PHASE III - SUPPLEMENTAL SITE INVESTIGATION STUDY

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

AUG 1991

Project No. 30-080-01

Prepared for:

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

Prepared by:

Alton Geoscience
1000 Burnett Avenue, Suite 140
Concord, California

August 21, 1991

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1.0 INTRODUCTION AND BACKGROUND

BP Oil Company retained Alton Geoscience to conduct a Phase III - Supplemental Site Investigation Study related to subsurface contamination at BP Oil Company Service Station No. 11133, 2220 98th Avenue, Oakland, California. The site location is shown in Figure 1, while a site plan is shown in Figure 2.

1.1 Purpose and Scope

This Phase III - Supplemental Site Investigation Study was performed to: (1) address the concerns of the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) and the Alameda County Department of Environmental Health (ACDEH) regarding petroleum hydrocarbon constituents in the subsurface soil and ground water.

Alton Geoscience supervised and/or performed the following tasks during this site investigation:

1. Drilled four soil borings for conversion into two onsite and two offsite ground water monitoring wells.
2. Collected and analyzed soil and ground water samples.
3. Analyzed field data and laboratory results.
4. Prepared this technical report presenting the results, findings, and recommendations of the investigation.

The results of these tasks provide the basis for developing a remedial plan and implementing a feasibility study.

1.2 Site Description

The site is currently an operating BP Oil service station located on the southeast corner of the intersection of 98th Avenue and Bancroft Avenue, Oakland, California. 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, Site Plan.

A sensitive receptors survey was conducted to identify nearby environmental elements and land uses that may be affected by or affect the subsurface environment at the site. The findings of the survey are as follows:

- The properties adjacent to the site are a mixture of residential and institutional developments. The site

is surrounded by single and multi-family homes to the east, southeast, and west.

- A review of RWQCB files indicate that there are three confirmed fuel releases within a 1/2-mile radius of the site. Two of the confirmed releases are upgradient of the site, and the third site is located directly across the street (cross-gradient) to the north of the site.

- There are no known municipal or private water supply wells within a 1/2-mile radius of the site.

- San Leandro Creek is the nearest surface body of water, located approximately 8 miles south of the site.

- E. Morris Cox Elementary School is the nearest school, located approximately 1,000 feet west of the site.

A copy of the sensitive receptors survey is presented in Appendix A.

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 indicated 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 install three monitoring wells (MW-1, MW-2, and MW-3) to assess ground water quality.

On January 24 and 25, 1990, Alton Geoscience completed a qualitative shallow water survey which included the drilling of eight soil borings to various depths, ranging from 16 to 35 feet below grade, depending on subsurface conditions. 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, and subsequently sampled. Additionally, the existing monitoring wells were monitored and sampled.

8 TWs
4 MWs
total of 12 MWs

Monitoring Well MW-1 and Temporary Well TW-4 contained 0.2 foot of free-product. Analysis of samples from the other monitoring and temporary wells indicated that they contained levels of dissolved-phase TPH as gasoline (TPH-G) and

2, 4"

benzene, toluene, ethylbenzene, and total xylenes (BTEX) ranging from nondetectable (ND) to 470,000 parts per billion (ppb).

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). wells 13 & 14

On June 5 and 6, 1990, Alton Geoscience supervised the drilling of three offsite soil borings which were converted into three 2-inch-diameter ground water monitoring wells (AW-2, AW-3, and AW-4). wells 15-17 future of 5 offsite & 12 on site

To control the migration of free-floating product, approximately 100 gallons of product/water was pumped from Recovery Well RW-1 during pump test activity. The fluid was pumped into two 55-gallon D.O.T. approved drums, then sealed, and labeled.

1.4 Regional Geology and Hydrogeology

The site is located approximately 40 above mean sea level in Oakland, California (USGS Topographic Map, Oakland East Quadrangle - 7.5 Minute Series) as shown in Figure 1.

The topography of the surrounding area is characterized by broad valleys and gentle slopes. The underlying unit in this region is Undivided Quaternary deposits (QU). The QU unit's composition and physical properties vary. The unit consists 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 a 580-square-mile basin drained by 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. Regional surface and ground water flow in the region is to the southwest, towards San Francisco Bay. The water supply of the City of Oakland is obtained from Pardee Dam, which receives water from the Sierra snow melt.

2.0 FIELD METHODS

This investigative work included the drilling of four soil borings, as outlined in the drilling and sampling protocol

shown in Appendix B. The borings were used for the installation of Monitoring Wells AW-5, AW-6, AW-7, and AW-8, following the design and installation procedures shown in Appendix B.

2.1 Soil Borings and Sampling

On February 5, 1991, prior to commencement of drilling activities, Ground Water Protection Ordinance Permit No. 91058 was obtained from the Alameda County Flood Control and Water Conservation District. On February 15, 1991, Street Excavation Permit Nos. 9100231 and 9100233 were obtained from the City of Oakland Department of Public Works. Copies of the ground water protection ordinance permit and street excavation permits are presented in Appendix C.

On February 27 and 28, 1991, Alton Geoscience supervised the drilling of two onsite and two offsite soil borings. The two onsite soil borings, SBA-5 and SBA-6, were converted into 4-inch-diameter ground water Monitoring Wells AW-5 and AW-6. The two onsite soil borings were drilled using 10-inch-diameter, hollow-stem augers to total depths of approximately 46.5 and 35.5 feet below grade, respectively. The two offsite soil borings, SBA-7 and SBA-8, were converted into 2-inch-diameter ground water Monitoring Wells AW-7 and AW-8. The borings were drilled using an 8-inch-diameter, hollow-stem auger to total depths of 35.5 and 40.5 feet below grade, respectively. During drilling, soil samples were collected from the soil borings at 5-foot intervals.

4 more wells

Drilling activities were performed by Soils Exploration Services of Vacaville, California, using a CME-55 drilling rig. The soil samples were collected using a split-spoon sampler lined with brass tubes. The samples recovered for laboratory analysis were wrapped with aluminum foil, capped with polyurethane caps, labeled, wrapped with clear 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 B.

2.2 Ground Water Monitoring Well Construction

The soil borings were completed as ground water Monitoring Wells AW-5, AW-6, AW-7, and AW-8. Monitoring Wells AW-5 and AW-6 were constructed of clean, 4-inch-diameter, flush-threaded, Schedule 40 PVC blank casing and 0.020-inch slotted casing to total depths of approximately 45 to 35 feet below grade, respectively. Monitoring Wells AW-7 and AW-8 were constructed of clean, 2-inch-diameter, flush-threaded, Schedule 40 PVC blank casing and 0.020-inch slotted casing to total depths of approximately 35 and 40 feet below grade,

respectively. Well installation procedures and construction details are presented in Appendix B.

2.3 Monitoring Well Development and Sampling

Well Development and sampling procedures were conducted in accordance with the RWQCB and ACDEH guidelines. A description of Alton Geoscience general field procedures for well development and sampling is presented in Appendix D.

Monitoring wells were developed by removing approximately 47 gallons of ground water from AW-5, 24 gallons from AW-6, 12 gallons from AW-7, and 15 gallons from AW-8. Development of the monitoring wells was conducted on March 7, 1991. Prior to well development, a clear PVC bailer was used in each well to check for the presence of floating product.

Prior to sampling of the wells on March 8, 1991, a minimum of 3 casing volumes of water was purged from each well. Water samples were collected after stabilization of temperature, pH, and conductivity of the purged water was observed. Each well was observed for the presence of free product and sheen. The water samples were decanted from a bailer into clean containers. Samples were immediately placed in an iced cooler prior to and during transportation to a California-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 C. Analytical methods, official laboratory reports and chain of custody records are presented in Appendix E.

2.4 Ground Water Level Monitoring and Surveying

Monitoring Wells AW-5, AW-6, AW-7, AW-8 were surveyed on April 5, 1991, to the nearest 0.01 foot. Monitoring Well AW-1 was used as a reference elevation (benchmark) for Monitoring Wells AW-5 and AW-6. Monitoring Wells AW-2 and AW-4 were used as reference elevations (benchmarks) for Monitoring Wells AW-7 and AW-8, respectively. The purpose of the survey was to determine the relative top of casing elevations of the monitoring wells for use in calculating the ground water elevation at each well. The water table elevation data is used to estimate the general direction of ground water flow and average hydraulic gradient beneath the site. Ground water level monitoring and survey data collected on April 5, 1991 is presented in Table 1. The survey data field notes are presented in Appendix D. A ground water elevation contour map based on interpretation of the monitoring data is shown in Figure 3.

2.5 Aquifer Analysis by Pumping Test 4/26/91

A pumping test was performed at the site on April 26, 1991. The purpose of the test was to estimate aquifer parameters which are used for remedial engineering design.

Prior to initiating the pumping test, transducers were placed in the pumping well (RW-1) and two observation wells (AW-1 and MW-3). An instrumentation Northwest TERRA 8 data logger was programmed to record readings from the transducers every 15 seconds for the first 30 minutes after pumping began, every minute for the next 2 hours, and then every 2 minutes for the duration of the test. Depth to water measurements were taken every hour from MW-1, MW-2, AW-2, AW-4, AW-5, AW-6, and AW-7 using an electronic probe.

A 2-inch-diameter, variable flow rate pump was submersed in the well. The water was pumped into a 6000-gallon steel tank prior to proper offsite disposal.

The test began at 11:19 a.m. on April 26, 1991. Flow rates were measured using a stopwatch and a 5-gallon bucket marked with 0.25 gallon increments. The flow rate was maintained at 0.75 GPM to 0.9 GPM. Drawdown was observed in AW-1 after 7.5 hours of pumping. No drawdown was observed in any of the other wells.

After approximately 9.5 hours of continuous pumping, 12 feet of drawdown had occurred in the pumping well, and 0.1 feet of drawdown was recorded in AW-1. The pump was then turned off and removed from the well. Ground water elevation readings continued after pump removal until ground water levels had recovered to approximately the initial static water level.

3.0 ANALYTICAL METHODS

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

3.1 Soil Analysis

Soil samples from the four borings were analyzed for the following constituents:

- TPH-G using EPA Methods 5030/8015
- BTEX constituents using EPA Methods 5030/8020

The results of the laboratory analyses of the soil samples are presented in Table 2; the official laboratory reports and chain of custody records are included in Appendix E.

3.2 Water Analysis

Ground water samples collected from all monitoring wells except MW-1 and RW-1, were analyzed for the following constituents:

- TPH-G using EPA Methods 5030/8015
- BTEX constituents using EPA Methods 5030/8020

The presence of sheen was observed in Monitoring Well MW-1. Recovery Well RW-1 was not accessible. The results of the laboratory analyses of the ground water samples are presented in Table 3; the official laboratory reports and chain of custody records are included in Appendix E.

4.0 SITE GEOLOGY AND HYDROGEOLOGY

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

4.1 Site Geology

A review of the boring logs generated during this phase, and previous phases of the investigation indicates that the stratigraphy beneath the site is relatively consistent. Silty clay was encountered in each boring in the first 10 to 15 feet below grade. Silty sand was encountered in each boring at depths ranging from 15 to 30 feet below grade. Silty clay was again encountered in the last 10 feet of each boring. This observation was generally consistent with the results of the previous investigations at the site.

4.2 Site Hydrogeology

As presented in Table 1, the depth to ground water in all wells ranged from 16.62 to 26.68 feet below grade, indicating the presence of multiple water-bearing zones.

The ground water elevations for Monitoring Wells AW-1 through AW-8, as measured on April 5, 1991, were used to develop the ground water elevation contour map shown in Figure 3. Monitoring Well MW-1 was not used in developing the ground water elevation contour map due to the presence of free product. Ground water level readings for Monitoring Wells MW-2 and MW-3 were not used in developing the ground water elevation contour map due to anomalous water level readings. The data indicates an overall southerly ground water flow direction at the site, with an average hydraulic gradient of approximately 0.08 foot per foot across the site.

what's this mean?

5.0 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.

5.1 Soil

A total of 33 soil samples was collected, of which 12 were analyzed as part of this site investigation study to assess the extent of subsurface soil contamination. The results are discussed below.

- Laboratory analysis indicates nondetectable levels of TPH-G in all soil samples collected.

