ALTON GEOSCIENCE, INC.

90 OCT -4 PM 1:53

October 3, 1990

Ms. Cynthia Chapman
Alameda County Health Agency
80 Swan Way, Room 200
Oakland, California 94621

30-248

Subject: BP Oil Service Station No. 11109
4280 Foothill Boulevard, Oakland, California

Dear Ms. Chapman:

Enclosed are copies of the following reports regarding the BP Oil Service Station No. 11109 (formerly the Mobil Oil Service Station No. 10-H69), located at 4280 Foothill Boulevard, Oakland, California.

- Site Investigation Report by Alton Geoscience dated February 16, 1990
- Proposed Scope of Work for Phase II - Supplemental Site Investigation by Alton Geoscience dated August 6, 1990

These copies are being provided to you as per our conversation at the site on September 27, 1990. As we discussed, a revised proposed scope of work based on recent developments will be produced and sent to you under separate cover.

If there are any questions or comments regarding this submittal, please call.

Sincerely,

ALTON GEOSCIENCE, INC.

Brady 9/9

Brady Nagle
Project Geologist

cc: Mr. Peter DeSantis, BP Oil Company

1000 Burnett Avenue, Suite 140 • Concord, CA 94520 • (415) 682-1582 • Fax 682-8921

SITE INVESTIGATION

MOBIL OIL CORPORATION
FORMER SERVICE STATION NO. 10-H69
4280 FOOTHILL BOULDVARD
OAKLAND, CALIFORNIA

Project No. 30-103

February 16, 1990

SITE INVESTIGATION

FORMER MOBIL OIL CORPORATION
STATION NO. 10-H69
4280 FOOTHILL BOULEVARD
OAKLAND, CALIFORNIA

ALTON GEOSCIENCE PROJECT NO. 30-103

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

This report was prepared by:

Brady Nagle
Project Manager

10/4/90
Date

This report was reviewed by:

Al Sevilla
Registered Civil Engineer
No. 26392
Operation Manager

2/16/90
Date

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1.0 INTRODUCTION

Mobil Oil Corporation retained Alton Geoscience, Inc. to perform a site investigation at the former Mobil Service Station No. 10-H69, located at 4280 Foothill Boulevard, Oakland, California. The Site Vicinity Map is presented in Figure 1 and the Site Plan is shown in Figure 2.

1.1 Purpose and Scope

This site investigation was performed to: (1) address the concerns of the Alameda County Department of Environmental Health (ACDEH) and the San Francisco Regional Water Quality Control Board (RWQCB) regarding a suspected petroleum hydrocarbon contamination of the subsurface soil and/or ground water at the site, (2) determine the presence of subsurface contamination, if any, and (3) develop an appropriate course of action for regulatory case closure or further remedial investigation and feasibility study.

The scope of the preliminary investigation work included the following tasks:

- Installation of soil borings and ground water monitoring wells.
- Collection and analysis of soil and ground water samples.
- Determination of the presence or non-presence of subsurface contamination.
- Preparation of a technical report presenting the results, findings, and recommendations of the study.

The results of these tasks provides the basis in determining the potential impact of contaminants on ground water quality and the need for further investigation and/or remediation.

1.2 Site Location and Description

The site, located at 4280 Foothill Boulevard, Oakland, California, is presently an operating BP Oil Company service station on the north corner of Foothill Boulevard and High Street. Three underground product storage tanks occupy a single cavity on the eastern corner of the site and one waste oil tank is located on the northern corner. The location and layout of the underground storage tanks is shown in Figure 2, Site

Plan. The sizes and contents of the underground storage tanks are as follows:

Tank Size (Gallons)	Product Stored
6,000	Regular Leaded Gasoline
8,000	Super Unleaded Gasoline
10,000	Unleaded Gasoline
550	Waste Oil

1.3 Project Background

Mobil Oil Corporation contracted Target Environmental Services to conduct a soil gas survey at the site, as part of a property transfer program to investigate the potential of subsurface hydrocarbon contamination onsite. The survey was conducted on March 10, 1989, and revealed the presence of detectable concentrations of petroleum hydrocarbon constituents in the soil vapor samples.

Isoconcentration maps and chromatogram data generated during the survey suggest two areas of potential hydrocarbon contamination of the subsurface soil; west of the main building, and between the eastern pump island and the tank field. Soil vapor contaminant migration to the southwest appears to be limited. The southeastern extent of the limit of soil gas isoconcentrations was not defined since it extends beyond the limits of the survey or property.

In April 1989, two 2-inch diameter ground water monitoring wells were installed by Rittenhouse-Zeman and Associates (RZA) of Bellevue, Washington. Soil samples taken from unspecified depths during well construction was analyzed for total petroleum hydrocarbons (TPH) with benzene, toluene, ethylbenzene, and total xylenes (BTEX) distinction. The results of the analysis showed 15 ppm TPH in the soil sample from Boring B-1. Borings B-1 and B-2 were converted into Monitoring Wells MW-1 and MW-2. Only the ground water sample from MW-1 was analyzed and only for BTEX. The results of this analysis showed 2,800 parts per billion total BTEX in the ground water sample.

1.4 Regional Geology

The site is located in an area underlain by Quaternary alluvium consisting of weakly consolidated clay, silt, sand, and gravel. The unit includes minor deposits of Holocene and late Pleistocene beach sand and marine terrace deposits, ranging from 0 to 50 meters in thickness. Underlying the Quaternary alluvium is the Franciscan Formation, consisting of mainly well-indurated sandstone and shale, but includes greenstone, chert, limestone, conglomerate, and metamorphic rock. This geologic unit is generally highly deformed and sheared with blocks of various lithologies in a matrix of clay materials.

1.5 Regional Hydrogeology

The site is within the Alameda Bay Plain Ground Water Basin. The ground water in this alluvial basin flows regionally to the west. According to the Alameda County Public Works Office, there are no production or domestic wells within a half mile radius of the site. Municipal water supply in Oakland 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 Appendix A. This investigation work entailed drilling of two soil borings and collection of soil samples. Each boring was completed as a ground water monitoring well, following the design and installation procedures outlined in Appendix D.

2.1 Soil Borings and Sampling

On January 18, 1990, prior to commencement of drilling activities, Well Permit Application Number 90030 was prepared and obtained from the Alameda County Flood Control and Water Conservation District (Zone 7). A copy of the permit is included in Appendix B.

On January 29 and 30, 1990, Alton Geoscience supervised the drilling of two soil borings and installation of two 4-inch-diameter ground water monitoring wells. Borings B-3 and B-4 were drilled to a total depth of 33.5 feet and 29.5 feet, respectively. Drilling activities were performed by Bay Land Drilling Company of Foster City, California, using a CME 75 drill rig with 10 inch hollow-stem augers.

Soil samples were collected at 5-foot intervals to the total depth of each boring. Saturated soils were encountered at approximately 31 feet below grade in Boring B-3 and approximately 20 feet below grade in Boring B-4. A description of drilling procedures and soil sampling protocol is included as Appendix A, while copies of the boring logs are presented in Appendix C.

2.2 Ground Water Monitoring Well Construction

Borings B-3 and B-4 were converted to ground water monitoring wells MW-3 and MW-4, respectively. The wells were constructed of clean, 4-inch-diameter, flush threaded, Schedule 40 polyvinyl chloride (PVC) blank casing and 0.020-inch, slotted PVC casing, to a depth of 32.0 feet below grade for MW-3, and to a depth of 27 feet below grade for MW-4. Well installation procedures and construction details are presented in Appendix D.

