THRIFTY OIL CO.

December 23, 1986

Alameda County
Environmental Health Services
470 27th Street
Suite 324
Oakland, CA 94612

ATTENTION: Ted Gerow

RE: Thrifty Oil Co. Station #63
6125 Telegraph Avenue
Oakland, CA 94603

RECEIVED
DEC 30 1986
ENVIRONMENTAL HEALTH
ADMINISTRATION

Dear Mr. Gerow,

Enclosed please find Woodward-Clyde Consultant's Subsurface Site Assessment report for the above referenced location.

As outlined in my letter to you of 11/10/86, the attached includes a complete analysis of soil and water samples.

Please reveiw the attached and contact me if more information is required or if you have any questions.

Very truly yours,

Peter D'Amico
Manager
Environmental Affairs

PD/dmt
Enclosure

cc: Mark B. Gilmartin, Straw & Gilmartin
Peter Johnson, Regional Water Quality Control Board

10000 Lakewood Boulevard, Downey, California 90240 (213) 923-9876

100 Pringle Avenue Suite 300
Walnut Creek CA 94596 3564
415-945 3000

Woodward-Clyde Consultants

December 16, 1986
90390A

Mr. Pete D'Amico
Manager, Environmental Affairs
Thrifty Oil Company
10000 Lakewood Boulevard
Downey, CA 90240

Subject: Subsurface Assessment Report
Thrifty Oil Company
6125 Telegraph Avenue
Oakland, California

Dear Mr. D'Amico:

Please find the enclosed copy of our report on the subsurface site assessment of the Thrifty Oil Service Station #63 in Oakland, California. Per you request, I have included our recommendations for additional investigative and remedial actions under this separate cover letter.

The data collected during our site assessment strongly suggests that free product is contained within the tank backfill and is responsible for the product appearing in MW-2 and MW-3 as well as the dissolved components in MW-4. Due to the relatively high levels of dissolved hydrocarbons in the water and the close proximity to residential housing in the down-gradient direction, the agencies may require treatment of the groundwater in addition to free product recovery. As with station 49, it may be acceptable to propose remediation of the free product only. A case could be built for leaving the groundwater contamination in place due to the low migration potential and the limited local groundwater uses. The rationale being that once the source is removed, the contaminant migration potential will be reduced substantially and would probably not affect any local uses.

Assuming the tank backfill does contain a substantial quantity of free product, remediation would consist of installing a well in the western edge of the backfill near MW-3 and recovering any product encountered either by single or dual phase pumping. Because of the amount of product in MW-3 and the distance from the backfill, it could take some time to recover the free product. A second well could also be installed at the other end of the backfill which would be used to inject a surfactant solution to flush out

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DEC 17 1986

residual contamination. The surfactant/hydrocarbon solution would be removed by the recovery well.

If you have any questions or comments on any of the above material, please do not hesitate to contact me.

Sincerely,

Martin Cramer
Project Scientist

MC/bv
BV328/BEV

Enclosure

SUBSURFACE ASSESSMENT
SERVICE STATION 63
OAKLAND, CALIFORNIA

December 15, 1986

Prepared for

Thrifty Oil Co.
10000 Lakewood Boulevard
Downey, CA 90240

Woodward-Clyde Consultants
100 Pringle Avenue
Walnut Creek, CA 94596

INTRODUCTION

In November of 1986, Thrifty Oil Co. retained Woodward-Clyde Consultants to conduct a subsurface site assessment at their Service Station #63 located at 6125 Telegraph Avenue in Oakland, California. This assessment was in response to groundwater contamination discovered during a previous assessment at the site by another firm. The objective was to further delineate the extent of the existing contamination.

The initial site assessment was conducted by Groundwater Technology from June through August of 1986 and consisted of advancing three borings and installing three 2-inch monitoring wells. Boring and well locations are shown in Figure 1. Soil samples were taken at 5-foot intervals in all borings beginning at a depth of 6 to 8 ft. The samples were field analyzed for volatile organic vapors using a photoionization detector. The samples taken at a depth of 14.0 to 14.5 in Borings, MW-2 and MW-3 and 17.0 to 17.5 feet in Borings MW-1 were submitted to a lab for analysis. The sample from MW-2 was found to contain 735 ppm total hydrocarbons while samples from MW-1 and MW-3 contained 471.5 and 52 ppm respectively. Groundwater samples were also taken from each well and analyzed for hydrocarbons. Total hydrocarbons in MW-1, MW-2 and MW-3 were 20.6, 1.5 and 49.4 ppm, respectively. Respective benzene, ethyl benzene, toluene and xylene (BTEX) levels in the three wells totaled 13.8, 0.4 and 23.9 ppm.

