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Woodward-Clyde Consultants

June 17, 1988
8820011A-0030

Gettler-Ryan Inc.
1992 National Avenue
Hayward, CA 94545

Attention: Mr. Jeff Ryan

Subject: Environmental Assessment
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

The following report summarizes the results of Woodward-Clyde Consultants (WCC) environmental assessment of shallow soils and groundwater at the former Shell Service Station at 2800 Telegraph Avenue in Oakland, California (Figure 1). The object of this investigation was to explore the shallow soils and groundwater at the site for the presence of petroleum products. To complete this task, three soil borings were drilled on the property at locations specified by Shell Oil Company, and monitoring wells S-1, S-2, and S-3 were constructed in these borings (Figure 2). While drilling, a WCC geologist: (1) collected soil samples from each boring, (2) measured the volatile organic vapor content of the samples using an HNu photoionization detector, (3) observed the monitoring well construction, and (4) prepared a field log for each boring describing the materials encountered using the Unified Soils Classification System. Chemical analyses of selected soil samples from the three borings, and groundwater samples from the three monitoring wells, were conducted by I.T. Corporation at their certified environmental laboratory in Santa Clara, California. The samples were analyzed for benzene, toluene, combined ethyl benzene and xylenes (BTEX), and low boiling point hydrocarbons (gasoline). The groundwater sample from Well S-1 was also analyzed for high boiling point hydrocarbons (diesel and oil). In addition to the field activities, available information concerning the regional hydrogeologic setting was reviewed. The results of WCC's background study, field investigation, and the chemical analyses are summarized below.

2800

SITE DESCRIPTION

The site is located at the northeast corner of Telegraph Avenue and 28th Street in Oakland, California. It is bordered on the north by commercial property and on the east by apartments and private residences. At the time of this investigation, the service station was not in operation and a chain-link fence had been constructed around the property.

Existing structures at the site include a service station building, two service islands, three underground gasoline storage tanks in one excavation, one underground waste oil storage tank in a separate excavation, and one abandoned underground storage tank north of the station building (Figure 2). Five soil borings (S-A, S-B, S-C, S-D, and S-E) were previously drilled at the site under the direction of Gettler-Ryan Inc.

HYDROGEOLOGIC SETTING

The site is located on the Bay Plain at the base of the Berkeley Hills. It lies approximately 2 miles east of San Francisco Bay and 1.6 miles northeast of the Oakland Inner Harbor. The local topography slopes gently to the southwest to approximately Grand Avenue, then due west to San Francisco Bay. The near surface soils consist of Late Pleistocene alluvium composed of weakly consolidated, slightly weathered, poorly sorted, and irregularly interbedded clay, silt, sand, and gravel (Helly, et al., 1979). The primary source of the alluvium is the Berkeley Hills to the east.

The site is located in the Alameda Bay Plain groundwater basin (California Department of Water Resources, 1980). Based on the local topography and surface drainage patterns, the shallow groundwater flow direction in the vicinity of the site under investigation is to the southwest. Recharge of the shallow groundwater is by surface infiltration from rainfall near the site and to the east, where soils derived from coarser-grained alluvium form the surface layer. Discharge is to the west and southwest into San Francisco Bay.

FIELD PROCEDURES

Soil Borings

Three soil borings (for Wells S-1, S-2, and S-3) were drilled on April 23, 1988 at the locations and to the depths specified by Shell Oil Company and shown on Figure 2. The borings were drilled using a truck-mounted CME-75 drilling rig with eight-inch diameter, hollow-stem, continuous flight augers. A WCC geologist observed the drilling and prepared a field log of each soil boring. Well logs are presented in Appendix A.

The three soil borings (for Wells S-1, S-2 and S-3) were each drilled to 28.5 feet below grade. The top of the first groundwater zone was encountered at approximately 12 feet below surface grade in each boring.

Soil Sampling

Soil samples were collected at five-foot intervals with a modified California Sampler through the hollow stem of the augers. The sampler was either pushed into the soil using the hydraulic system on the rig, or driven a maximum of 18 inches, using a 140-pound hammer with a 30-inch drop. The number of blows or hydraulic pressure, in psi, required to drive or push the sampler are shown on the well log.

The soil samples were retained in four, four-inch long, two-inch diameter brass liners within the sampler. The brass liners were labeled A through D from bottom to top. Soil sample A was retained for laboratory analysis by covering both ends of the liner with teflon sheeting and sealing with plastic end caps and electrical tape. The sample was then labeled, and selected samples were later transported on ice to the laboratory using chain-of-custody documentation.

Soil sample B was used to perform a head-space analysis in the field for volatile organic compounds. The test procedure involved emptying the contents of the brass liner into a clear glass jar and sealing the jar with aluminum foil secured under a ring-type threaded lid. The jar was placed

in a warm area for twenty to thirty minutes. The foil was pierced and the head-space within the jar was tested for total organic vapor, measured in parts per million (HNu units), with an HNu photoionization detector. The results of these tests appear on the boring logs and in Table 1.

Soil samples C and D were described by a WCC geologist using the Unified Soils Classification System. The descriptions are shown on the field logs presented in Appendix A.