2.3 Monitoring Well Development and Sampling

Well development of all wells onsite was conducted on January 31, 1990 and February 5, 1990, using 2-inch and 4-inch bailers. Each well was developed by purging until stabilization of pH, temperature, and conductivity of the well water was achieved, indicating the presence of formation water in the well. Field observations during well development are presented in the water sampling survey forms (Appendix E).

Water samples were collected on February 5, 1990, following the purging of approximately 10 gallons from each well, with the exception of MW-1, which was observed to have 0.04 foot of free floating product. The well development and sampling procedures were conducted in accordance with the Regional Water Quality Control Board (RWQCB) guidelines and the standard protocol described in Appendix E.

Water samples were collected in clean containers and transported in an iced cooler to Anametrix Analytical Laboratories for analysis, following proper chain of custody procedures.

2.4 Ground Water Level Monitoring and Surveying

Ground water level monitoring data collected at the time of sample collection is presented in Table 1. A ground water elevation contour map based on interpretation of this monitoring data is presented in Figure 3.

The monitoring wells were surveyed on February 5, 1990, using a City of Oakland Survey Station (Section 20; Station D; Quadrant 19) with an elevation of 42.19 feet. The purpose of the survey was to determine the relative top of casing elevations of the four monitoring wells, for use in calculating the water table elevation at each well. The water table elevation data is then used to determine the direction of ground water flow in the shallow aquifer beneath the site, as discussed in Section 3.2, Site Hydrogeology. The survey data is also included in Table 1.

TABLE 1

SURVEY AND WATER LEVEL MONITORING DATA

Well Number	Elevation (feet)	Depth to Water (feet)	Water Level Elevation (feet)
	February 5, 1990		
MW-1	38.19	---	---
MW-2	38.18	21.19	16.27
MW-3	37.73	17.45	20.28
MW-4	37.07	20.75	16.32

--- Not measured due to the presence of free floating product

3.0 SITE GEOLOGY AND HYDROGEOLOGY

This section presents a brief description of the pertinent background information on the site geology and hydrogeology.

3.1 Site Geology

Lithology in the two borings, B-3 and B-4, drilled by Alton Geoscience was relatively different. The uppermost unit in each boring was a dark brown to black, damp, silty clay to a depth of 3 to 5 feet underlain by a brown, silty clay of lesser plasticity. Underlying the silty clay was a brown, moist to damp sandy clay. In Boring B-4 two separate clayey sand layers from about 13 to 16 feet and from about 20 to 24 feet below grade were encountered. These clayey sand layers were not encountered in Boring B-3. In Boring B-3, a sandy

clay layer was encountered at 26 feet and became saturated at 26 feet. However, in Boring B-4, a very stiff, silty clay layer was encountered at 24 feet changing into a damp, very stiff clayey silt to about 28 feet below grade.

Comparison of the boring logs for MW-1 and MW-2 generated by RZA and Alton Geoscience boring logs indicated some correlation in the site stratigraphy. The upper silty and sandy clay layers were encountered at similar depths in each of the RZA borings. Likewise, competent silt and clay aquitards were found at similar depths below the first encountered ground water. The boring logs for MW-1 and MW-2, however, show a clayey sand layer from about 25 or 26 to about 29 feet below grade. This clayey sand unit was not encountered in MW-3, but was observed at a relatively different interval in MW-4.

Hydrogeologic cross-sections, as presented in Figures 4 and 5, have been developed based on the two soil boring logs prepared by Alton Geoscience and the boring logs generated from the preliminary investigation work by RZA.

3.2 Site Hydrogeology

Depth to water measurements in the wells ranged from 17.45 to 21.19 feet, while ground water elevation ranged from approximately 16.27 to 20.28 feet above mean sea level. The ground water flow direction is towards the northeast, with a gradient of approximately 0.05 foot per foot.

4.0 ANALYTICAL METHODS AND RESULTS

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 (DHS). Anametrix, of San Jose, analyzed both soil and ground water samples. A listing of the analytical methods used is presented in Appendix F.

4.1 Soil Analysis

Soil samples collected from Borings B-3 and B-4 were analyzed for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, ethylbenzene, and xylenes (BTEX). The results of the laboratory analyses of soil samples are presented in Table 2. The official laboratory reports and chain of custody records are included in Appendix F.

4.2 Ground Water Analysis

Ground water samples collected from Monitoring Wells MW-1 through MW-4 were analyzed for TPH-G and BTEX. The results of the laboratory analyses are presented in Table 3. The official laboratory reports and chain of custody record are included in Appendix F.

TABLE 2

RESULTS OF
LABORATORY ANALYSIS OF SOIL SAMPLES

Boring	Sample Depth (feet)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
B-3	5	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	10	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	15	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	20	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	25	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	29	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
B-4	5	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	10	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	15	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	20	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	25	16,000	ND<50.0	ND<50.0	ND<50.0	170
	29	ND<1,000	ND<5.0	ND<5.0	ND<5.0	ND<5.0

Notes: TPH-G = total petroleum hydrocarbons as gasoline
B = benzene
T = toluene
E = ethylbenzene
X = xylenes
ND = not detected at the given method detection limits
ppb = parts per billion

TABLE 3

RESULTS OF
LABORATORY ANALYSIS OF GROUND WATER SAMPLES
February 5, 1990 (?)

Monitoring Well	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
MW-1	---	---	---	---	---
MW-2	1,300	14.0	ND<1.0	9.0	13.0
MW-3	1,400	15.0	ND<2.5	11.0	8.0
MW-4	620	ND<0.5	9.0	ND<0.5	10.0

Notes: TPH-G = total petroleum hydrocarbons as gasoline
B = benzene
T = toluene
E = ethylbenzene
X = xylenes
--- = not analyzed due to presence of free product
ppb = parts per billion

5.0 DISCUSSION OF RESULTS

The results of the laboratory analyses of soil and ground water samples collected during this investigation are discussed below.

5.1 Soil

Twelve soil samples were collected from the 2 borings for chemical analysis. Analysis of the soil samples indicated that only one sample contained compounds above the laboratory detection limits. The soil sample from B-4 at 25 feet below grade contained 16,000 ppb TPH as gasoline and 170 ppb total xylenes. Analysis of the other soil samples did not detect any of the petroleum hydrocarbon constituents above the corresponding method detection limits.

5.2 Ground Water

Laboratory analyses of ground water samples collected from three of the four monitoring wells on site all had detectable levels of TPH as gasoline and BTEX. The highest levels of TPH as gasoline and benzene detected through analysis were

from MW-3, with 1,400 ppb TPH as gasoline and 15 ppb benzene as well as 11.0 ppb ethylbenzene and 8.0 ppb total xylenes. The sample from MW-2 contained 1,300 ppb TPH as gasoline and 14.0 ppb benzene, while the sample from MW-4 contained 620 ppb TPH as gasoline and no detectable level of benzene.

6.0 FINDINGS AND CONCLUSIONS

The preliminary investigation work involved drilling two soil borings of approximately 33.5 and 29.5 feet below grade. Subsurface soils consist primarily of clay with various amounts of silt and sand. During drilling, ground water was encountered at a depth of 20 and 31 feet below grade. Each of the borings was completed as a ground water monitoring well, with ground water stabilizing at depths between 17.45 and 21.79 feet below the top of the well casings.