- The highest concentrations of BTEX constituents in the soil samples were detected in Soil Boring SBA-6, (AW-6), at 10.5 to 11.0 feet below grade. Laboratory analysis of Benzene, toluene, ethylbenzene, and total xylenes detected in soil samples SBA-6 at 10.5 to 11.0 feet below grade, indicates levels of 0.091, 0.022, 0.008, and 0.040 ppm, respectively.

5.2 Ground Water

Results of the field survey and laboratory analysis of ground water samples collected from the new and existing Monitoring Wells were used to assess the extent of ground water contamination. The results of the laboratory analysis are discussed below and are summarized in Table 3.

- During the sampling event on March 8, 1991, free-floating product was encountered in Monitoring Well MW-1.

- Recovery Well RW-1 was not accessible. why ?

- Laboratory analysis of ground water samples collected from the monitoring wells indicated TPH-G concentrations ranging from nondetectable in Monitoring Wells MW-2, MW-3, AW-2, and AW-7, to 110,000 ppb detected in AW-4.

- Laboratory analysis of ground water sample analyzed for benzene revealed concentrations ranging from nondetectable in Monitoring Wells MW-3 and AW-2 to 40,000 ppb in Monitoring Well AW-4.

- Laboratory analysis of ground water sample analyzed for toluene revealed concentrations ranging from nondetectable in Monitoring Wells MW-3 and AW-2 to 13,000 ppb in Monitoring Well AW-4.

- Laboratory analysis of ground water sample analyzed for ethylbenzene revealed concentrations ranging from nondetectable in Monitoring Wells MW-2, MW-3 AW-2, and AW-7 to 2,000 ppb in Monitoring Well AW-4.

- Laboratory analysis of ground water sample analyzed for total xylenes revealed concentrations ranging from nondetectable in Monitoring Wells MW-2, MW-3 AW-2, and AW-7 to 5,500 ppb in Monitoring Well AW-4.

5.3 Analysis of Aquifer Parameters by Pumping Test

As described in Section 2.5, an aquifer pumping test was performed on Recovery Well RW-1 with nine observation wells located between 35 and 135 feet from the pumping well. After pumping for about 9.5 hours, measurable drawdown was observed in AW-1.

Using the computer program AQTESOLV, (Geraghty & Miller Modeling Group), based on the Theis (1935) solutions, storativity (S) and transmissivity (T) were calculated as follows:

Well ID	S	T (ft2/min)
AW-1	0.3493	0.1491

These values will be used to calculate the parameters for the design of the remediation system. A graphical representation of the drawdown curve is presented in Appendix F.

6.0 FINDINGS AND CONCLUSIONS

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

- The concentrations of TPH-G and BTEX constituents detected in the soil samples from the borings onsite ranged from nondetectable to very low. The extent of petroleum hydrocarbon constituents in the soil is limited onsite to the northeast portion of the service station. The hydrocarbon constituents detected in AW-3 appear to be from an offsite source.

- The shallow ground water beneath the site has been impacted by free-floating product. The free-floating product is localized onsite in the vicinity of Monitoring Well MW-1 and Recovery Well RW-1. + AW-1

- The results of the sampling event indicate the continued presence of dissolved-phase petroleum hydrocarbon constituents onsite and offsite.

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

- Depth to ground water ranged from 16.62 feet to 26.68 feet below grade, indicating the presence of two distinct water bearing zones. Monitoring Wells MW-2 and MW-3 appear to intercept a perched water zone.

- The ground water elevation contour map, developed from the water level and survey data, indicates an overall southerly ground water flow direction beneath the site, with an average hydraulic gradient of approximately 0.08 foot per foot across the site.

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

This is B.S.

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

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

ALTON GEOSCIENCE

Matthew A. Taylor
Staff Engineer

Matthew Hopwood
Project Manager

Jeffery Weigand, CEG 331
Vice President

REFERENCES

Alton Geoscience, A., 1990. Phase II - Supplemental Site Investigation Report

Geraghty & Miller Modeling Group, AQTESOLV: Aquifer Test Solver, by G. M. Duffield and J. O. Rumbaugh, 1989.

Theis, C. V., 1935. "The Relation Between the Lowering of the Piezometric Surface and Duration of Discharge of a Well using Ground Water Storage", American Geophysical Union Transactions, Vol. 16, pp. 519-524.

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

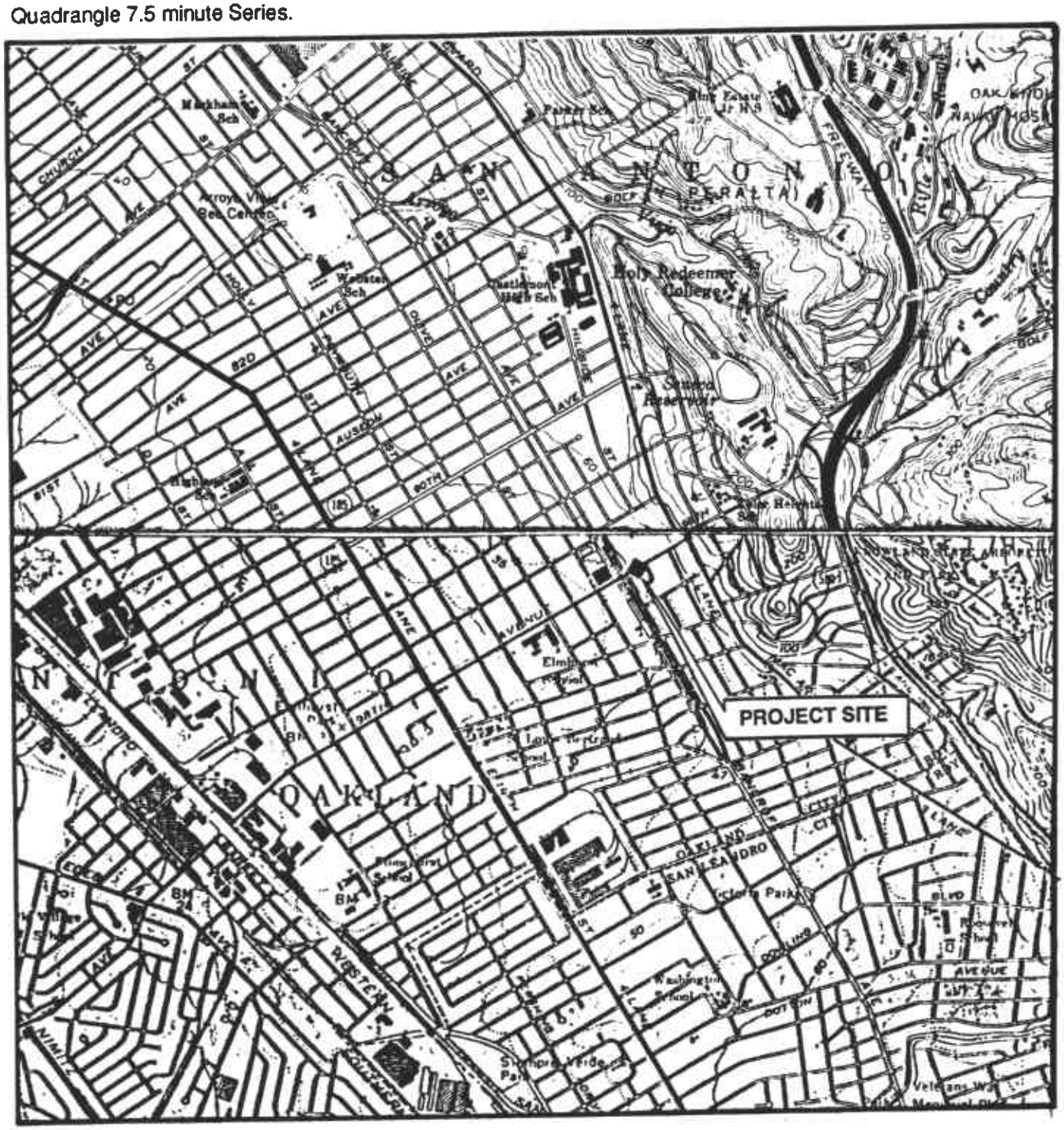


FIGURE 1

SITE VICINITY MAP

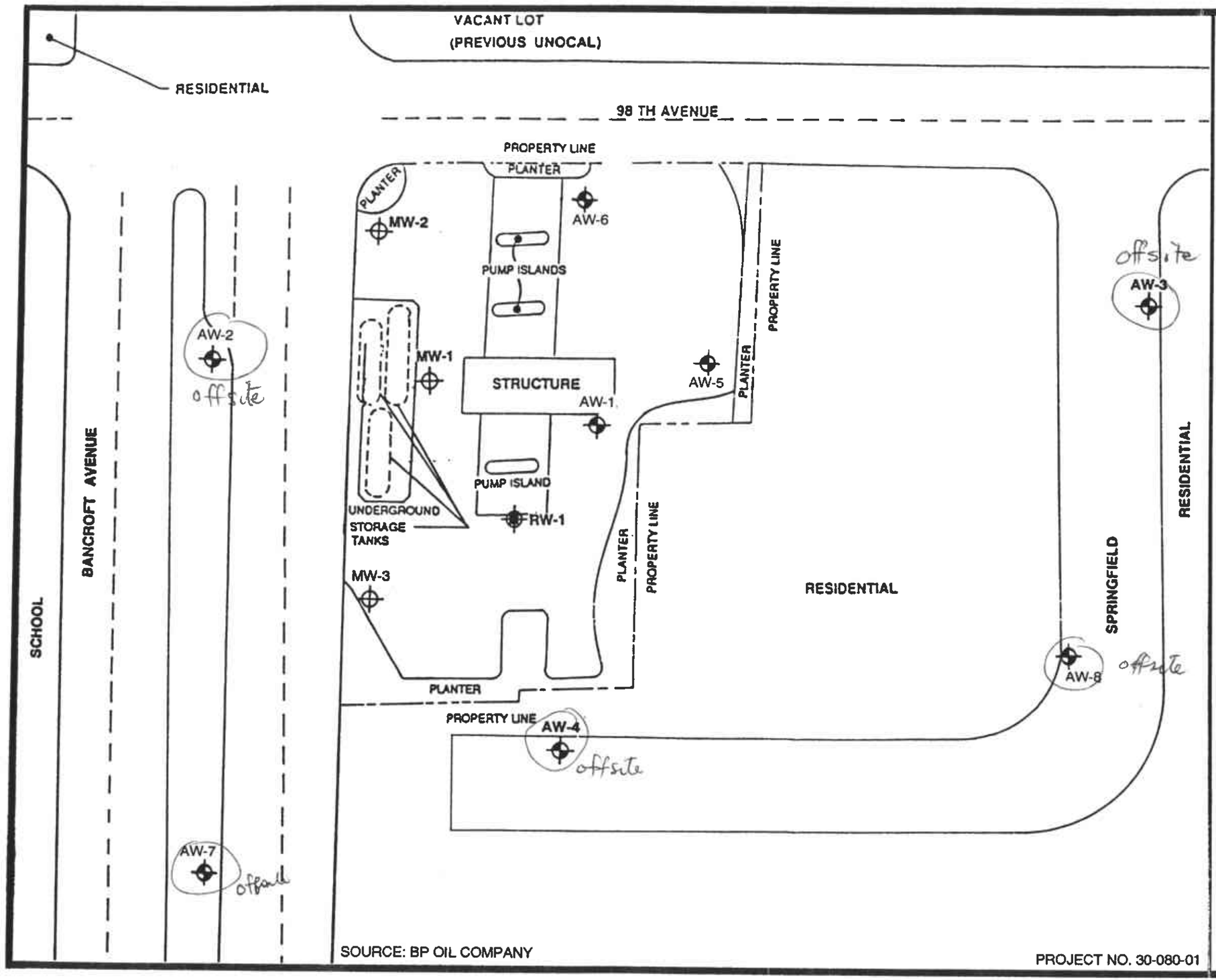
0 1000 2000

SCALE IN FEET

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

PROJECT NO. 30-080-01

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



SOURCE: BP OIL COMPANY

PROJECT NO. 30-080-01

N

0 15 30

SCALE IN FEET

LEGEND:

- MONITORING WELLS INSTALLED BY ALTON GEOSCIENCE
- MONITORING WELLS INSTALLED BY KAPREALIAN ENGINEERING,INC.
- RECOVERY WELL INSTALLED BY ALTON GEOSCIENCE

