-20-7	Total Xylenes	0.5	ND
	TPH as Gasoline	50	66

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW-2
Matrix : WATER
Date sampled : 06/12/90
Date anl.TPHg: 06/22/90

Anametrix I.D. : 9006190-04
Analyst : CK
Supervisor : DDG
Date released : 06/29/90

CAS #	Compound Name	Detection Limit (ug/l)	Amount Found (ug/l)
71-43-2	Benzene	0.5	ND
108-88-3	Toluene	0.5	ND
100-41-4	Ethylbenzene	0.5	ND
1330-20-7	Total Xylenes	0.5	ND
	TPH as Gasoline	50	ND

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW-3
Matrix : WATER
Date sampled : 06/12/90
Date anl.TPHg: 06/22/90

Anametrix I.D. : 9006190-05
Analyst : GV
Supervisor : DOG
Date released : 06/29/90

CAS #	Compound Name	Detection Limit (ug/l)	Amount Found (ug/l)
71-43-2	Benzene	0.5	1.9
108-88-3	Toluene	0.5	ND
100-41-4	Ethylbenzene	0.5	ND
1330-20-7	Total Xylenes	0.5	42
	TPH as Gasoline	50	88

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 30-080 AW-4
Matrix : WATER
Date sampled : 06/12/90
Date anl.TPHg: 06/22/90

Anametrix I.D. : 9006190-06
Analyst : CK
Supervisor : DCG
Date released : 06/29/90

CAS #	Compound Name	Detection Limit (ug/l)	Amount Found (ug/l)
71-43-2	Benzene	250	18000
108-88-3	Toluene	250	2300
100-41-4	Ethylbenzene	250	1500
1330-20-7	Total Xylenes	250	2000
	TPH as Gasoline	25000	38000

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA 8020.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 80987
CLIENT: Alton Geoscience
CLIENT JOB NO.: 30-080

DATE RECEIVED: 06/08/90
DATE REPORTED: 06/15/90

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 5030 and 8015

LAB #	Sample Identification	Concentration (mg/Kg) Gasoline Range
1	AW-2/21	ND<1
2	AW-2/26	ND<1
3	AW-3/21	ND<1
4	AW-3/26	ND<1
5	AW-4/11	ND<1
6	AW-4/16	ND<1
7	AW-4/21	1

mg/kg - parts per million (ppm)

Method Detection Limit for Gasoline in Soil: 1 mg/Kg
Method Detection Limit for Gasoline in Water: 0.05 mg/L

QAQC Summary:

Daily Standard run at 2mg/L: RPD Gasoline = 9%
MS/MSD Average Recovery = 101%: Duplicate RPD = 2%

Richard Srna, Ph.D.

Laboratory Manager

Date Rcv'd. _____

Acct. No.	Div.	Job No.	Amount
		Total	

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 80987
CLIENT: Alton Geoscience
CLIENT JOB NO.: 30-080

DATE RECEIVED: 06/08/90
DATE REPORTED: 06/15/90

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ug/Kg) Benzene	Toluene	Ethyl Benzene	Xylenes
1	AW-2/21	ND<3	ND<3	ND<3	ND<3
2	AW-2/26	ND<3	ND<3	ND<3	ND<3
3	AW-3/21	74	27	10	49
4	AW-3/26	83	10	4	18
5	AW-4/11	ND<3	ND<3	ND<3	ND<3
6	AW-4/16	170	10	24	45
7	AW-4/21	150	13	40	90

ug/L - parts per billion (ppb)
ug/Kg - parts per billion (ppb)

Method Detection Limit in Soil: 3 ug/Kg
Method Detection Limit in Water: 0.3 ug/L

QAQC Summary:

Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 94 %: Duplicate RPD = <1%

Richard Srna, Ph.D.

Laboratory Manager

Date Rcv'd. _____

Acct. No.	Div.	Job No.	Amount
		Total	

ALTON GEOSCIENCE
1000 BURNETT AVE., STE. 140
CONCORD, CA 94520 (415) 682-1582

CHAIN of CUSTODY RECORD

PAGE of

DATE: 5/17/90 DUE BY: Normal
LABORATORY: AnameTrix

PROJECT NUMBER / MANAGER: MATT Hopwood SAMPLERS SIGNATURE: M. Hopwood
PROJECT NAME / ADDRESS: 30-080 - 98TH AVE - OAKland
REMARKS OR SPECIAL INSTRUCTIONS:

9005253

SAMPLE NUMBER	SAMPLE DATE/TIME	LOCATION/ DESCRIPTION	SAMPLE MATRIX	SAMPLE TYPE: GRAB	SAMPLE TYPE: COMP.	TYPE & NUMBER OF CONTAINERS	ANALYSIS: TPH-G & BTEX	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS
① AW 1/5	5/17		Soil			BRASS Sleeve							
② AW 1/10	5/17		"			"							
③ AW 1/15	5/17		"			"							
④ AW 1/20	5/17		"			"							
⑤ AW 1/25	5/17		Soil			"							
⑥ AW 1/30	5/17		"			"							
⑦ RW-3/5	5/17		"			"							
⑧ RW-3/10	5/17		"			"							
⑨ RW-3/15	5/17		"			"							
⑩ RW-3/20	5/17		"										
⑪ RW-3/25	5/17		Soil										

CHAIN OF CUSTODY

SIGNATURE	INCLUSIVE DATES/TIMES		SIGNATURE	INCLUSIVE DATES/TIMES	
1. Matthew A. [signature]	5/21/90		4. [signature]	05-21-90	13:45
2. [signature]	5-21-90	10:45	5.		
3.			6.		

ALTON GEOSCIENCE
1000 BURNETT AVE., STE. 140
CONCORD, CA 94520 (415) 682-1582

CHAIN of CUSTODY RECORD

PAGE of

DATE: 6/7/90 DUE BY:
LABORATORY: Superior

PROJECT NUMBER / MANAGER: 30-080 SAMPLERS SIGNATURE: Matthew A Taylor

PROJECT NAME / ADDRESS: 2220 98th Ave. Oakland CA

REMARKS OR SPECIAL INSTRUCTIONS:
SEE Paper labels for ID
NOT End CAPS

SAMPLE NUMBER	SAMPLE DATE/TIME	LOCATION/ DESCRIPTION	SAMPLE MATRIX	SAMPLE TYPE: GRAB	SAMPLE TYPE: COMP.	TYPE & NUMBER OF CONTAINERS	ANALYSIS: TPH-G & BTEX	ANALYSIS
AW 2/21	6/5/90		Soil	X			X	
AW 2/26	6/5/90							
AW 3/21	6/6/90							
AW 3/26	6/6/90							
AW 4/11	6/6/90							
AW 4/16	6/6/90							
AW 4/21	6/6/90							

CHAIN OF CUSTODY

	SIGNATURE	INCLUSIVE DATES/TIMES		SIGNATURE	INCLUSIVE DATES/TIMES	
1.	Matthew A. Taylor	6/7/90		4.		
2.				5.		
3.				6.		

ALTON GEOSCIENCE
1170 BURNETT AVE., STE. S
CONCORD, CA. 94520 (415) 682-1582

CHAIN of CUSTODY RECORD

PAGE 1 of 1

DATE: 6-14-90 DUE BY: 6-28-90
LABORATORY: Anametrix

PROJECT NUMBER / MANAGER: 30-080 M. Hopwood
SAMPLERS SIGNATURE: William G. Stipp
PROJECT NAME / ADDRESS: BP, 98th Ave, Oakland
REMARKS OR SPECIAL INSTRUCTIONS:

SAMPLE NUMBER	SAMPLE DATE/TIME	LOCATION/ DESCRIPTION	SAMPLE MATRIX	SAMPLE TYPE: GRAB	SAMPLE TYPE: COMP.	TYPE & NUMBER OF CONTAINERS	SOIL ANALYSIS			WATER ANALYSIS			
										TPH as G/BTEX			
MW-2	6-12-90	MW-2	Water	X		2 x 40ml				X			
MW-3		MW-3		X						X			
AW-1		AW-1		X						X			
AW-2		AW-2		X						X			
AW-3		AW-3		X						X			
AW-4		AW-4		X						X			

CHAIN OF CUSTODY

	SIGNATURE	INCLUSIVE DATES/TIMES			SIGNATURE	INCLUSIVE DATES/TIMES	
1.	William G. Stipp	6-14-90	[redacted]		4.		
2.	John Mamet	6/15/90	11:10		5.		
3.					6.		