The ground water elevation contour map developed from the water level and survey data indicates a relatively steep gradient with a northeasterly flow direction beneath the site.

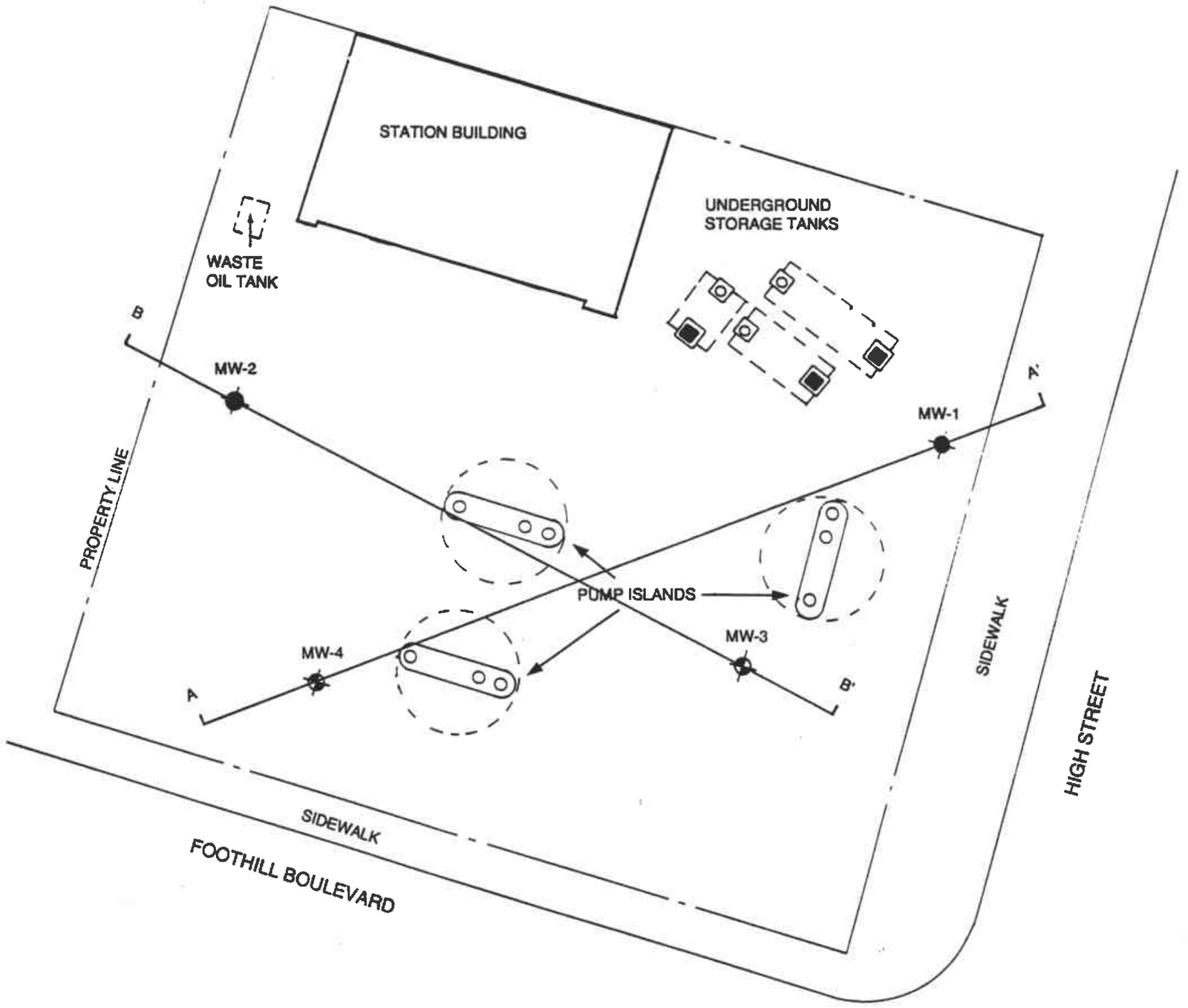
Petroleum hydrocarbon constituents were detected in only one of the 12 soil samples from the two borings. Only the sample from B-4 at the 25-foot depth contained 16,000 ppb TPH as gasoline and 170 ppb benzene. All ground water samples analyzed contained detectable levels of TPH as gasoline and BTEX and one sample was observed to have free floating product.

It is apparent that additional investigative work is warranted to determine the extent of subsurface contamination and the appropriate course of action for remediation. Since there are no domestic or municipal wells in the region, and since municipal water supply is from an imported source, it does not appear that the petroleum hydrocarbon contamination of the shallow ground water is a threat to any domestic water supply source.

Source: U.S.Geological Map, Oakland East Quadrangle, California. 7.5 minute series. 1959. Photorevised 1980.

FIGURE 1 VICINITY MAP

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



N

0 10 20
SCALE IN FEET

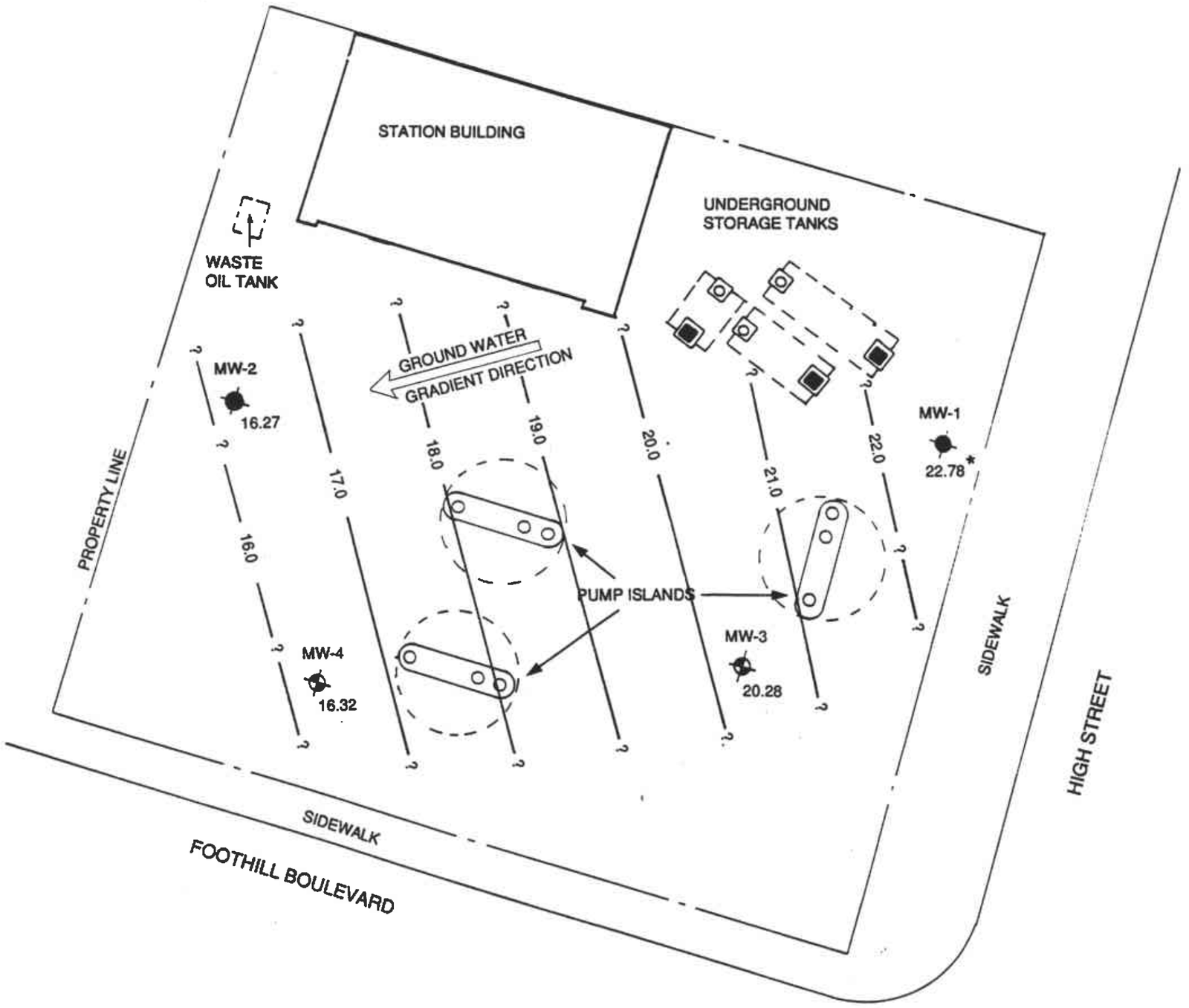
LEGEND:

- EXISTING MONITERING WELL BY ALTON
- EXISTING MONITERING WELL BY OTHERS
- A ⟷ A' LINE OF HYDROGEOLOGIC CROSS SECTION

FIGURE 2
SITE PLAN

SOURCE: PROPERTY MAP PROVIDED BY MOBIL OIL CORPORATION

PROJECT NO. 30-103



N

0 10 20
SCALE IN FEET

LEGEND:

- EXISTING MONITERING WELL BY ALTON
- EXISTING MONITERING WELL BY OTHERS
- ? —— ? GROUND WATER ELEVATION CONTOUR (DASHED AND QUERIED WHERE UNCERTAIN)
- * GROUND WATER ELEVATION FOR MW-1 TAKEN JANUARY 31, 1990

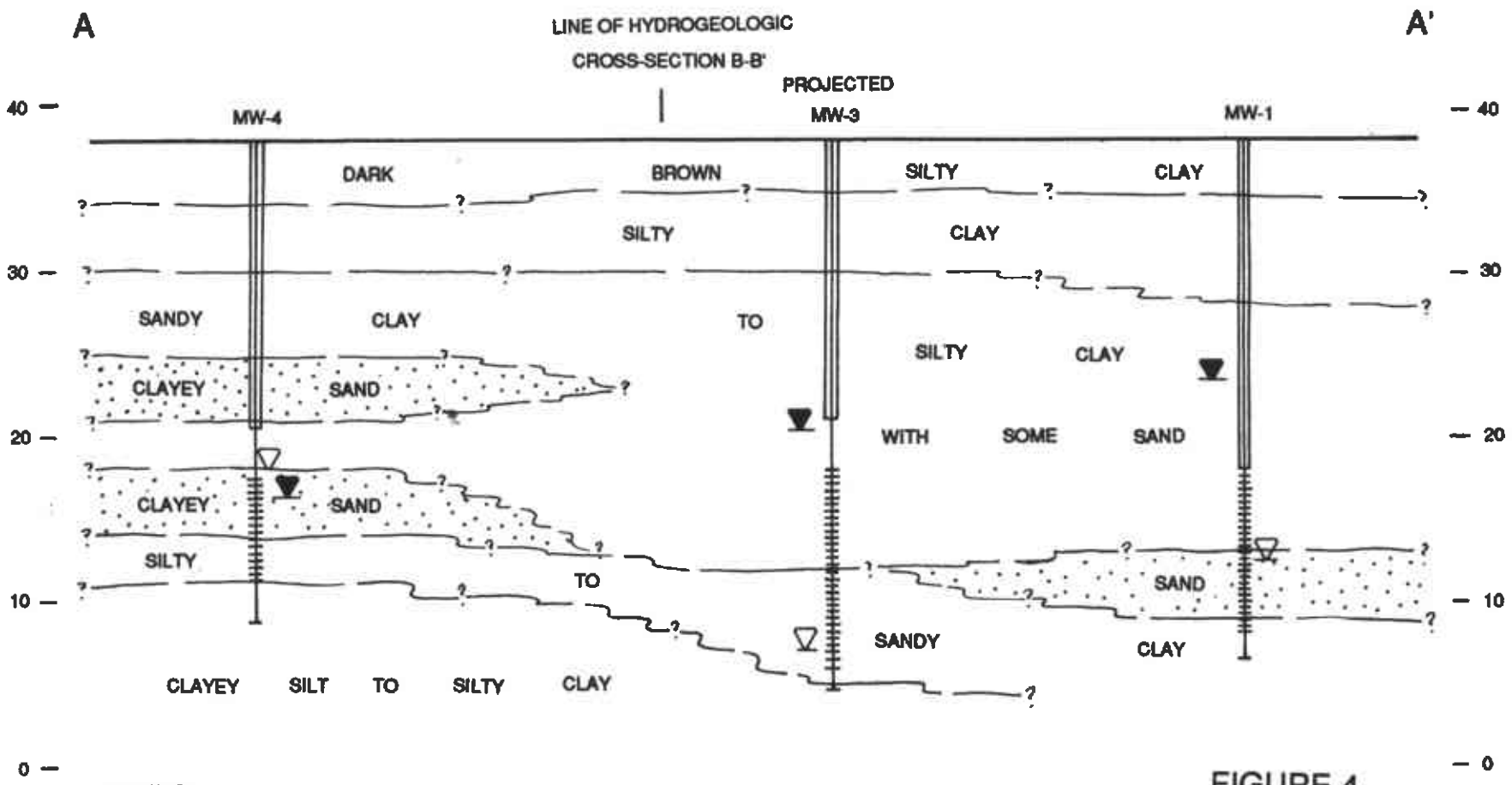
FIGURE 3

GROUND WATER GRADIENT MAP

FEBRUARY 5, 1990

PROJECT NO. 30-103

SOURCE: PROPERTY MAP PROVIDED BY MOBIL OIL CORPORATION



LEGEND

GROUND WATER MONITORING WELL SHOWING SLOTTING AND SEAL

WATER LEVEL AT TIME OF DRILLING

WATER ELEVATION FEBRUARY 5, 1990

SCALE: 1" = 20' HOROZONTAL
1" = 10' VERTICAL
DISTANCES AND ELEVATIONS IN FEET

FIGURE 4

HYDROGEOLOGIC
CROSS-SECTION A-A'