Monitoring Well Construction

Following completion of each boring, a monitoring well was constructed within the borehole. To complete this task, three-inch diameter, schedule 40, flush threaded, PVC well casing, with a threaded cap placed on the bottom, was placed down the hollow-stem of the augers. The casing consisted of a lower section of 0.020-inch slotted casing from approximately 27.5 to 3.5 feet below grade, with 3 feet of blank casing on top. All of the augers were then pulled from the borehole, and number 12/20 Monterey sand was poured into the annular space between the borehole wall and the well casing. The sand pack was installed from the base of the borehole to approximately 2 feet below grade. One-half foot of bentonite pellets was then poured on top of the sand pack to provide a seal. The remaining portion of the annulus above the bentonite pellets was filled with cement grout, a locking lid was placed over the casing, and a christy box placed over the locking lid. The well construction details are shown on the right side of each log in Appendix A.

RESULTS

Soil Description

As shown on the logs in Appendix A, the native soils encountered below the site consist predominantly of a mixture of materials of clay, silt, and sand sizes with occasional gravel clasts and interbeds to a depth of 28.5 feet below grade, the maximum depth drilled for this investigation. In Well S-1, soil samples 1 and 2 consisted of light olive-gray and brown

mottled silty clay (CL) and light brown to olive-gray silty clay (CL), respectively. The driller reported a possible thin gravel layer between depths of 10.5 and 14 feet below grade, and gravel was observed in the cuttings. The first indication of groundwater was also encountered in this interval. Sample 3, from 14 to 15.5 feet below grade, consisted of light brown and gray mottled clayey sand (SC) and sandy clay (CL). Sample 4, from 20 to 21.5 feet, consisted of thin interbeds of clayey gravel (GC) to clayey sand (SC), sandy clay (CL), and silty sand (SM). Sample 5, from 26.5 to 28 feet, consisted of olive-gray to light brown mottled clayey sand (SC) to sandy clay (CL).

In Well S-2, the soils consisted of clayey sand (SC) to silty sand (SM) fill containing brick fragments to 4 feet below grade. Sample 1, from 4 to 5.5 feet, consisted of native soil comprised of olive-gray clayey sand (SC) to sandy silt (ML) with organic debris. The cuttings became dark gray between about 8 and 9 feet below grade. Sample 2 consisted of brown sandy clay (CL) to sandy silt (ML) and samples 3 and 4 consisted of medium brown to gray silty sand (SM) to sand (SW) containing little fine and coarse gravel. The driller reported thin (2- to 4-inch thick) gravel layers from 21.5 to 26.5 feet below grade based on short intervals of slower and more difficult drilling. The lowermost sample, from 26.5 to 28 feet, consisted of olive to brown silty clay.

In Well S-3, the upper 1 to 2 feet of soils consisted of artificial fill comprised of clayey sand (SC) with brick fragments. Samples 1, 2, 3, and 4 consisted of native soils comprised of mixtures of clay, silt, and sand including clayey silt (ML), silty sand (SM), clayey sand (SC), silty clay (CL), and sandy silt (ML). Sample 5, from 26.5 to 28 feet, consisted of clayey gravel (GC) and silty sand (SM).

Organic Vapor Detection

Organic vapor was detected with the HNu photoionization detector by field head-space analysis in Samples 1, 2, 3, and 4 from Well S-2 and all five

samples from Well S-3. The results of the analyses are summarized in Table 2. Maximum HNu readings (from 375 to 500 ppm) were detected in the upper two samples from each of these wells and generally decreased with depth. However, the HNu readings in samples from Well S-3 may have been affected by rain resulting in humidity and moisture within the instrument. No organic vapor was detected in samples from Well S-1 by the field head-space method. In general, the presence of hydrocarbon odors directly corresponded with the HNu readings. The stronger hydrocarbon odors were observed in the upper two samples from Wells S-2 and S-3 and decreased with depth. No hydrocarbon odors were observed in soil samples from Well S-1.

Laboratory Soil Analysis

Soil samples from Wells S-2 and S-3 were selected by Gettler-Ryan to be analyzed by the I.T. Corporation certified environmental laboratory for benzene, toluene, ethyl benzene, xylenes (BTEX) and low boiling point hydrocarbons (gasoline). The analytical results are summarized in Table 2. The I.T. Corporation analytical report and chain-of-custody documents are provided in Appendix A.

High concentrations of gasoline and BTEX were detected in soil samples 1 and 2 from Well S-2 and soil sample 2 from Well S-3. In soil sample 1 from Well S-2, gasoline was detected at a concentration of 1400 ppm, benzene at 4 ppm, toluene at 36 ppm, and combined ethyl benzene and xylenes at 230 ppm. In soil sample 2 from Well S-2, the detectable gasoline concentration decreased to 1100 ppm, benzene remained constant at 4 ppm, and toluene and combined ethyl benzene and xylenes decreased to 8 and 150 ppm, respectively.

In sample 1 from Well S-3, gasoline and toluene were detected at their respective detection limits and benzene and combined ethyl benzene and xylenes were not detected. In sample 2 from Well S-3, gasoline was detected at a concentration of 4800 ppm, benzene at 38 ppm, toluene at 400 ppm, and combined ethyl benzene and xylenes at 870 ppm.