FIGURE 2: SITE PLAN

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

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

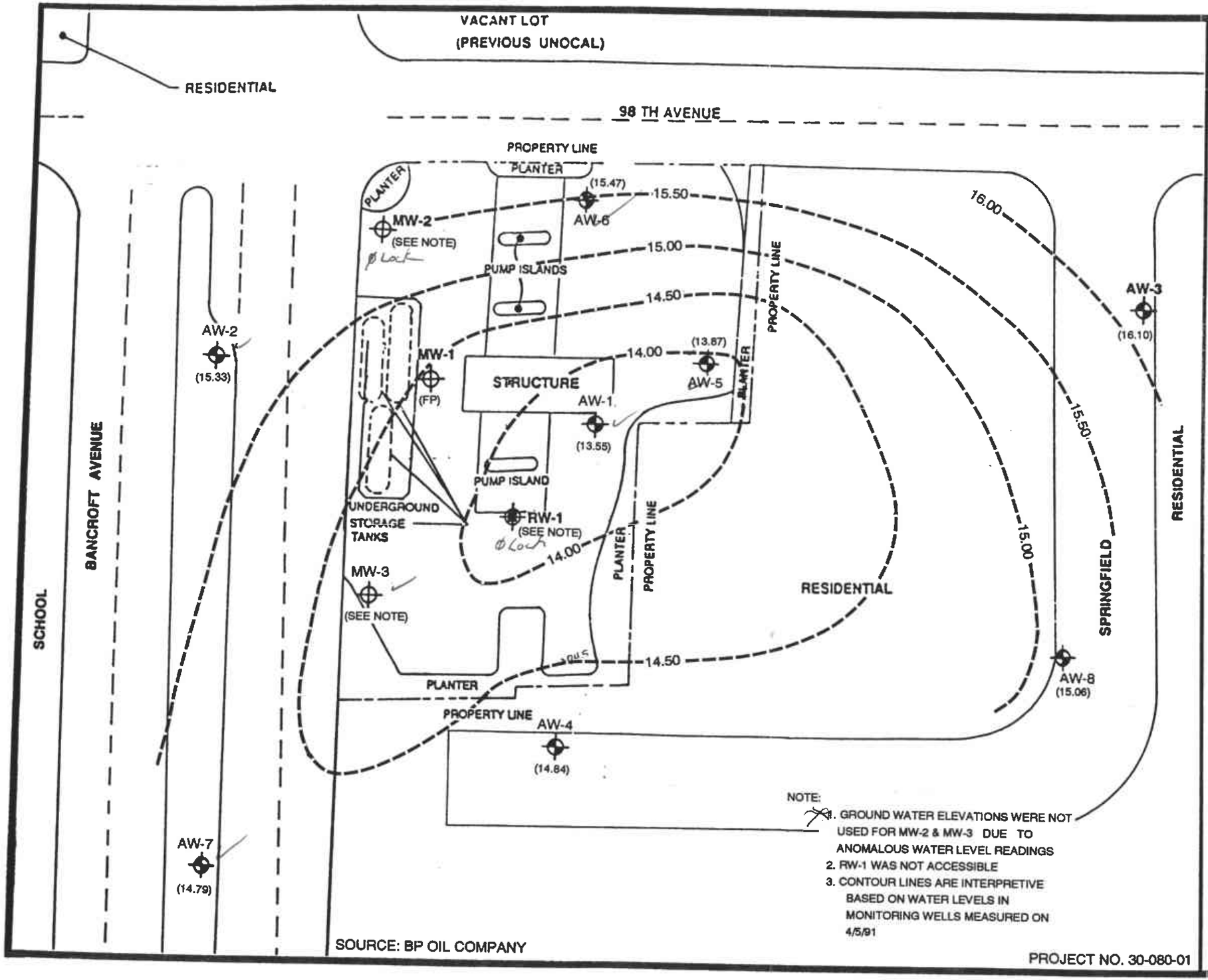


FIGURE 3: GROUND WATER ELEVATION CONTOUR MAP

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

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

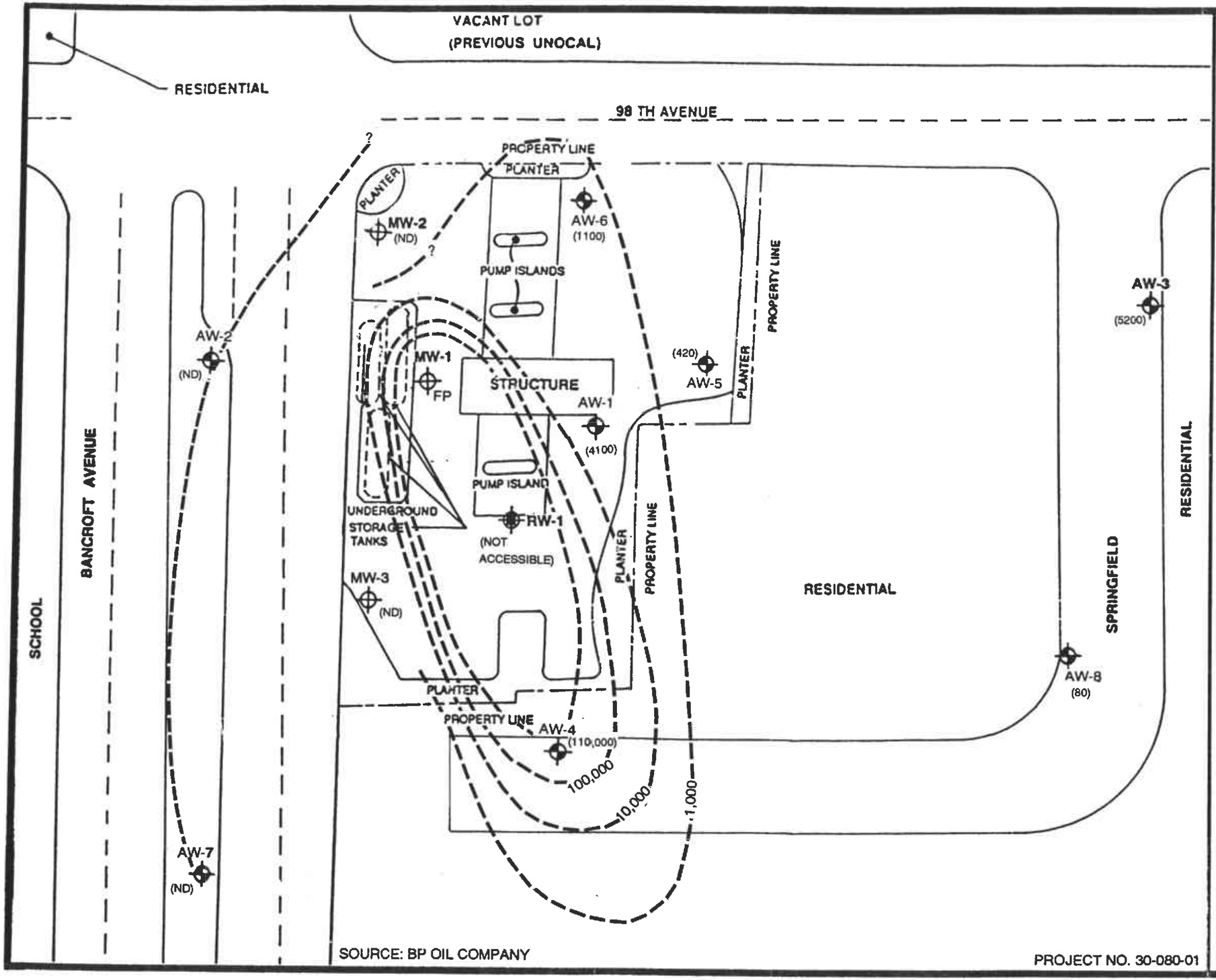


FIGURE 4: TPH-G ISOCONCENTRATION CONTOUR MAP (ppb)

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

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

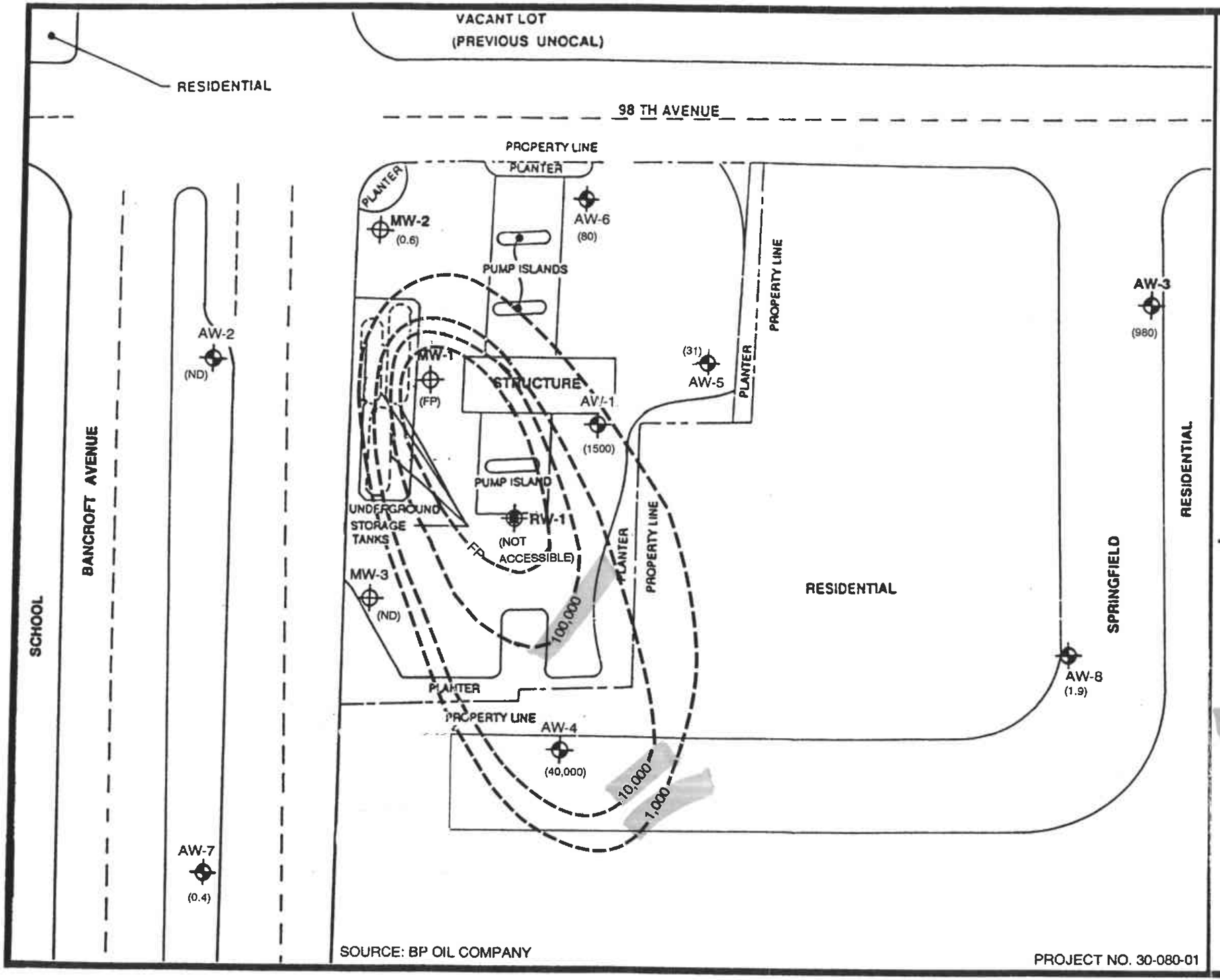


FIGURE 5: BENZENE ISOCONCENTRATION CONTOUR MAP (ppb)

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

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

TABLE 1

SURVEY AND WATER LEVEL MONITORING DATA
April 1991

Well Number	Well Elevation (Feet)*	Depth to Water (Feet)	Free Product Thickness (Feet)	Ground Water Elevation (Feet)*
MW-1	37.33	**	**	**
MW-2	36.36	16.62	----	19.74
MW-3	37.40	17.84	----	19.56
AW-1	38.99	25.44	----	13.55
AW-2	37.69	22.36	----	15.33
AW-3	40.00	23.90	----	16.10
AW-4	39.96	25.12	----	14.84
AW-5	39.35	25.48	----	13.87
AW-6	37.95	22.48	----	15.47
AW-7	38.17	23.38	----	14.79
AW-8	41.74	26.68	----	15.06
RW-1	38.60	***	***	***

Note:

* Elevation in feet relative to a common datum (AW-3) with an assumed elevation of 40.00 feet above mean sea level, as measured on July 5, 1990 by Alton Geoscience. Monitoring Wells AW-1, AW-2, and AW-4 were used as reference bench marks for survey performed April 5, 1991.