PROJECT NO. 30-103

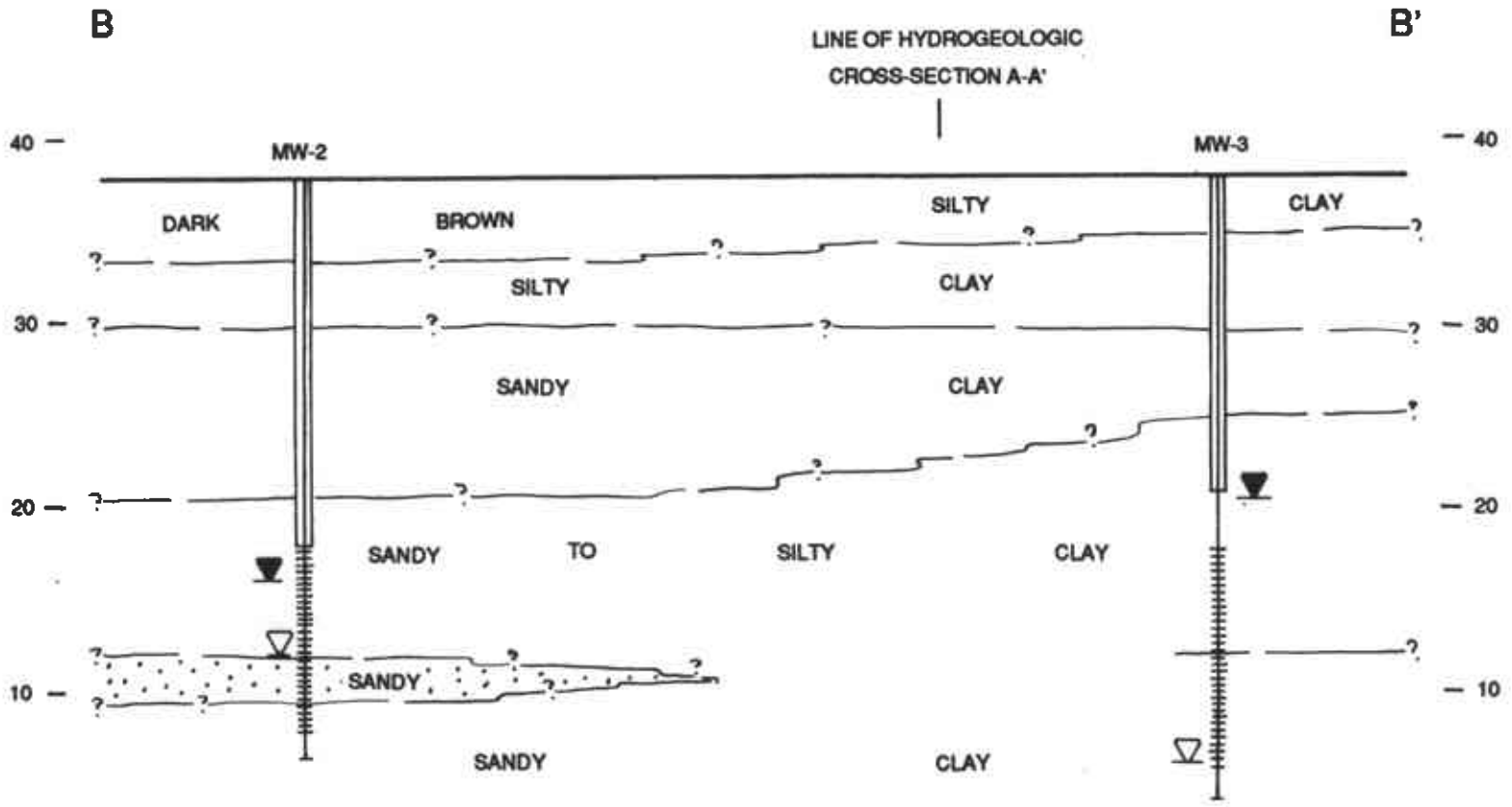


FIGURE 5

HYDROGEOLOGIC

CROSS-SECTION B-B'

PROJECT NO. 30-103

APPENDIX A

DRILLING AND SOIL SAMPLING

APPENDIX A

DRILLING AND SOIL SAMPLING

Soil borings/monitoring wells were drilled utilizing 10-inch-diameter, continuous-flight, hollow-stem augers. Boring B-1 was initially drilled with 8-inch-diameter, hollow-stem augers. It was determined that the installation of monitoring wells was necessary and therefore required re-drilling with 10-inch-diameter, 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 hydrocarbon vapor testing, and laboratory analysis. Samples were collected at 5-foot intervals from Borings B-3 and B-4.

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 18-inch sampler, the sample tubes were removed and securely sealed with Teflon sheeting and polyurethane caps. The bottom sample tube was removed and capped. The sample was labeled with sample identification, sample depth, geologist's initials, and date of collection. The soil sample was kept on dry ice prior to and during transport to a state-certified laboratory.

Soil immediately adjacent to that selected for laboratory analysis was tested for elevated hydrocarbon concentrations, with a Gastech Model 1238 combustible gas indicator (CGI). The CGI reading was taken after approximately 15 seconds and recorded on the boring log.

The remaining 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.

APPENDIX B

WELL PERMIT

30-103

463 3914

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 4280 Foothill Blvd (@ High St.) Oakland, CA

CLIENT
Name Mobil Oil Corporation
Address 3800 W. Alameda Phone (818) 953-2626
City Burbank, CA Zip 91505-4331

APPLICANT
Name Brady Nagle, Alton Geoscience, Inc.
Address 1170 Burnett Phone (415) 682-1582
City Concord, CA Zip 94520

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

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other N/a
Municipal ___ Irrigation ___

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

DRILLER'S LICENSE NO. 374152

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum Depth 50 ft.
Casing Diameter 4 in. Number 4
Surface Seal Depth 20 ft.

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

ESTIMATED STARTING DATE 1/29/90
ESTIMATED COMPLETION DATE 1/31/90

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

APPLICANT'S SIGNATURE Brady Nagle Date ___

FOR OFFICE USE

PERMIT NUMBER 90030
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 18 Jan 90
Wyman Hong