The subsequent site assessment was conducted by Woodward-Clyde and consisted of advancing three 30-foot deep borings and installing three monitoring wells. Soil samples were also taken at 5-foot intervals down to the water table in all borings. Only those samples exhibiting signs of contamination and/or located at the water table were submitted to a lab for analysis. Water samples were taken later from each of the three newly-installed wells and also submitted for laboratory analysis. Relative well casing elevations were established to calculate the local groundwater gradient. In addition, an attempt was made to determine the ambient groundwater quality and existing uses in the area.

ASSESSMENT ACTIVITIES

Boring/Well Installation

The installation of the three borings and monitoring wells was conducted on November 13, 1986 using a Mobile B-53 rig with 8-inch hollow stem augers. Locations of the boring/monitoring wells are shown in Figure 1. All wells were located to better delineate the groundwater contamination and free product discovered in the previous investigation. Observations made during the installation of MW-4 and the contamination levels in wells MW-1, MW-2, and MW-3 suggest that the primary area of contamination was centered around the tank pit and that migration is occuring generally to the west. Both MW-5 and MW-6 were found to be clean with no hydrocarbon odors or vapors detected in the samples or cuttings. The majority of these cuttings were placed in an onsite dumpster for general disposal. Because of the hydrocarbon odors noted in MW-4, a composite sample of the cuttings was taken for analysis. These cuttings and the remaining cuttings from the other borings were then placed in four drums, sealed, labeled and left onsite pending sample analysis.

The three wells were completed to a depth of 27 to 29 feet and constructed of 4-inch I.D. PVC casing to allow them to be utilized for extraction wells if required. Well MW-4 was screened from 9 to 29 ft. below grade while MW-5 and MW-6 were screened from 7 to 27 ft. The water table was detected at a depth of approximately 15.5 ft. in Well MW-1 at the time of drilling. The boring/well construction logs are included in Appendix A. Permitting and installation of the monitoring wells were conducted in accordance with the Alameda County Flood Control and Water Conservation District Zone 7 guidelines.