APPENDIX F

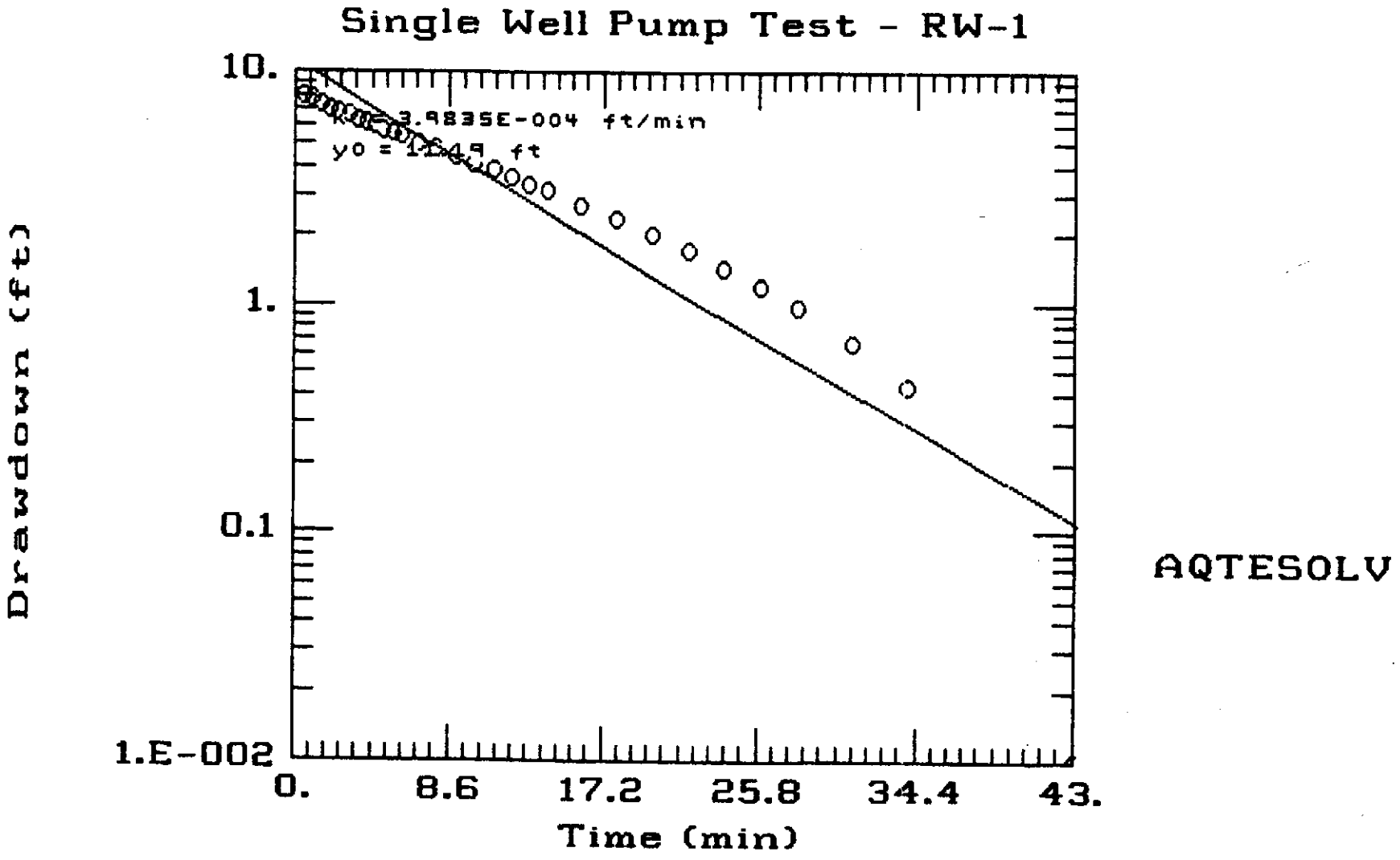
AQUIFER TEST DATA

RISING HEAD TEST DATA

RW-1

JULY 1990

TIME (min)	DRAWDOWN (ft)
0.5	8.02
1.0	7.69
1.5	7.36
2.0	7.10
2.5	6.83
3.0	6.59
3.5	6.37
4.0	6.15
4.5	5.94
5.0	5.74
5.5	5.55
6.0	5.37
7.0	5.03
8.0	4.70
9.0	4.38
10.0	4.09
11.0	3.82
12.0	3.55
13.0	3.32
14.0	3.09
16.0	2.69
18.0	2.33
20.0	2.00
22.0	1.71
24.0	1.44
26.0	1.19
28.0	0.97
31.0	0.68
34.0	0.43
43.0	0.01


Single Well Pump Test - RW-1
10.
1.
0.1
1.E-002
Drawdown (ft)
3.9835E-004 ft/min
y0 = 12.49 ft
0.
8.6
17.2
25.8
34.4
43.
Time (min)
AQTESOLV