121989

APPENDIX C

BORING LOGS

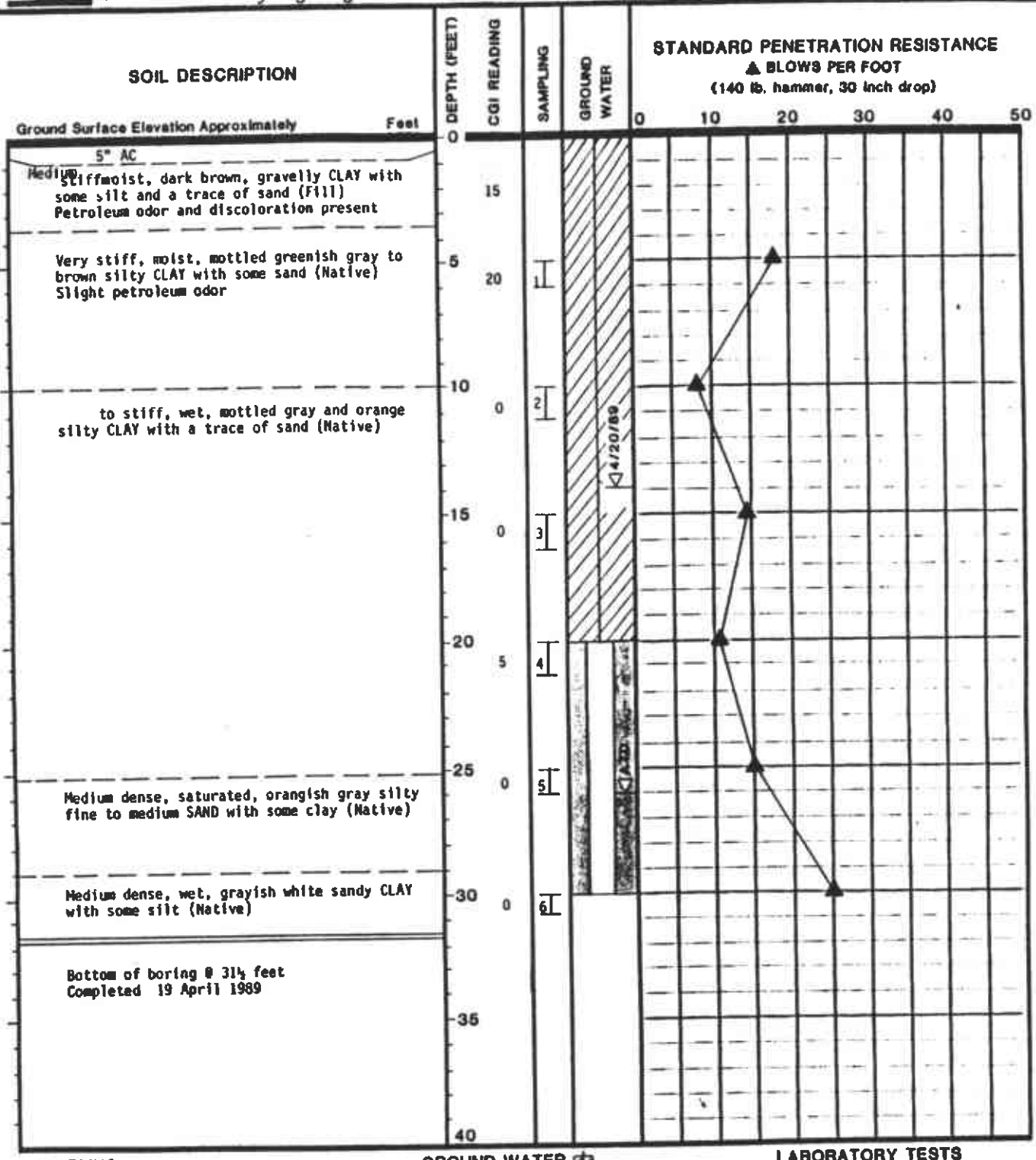
RZA

RITTENHOUSE-ZEMAN & ASSOC., INC.

Geotechnical / Hydrogeological Consultants

BORING NUMBER B-1 W.O. W-6095

PROJECT NAME Oakland, CA Mobil



SAMPLING

- 2" OD SPLIT SPOON SAMPLE
- 3" OD SHELBY SAMPLE
- 2.5" ID RING SAMPLE
- BULK SAMPLE
- ★ SAMPLE NOT RECOVERED

GROUND WATER

SEAL

DATE

WATER LEVEL AT TIME OF DRILLING

ATD

OBSERVATION WELL TIP

SILICA SAND

LABORATORY TESTS

- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT

FIGURE 2

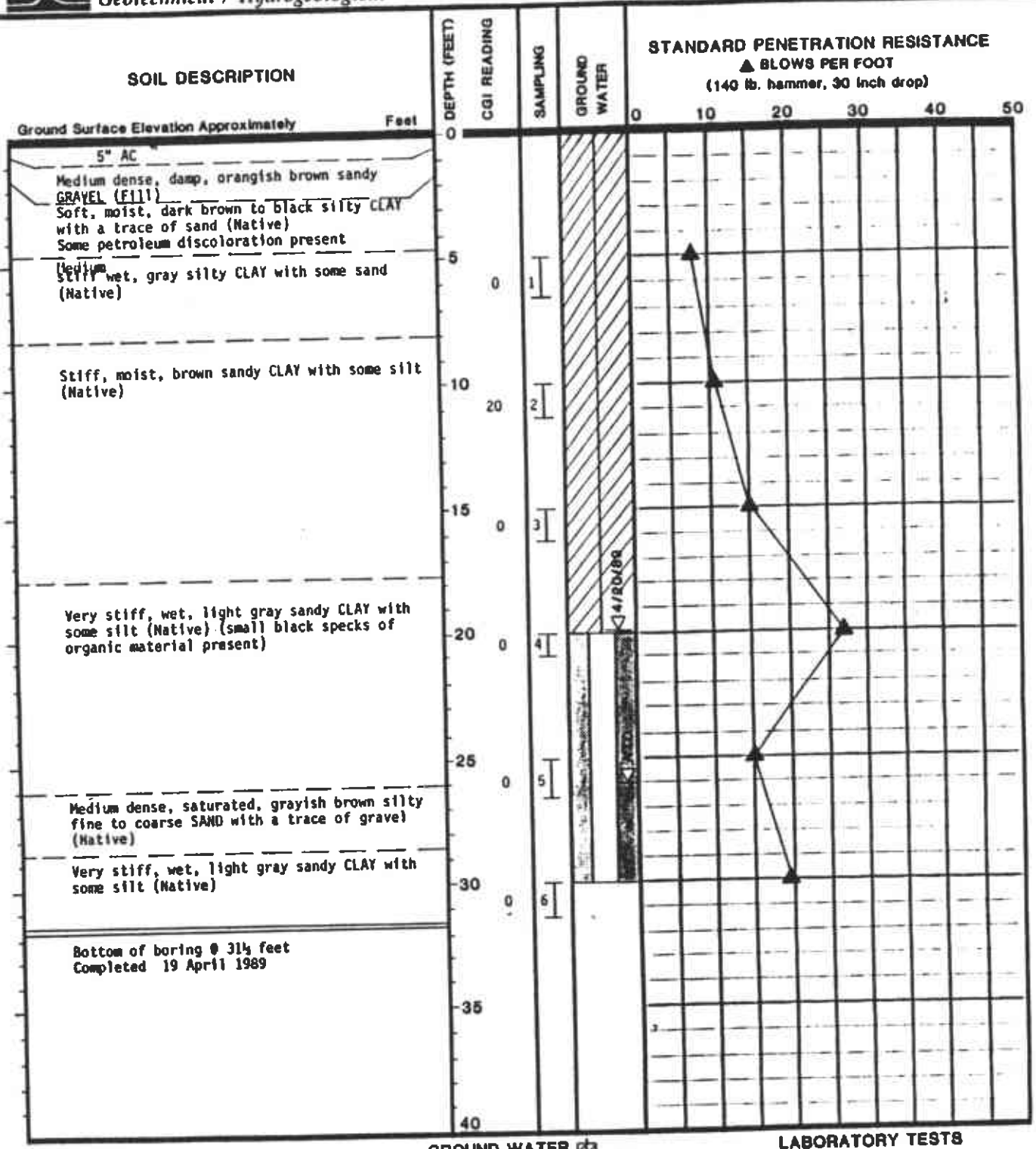
RZA

RITTENHOUSE-ZEMAN & ASSOC., INC.

Geotechnical / Hydrogeological Consultants

BORING NUMBER B-2 W.O. W-6095

PROJECT NAME Oakland, CA Mobil



SAMPLING

- 2" OD SPLIT SPOON SAMPLE
- 3" OD SHELBY SAMPLE
- 2.5" ID RING SAMPLE
- B BULK SAMPLE
- ★ SAMPLE NOT RECOVERED

GROUND WATER

SEAL

DATE

WATER LEVEL AT TIME OF DRILLING

OBSERVATION WELL TIP

SILICA SAND

LABORATORY TESTS

● % WATER CONTENT

NP NON PLASTIC

LIQUID LIMIT

NATURAL WATER CONTENT

PLASTIC LIMIT

FIGURE 3

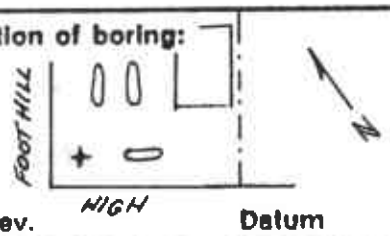
ALTON GEOSCIENCE

LOG OF EXPLORATORY BORING

PROJECT NO. 30-103 DATE 01/29/90
CLIENT Mobil Oil Corporation
LOCATION 4280 Foothill Blvd., Oakland
LOGGED BY B. Nagle DRILLER Bayland

BORING NO. B-3
Sheet 1 of 1

Field location of boring:



Ground Elev. Datum

Drilling method Hollow-stem auger
Hole Dia. 10"

Casing Installation Data 4" perforated (0.020") pipe 32-20', #3 lonestar sand 33-18', bentonite pellets 18-17'; cement seal to surface.