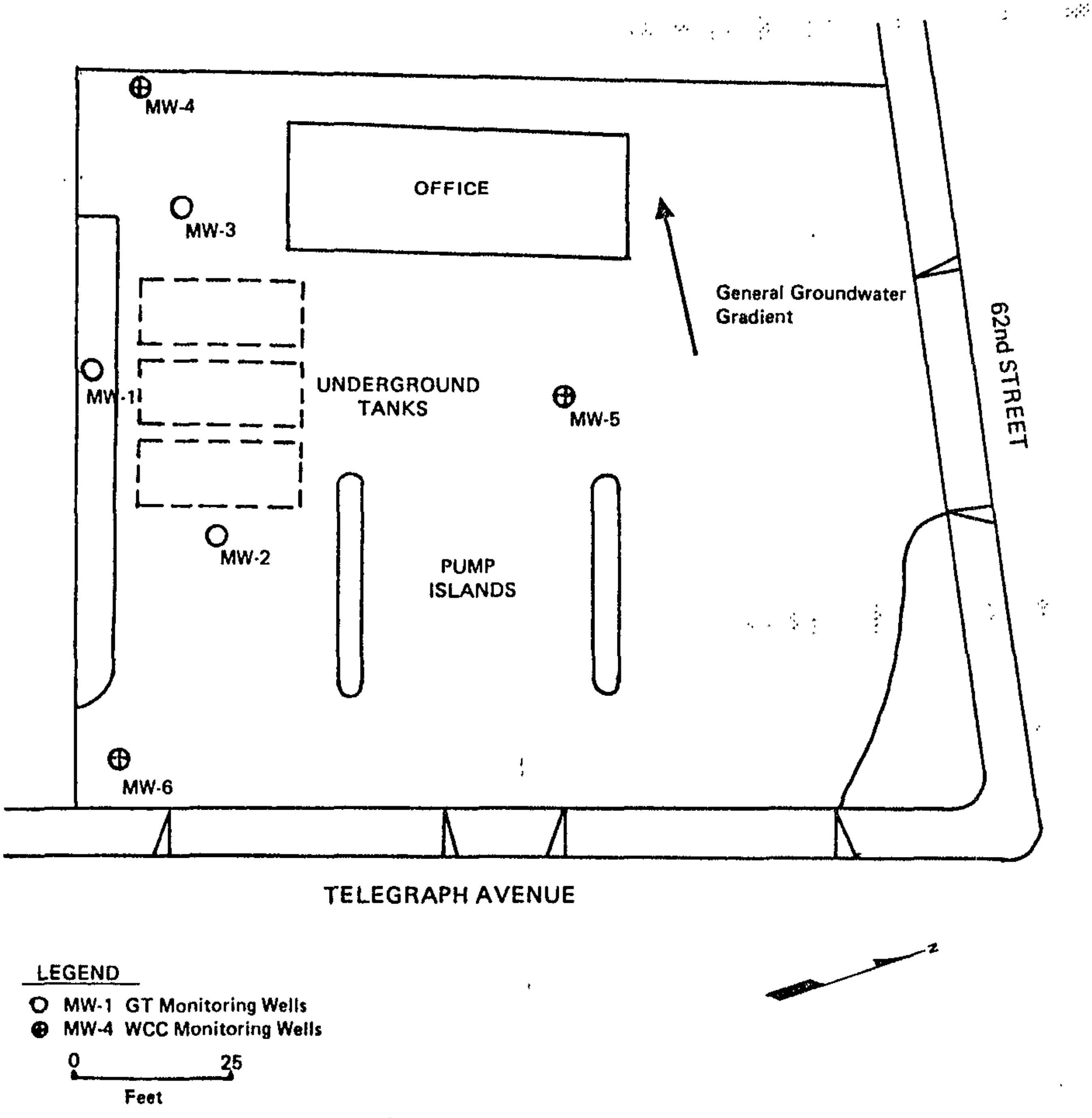


Figure 1. MONITORING WELL LOCATIONS

Soil Sampling

Soil samples were taken in all borings at depths of 5.0 to 6.5 ft, 10.0 to 11.5 and 15.0 to 16.5 ft. The third sample was intended to intercept the water table which is where the highest contaminant levels, if present, would be expected to occur. In MW-6, however, the table was higher than anticipated, resulting in the sampling intervals being located just above and below it. Samples were obtained using a modified California sampler containing three brass tubes measuring 2.5 inches in diameter by 6 inches long. The sampler was driven ahead of the augers by a 140-pound drop hammer. After each sample drive, one tube was extruded into a plastic bag in the field, and a headspace analysis was performed using a flame-ionization organic vapor analyzer. Only samples from MW-4 resulted in positive headspace readings with >1,000 ppm detected in 4-3 and 80 ppm in 4-2. No soil was recovered in the 4-1 sample after three attempts. Due to the high headspace readings, one of the adjacent tubes from the 4-2 and 4-3 sample drives was sealed at each end with aluminum foil, PVC end caps and tape and submitted to Brown and Caldwell Laboratories in Emeryville for analysis. The samples nearest the water in MW-5 and MW-6 and the soil cuttings composite sample were sealed in the same manner and also submitted to Brown and Caldwell.

Well Monitoring, Development and Sampling

On November 21, 1986, the new wells were developed by bailing to remove silts and sand and to improve well performance. Due to the clayey nature of the substrate, groundwater recharge to the wells was very slow. After bailing each well dry, they were allowed to recover to at least 80 percent of their original water level before sampling per the Regional Water Quality Control Board guidelines. Bailing and sampling were conducted with Teflon bailers which were decontaminated between wells. Samples from each well were collected in two sterilized VOA vials and submitted to Brown and Caldwell Laboratories for analysis. The bailed water was placed in two drums which were secured, labeled and left onsite pending results of the sample analyses.