Laboratory Groundwater Analysis

Wells S-1, S-2, and S-3 were developed and sampled under the direction of Gettler-Ryan Inc. One groundwater sample from Well S-1 was analyzed by the I.T. Corporation certified environmental laboratory for benzene, toluene, ethyl benzene, xylenes (BTEX), low boiling hydrocarbons (gasoline), and high boiling hydrocarbons (oil and diesel). One groundwater sample from Wells S-2 and S-3 was analyzed by the I.T. Corporation certified environmental laboratory for benzene, toluene, ethyl benzene, xylenes (BTEX), and low boiling point hydrocarbons (gasoline). The analytical results are summarized in Table 3. The I.T. Corporation method of analysis and analytical results are presented in Appendix A. A trip blank was also analyzed by the laboratory as quality control for the groundwater samples.

Benzene was detected at the detection limit (0.5 µg/L) in the groundwater sample from Well S-1, but all other hydrocarbon constituents tested for in this sample were not detected. High concentrations of gasoline and BTEX were detected in the groundwater sample from Well S-3, with lower concentrations detected in the groundwater sample from Well S-2. In the sample from Well S-3, gasoline was detected at a concentration of 46,000 µg/L, benzene at 2700 µg/L, toluene at 10,000 µg/L, and combined ethyl benzene and xylenes at 10,000 µg/L. In the sample from Well S-2, gasoline was detected at a concentration of 16,000 µg/L, benzene at 79 µg/L, toluene at 89 µg/L, and combined ethyl benzene and xylenes at 480 µg/L.

Groundwater Flow Direction

Several days after construction, the elevation of the top of Wells S-1, S-2, and S-3 were surveyed to a project datum. The depth to water in all wells at the site was measured on April 26, 1988. The results of the elevation survey, water depth soundings, and observations on the presence of separate phase hydrocarbons in water samples is summarized in Table 4.

The groundwater elevations from Wells S-1, S-2, and S-3 were utilized to prepare a groundwater contour map (Figure 3). The contour orientations indicate a general northeast to southwest groundwater flow direction.

SUMMARY

The results of this study are summarized as following:

- The site is underlain predominantly by soils consisting of mixtures of clay, silt, and sand with gravel interbeds. .

- Groundwater was first encountered at approximately 12 feet below grade in all three borings drilled at the site. The top of groundwater as depicted by the ground water contour map (Figure 3) slopes from northeast to southwest, indicating a southwestward groundwater flow direction at this site.

- Head-space measurements with an HNu photoionization detector indicate that organic vapors were present in soil samples from Wells S-2 and S-3 ranging from 0 to 500 ppm. The maximum head-space reading of 500 ppm was detected in Sample 2B from a depth of 9 to 10.5 feet in Well S-3. The head-space measurements generally were high in the upper samples and decreased with depth. No organic vapors were detected by the field head-space method in soil samples from Well S-1. Hydrocarbon odors were observed in most soil samples collected from Wells S-2 and S-3, but odors were not observed in any soil sample from Well S-1.

- Laboratory analyses of soil samples detected gasoline at 1400 and 1100 ppm in samples 1 and 2 from Well S-2, respectively. BTEX was detected at concentrations ranging from 4 to 230 ppm in these samples. In soil samples 1 and 2 from Well S-3, gasoline was detected at concentrations of 5 and 4800 ppm, respectively. BTEX ranged from 38 to 870 ppm in Sample 2. In Sample 1, gasoline and toluene were detected at their detection limits and benzene and combined ethyl benzene and xylenes were not detected.

- Laboratory analyses of water samples detected gasoline at concentrations of 1600 µg/L and 46,000 µg/L from Wells S-2 and S-3, respectively, but gasoline was not detected in Well S-1. BTEX was detected at concentrations of 79 to 10,000 µg/L in Wells S-2 and S-3, but only benzene was detected in Well S-1 at the detection limit. No other hydrocarbon constituents analyzed for were detected in the groundwater sample from Well S-1.

LIMITATIONS

This study was performed under contract with Gettler-Ryan Inc. and within the scope outlined by Shell Oil Company. The scope of the field investigation was limited to exploration of shallow soils for evidence of petroleum product contamination. The possible presence or absence of any other type of contamination at the site is not addressed in this study. The boring logs indicate the approximate soil conditions encountered at the time and locations where the borings were made, and may not represent conditions at other times and locations.

We appreciate the opportunity to provide consulting services on this project. Please call if we can be of additional assistance.

Sincerely,

WOODWARD-CLYDE CONSULTANTS

O. Glenn Heyman
Senior Staff Geologist

Michael S. Bonkowski
Senior Project Geologist
CEG 1329

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ATTACHMENTS

BIBLIOGRAPHY

Table 1 - Organic Vapor Concentrations as Measured with an HNu Photoionization Detector in Borings at 2800 Telegraph Avenue, Oakland, California.

Table 2 - Summary of Soil Sample Laboratory Analyses, Former Shell Service Station, 2800 Telegraph Avenue, Oakland, California.