** Depth to water not recorded due to the presence of free product.

*** Recovery Well RW-1 was not accessible.

Depth to water levels were measured on April 5, 1991, prior to surveying the wells.

TABLE 2

RESULTS OF
LABORATORY ANALYSIS OF [redacted]
April 1991

Boring	Sample Depth (Feet)	TPH-G	B	T	E	X
		(Concentrations in Parts Per Million)				
SBA-5	10.5-11.0	ND<1	0.016	ND<.003	ND<.003	ND<.003
(AW-5)	20.5-21.0	ND<1	0.020	ND<.003	0.007	0.008
	25.5-26.0	ND<1	0.0077	ND<.003	0.003	0.011
SBA-6	10.5-11.0	ND<1	0.091	0.022	0.008	0.040
(AW-6)	20.5-21.0	ND<1	ND<.003	ND<.003	ND<.003	ND<.003
	25.5-26.0	ND<1	0.005	0.010	ND<.003	0.0066
SBA-7	10.5-11.0	ND<1	ND<.003	ND<.003	ND<.003	ND<.003
(AW-7)	20.5-21.0	ND<1	ND<.003	ND<.003	ND<.003	ND<.003
	25.5-26.0	ND<1	ND<.003	ND<.003	ND<.003	ND<.003
SBA-8	10.5-11.0	ND<1	ND<.003	ND<.003	ND<.003	ND<.003
(AW-8)	20.5-21.0	ND<1	ND<.003	ND<.003	ND<.003	ND<.003
	25.5-26.0	ND<1	ND<.003	ND<.003	ND<.003	ND<.003

Notes:

TPH-G = Total petroleum hydrocarbons as gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total xylenes
ND = Not detected at method detection limit shown

TABLE 3

RESULTS OF
LABORATORY ANALYSIS OF GROUND WATER SAMPLES
April 1991

Monitoring Well	TPH-G	B	T	E	X
	(Concentrations in Parts per Billion)				
MW-1	*	*	*	*	*
MW-2	ND<50	0.6	0.9	ND<0.3	ND<0.3
MW-3	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.3
AW-1	4,100	1,500	69	100	83
AW-2	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.3
AW-3	5,200	980	450	95	310
AW-4	110,000	40,000	13,000	2,000	5,500
AW-5	420	31	7.5	20	68
AW-6	1,100	80	19	1.4	230
AW-7	ND<50	0.4	0.7	ND<0.3	ND<0.3
AW-8	80	1.9	2.2	0.5	1.3
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 D, Official Laboratory Reports)
* = No sample collected due to the presence of free-floating product
** = RW-1 was not accessible - no sample was collected

APPENDIX A

SENSITIVE RECEPTORS SURVEY

SENSITIVE RECEPTORS SURVEY
SITE SURVEY AND LITERATURE SEARCH

Client: BP Oil Company Project No.: 30-080-01

Station No.: 11133

Location: 2220 98TH AVE

City/State: Oakland CA

I. Provide answers to the following questions:

A. Is there a public water supply well within 2500 feet? Y/N No
If Yes, Distance — ft.

B. Is there a private water supply well within 1000 feet? Y/N No
If Yes, Distance — ft.

C. Is there a subway within 1000 feet? Y/N NO
If Yes, Distance — ft.

D. Is there a basement within 1000 feet? Y/N NO
If Yes, Distance — ft.

E. Is there a school within 1000 feet? Y/N Yes
If Yes, Distance ____ ft.

F. Is there a surface body of water within 1000 feet? Y/N NO
If Yes, Distance — ft.
Name ____

II. Describe type of local water supply.

Public: X

- Suppliers Name: EAST BAY MUNICIPAL WATER DISTRICT
- Suppliers Source: SIERRA SNOW MELT, PARDEE DAM
- Distance to Site: ____

Private: ____

SENSITIVE RECEPTORS SURVEY
SITE SURVEY AND LITERATURE SEARCH

III. Distance to Nearest Adjacent Properties:

Residential	~50 ft.
Commercial	— ft.
Industrial	— ft.
Hospital	13,200 ft.
School (E. Morris Cox Elementary)	~1000 ft.
Name	

IV. Aquifer Classification, if available.

Class I	- Special Ground Waters	
	- Irreplaceable Drinking Water Source	
	- Ecologically Vital	
Class II	- Current and Potential Drinking Water Sources	
Class III	- Not Potential Source of Drinking Water	X

V. Describe observation wells, if any.

Number	11
Free Product? Y/N	Yes

VI. Signature of Preparer: Matthew A. Taylor

Date: 2-20-91

VII. Sketch of Site

APPENDIX B

GENERAL FIELD PROCEDURES AND BORING LOGS

APPENDIX B

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. 30-080-01 DATE DRILLED 2-27-91
CLIENT BP Oil Company
LOCATION 2201 98th Ave, Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

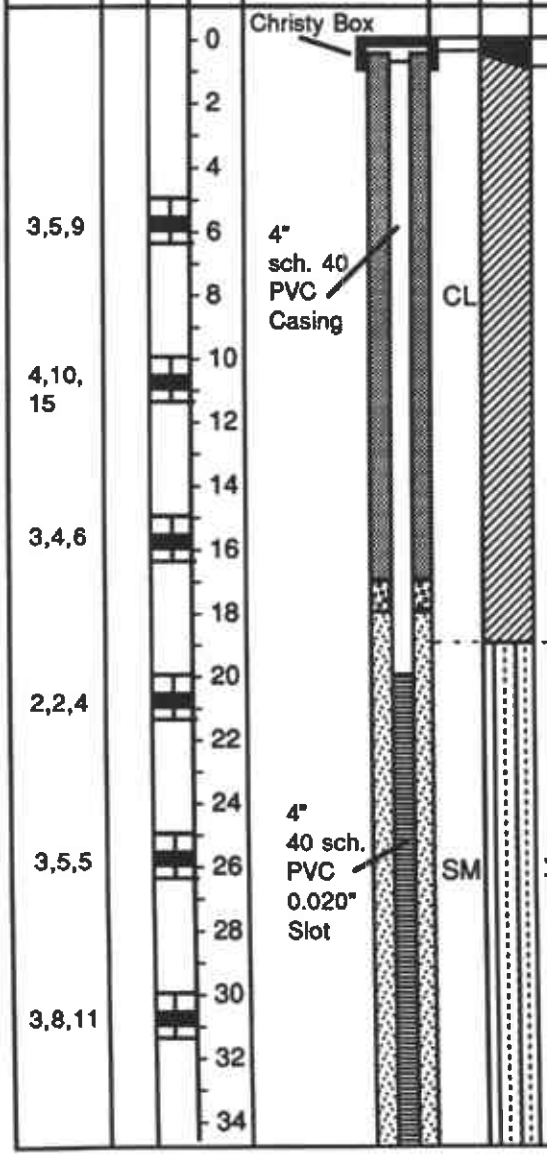
BORING NO. SBA-5
WELL NO. AW-5

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 39.35'

DRILLING METHOD Hollow stem auger HOLE DIAM. 10"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction details
DRILLER Soils Exploration Services , Inc.

WATER LEVEL	26.00'	25.48'
DATE	2/27/91	4/5/91
TIME	2:00 pm	1:00 pm



DESCRIPTION

1" Asphalt

SILTY CLAY: brown, damp, stiff, medium plasticity

Same, becomes very stiff

Same, becomes moist, stiff

SILTY SAND: black to brownish green, moist, firm, low plasticity

Same, becomes brownish green, wet, stiff

▽ 26'

Same, becomes very stiff, low to medium plasticity

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2/27/91
CLIENT BP Oil Company
LOCATION 2201 98th Ave., Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

BORING NO. SBA-5
WELL NO. AW-5

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 39.35'

DRILLING METHOD Hollow stem auger HOLE DIAM. 10"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	26.00'	25.48'
DATE	4/5/91	4/5/91
TIME	2:00 pm	1:00 pm

BLOWS PER FOOT(N)	PID (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
4,7,12			36		SM		SILTY SAND: brown, wet, very stiff, medium plasticity
			38				
			40				
3,4,8			42		CL		SILTY CLAY: light brown, wet to moist, stiff, medium to high plasticity
			44				
4,7,9			46	End Cap			Same, becomes moist, very stiff
			48				BORING TERMINATED AT 46.5 FEET BELOW GRADE
			50				
			52				
			54				
			56				
			58				
			60				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval
Water level encountered during drilling

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2-28-91
CLIENT BP Oil Company
LOCATION 2201 98th Ave, Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

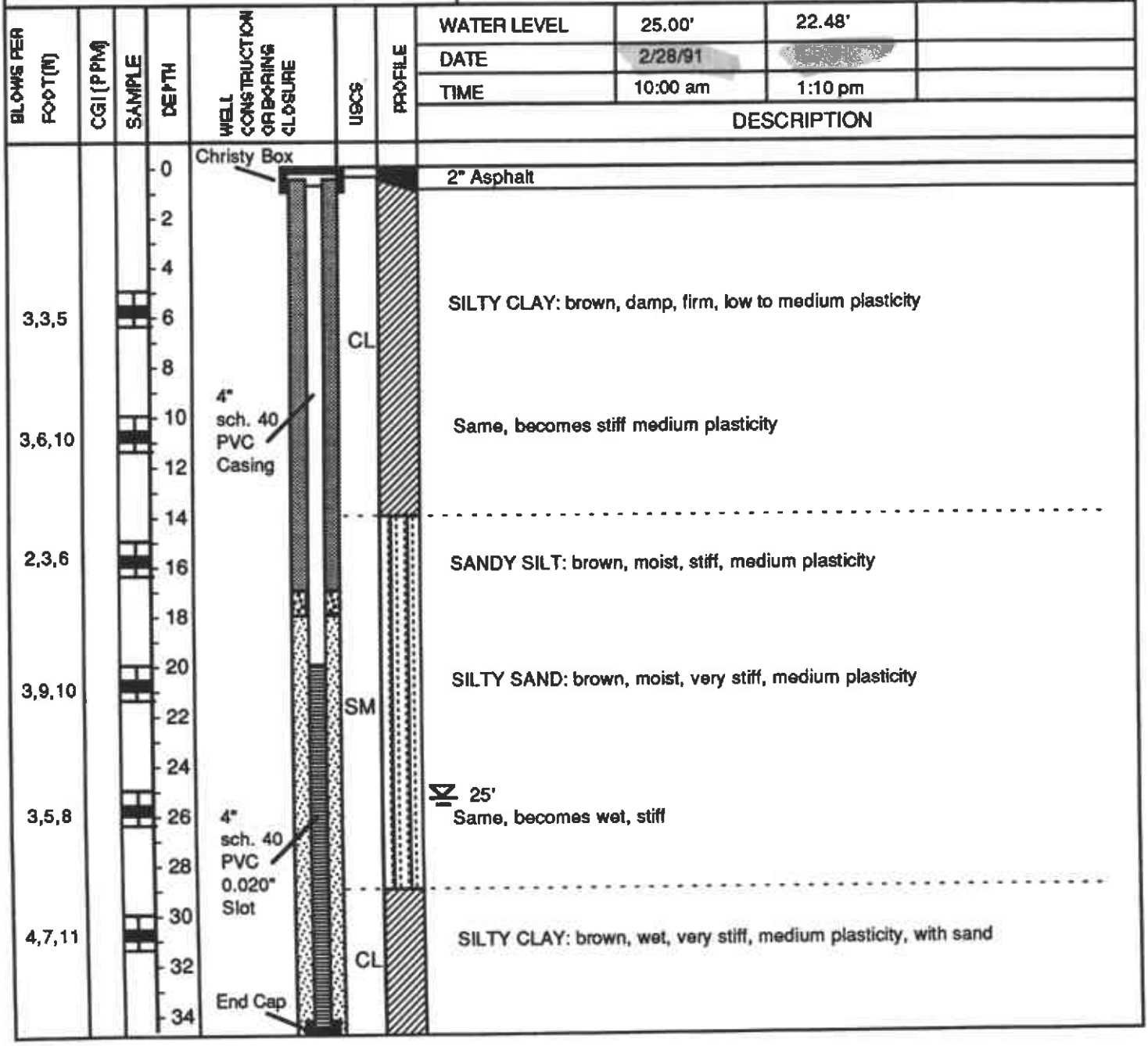
BORING NO. SBA-6
WELL NO. AW-6

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 37.95'

DRILLING METHOD Hollow stem auger HOLE DIAM. 10"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction details
DRILLER Soils Exploration Services, Inc.