Fluid level measurements were taken in all wells on November 24 and again on December 12. The relative well casing elevations were also surveyed to enable calculation of the local groundwater gradient. The calculations indicate that the gradient was to the west northwest which is inline with the regional gradient. Free product measuring 0.11 and 0.10 feet was discovered during the November 24 measurements in wells MW-2 and MW-3 respectively. These readings had increased to 0.30 and 0.37 feet by the December 12 measurements. All measurements are listed in Table 1.

Laboratory Analyses

All samples were analyzed by gas chromatography using various EPA methods. Total fuel hydrocarbons in both soils and water were analyzed by method 8015 while soil BTX was analyzed by method 8020. The BTEX in the water samples was analyzed by method 602. The lead concentration in the one soil sample was analyzed by method 7420/7421. Sample 4-3-2 was chosen for lead analysis because the field observations and headspace readings of the adjacent tube suggested that it was the most heavily contaminated of the samples submitted for analysis. The results of these analyses are listed in Table 2, and a discussion is provided below in the Conclusions section. Copies of the lab reports are appended.

Local Groundwater Use

The Regional Water Quality Control Board (RWQCB) and the Alameda County Flood Control and Water Conservation District (ACFC&WCD) were contacted to assess the ambient quality and identify existing and potential uses of the groundwater in the vicinity of the site. The ACFC&WCD maintains records, to the extent possible, of all wells in the district and does periodic water quality testing in selected wells. Unfortunately, they are primarily

Table 1. WELL MEASUREMENT DATA

Well Number	Relative Casing Elevation	11-24-86 Depth to Water	Elev. of Water	Product Thick.	12-2-86 Depth to Water	Elev. of Water	Product Thick.
MW-1	99.34	15.42	83.92	0	15.03	84.31	0
MW-2	100.01	14.99	85.10	0.11	14.78	85.46	0.30
MW-3	99.76	16.25	83.59	0.10	16.02	83.74	0.37
MW-4	99.48	16.22	83.26	T	15.73	83.75	T
MW-5	100.98	16.10	84.88	0	15.57	85.41	0
MW-6	99.44	12.64	86.80	0	11.96	87.48	0

*All measurements given in feet
T - Trace of hydrocarbons (moderate odor)

Table 2. ANALYTICAL RESULTS*

Sample Type and Number	Depth Taken	Total Fuel HC	Benzene	Ethyl Benzene	Toluene	Xylene	Total BTEX	Lead
Soil								
4-2-2	10.50 ft	<10	<0.5	N.T.	<0.5	<0.5	<0.5	N.T.
4-3-2	16.0 ft	1100	13.0	N.T.	14.0	34.0	61.0	25
5-3-2	16.0 ft	<10	<0.5	N.T.	<0.5	<0.5	<0.5	N.T.
6-3-1	15.5 ft	<10	<0.5	N.T.	<0.5	<0.5	<0.5	N.T.
C-1 (Cuttings Composite)	N/A	58	<0.5	N.T.	5.8	<0.5	5.8	N.T.
Water								
MW-4	N/A	100	3.2	2.4	2.7	14	22.3	N.T.
MW-5	N/A	>1	0.0048	>0.0005	0.0021	0.0048	0.0074	N.T.
MW-6	N/A	>1	>0.002	>0.002	>0.002	>0.002	>0.002	N.T.

N/A - Not Applicable
N.T. - Not Tested
* - Results are given in ppm

concerned with salt water intrusion and do not test any of the wells within several miles of the site. They did indicate that salt water intrusion was not a problem in the vicinity of the site.

The records on active wells in the area appear to be complete but outdated, and very little data is available on well construction. The records indicate that approximately five wells exist within a 1-mile radius of the site. This information, however, is rarely updated unless the well owner contacts the ACFC&WCD which, in turn, means the wells may or may not currently be in operation. The previous assessment also identified five wells within a one-mile radius and found that only three were currently in use. Unfortunately, the report neglected to state which wells were operating. Two of the wells in the area are, or were, used for industrial purposes, two for irrigation and one for domestic use. No municipal wells were identified anywhere near the site. The closest well is the domestic well located approximately 1/4 mile to the south. The closest one in the downgradient direction is an irrigation well 1/2 mile to the west northwest. The locations of the wells are shown in Figure 2.