Table 3 - Summary of Groundwater Sample Laboratory Analyses, Former Shell Service Station, 2800 Telegraph Avenue, Oakland, California.

Table 4 - Summary of Monitoring Well and Liquid Elevations with Observations on Free Product in Water Samples collected on April 26, 1988, Former Shell Service Station, 2800 Telegraph Avenue, Oakland, California.

Figure 1 - Location Map, Shell Service Station, 2800 Telegraph Avenue, Oakland, California.

Figure 2 - Site Plan Showing Monitoring Well Locations, 2800 Telegraph Avenue, Oakland, California.

Figure 3 - Groundwater Elevation Contour Map, Former Shell Service Station, 2800 Telegraph Avenue, Oakland, California.

APPENDIX A

Field Logs S-1, S-2 and S-3. Explanation of Terms Used for Soil Description and Legend of Field Log Symbols.

BIBLIOGRAPHY

California Department of Water Resources, 1980, Ground Water Basins in California, California Groundwater, Bulletin 118-80, 73 p.

Helly, E.J., La Joie, K.R., Spangle, W.E., and Blair, M.L., 1979, Flatland Deposits of the San Francisco Bay Region, California, U.S. Geological Survey Professional Paper 943, 88p.

Table 1. ORGANIC VAPOR CONCENTRATIONS AS MEASURED WITH AN HNU PHOTOIONIZATION DETECTOR IN BORINGS AT 2800 TELEGRAPH AVENUE, OAKLAND, CALIFORNIA

Well Number	Sample Number	Depth (feet)	Maximum HNu Reading (ppm - HNu Units)
S-1	1B	4 - 5.5	0
	2B	9 - 10.5	0
	3B	14 - 15.5	0
	4B	20 - 21.5	0
	5B	26.5 - 28	0
S-2	1B	4 - 5.5	450
	2B	9 - 10.5	375
	3B	14 - 15.5	30
	4B	20 - 21.5	250
	5B	26.5 - 28	0
S-3	1B	4 - 5.5	N/A
	2B	9 - 10.5	500
	3B	14 - 15.5	175
	4B	20 - 21.5	45
	5B	26.5 - 28	50

Table 2. SUMMARY OF SOIL SAMPLE LABORATORY ANALYSES, FORMER SHELL SERVICE STATION, 2800 TELEGRAPH AVENUE, OAKLAND, CALIFORNIA

Well Number	Sample Identification	Parts per million (ppm) - Dry Soil Basis			
		Low Boiling Hydrocarbons (Gasoline)	Benzene	Toluene	Ethyl Benzene and Xylene
S-2	S-2/1, 5-5.5', A	1,400.	4.	36.	230.
	Detection Limit	100.	1.	2.	10.
S-2	S-2/2, 10-10.5', A	1,100.	4.	8.	150.
	Detection Limit	100.	1.	2.	10.
S-3	S-3/1, 5-5.5', A	5.	ND	0.1	ND
	Detection Limit	5.	0.05.	0.1	0.4
S-3	S-3/2, 10-10.5', A	4,800.	38.	400.	870.
	Detection Limit	500.	5.	10.	40.