WATER LEVEL	25.00'	22.48'
DATE	2/28/91	
TIME	10:00 am	1:10 pm



ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2/28/91
CLIENT BP Oil Company
LOCATION 2201 98th Ave., Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

BORING NO. SBA-6
WELL NO. AW-6

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 37.95'

DRILLING METHOD Hollow stem auger HOLE DIAM. 10"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	25.00'	22.48'	
DATE	2/28/91	4/5/91	
TIME	10:00 am	1:10 pm	

BLOWS PER FOOT(N)	OVA (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
4,7,12		■	36		CL		SILTY CLAY: brown, wet, very stiff, medium plasticity, with some sand
			38				BORING TERMINATED AT 36.5 FEET BELOW GRADE
			40				
			42				
			44				
			46				
			48				
			50				
			52				
			54				
			56				
			58				
			60				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval
Water level encountered during drilling

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 3-1-91
CLIENT BP Oil Company
LOCATION 2201 98th Ave, Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

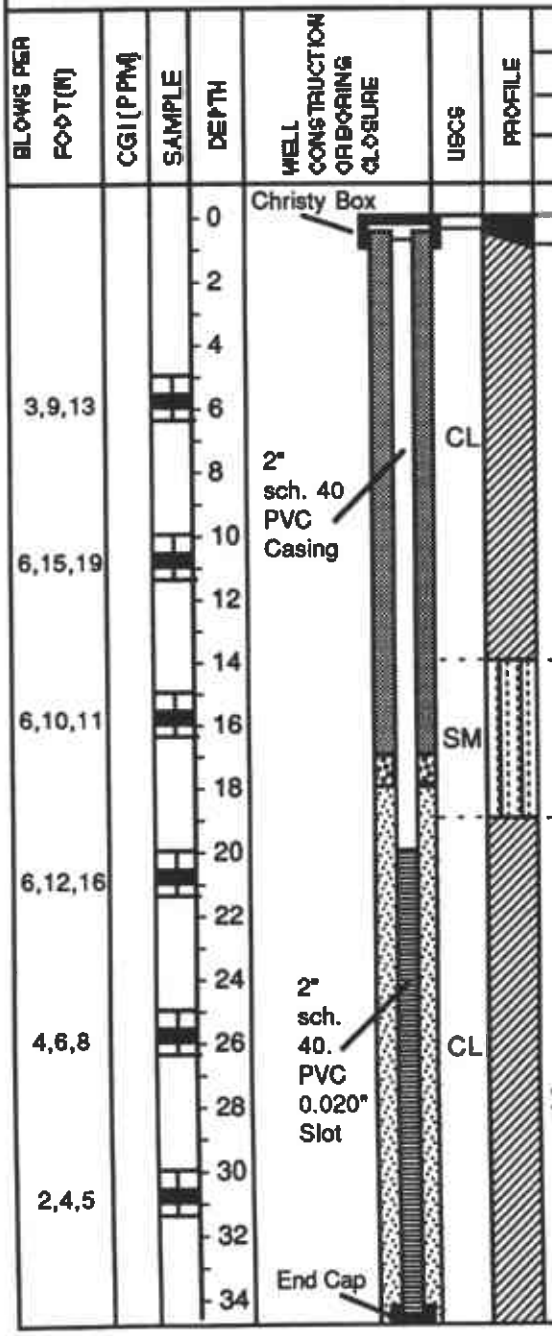
BORING NO. SBA-7
WELL NO. AW-7

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 38.17'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction details
DRILLER Soils Exploration Services, Inc.

WATER LEVEL	28.00'	23.38'
DATE	3/1/91	4/5/91
TIME	11:00 am	1:20 pm



DESCRIPTION
Grass (Top Soil) Median
SILTY CLAY: brown, damp, very stiff, low to medium plasticity
Same, becomes hard, low plasticity, with gravel
SANDY SILT: brown, moist, very stiff, low plasticity, with gravel
SILTY CLAY: light brown, moist, very stiff, low plasticity, with fine sand
Same, becomes brown, moist to wet, stiff, medium plasticity
▽ 28'
Same, becomes saturated, stiff, low to medium plasticity, with sand

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 3/1/91
CLIENT BP Oil Company
LOCATION 2201 98th Ave., Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

BORING NO. SBA-7
WELL NO. AW-7

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 38.17'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	28.00'	23.38'
DATE	3/1/91	4/5/91
TIME	11:00 am	1:20 pm

BLOWS PER FOOT(N)	CGI(PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
2,4,6			36		CL		SILTY CLAY: brown, saturated, stiff, medium plasticity, with some sand
							BORING TERMINATED AT 36.5 FEET BELOW GRADE

38
40
42
44
46
48
50
52
54
56
58
60

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval
Water level encountered during drilling

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2-28-91
CLIENT BP Oil Company
LOCATION 2201 98th Ave, Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwwod

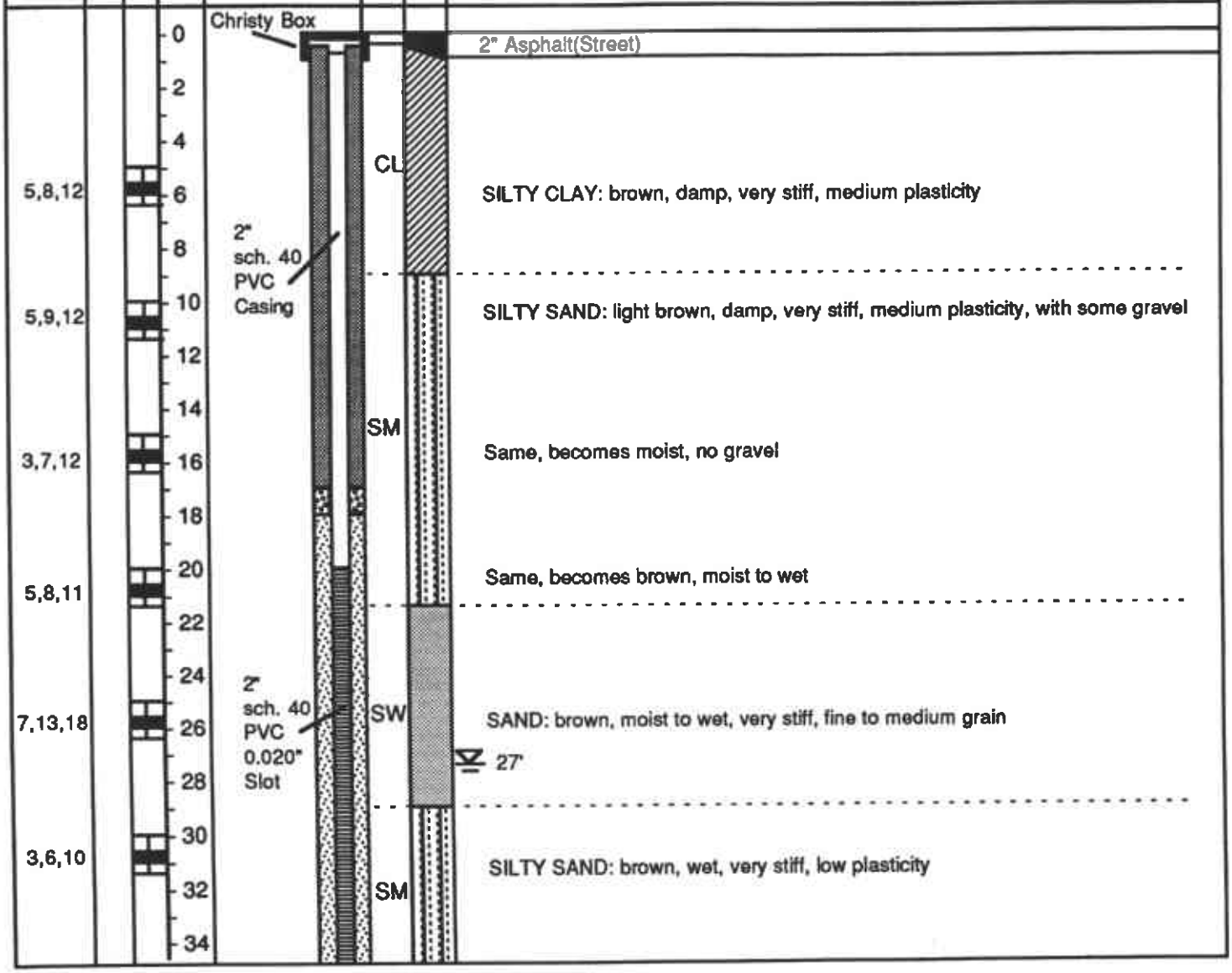
BORING NO. SBA-8
WELL NO. AW-8

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 41.74'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction details
DRILLER Soils Exploration Services , Inc.

WATER LEVEL	27.00'	26.68'	
DATE	2/28/91	4/5/91	
TIME	3:00 pm	1:30 pm	



ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2/28/91
CLIENT BP Oil Company
LOCATION 2201 98th Ave., Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

BORING NO. SBA-8
WELL NO. AW-8

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 41.74'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	27.00'	26.68'	
DATE	2/28/91	4/5/91	
TIME	3:00 pm	1:30 pm	

BLOWS PER FOOT(N)	OVA (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
5,8,11			36				SILTY CLAY: brown, wet, very stiff, medium plasticity
			38		CL		
4,8,9			40	End Cap			Same, becomes saturated, low plasticity, with some fine sand
			42				BORING TERMINATED AT 41.5 FEET BELOW GRADE
			44				
			46				
			48				
			50				
			52				
			54				
			56				
			58				
			60				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval
Water level encountered during drilling

APPENDIX C

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

LOCATION OF PROJECT 2220 98th Avenue
Oakland CA

CLIENT
Name BP Oil Company
Address 2868 Prospect Dr Phone 916 631 0733
City Rancho Cordova Zip 95670

APPLICANT
Name AITON GEOScience, Inc.
Address 1000 Burnett Ave. N. Phone 415 682 1582
City Concord Zip 94520

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	___	General	___
Water Supply	___	Contamination	___
Monitoring	X	Well Destruction	___

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other X
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. C-57 582696

WELL PROJECTS
Drill Hole Diameter 8 in. Maximum
Casing Diameter 2 in. Depth 40 ft.
Surface Seal Depth 15 ft. Number 3

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

ESTIMATED STARTING DATE 2-28-91
ESTIMATED COMPLETION DATE 3-1-91

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

APPLICANT'S SIGNATURE Matthew T. Taylor Date 1-30-91

FOR OFFICE USE

PERMIT NUMBER 91058
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 and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

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 31 Jan 91
Wyman Hong

121989

Permit # X9102035

350-6 (REV. 8/90)

CITY OF OAKLAND
PERMIT TO EXCAVATE IN STREETS OR OTHER WORK AS SPECIFIED

EXC 135.00
APP FEE 30.00
TOTAL 165.00

LOCATION OF WORK: Spring Field (Street or Address) BETWEEN 98TH (Street/Ave.) AND BANCROFT (Specify)

PERMISSION TO EXCAVATE IN THE PUBLIC RIGHT-OF-WAY IS HEREBY GRANTED TO:

APPLICANT Soils Exploration Services Inc

ADDRESS 561 Buckeye st Vacaville Ca PHONE #: (707) 451-9213

TYPE OF WORK: GAS ___ ELECTRIC ___ WATER ___ TELEPHONE ___ CABLE TV ___ SEWER ___ OTHER Drilling (Specify)

NATURE OF WORK: Installation of Groundwater Monitoring Well

EXCV 135.00
APPL 30.00
SUBTL 165.00
CHECK 165.00
ITEM 2
#2 ICL 9662 11:29TH

00 15 91

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 it's 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 _____

PERMIT VOID 90 DAYS FROM DATE OF ISSUE UNLESS EXTENSION GRANTED BY DIRECTOR OF PUBLIC WORKS.