According to the ACFC&WCD personnel contacted, there were several industrial and domestic wells installed in the early-to-mid 1900's, but since the East Bay Municipal Utility District began supplying water, the majority of these wells were either abandoned or inactivated. The low permeability of the sediments inhibits water production in the wells, which further deters the use of groundwater wells for water supply. The ACFC&WCD personnel did not know of any potential future uses of the groundwater in the area other than the few existing industrial and irrigation wells.

CONCLUSIONS

The laboratory results and observations made during drilling and sampling reveal that subsurface contamination does exist in both the soil and groundwater at the site, although it does not appear to be extensive. The

Figure 2. LOCAL WATER WELL LOCATIONS

product storage tanks and pipelines were reported to have been tested and found to be tight, which suggests that the contamination may be the result of occasional tank overfills. The location of the existing groundwater contamination does appear to be centered around the tank pit area and is generally migrating to the west or northwest. The presence of free product in wells MW-2 and MW-3 indicates that some free product is present within the tank backfill but may have been relatively well contained by the surrounding silty clay substrate.

The soil contamination at the site does not seem to be extensive even though some elevated levels were encountered in both the current and previous assessment. The current assessment only encountered detectable soil contamination in one sample from MW-4 while contamination was found in all three of the previous borings to varying degrees. Although the contaminant level in the MW-4 sample (1,000 mg/kg total hydrocarbons) was greater than the levels found in samples from MW-1, MW-2 and MW-3 (472, 735 and 52 mg/kg respectively), free product was detected in all three of the latter wells while only a trace was found in MW-4. A possible explanation could be the locations of the samples taken in the previous investigation being above or below the water table. The sample from MW-2 was the closest of the three to the water table (0.5 ft above) which could account for it having the highest hydrocarbon content. Conversely, the sample from MW-3 contained the lowest concentration of hydrocarbons but was also the farthest from the water table. It appears the majority of soil contamination outside the suspected source (tank backfill) exists in a relatively narrow, horizon and is probably limited to the vicinity of the backfill although it does seem to be migrating downgradient to some degree.

Past WCC spill experience in clayey, low permeability materials such as these suggest that free product may typically migrate slowly downgradient along the water table and be distributed vertically through the substrate from seasonal water table fluctuations. The high retention capacity of the fine-grained materials rapidly immobilizes the free product prior to migrating any great distance. The relatively high hydrocarbon contamination in the soil in MW-4 and the absence of free product in the well would appear to support this.

The presence of free product in MW-2, MW-3 and initially in MW-1 endorses a previous assumption that some free product may still be present in the tank backfill. Apparently, the original product thicknesses were greater but a manual bailing recovery program implemented by Thrifty Oil has reduced these thicknesses considerably. The current product increases in MW-2 and MW-3 could be the result of water table fluctuations redistributing the product plume or possibly a recent leak or tank overfill. The presence of product in MW-2 is likely due to its close proximity to the backfill while the product in MW-3 is probably a result of it being located downgradient of the backfill. The low permeability nature of the clayey substrate surrounding the tank pit area would tend to contain, within the backfill, any free product that may have accumulated from occasional overfills or historical leaks. The product would, however, eventually migrate into the surrounding clays. The absence of free product in MW-4 and MW-1 would indicate that the plume has not migrated offsite.

The dissolved hydrocarbon levels found in the wells adjacent to and downgradient of the storage tanks also suggest free product is present in the tank backfill. The total hydrocarbon level in the water sample from MW-4 (100ppm) is greater than the level found previously in MW-3 (49.4 ppm) although the total BTEX levels were essentially the same. The higher level in MW-4 could indicate that downgradient contaminant migration is occuring but it is more likely a result of different samples being analyzed at different times by different labs. The recent increase in product thickness in MW-3 relative to MW-2 would, however, suggest that the free product plume, and therefore the dissolved contamination, may be migrating downgradient to some degree.

Disposition of the drummed soil cuttings and well development water may have to be coordinated with the Regional Water Quality Control Board (RWQCB) due to the hydrocarbon levels found in the sample analyses. Soil containing between 100 and 1000 mg/kg hydrocarbons generally requires disposal in a Class III or II-1 landfill but it is handled on a case-by-case basis and a lower limit of 50 mg/kg has occasionally been imposed. There are four drums of soil and two drums of water. If necessary, it may be possible to aerate the soil onsite to avoid transportation and disposal costs at a regulated landfill. The water from MW-4 may also require regulated disposal due to the hydrocarbons found in the sample. The limitations RCWQCB should allow the water from MW-5 and MW-6 to be discharged to a storm drain. The RWQCB should be contacted to determine their requirements in this situation.