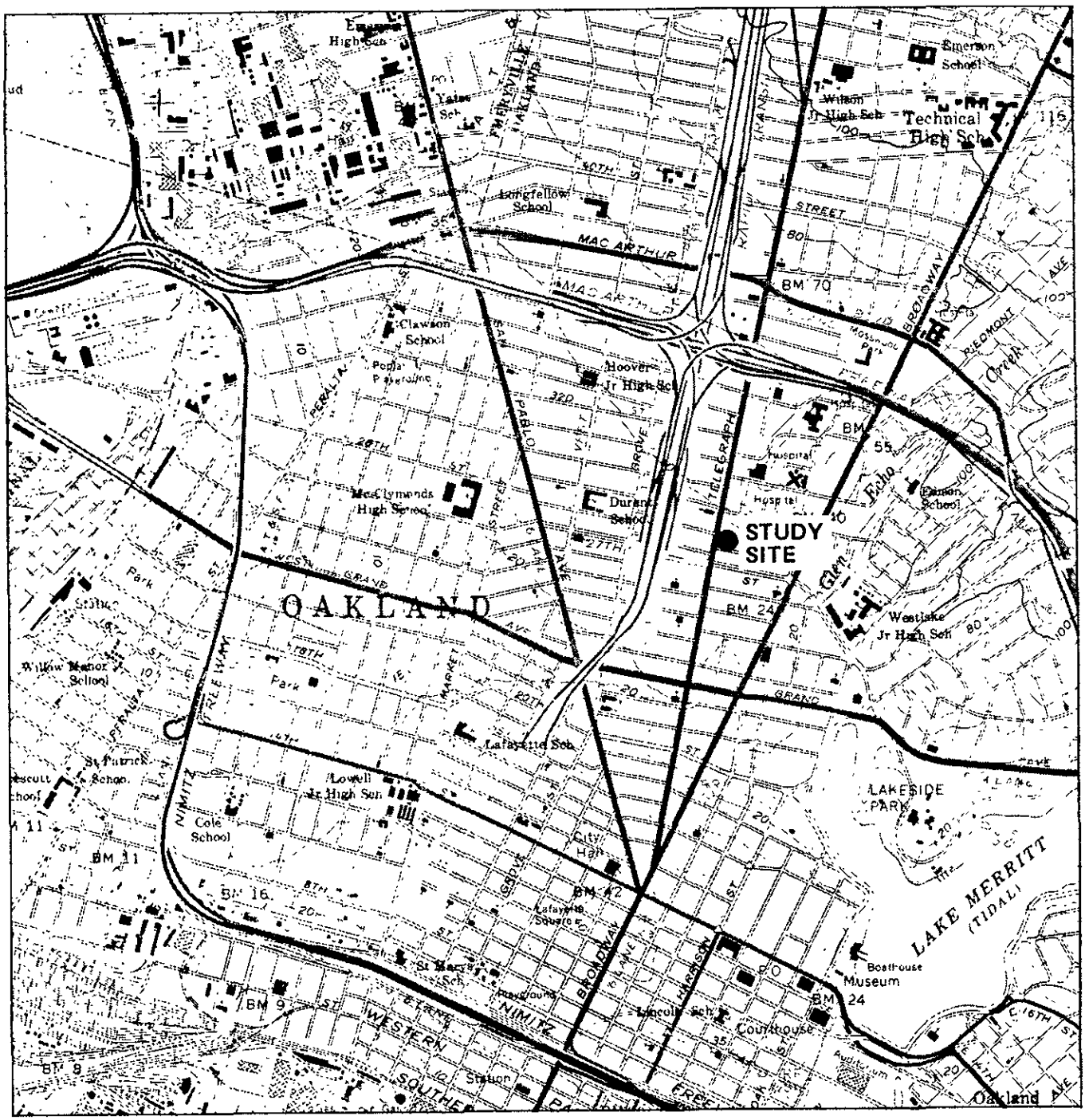
ND - None Detected

Table 3. SUMMARY OF GROUNDWATER SAMPLE LABORATORY ANALYSES, FORMER SHELL SERVICE STATION, 2800 TELEGRAPH AVENUE, OAKLAND, CALIFORNIA

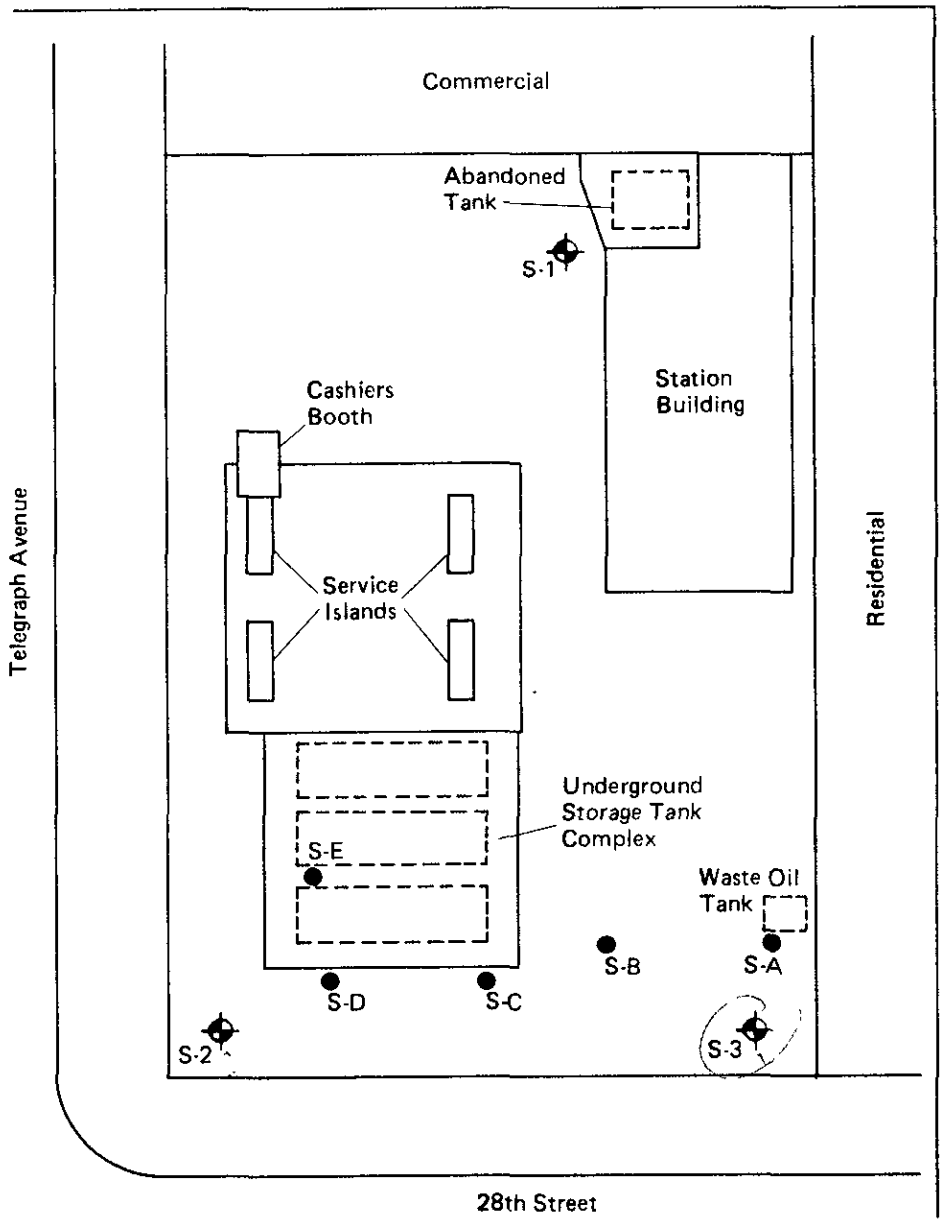
	Micrograms per Liter (μ g/L)					
Well Number	High Boiling Hydrocarbon (Diesel)	High Boiling Hydrocarbon (Oil)	Low Boiling Hydrocarbon (Gasoline)	Benzene	Toluene	Ethyl Benzene and Xylenes
S-1	ND	ND	ND	0.5	ND	ND
Detection Limit	100.	500.	50.	0.5	1.	4.
S-2	--	--	1,600.	79.	89	480.
Detection Limit			200.	2.	5.	20.
S-3	--	--	46,000.	2,700.	10,000.	10,000.
Detection Limit			10,000.	100.	200.	1,000.
Trip Blank	--	--	ND	ND	ND	ND
Detection Limit	--	--	50.	0.5	1.	4.