Water Level	6.72	20.28					
Time	11:00	13:51					
Date	1/29/90	2/05/90					

Blow Counts	PID / OVA	Depth	Sample	Soil Group Symbol (uscs)	Litho-graphic Symbol	DESCRIPTION
						3" asphalt; 6" baserock
		2		CL		
	25					SILTY CLAY: Black, moist, high plasticity.
		4				Appearance of fine to coarse grained sand; color
3,4,8	50	6		CL		change to dark brown.
						SILTY CLAY: Mottled olive green/brown, moist,
		8				moderate plasticity, stiff; gravels up to ¼".
		10				
10,13,17	40			CL		SANDY CLAY: Brown, moist, low plasticity, very
		12				stiff; gravels up to ½".
		14				Driller felt auger out of gravels at 13'
6,7,9	40	16				SILTY CLAY: Tan, damp to moist, medium plasticity, stiff,
						blue-gray staining along occasional rootlets.
		18				
				CL		
		20				
5,9,10	25					Change to very moist, increase in ½" carbon granules.
		22				
		24				
4,9,15	50	26				SANDY CLAY: Blue-gray to tan, moist, low plasticity, stiff.
	100 In Shoe					
		28		CL		Color change to light gray.
5,6,9		30				Top of 32'-33½' sample wet with sandy gravel stringers
						up to 2".
7,10,14		32				
				CL		SILTY CLAY: Mottled brown and gray, damp, medium
						plasticity, very stiff.
						Boring terminated at 33½'. Free ground water encountered
						at approximately 31'.

ALTON GEOSCIENCE

LOG OF EXPLORATORY BORING

PROJECT NO. 30-103 DATE 01/30/90
CLIENT Mobil Oil Corporation
LOCATION 4280 Foothill Blvd., Oakland
LOGGED BY B. Nagle DRILLER Bayland

BORING NO. B-4
Sheet 1 of 1

Field location of boring:

Ground Elev. Datum

Drilling method Hollow-stem auger
Hole Dia. 10"
Casing Installation Data 4" perforated (0.020") pipe 27-20'; #3 lonestar 27-18½', bentonite pellets 18½-17½'; neat cement seal 17½ to surface.

Water Level	17.07	16.32	
Time	13:30	13:15	
Date	1/30/90	2/05/90	

Blow Counts	PID / OVA	Depth	Sample	Soil Group Symbol (USCS)	Litho-graphic Symbol	DESCRIPTION
						4" asphalt, 6" baserock
		2				SILTY CLAY: Dark brown, damp to moist, high plasticity,
		4				stiff.
4,7,7	20	6				SILTY CLAY: Mottled orange-brown, damp, low plasticity, stiff; minor fine sand and angular gravels up to ¼".
		8				SANDY CLAY: Light brown, damp, medium plasticity, stiff; occasional carbon granules.
3,5,7	40	10				
		12				Driller felt increase in resistance at 13½ feet.
		14				CLAYEY SAND: Brown, moist, medium dense; occasional fine to coarse grained gravels up to ¼".
6,9,11	25	16				Driller felt smoother drilling at approximately 17'.
		18				
4,5,13		20	▽			SANDY CLAY: Light brown, moist, low plasticity, stiff
		22				CLAYEY SAND: Light brown, wet, medium dense.
		24		?—?	? ? ?	SILTY CLAY: Mottled blue gray and brown, low plasticity,
5,9,12	75	26				very stiff; minor very fine sand.
		28				Driller needed more pressure to drill at 27'.
3,7,10	70					CLAYEY SILT: Whiteish gray to tan, moist, low plasticity, very stiff; some fine sand.
						Boring terminated at 29½ feet.
						Free ground water encountered at approximately 20 feet.