LIMITATIONS

The discussions, conclusions, and recommendations contained herein are based on the results of the field exploration and laboratory test program and the assumption that the site subsurface conditions do not deviate substantially from those disclosed in the borings and monitoring wells. If subsequent events indicate deviations from the conditions disclosed by our investigation, Woodward-Clyde Consultants should be contacted for further recommendations.

APPENDIX A
BORING LOGS

Project No.: 90390A
Date: 11-13-86

Elevation.

DEPTH IN FEET	SAMPLE NUMBER	PENE. RESIS. / FT.	DESCRIPTION
			Existing Ground Surface
0–1			Black Topsoil
1–5			Brown Silty Clay - Crumbly - Dry - No Odor
5–6	4-1	12	Headspace = No Sample Recovery
6–10			Same but stiffer
10–11			Olive/Grn Silty Clay-Moist-No Odor
11	4-2		Olive/Grn Silty Sand-Sat.-Poss. Odor
11–14			Black Gravelly Sandy Silty Clay - Saturated - Very Slight HC Odor Headspace = 80 ppm
14–18	4-3	20	Brown and Olive Green Silty Clay - Very Moist to Saturated - Moderate HC Odor Headspace = > 1000 ppm
18–25			Brown Gravelly Sandy Silty Clay - Very Moist - No Odor
25–27			Lighter Brown Sandy Silty Clay - Saturated - No Odor

WELL DESIGN

#3 SAND
4"ID-0.02 SLOT

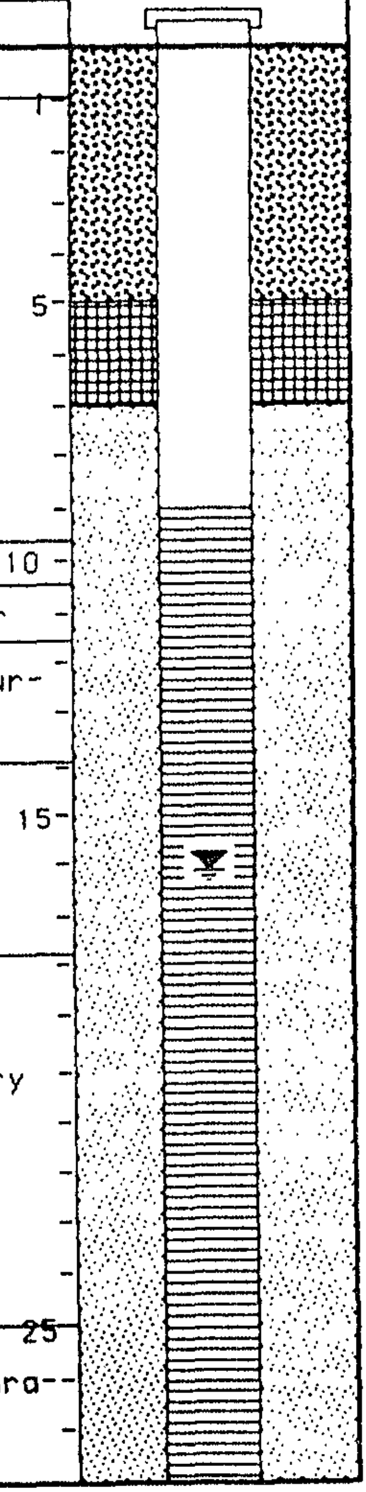


Figure 3A - Test Boring Log No. 1
- Monitoring Well No. MW-4

Woodward-Clyde Consultants

Project No.: 90390A
Date: 11-13-86

Elevation.