Table 4. SUMMARY OF MONITORING WELL AND LIQUID ELEVATIONS WITH OBSERVATIONS ON FREE PRODUCT IN GROUNDWATER SAMPLES COLLECTED ON APRIL 26, 1988, FORMER SHELL SERVICE STATION, 2800 TELEGRAPH AVENUE, OAKLAND, CALIFORNIA

Well Number	Elevation of Top of Casing (feet)	Depth to Top of Liquid (feet)	Free Product Present (Yes/No)
S-1	98.10	8.41	No
S-2	96.64	8.01	No
S-3	96.38	8.30	No



Project No. 8820011A	Gettler-Ryan	LOCATION MAP, SHELL SERVICE STATION, 2800 TELEGRAPH AVE., OAKLAND, CA	Figure 1
Woodward-Clyde Consultants			



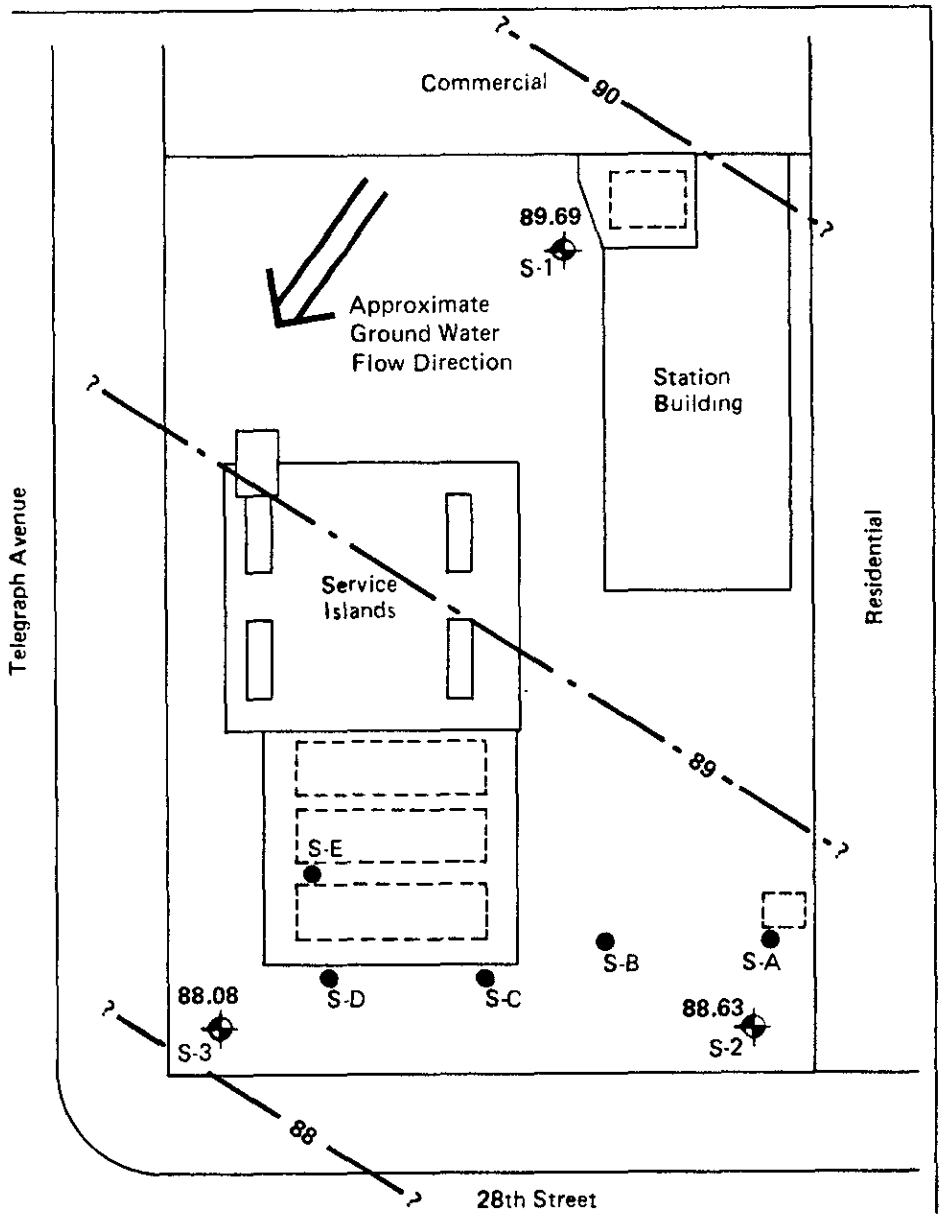
LEGEND

S-B Soil Boring Location

S-3 Groundwater Monitoring Well Location

N

Project No. 8820011A	Gettler-Ryan	SOIL BORING AND GROUNDWATER MONITORING WELL LOCATION MAP, FORMER SHELL SERVICE STATION, 2800 TELEGRAPH AVE., OAKLAND, CA	Figure 2
Woodward-Clyde Consultants			



LEGEND

- S-A — Soil Boring Location
- 88.63 / S-2 — Ground Water Monitoring Well Location Showing Elevation of Ground Water on 4/26/88 - Surveyed to Project Datum
- Groundwater Elevation Contour, in feet

Contour Interval = 1 foot

N

0 30
feet

Project No. 8820011A	Gettler-Ryan	GROUND WATER ELEVATION CONTOUR MAP, FORMER SHELL SERVICE STATION, 2800 TELEGRAPH AVE., OAKLAND, CA	Figure 3
Woodward-Clyde Consultants			

Woodward-Clyde Consultants

PROJECT NAME GETTLER RYAN NO. 8820011A

MONITORING WELL LOCATION 2800 Telegraph Avenue, Oakland CA; S-1		ELEVATION AND DATUM	
DRILLING AGENCY Bay Land Drilling	DRILLER	DATE STARTED / DATE FINISHED 4/22/88	
DRILLING EQUIPMENT CME - 55 Truckmount		COMPLETION DEPTH 28.5'	SAMPLER Modified California Sampler
DRILLING METHOD 8" HSA	DRILL BIT CME Carbide	NO. OF SAMPLES DIST. 5	UNDIST.
SIZE AND TYPE OF CASING 3" PVC		WATER LEVEL FIRST 12'	COMPL. N/A / 24 HRS.
TYPE OF PERFORATION 0.020" slotted	FROM 27.5 TO 3.5 FT.	LOGGED BY: S. Bluestone	CHECKED BY: M. Bonkowski
SIZE AND TYPE OF PACK 12/20 Monterey Sand	FROM 28.5 TO 2.0 FT.		
TYPE OF SEAL NO. 1 Bentonite Pellets	FROM 2.0 TO 1.5 FT.		
NO. 2 Concrete Grout	FROM 1.5 TO G.S. FT.		

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Well Construction
			ASPHALT		
			SILTY SAND (Cuttings) dark brown, with fine to medium sand grains, little coarse sand, moist, loose	SM	
5	1	pushed abt. 300 psi	SILTY CLAY light olive gray and brown mottled, little fine sand, low plasticity, soft, moist, appears to be interbedded with thin layers (0.5' - 1' thick) of Silty Sand, trace to little black organic debris — H Nu = 0 No Hydrocarbon odor	CL	
10	2	4 6 13	CLAY light brown to olive gray mottled, little fine sand, medium plasticity, stiff, wet — H Nu = 0 No Hydrocarbon odor	CL	
			CLAYEY GRAVEL? (Cuttings) (according to driller)	GC(?)	
15	3	4 9 25	CLAYEY SAND to SANDY CLAY light brown and gray mottled, little coarse sand, some medium to fine sand, little gravel to 1.5", moderate plasticity, medium dense — H Nu = 0 No Hydrocarbon odor	SC-CL	
20	4	5 7 10	CLAYEY GRAVEL to CLAYEY SAND with interbeds of SANDY CLAY to abt. 5" & SILTY SAND light brown to gray mottled, moderate plasticity saturated, medium dense, saturated — H Nu = 0 No Hydrocarbon odor	GC-SC, CL, SM	
			GRAVEL (according to driller)		
25	5	4 6 9	CLAYEY SAND to SANDY CLAY olive gray to light brown mottled, fine to medium sand, moderate plasticity, stiff (or med. dense), saturated — H Nu = 0 No Hydrocarbon odor	SC-CL	
30			Bottom of Well: 28.5 feet		
35					