Approximate Starting Date	DATE	2/27 th
Approximate Completion Date	DATE	3/30 th
HOLIDAY RESTRICTION (1 NOV — 1 JAN)	YES ___	NO X
LIMITED OPERATION AREA (7AM – 9AM / 4PM – 6PM)	YES ___	NO X
DATE STREET LAST RESURFACED	DATE	58
SPECIAL PAVING DETAIL REQUIRED	YES ___	NO X

24-HOUR EMERGENCY PHONE NUMBER _____

PERMIT NOT VALID WITHOUT 24 HOUR NUMBER.

Telephone 273-3668 Forty-eight (48) HOURS BEFORE ACTUAL CONSTRUCTION.

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 USA ID Number 22396

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 # _____ Company Name STATE COMP INS FUND

☐ Certified copy is hereby furnished.

☑ Certified copy is filed with the city building inspection dept.

Signature _____ Date 2/12/91

(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 imply with such provisions or this permit shall be deemed revoked.

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.

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 582696 C-57 CITY BUSINESS TAX #

X _____ Date 2/12/91
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. _____

Traffic Striping Replaced _____ Date

APPROVED
Engineering Services JW Date 2-15-91

Planning _____ Date _____

Field Services _____ Date _____

Construction _____ Date _____

Traffic Engineering _____ Date _____

Electrical Engineering _____ Date _____

DIRECTOR OF PUBLIC WORKS
APPROVED BY: JW O.
DATE: 2-15-91

EXTENSION GRANTED BY: _____
DATE: _____

350-2 (REV. 6/90)

CITY OF OAKLAND

PERMIT TO EXCAVATE IN STREETS OR OTHER WORK AS SPECIFIED

App Fee 30.00
Total # 165.00

LOCATION OF WORK: 2220 98TH AVE (Street or Address) BANCROFT 98TH BETWEEN BANCROFT (Street/Ave.) AND Springfield (Specify)

PERMISSION TO EXCAVATE IN THE PUBLIC RIGHT-OF-WAY IS HEREBY GRANTED TO:

APPLICANT Soil Exploration Services, Inc.

ADDRESS 561 Buckeye Ct. Vacaville CA PHONE #: 707 451.9213

TYPE OF WORK: GAS____ ELECTRIC____ WATER____ TELEPHONE____ CABLE TV____ SEWER____ OTHER G.W. Monitoring Wells (Specify)

NATURE OF WORK: Installation of Ground Water Monitoring Wells

PERMIT # X9100231

EXCV	135.00
APPL	30.00
	165.00
CHECK	265.00
ITEM	3
ICL	9664 11:30IM

PERMIT VOID 90 DAYS FROM DATE OF ISSUE UNLESS EXTENSION GRANTED BY DIRECTOR OF PUBLIC WORKS.

Approximate Starting Date	DATE	2/27/91 02-15-91
Approximate Completion Date	DATE	3/30/91
HOLIDAY RESTRICTION (1 NOV — 1 JAN)	YES ____	NO X
LIMITED OPERATION AREA 9-4 only (7AM – 9AM / 4PM – 6PM)	YES X	NO ____
DATE STREET LAST RESURFACED	DATE	11-76
SPECIAL PAVING DETAIL REQUIRED	YES ____	NO X

24-HOUR EMERGENCY PHONE NUMBER ____ PERMIT NOT VALID WITHOUT 24 HOUR NUMBER.

Telephone 273-3668 Forty-eight (48) HOURS BEFORE ACTUAL CONSTRUCTION.

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 it's 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. 70044, 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 # ____ Company Name STATE COMP. INS. FUND

☐ Certified copy is hereby furnished.

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

Signature [signature] Date FEB 15 1991

(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 imply with such provisions or this permit shall be deemed revoked.

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 USA ID Number 123985

This permit issued pursuant to all provisions of Chapter 9, 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.

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 562696 C-57 CITY BUSINESS TAX #

Signature of Contractor Owner or Agent ____ Date ____

☐ 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. ____

Traffic Striping Replaced ____ Date ____

APPROVED

Engineering Services [signature] Date 2-15-91

Planning ____ Date ____

Field Services ____ Date ____

Construction ____ Date ____

Traffic Engineering ____ Date ____

Electrical Engineering ____ Date ____

DIRECTOR OF PUBLIC WORKS

APPROVED BY: [signature]

DATE: 2-15-91

EXTENSION GRANTED BY: ____

DATE: ____

APPENDIX D

WELL DEVELOPMENT AND WATER SAMPLING PROCEDURES, FIELD SURVEY FORMS, AND SURVEY DATA FIELD NOTES

APPENDIX D

WELL DEVELOPMENT AND WATER SAMPLING PROCEDURES AND FIELD SURVEY FORMS

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.

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

JOB NUMBER 30-080-01 TECHNICIAN D. Burel

JOB LOCATION OAKLAND DATE 3/7/91

PUMPOUT ☐ YES ☐ NO	DATE OF LAST PUMPOUT:			WEATHER: TIME:		COMMENTS (Notes, conditions, etc.)
	HOLD	CUT	LEVEL			
WELL #	DEPTH TO WATER	DEPTH TO PRODUCT	PROD. THICKNESS (FT)	TOTAL DEPTH	DEPTH TO PUMP	
4" AW-5	26.69			34.01		
4" AW-6	24.62			33.90		
2" AW-7	25.73			33.43		
2" AW-8	29.20			39.00		
						* AW-6 want 0 gal * 24 gal

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

Project # 30-080-01 Site: B-P Date: 3/7/91

Well: AW-5 Sampling Team: D. Burel

Well Development Method: Bailer

Sampling Method: _____

Describe Equipment Decontamination Before Sampling: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 34.01 feet Time: _____ Water level Before Pumping: 26.69

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
7.32	feet x	0.16	(0.65)	4.7	10	47

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
6:36	9.4	7.50	5.50	60.4	LT BROWN
6:39	18.8	7.68	5.68	63.6	" "
6:47	28.2	12.27	—	62.3	" "
6:55	37.6	12.00	17.50	60.4	" "
7:00	47	11.42	5.50	60.5	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 47

Time Sample Collection Begins: -0

Time Sample Collection Ends: 0

Total Gallons Purged: 47

Comments: at 28 GAL Bot of mud in well

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

Project #: 30-080-01 Site: B-P Date: 3/7/91

Well: AW-6 Sampling Team: D. Burel

Well Development Method: Bailer

Sampling Method: _____

Describe Equipment Decontamination Before Sampling: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 33.90 feet Time: _____ Water level Before Pumping: 24.62

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
9.28	feet x	0.16	(0.65)	6.0	10	60

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
6.14	12	7.93	6.50	61.6	LT BROWN
6.29	24	7.70	8.20	59.9	" "
	36				
	48				
	60				

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 24

Time Sample Collection Begins: 0

Time Sample Collection Ends: 0

Total Gallons Purged: 24

Comments: Well went Dry at 24 gal at 6:30

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

Project #: 30-080-01 Site: B-P Date: 3/7/91

Well: AW-7 Sampling Team: D. Burcl

Well Development Method: Bailer

Sampling Method: _____

Describe Equipment Decontamination Before Sampling: Triple rinse

Well Development/ Well Sampling Data

Total Well Depth: 33.43 feet Time: _____ Water level Before Pumping: 25.73

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
7.7	feet x	(0.16)	0.65	1.2	10	12

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
5:29	2.4	8.32	13.56	62.2	LT BKown/SLGHTY
5:34	4.8	8.05	9.52	61.9	" "
5:37	7.2	7.70	8.75	62.0	" "
5:45	9.6	7.76	7.53	61.2	" "
5:50	12	7.45	6.91	61.3	" "

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: ~~0~~

Time Sample Collection Ends: ~~0~~

Total Gallons Purged: 12

Comments: _____

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

Project #: 30-080-01 Site: BP Date: 3/7/91

Well: AW-8 Sampling Team: D. Burel

Well Development Method: Bailer

Sampling Method: _____

Describe Equipment Decontamination Before Sampling: Triple Rinse

Well Development/ Well Sampling Data

Total Well Depth: 39.00 feet Time: _____ Water level Before Pumping: 29.20

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
9.8	feet x	(0.16)	0.65	1.5	10	15

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
4:50	3	7.94	10.50	68.3	LT BROWN/SILTY
4:55	6	7.72	10.11	67.0	" "
5:00	9	7.80	9.91	65.4	" "
5:05	12	7.38	9.65	65.7	" "
5:10	15	7.86	9.41	62.5	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 15

Time Sample Collection Begins: 0

Time Sample Collection Ends: 0

Total Gallons Purged: 15

Comments: _____

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

JOB NUMBER 30-080-01 TECHNICIAN D. Burcl

JOB LOCATION OAKLAND DATE 3/8/91

PUMPOUT ☐ YES ☐ NO	DATE OF LAST PUMPOUT:			WEATHER: SUNNY TIME:		COMMENTS (Notes, conditions, etc.)
	HOLD	CUT	LEVEL			
WELL #	DEPTH TO WATER	DEPTH TO PRODUCT	PROD. THICKNESS (FT)	TOTAL DEPTH	DEPTH TO PUMP	
MW-3	23.00			31.01		
AW-1	26.50			38.30		
AW-2	24.69			35.22		
AW-4	27.41			32.83		
MW-2	20.70			33.98		
AW-3	25.50			35.43		
AW-5	27.62			42.41		
AW-6	24.53			33.91		
AW-7	25.72			32.13		
AW-8	28.89			39.00		
MW-1	12.31			28.20		
RW						* MW-1 HAD F.P IN WELL RW THE CAP CAN NOT COME OFF

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

Project # 30-080-01 Site: B-P . Date: 3/8/91

Well: AW-1 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

---

Well Development/ Well Sampling Data

Total Well Depth: 38.30 feet Time: _____ Water level Before Pumping: 26.50

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
11.8 feet x	0.16	0.65	1.8	4	7.5

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
12:30	1.5	7.69	17.86	29.5	CLEAR
12:35	3	7.25	8.79	74.4	" "
12:39	4.5	6.89	6.98	72.3	" LT BROWN
12:44	6	6.95	6.82	72.6	" "
12:50	7.5	6.84	7.02	73.9	" "

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: 12:52

Time Sample Collection Ends: 12:55

Total Gallons Purged: 9

Comments: _____

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

Project # 30-080-01 Site: B-1 Date: 3/8/91

Well: AW-2 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

Well Development/ Well Sampling Data

Total Well Depth: 32.22 feet Time: _____ Water level Before Pumping: 24.69

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
10.53	feet x	(0.16)	0.65	1.6	4	7

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
1:55	1.4	7.94	5.60	71.7	LT Brown
2:00	2.8	7.70	4.95	69.0	" "
2:05	4.2	7.73	4.69	66.0	" "
2:09	5.6	7.62	4.55	67.1	" "
2:11	7	7.55	4.73	67.3	" "

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: 2:13

Time Sample Collection Ends: 2:18

Total Gallons Purged: 7.5

Comments: _____

ALTON GEOSCIENCE, INC.