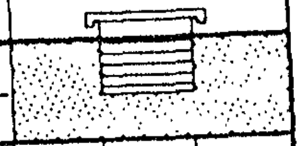
DEPTH IN FEET	SAMPLE NUMBER	LOG & SAMPLE	PENE RESIS / FT.	DESCRIPTION	WELL DESIGN: #3 SAND 4"ID-0.02 SLOT
				28 Feet Below Existing Ground Surface	
28				Light Brown Sandy Sandy Silty Clay - Saturated - No Odor	
29					
30				Bottom of Boring at 30 ft. (30)	
31					
32					
33					
34					
35				(35)	
36					
37					
38					
39					
40				(40)	
41					
42					
43					
44					
45				(45)	
46					
47					
48					
49					
50				(50)	
51					
52					
53					
54					
55				(55)	

Figure 3B - Test Boring Log No. 1
- Monitoring Well No. MW-4

Woodward-Clyde Consultants

Project No.: 90390A

Date: 11-13-86

Elevation.

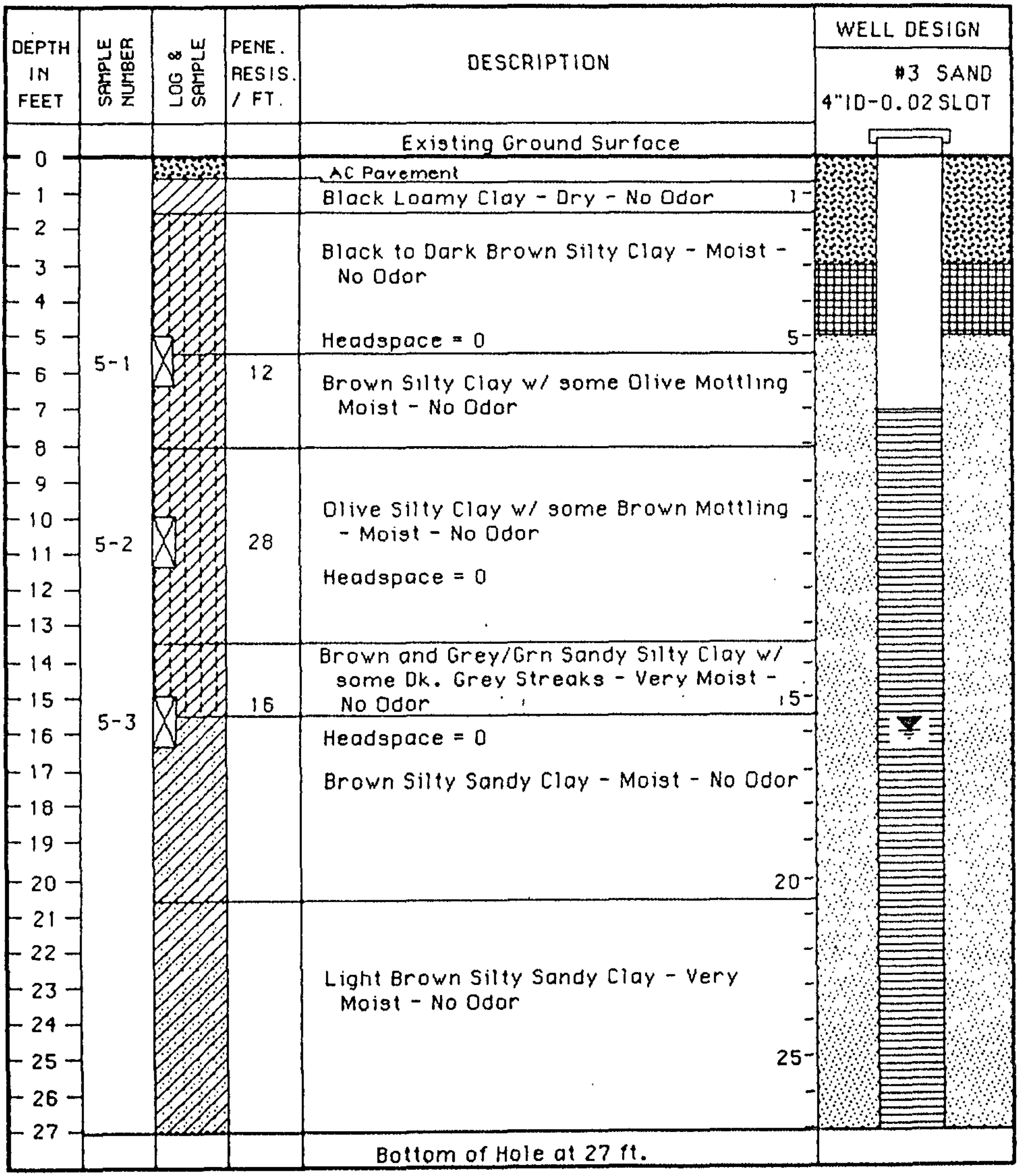


Figure 4 – Test Boring Log No. 2
– Monitoring Well No. MW-5

Woodward-Clyde Consultants

Project No.: 90390A

Date: 11-13-86

Elevation.