KEY TO BORING LOGS AND WELL CONSTRUCTION

BORING LOG SYMBOLS

——	GEOLOGIC CONTACT LINE
═══	TERMINATION OF BORING
▽	WATER LEVEL, PRELIMINARY MEASUREMENT
▼	WATER LEVEL, STABILIZED

SAMPLE RECOVERY

■	UNDISTURBED SAMPLE, RETAINED IN LAB
▯	SAMPLER DRIVE DISTANCE, SAMPLE EXAMINED IN FIELD
☒	NO RECOVERY

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APPENDIX D

MONITORING WELL INSTALLATION PROCEDURES AND CONSTRUCTION DETAILS

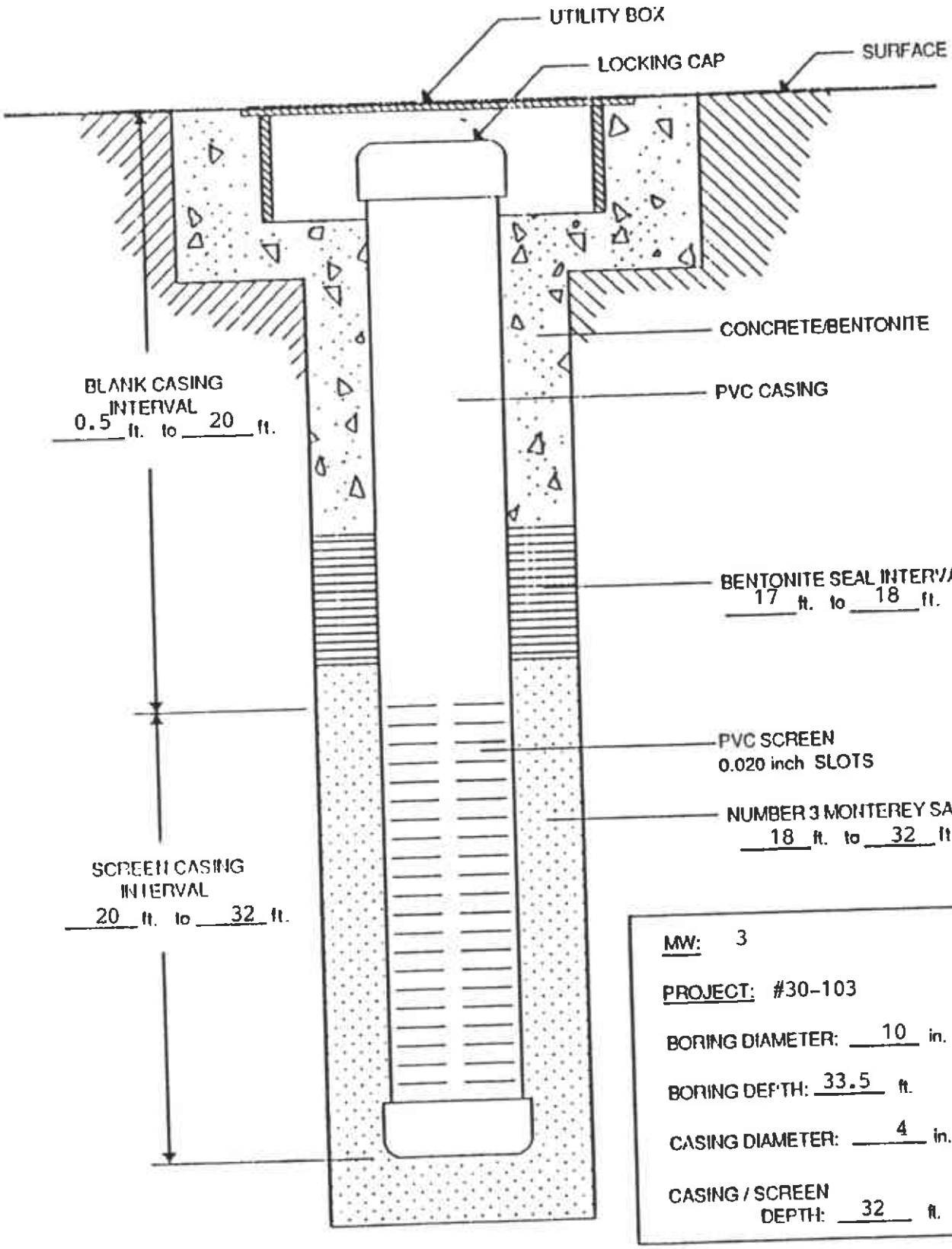
APPENDIX D

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 1.5 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, water-tight well caps were installed to ensure the integrity of the well.

MONITORING WELL CONSTRUCTION DETAIL



MW: 3

PROJECT: #30-103

BORING DIAMETER: 10 in.

BORING DEPTH: 33.5 ft.

CASING DIAMETER: 4 in.

CASING / SCREEN DEPTH: 32 ft.

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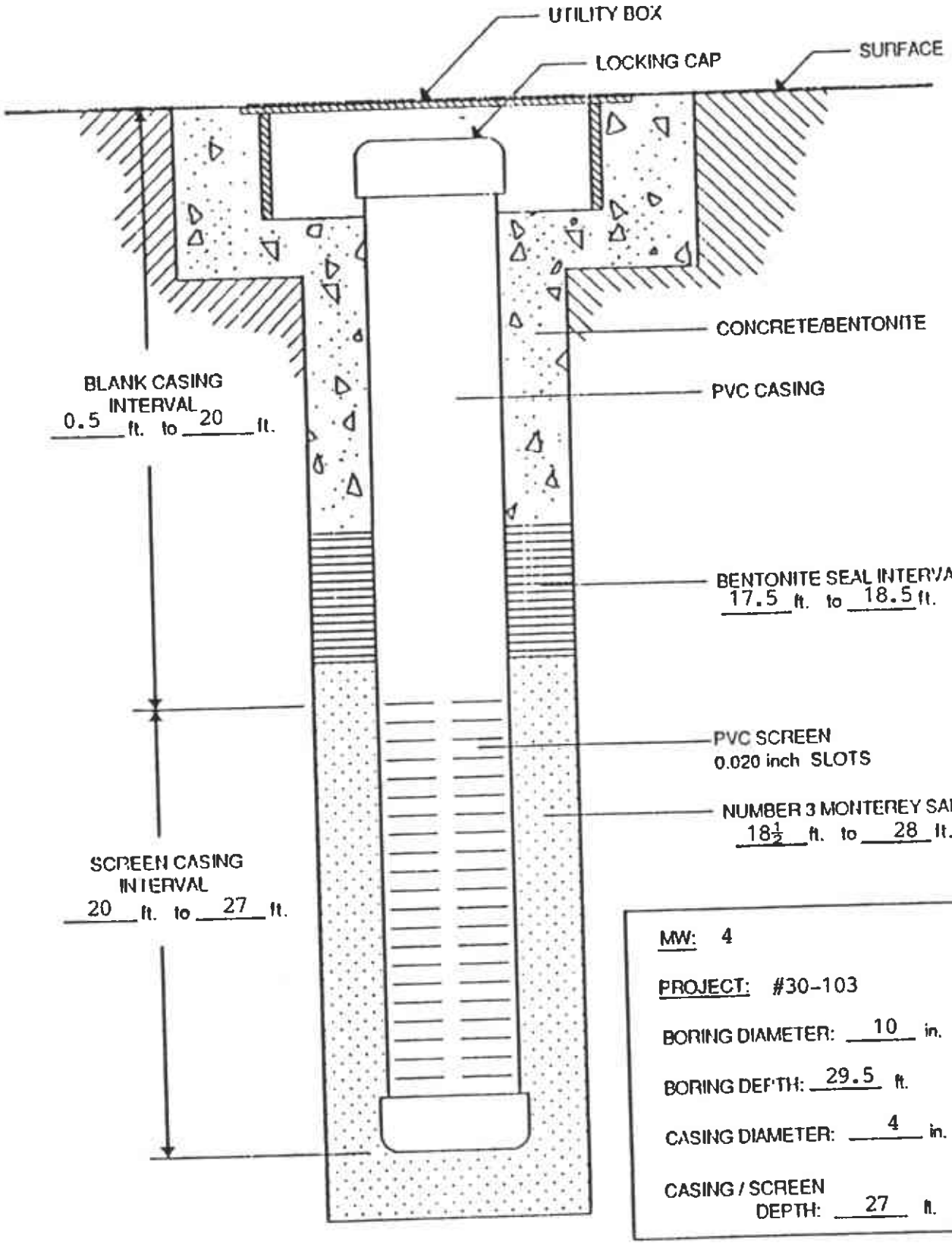
CONCORD, CA. 94520

NOTE DRAWING IS NOT TO SCALE

PROJECT #30-103

MONITORING WELL CONSTRUCTION DETAIL



MW: 4

PROJECT: #30-103

BORING DIAMETER: 10 in.

BORING DEPTH: 29.5 ft.

CASING DIAMETER: 4 in.

CASING / SCREEN DEPTH: 27 ft.

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

NOTE: DRAWING IS NOT TO SCALE PROJECT #30-103

APPENDIX E

WELL DEVELOPMENT AND WATER SAMPLING PROCEDURES AND FIELD SURVEY FORMS

APPENDIX E

WELL DEVELOPMENT, 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 electroconductivity were measured periodically until these parameters stabilized, indicating formation water had entered the well casing. The purged water was pumped into barrels prior to disposal or recycling at an appropriate waste disposal facility.

Ground water samples were collected by lowering a 2-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 geologist's initials. The samples remained on ice prior to laboratory analysis.

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

Project # 30-103 Site: Mobil-#10-H69 Date: 1/31/90

Well: MW-1 Sampling Team: Donnie/Brady

Well Development Method: Bailing

Sampling Method: N/A

Describe Equipment Before Sampling This Well: N/A

Well Development/ Well Sampling Data

Total Well Depth: 30.26 feet Time: 14:48 Depth to Water Before Pumping: 15.41

Water Column	Casing Diameter 2-inch	4-inch	Volume	Factor	Volume to Purge
14.85 feet x	(0.16)	0.65	2.37	4	9.5

Depth Purging From: 30 feet. Time Purging Begins: 15:00

Notes on Initial Discharge: 0.04" f.p. on clear ground water.

NOTES

1528 - Bailed dry after removing over 10 gals. FREE Fire product became only a sheen after removing ½ gal.

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: _____