Well Development and Water Sampling Field Survey

Project # 30-080-01 Site: B-P Date: 3/8/91

Well: AW-3 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

---

Well Development/ Well Sampling Data

Total Well Depth: 35.43 feet Time: _____ Water level Before Pumping: 25.50

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
9.93	feet x	(0.16)	0.65	1.5	4	6

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
3:36	1.2	7.62	12.58	69.2	CLEAR
3:39	2.4	7.28	12.07	67.3	" "
3:42	3.6	7.14	12.16	66.5	" "
3:42	4.9	7.33	10.86	65.4	LT GRAY
3:46	6	7.34	10.36	64.5	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 6

Time Sample Collection Begins: 3:50

Time Sample Collection Ends: 3:55

Total Gallons Purged: 6.5

Comments: _____

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

Project # 30-080-01 Site: B-1 Date: 3/8/91

Well: AW-4 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple rinsed

Well Development/ Well Sampling Data

Total Well Depth: 32.83 feet Time: _____ Water level Before Pumping: 27.41

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
5.42 feet x	(0.16)	0.65	0.8	4	3.5

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity	T	Notes
2:55	0.7	6.89	9.38	66.0	CLEAR
2:59	1.4	6.71	9.69	67.1	" "
3:04	2.1	6.58	9.61	67.3	" "
3:07	2.8	6.61	9.35	67.4	LT GREEN
3:09	3.5	6.64	9.39	67.1	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 3.5

Time Sample Collection Begins: 3:10

Time Sample Collection Ends: 3:14

Total Gallons Purged: 4

Comments: Had a gas smell

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

Project # 30-080-01 Site: B-P Date: 3/8/91

Well: AW-5 Sampling Team: D. Burcl

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple rinsed

Well Development/ Well Sampling Data

Total Well Depth: 42.41 feet Time: _____ Water level Before Pumping: 27.62

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
14.79 feet x	0.16	(0.65)	9.6	4	38

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity	T	Notes
4:44	7.6	7.80	5.26	62.4	LT BROWN
4:49	15.2	8.33	4.92	62.9	" "
4:53	22.8	8.79	5.39	63.7	" "
4:58	30.4	9.13	4.72	62.9	" "
5:03	38	9.06	4.37	62.2	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 38

Time Sample Collection Begins: 5:04

Time Sample Collection Ends: 5:10

Total Gallons Purged: 38.5

Comments: _____

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

Project #30-080-01 Site: B-P Date: 3/8/91

Well: AW-6 Sampling Team: D. Burcl

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

Well Development/ Well Sampling Data

Total Well Depth: 33.91 feet Time: _____ Water level Before Pumping: 24.53

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
9.39	feet x	0.16	(0.65)	6.0	4	24

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
4:06	4.8	7.87	6.58	63.5	LT BROWN
4:09	9.6	7.44	5.40	65.0	" "
4:12	14.4	7.27	5.63	65.1	" "
4:16	19.2	7.38	6.27	65.9	" "
4:20	24	7.31	6.95	65.3	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 24

Time Sample Collection Begins: 4:21

Time Sample Collection Ends: 4:25

Total Gallons Purged: 24.5

Comments: _____

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

Project # 30-09-01 Site: B-P Date: 3/9/91

Well: AW-7 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

Well Development/ Well Sampling Data

Total Well Depth: 32.13 feet Time: _____ Water level Before Pumping: 25.72

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
6.41 feet x	(0.16)	0.65	1.0	4	4

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
1:35	0.9	7.75	8.02	69.3	LT BROWN
1:38	1.6	7.65	9.39	67.8	" "
1:40	2.4	7.55	8.52	67.4	" "
1:43	3.2	7.62	8.16	67.5	" "
1:46	4	7.51	7.63	66.4	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 4

Time Sample Collection Begins: 1:47

Time Sample Collection Ends: 1:52

Total Gallons Purged: 4.5

Comments: _____

ALTON GEOSCIENCE, INC.

Well Development and Water Sampling Field Survey

Project #: 30-040-01 Site: B-P Date: 3/8/91

Well: AW-8 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

Well Development/ Well Sampling Data

Total Well Depth: 39.00 feet Time: _____ Water level Before Pumping: 28.89

Water Column		Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
10.11	feet x	(0.16)	0.65	1.6	4	6

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
3:17	1.2	7.60	10.73	68.6	LT BROWN
3:20	2.4	7.49	11.14	69.5	" "
3:23	3.6	7.29	10.47	68.8	" "
3:27	4.9	7.24	10.36	68.2	" "
3:29	6	7.24	10.57	69.4	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 6

Time Sample Collection Begins: 3:30

Time Sample Collection Ends: 3:34

Total Gallons Purged: 6.5

Comments: _____

ALTON GEOSCIENCE, INC.

Well Development and Water Sampling Field Survey

Project # 30-080-01 Site: B-P Date: 3/8/91

Well: MW-1 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

---

Well Development/ Well Sampling Data

Total Well Depth: 28.20 feet Time: _____ Water level Before Pumping: 12.31

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
15.89 feet x	(0.16)	0.65	2.5	4	10

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

Notes on Initial Discharge: _____

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: NOT SAMPLE F.P IN well

ALTON GEOSCIENCE, INC.

Well Development and Water Sampling Field Survey

Project # 30-080-01 Site: B-P . Date: 3/8/91

Well: MW-2 Sampling Team: D. Burel

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Decontamination Before Sampling: Triple rinsed

---

Well Development/ Well Sampling Data

Total Well Depth: 33.98 feet Time: _____ Water level Before Pumping: 20.70

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
13.28 feet x	(0.16)	0.65	2.1	4	8.5

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity X100	T	Notes
1:00	1.7	7.68	2.69	70.5	LT BROWN
1:05	3.4	7.83	2.18	69.2	" "
1:10	5.1	7.97	2.58	68.8	" "
1:13	6.8	7.91	2.54	67.4	" "
1:19	8.5	7.92	2.57	68.0	" "

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 8.5

Time Sample Collection Begins: 1:20

Time Sample Collection Ends: 1:25

Total Gallons Purged: 9

Comments: _____

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

Project # 30-080-01 Site: B-P Date: 3/8/91

Well: mw-3 Sampling Team: D. Burcl

Well Development Method: N/A

Sampling Method: Bailer

Describe Equipment Before Sampling This Well: Triple rinsed

Well Development/ Well Sampling Data

Total Well Depth: 31.01 feet Time: _____ Water level Before Pumping: 23.00

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
8.01 feet x	(0.16)	0.65	1.2	4	5

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

Notes on Initial Discharge: _____

Time	Volume	pH	Conductivity	T	Notes
2:25	1	8.25	2.30	69.1	CT Blown
2:28	2	8.10	1.75	68.9	"
2:33	3	8.04	1.71	67.1	"
2:37	4	8.27	1.77	66.6	"
2:40	5	8.15	1.76	67.2	"

Time Field Parameter Measurement Begins: _____

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

Presample Collection Gallons Purged: 5

Time Sample Collection Begins: 2:41

Time Sample Collection Ends: 2:46

Total Gallons Purged: 5.5

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

JOB NUMBER 30-080-01 TECHNICIAN Awwad & Taylor

JOB LOCATION Oakland 98TH Ave DATE 4-5-91

PUMPOUT ☐ YES ☐ NO	DATE OF LAST PUMPOUT:			WEATHER: TIME:		COMMENTS (Notes, conditions, etc.)
	HOLD	CUT	LEVEL			
WELL #	DEPTH TO WATER	DEPTH TO PRODUCT	PROD. THICKNESS (FT)	TOTAL DEPTH	DEPTH TO PUMP	
MW-1	—					Floating Product
MW-2	16.62					
MW-3	17.84					
AW-1	25.44					
AW-2	22.36					
AW-3	23.90					
AW-4	25.12					
AW-5	25.48					
AW-6	22.48					
AW-7	23.38					
AW-8	26.68					
RW-1	—					NO Access

SURVEY DATA

DATE: 4-5-91

SURVEY BY: AWWAD / TAYLOR

PROJECT NUMBER: 30-080-01

ADDRESS: 2220 98TH AVE

Oakland CA

ELEVATION REFERENCE DESCRIPTION: AW-3 (40')

REFERENCE SOURCE: AW-1, AW-2 & AW-4

STA.	(+) B.S.	H.I.	(-) F.S.	ELEV.
AW-1				38.99
	5.22	44.21		
AW-5			4.86	39.35
AW-6			6.26	37.95
AW-2				37.69
	4.78	42.47		
AW-7			4.30	38.17
AW-4				39.96
	6.54	46.50		
AW-8			4.76	41.74

NOTES:

APPENDIX E

ANALYTICAL METHODS, OFFICIAL LABORATORY REPORTS AND CHAIN OF CUSTODY RECORDS

SUPERIOR ANALYTICAL LABORATORIES, INC.
825 ARNOLD, STE. 114 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512
DOHS #319
DOHS #220

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 82573
CLIENT: Alton Geoscience
CLIENT JOB NO.: 30-080-01

DATE RECEIVED: 03/04/91
DATE REPORTED: 03/12/91

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

LAB #	Sample Identification	Concentration (mg/kg) Gasoline Range
1	SBA-5-10.5-11	ND<1
2	SBA-5-20.5-21	ND<1
3	SBA-5-25.5-26	ND<1
4	SBA-6-10.5-11	ND<1
5	SBA-6-20.5-21	ND<1
6	SBA-6-25.5-26	ND<1
7	SBA-7-10.5-11	ND<1
8	SBA-7-20.5-21	ND<1
9	SBA-7-25.5-26	ND<1
10	SBA-8-10.5-11	ND<1
11	SBA-8-20.5-21	ND<1
12	SBA-8-25.5-26	ND<1

mg/kg - parts per million (ppm)

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

QAQC Summary:

Daily Standard run at 2mg/L: RPD Gasoline = <15
MS/MSD Average Recovery = 94%: Duplicate RPD = 0

Richard Srna, Ph.D.
Laboratory Manager

OUTSTANDING QUALITY AND SERVICE

MAR 14 1991

SUPERIOR ANALYTICAL LABORATORIES, INC.
825 ARNOLD, STE. 114 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512
DOHS #319
DOHS #220

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 82573
CLIENT: Alton Geoscience
CLIENT JOB NO.: 30-080-01

DATE RECEIVED: 03/04/91
DATE REPORTED: 03/12/91

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	SBA-5-10.5-11	16	ND<3	ND<3	ND<3
2	SBA-5-20.5-21	20	ND<3	7	8
3	SBA-5-25.5-26	7.7	ND<3	3	11
4	SBA-6-10.5-11	91	22	8.0	40.0
5	SBA-6-20.5-21	ND<3	ND<3	ND<3	ND<3
6	SBA-6-25.5-26	5.0	10	ND<3	6.6
7	SBA-7-10.5-11	ND<3	ND<3	ND<3	ND<3
8	SBA-7-20.5-21	ND<3	ND<3	ND<3	ND<3
9	SBA-7-25.5-26	ND<3	ND<3	ND<3	ND<3
10	SBA-8-10.5-11	ND<3	ND<3	ND<3	ND<3
11	SBA-8-20.5-21	ND<3	ND<3	ND<3	ND<3
12	SBA-8-25.5-26	ND<3	ND<3	ND<3	ND<3

ug/Kg - parts per billion (ppb)

Method Detection Limit in Soil: 3 ug/Kg

QAQC Summary:

Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 93%: Duplicate RPD = 5 %

Richard Srna, Ph.D.

Laboratory Manager

OUTSTANDING QUALITY AND SERVICE

MAR 14 1991

ALTON GEOSCIENCE
1988 BURNETT AVE., STE. 140
CONCORD, CA 94520 (415) 682-1582

CHAIN of CUSTODY RECORD

PAGE 1 of 1

DATE: 3/4/91 DUE BY: Normal T.A.T.

LABORATORY: Superior

PROJECT NUMBER / MANAGER: 30-080-01 SAMPLERS SIGNATURE: Matthew A. Taylor

PROJECT NAME / ADDRESS: 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: TPH-G & BTEX	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS: MAR 14 1991
	2-27-91	SBA-5-10.5'-11'	Soil	X		Brass Sleeve	X						
	2-27-91	SBA-5-20.5'-21'					X						
	2-27-91	SBA-5-25.5'-26'					X						
	2-28-91	SBA-6-10.5'-11'					X						
	2-28-91	SBA-6-20.5'-21'					X						
	2-28-91	SBA-6-25.5'-26'					X						
	3-1-91	SBA-7-10.5'-11'					X						
	3-1-91	SBA-7-20.5'-21'					X						
	3-1-91	SBA-7-25.5'-26'					X						
	2-28-91	SBA-8-10.5'-11'					X						
	2-28-91	SBA-8-20.5'-21'					X						
	2-28-91	SBA-8-25.5'-26'											

CHAIN OF CUSTODY

	SIGNATURE	INCLUSIVE DATES/TIMES		SIGNATURE	INCLUSIVE DATES/TIMES	
1.	Matthew A. Taylor	3/4/91	11:45 AM	4. M.J. Dick	3-4-91	13:38
2.	Wayne Dick	3-4-91	1352	5.		
3.				6. Dadermann	3/4/91	13:56

SUPERIOR ANALYTICAL LABORATORIES, INC.
825 ARNOLD, STE. 114 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512
DOHS #319
DOHS #220

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 82623
CLIENT: Alton Geoscience
CLIENT JOB NO.: 30-080-01

DATE RECEIVED: 03/11/91
DATE REPORTED: 03/19/91

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

LAB #	Sample Identification	Concentration (mg/L) Gasoline Range
1	AW-1	4.1
2	AW-2	ND<0.05
3	AW-3	5.2
4	AW-4	110
5	AW-5	0.42
6	AW-6	1.1
7	AW-7	ND<0.05
8	AW-8	0.08
9	MW-2	ND<0.05
10	MW-3	ND<0.05

mg/L - parts per million (ppm)

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

QAQC Summary:

Daily Standard run at 2mg/L: RPD Gasoline = <15
MS/MSD Average Recovery =90 %: Duplicate RPD = 3

Richard Srna, Ph.D.