Depth in Feet	Sample Number	Pene. Resis. / Ft.	Description
0			Existing Ground Surface
0–1			AC Pavement and Base
1–4			Brown Silty Clay, Stiff - Moist - No Odor
4–7	6-1	36	Brown Silty Clay, Crumbly - Slightly Moist - No Odor Headspace = No Sample Recovery
7–9			Olive Green to Blue Green Silty Clay - Moist - No Odor
9–15	6-2	4	Headspace = 0 Brown Silty Clay - Moist - No Odor
15–20	6-3	28	Headspace = 0 Brown Silty Sandy Clay - Saturated - No Odor
20–22			Brown Silty Clay w/ Little Sand - Very Moist - No Odor
22–27			Brown Silty Sandy Clay w/ some Gravel - Very Moist - No Odor
27			Bottom of Boring at 27 ft.

Well Design: #3 SAND, 4"ID-0.02 SLOT

Figure 5 - Test Boring Log No. 3
- Monitoring Well No. MW-6

Woodward-Clyde Consultants

APPENDIX B
LABORATORY REPORTS

BROWN AND CALDWELL
ANALYTICAL LABORATORIES

LOG NO: E86-11-281

Received: 14 NOV 86
Reported: 08 DEC 86

Mr. Marty Cramer
Woodward-Clyde Consultants
100 Pringle Avenue
Walnut Creek, California 94596

Project: TO-63

REPORT OF ANALYTICAL RESULTS

NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
81-1	5-3-2	13 NOV 86
81-2	C-1	13 NOV 86
81-3	6-3-1	13 NOV 86
81-4	4-2-2	13 NOV 86
81-5	4-3-2	13 NOV 86

METER	11-281-1	11-281-2	11-281-3	11-281-4	11-281-5
, mg/kg	---	---	---	---	25
ic Acid Digestion, Date	---	---	---	---	11.17.86
ene,Toluene,Xylene Isomers					
zene, mg/L	<0.5	<0.5	<0.5	<0.5	13
uene, mg/L	<0.5	5.8	<0.5	<0.5	14
al Xylene Isomers, mg/L	<0.5	<0.5	<0.5	<0.5	34
l Fuel Hydrocarbons, mg/kg	<10	58	<10	<10	1100

. McLean, Laboratory Director

BROWN AND CALDWELL
ANALYTICAL LABORATORIES

LOG NO: E86-11-456

Received: 21 NOV 86
Reported: 05 DEC 86

Mr. Marty Cramer
Woodward-Clyde Consultants
100 Pringle Avenue
Walnut Creek, California 94596

Project: 90390A

REPORT OF ANALYTICAL RESULTS

G NO	SAMPLE DESCRIPTION, WATER SAMPLES	DATE SAMPLED
-456-1	MW-4	21 NOV 86
-456-2	MW-5	21 NOV 86
-456-3	MW-6	21 NOV 86

RAMETER	11-456-1	11-456-2	11-456-3
tal Fuel Hydrocarbons, mg/L	100	<1	<1
A Method 602			
ate Extracted	12.01.86	12.03.86	12.01.86
,2-Dichlorobenzene, ug/L	<10	<0.5	<2
,3-Dichlorobenzene, ug/L	<10	<0.5	<2
,4-Dichlorobenzene, ug/L	<10	<0.5	<2
enzene, ug/L	3200	4.8	<2
hlorobenzene, ug/L	<10	<0.5	<2
thylbenzene, ug/L	2400	<0.5	<2
oluene, ug/L	2700	2.1	<2
otal Xylene Isomers, ug/L	14000	4.8	<2

A. McLean, Laboratory Director