Laboratory Manager

MAR 21 1991

SUPERIOR ANALYTICAL LABORATORIES, INC.
825 ARNOLD, STE. 114 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512
DOHS #319
DOHS #220

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 82623
CLIENT: Alton Geoscience
CLIENT JOB NO.: 30-080-01

DATE RECEIVED: 03/11/91
DATE REPORTED: 03/19/91

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	AW-1	1500	69	100	83
2	AW-2	ND<0.3	ND<0.3	ND<0.3	ND<0.3
3	AW-3	980	450	95	310
4	AW-4	40000	13000	2000	5500
5	AW-5	31	7.5	20	68
6	AW-6	80	19	1.4	230
7	AW-7	0.4	0.7	ND<0.3	ND<0.3
8	AW-8	1.9	2.2	0.5	1.3
9	MW-2	0.6	0.9	ND<0.3	ND<0.3
10	MW-3	ND<0.3	ND<0.3	ND<0.3	ND<0.3

ug/Kg - parts per billion (ppb)

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 = <12

Richard Srna, Ph.D.

Laboratory Manager

OUTSTANDING QUALITY AND SERVICE

MAR 2 1 1991

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

CHAIN of CUSTODY RECORD

PAGE of

DATE: 3/11/91

RESULTS DUE BY: Normal T.A.T.

PROJECT NUMBER: 30-080-01 PROJECT NAME AND ADDRESS:

PROJECT MANAGER: MATT HOPWOOD SAMPLER'S SIGNATURE: [signature] LABORATORY: Superior

REMARKS OR SPECIAL INSTRUCTIONS: 82623

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. 3510: SOLV. EXTR.	SAMPLE PREP. 3540: HEAD SPACE	SAMPLE PREP. 5030: PURGE & TRAP	SOIL ANALYSIS TPH-G & BTEX	SOIL ANALYSIS 418.1: TPHC (IR)	SOIL ANALYSIS 8010: HALOCARBONS	SOIL ANALYSIS 8020: BTXE	SOIL ANALYSIS DHS METHOD: TPHC (GC)	SOIL ANALYSIS 7420: TOTAL Pb	WATER ANALYSIS 418.1: TPHC (IR)	WATER ANALYSIS 601: HALOCARBONS	WATER ANALYSIS 602: BTXE	WATER ANALYSIS DHS METHOD: TPHC (GC)	WATER ANALYSIS 7421: TOTAL Pb
AW-1	3-8-91		H_2O							X										
AW-2										X										
AW-3										X										
AW-4										X										
AW-5										X										
AW-6										X										
AW-7		MAP 2								X										
AW-8		MAP 2								X										
MW-2 MW-3		199								XX										
					TOTAL NO. OF CONTAINERS:		20													

Please initial:
Samples Stored In Ice.
Appropriate containers.
Samples free of headspace.
VOA's without headspace.
Containers intact.

RELINQUISHED BY: [signature]	RECEIVED BY: [signature]	DATE/TIME: 3-11-91 11:45	METHOD OF SHIPMENT: EXPRESS-11 COURIER
RELINQUISHED BY: [signature]	RECEIVED BY:	DATE/TIME:	SHIPPED BY:
RELINQUISHED BY:	RECEIVED BY: [signature] 3/11/91 11:45	DATE/TIME:	COURIER:

APPENDIX F

PUMP TEST DATA

AQUIFER TESTING AND ANALYSIS

The analysis of aquifer characteristics for the purpose of estimating the fate and transport characteristics of contaminants in ground water involves several steps. The first step is the exploratory stage, using surface and subsurface geological and geophysical techniques to define the water-bearing formation. Next is the evaluation stage to determine the hydrogeologic parameters and physical characteristics of the aquifer necessary for the proper design and construction of recovery or extraction wells, and for the control of contaminant migration. The last step is the confirmation stage to optimize the design and operation of each well for the management and remediation of ground water.

Literature Review and Basis of Analysis

The hydraulic properties of aquifers and unsaturated soil materials that define the rate of water movement into, through, and out of subsurface materials, and its effect on the piezometric surfaces or water tables, are hydraulic conductivity (K), transmissivity (T), and the storage coefficient (S) or specific yield for unconfined aquifer.

Hydraulic conductivity is defined as the rate at which water moves through a porous media under a unit hydraulic gradient. It is primarily dependent upon the porosity and permeability of the soil and the density and viscosity of the water. However, not all water occupying pore spaces in a saturated aquifer will be readily move through the aquifer. One measure of the water-yielding ability of an aquifer is the storage coefficient (S). The storage coefficient of an aquifer is defined as the volume of water produced per unit horizontal area by a unit drop in the water table level (unconfined aquifers) or the piezometric surface (confined aquifers). Another term indicative of the water yielding capacity of an aquifer is its transmissivity or transmissibility. The transmissivity of an aquifer is the product of the hydraulic conductivity (K) in feet/day and the saturated thickness (b) in feet, or :

$$T = Kb$$

The movement or yielding capabilities of the water-bearing formation is important to understand aquifer characteristics. It is necessary to obtain values for one or more of the aquifer properties to determine these parameters. Various techniques have been developed for obtaining values for these properties or parameters.

The pumping test technique is generally used to evaluate the hydraulic properties of aquifers. The results of this test

are used to predict well yields, position of water tables and piezometric surfaces, and recharge rates of aquifers. Other techniques, such as the auger-hole and slug test methods (rate-of-rise or rate-of-fall techniques), have been developed to measure the localized hydraulic conductivity (K) of the soil profile in shallow ground water.

Pumped-Well Technique or Pumping Test

With the pumped-well technique, often called pumping test, hydraulic properties of the aquifer are calculated by pumping a well at a constant rate and observing the drawdown of the piezometric surfaces or water table in observation wells at some distance from the pumped well. Two types of tests are used; the steady-state and the non-steady or transient-state test. With the steady-state test, pumping is conducted for a sufficient period of time for the water levels in the observation wells to approach equilibrium. The equilibrium drawdown then enables the calculation of transmissivity (T). With the transient pumping tests, the change in water level in the observation wells is measured in relation to time to calculate the properties T and S.

Due to time constraints transient-state pumping tests are more commonly used than steady-state tests. Certain assumptions have to be made in calculating T and S from the pumping-test data, such as whether the aquifer is homogeneous or isotropic. In this study, only the transient-state method was used. A Theis curve matching procedure was used to evaluate T and S.

The transient flow differential equation developed by Theis is:

$$s = Q\,W(u)/(4\,T)$$

where: s = Drawdown of piezometric surface
Q = Pumping rate

$$W(u) = \text{Well function} = \int_{Y}^{\infty} \frac{e^{-y}}{y}\,dy$$

and:

$$u = r^2\,S/(4Tt)$$

where: r = Distance between the pumping and observation wells
t = time

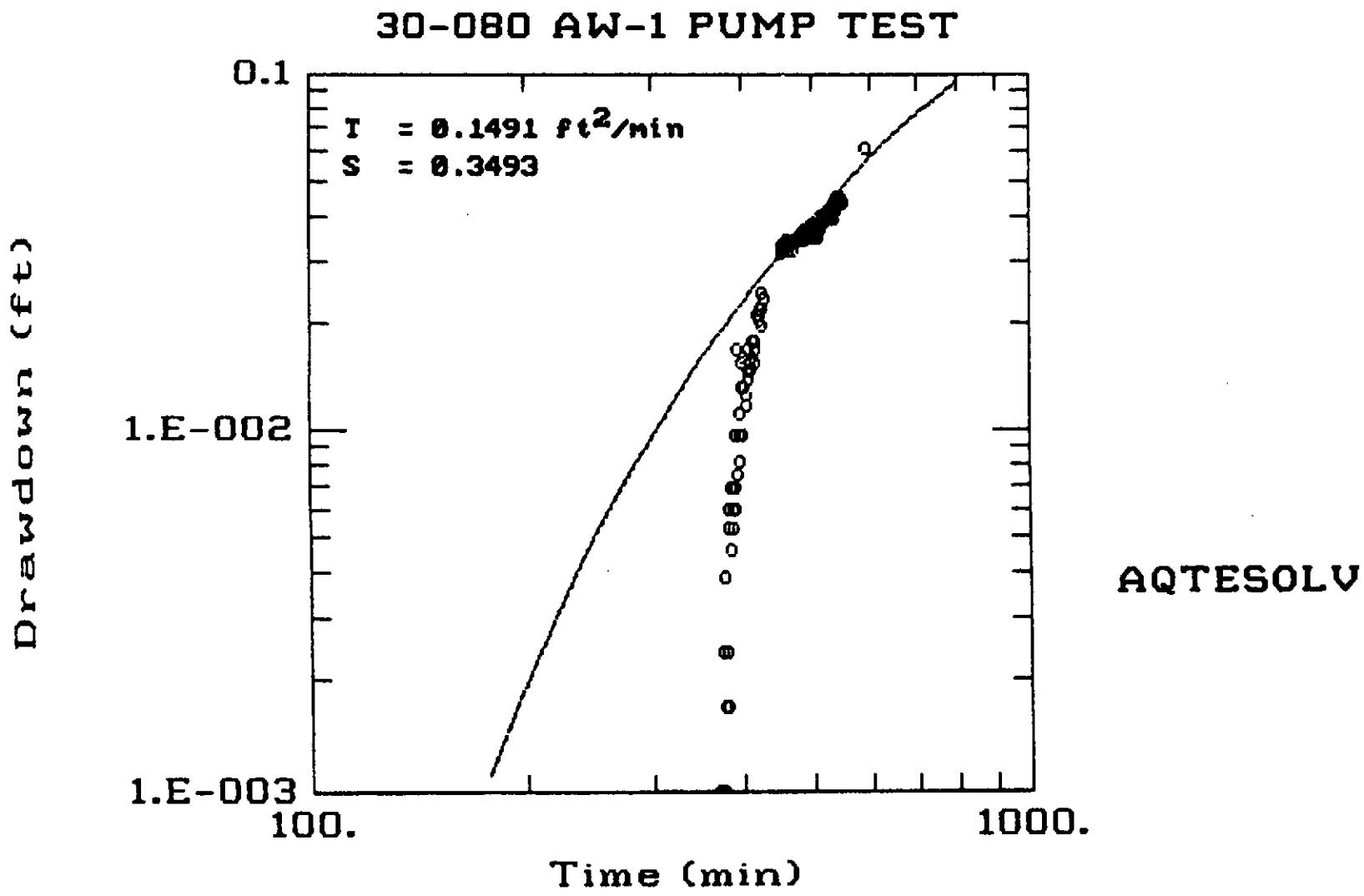
Rearranging and taking logarithms of both equations yields:

$$\log (s) = \log (Q/4\ T) + \log W(u)$$

and:

$$\log r^2/t = \log (4T/S) + \log (u)$$

Given the above relationships, a logarithmic plot of s versus $r^{2/t}$ and a log-log plot of W(u) versus u will be similar. A match point is determined by superimposing these two plots. Using the four coordinates of the match point and the above equations, the transmissivity (T) and storage coefficient (S) of the aquifer can then be determined.


30-080 AW-1 PUMP TEST
T = 0.1491 ft²/min
S = 0.3493
0.1
1.E-002
1.E-003
100.
1000.
Drawdown (ft)
Time (min)
AQTESOLV