LOG OF MONITORING WELL NO. S-1 SHEET 1 OF 1

Woodward-Clyde Consultants

PROJECT NAME GETTLER RYAN NO. 8820011A

MONITORING WELL LOCATION 2600 Telegraph Avenue, Oakland CA; S-2		ELEVATION AND DATUM	
DRILLING AGENCY Bay Land Drilling	DRILLER	DATE STARTED / DATE FINISHED 4/22/88	
DRILLING EQUIPMENT CME - 55 Truckmount		COMPLETION DEPTH 28.5'	SAMPLER Modified California Sampler
DRILLING METHOD 8" HSA	DRILL BIT CME Carbide	NO. OF SAMPLES DIST. 5	UNDIST.
SIZE AND TYPE OF CASING 3" PVC		WATER LEVEL FIRST ATD 12'	COMPL. N/A 24 HRS.
TYPE OF PERFORATION 0.020" slotted	FROM 27.5 TO 3.5 FT.	LOGGED BY: S. Bluestone	CHECKED BY: M. Bonkowski
SIZE AND TYPE OF PACK 12/20 Monterey Sand	FROM 28.5 TO 2.0 FT.		
TYPE OF SEAL NO. 1 Bentonite Pellets	FROM 2.0 TO 1.5 FT.		
NO. 2 Concrete Grout	FROM 1.5 TO G.S. FT.		

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION		USCS	Well Construction
			ASPHALT			
			FILL - CLAYEY SAND to SILTY SAND (Cuttings) dark brown, with little coarse sand, fine grained, moist, loose, brick fragments, little organics		SC-SM	
5	1	pushed	CLAYEY SAND to SANDY SILT olive gray, fine grained, low plasticity, loose (soft), moist, little organic debris	H Nu = 450 Strong Hydrocarbon odor	SC-ML	
			dark gray about 8 - 9'			
10	2	3 4 8	SANDY CLAY to SANDY SILT light brown to brown, moderate plasticity, stiff, wet	H Nu = 375 ppm Strong Hydrocarbon odor	CL-ML	
15	3	6 16 18	SILTY SAND to SAND medium brown to medium gray, fine grained to very coarse grained with little gravels (fining upwards), medium dense, saturated, (interbedded graded sands from abt. 2" to abt. 1.5')	H Nu = 30 ppm Weak Hydrocarbon odor	SM-SW	
20	4	13 12 6	overall increase in grain size, little gravels, angular, trace to little clay, medium dense, saturated	H Nu = 250 ppm Moderate Hydrocarbon odor		
			driller reports thin gravel layers about 2" to 4" thick to 26.5' below grade			
25	5	3 6 7	SILTY CLAY olive - brown, little fine sand, medium plasticity, stiff, saturated	H Nu = 0 No Hydrocarbon odor	CL	
30			Bottom of Well: 28.5 feet			
35						

Woodward-Clyde Consultants

PROJECT NAME GETTLER RYAN NO. 8820011A

MONITORING WELL LOCATION	2800 Telegraph Avenue, Oakland CA; S-3	ELEVATION AND DATUM	
DRILLING AGENCY	Bay Land Drilling / DRILLER	DATE STARTED / DATE FINISHED	4/22/88
DRILLING EQUIPMENT	CME - 55 Truckmount	COMPLETION DEPTH 28.5'	SAMPLER Modified California Sampler
DRILLING METHOD	8" HSA / DRILL BIT CME Carbide	NO. OF SAMPLES DIST. 5	UNDIST. —
SIZE AND TYPE OF CASING	3" PVC	WATER LEVEL FIRST 12'	COMPL. 8.8 / 24 HRS. —
TYPE OF PERFORATION	0.020" slotted — FROM 27.5 TO 3.5 FT.	LOGGED BY: S. Bluestone	CHECKED BY: M. Bonkowski
SIZE AND TYPE OF PACK	12/20 Monterey Sand — FROM 28.5 TO 2.0 FT.		
TYPE OF SEAL NO. 1	Bentonite Pellets — FROM 2.0 TO 1.5 FT.		
TYPE OF SEAL NO. 2	Concrete Grout — FROM 1.5 TO G.S. FT.		

Depth (feet)	Samples	Blows	MATERIAL DESCRIPTION	USCS	Well Construction
			ASPHALT		
			FILL - CLAYEY SAND (Cuttings) dark brown, medium grained, little gravel/brick fragments, moist, loose	SC	
5	1	pushed	CLAYEY SILT gray to very dark gray, little fine sand & gravels to about 0.7" diameter, locally moderate plasticity, moist, soft — H Nu = N/A* Strong Hydrocarbon odor	ML	
10	2	4, 7, 8	SILTY SAND to CLAYEY SAND light gray to olive, fine grained with some medium grained sand, medium dense, moist — H Nu = 500 ppm Strong Hydrocarbon odor	SM-SC	
15	3	8, 12, 20	local slight increase in grain size to medium coarse, wet — H Nu = 175 ppm Moderate Hydrocarbon odor		
			gradational		
20	4	4, 10, 12	SILTY CLAY to SANDY SILT light brown to brown, interbedded silty clay with sparse fine sand & Sandy Silt with little fine to medium sand, moderate plasticity very stiff, saturated — H Nu = 45 ppm Weak Hydrocarbon odor	CL-ML	
25	5	5, 7, 6	CLAYEY GRAVEL to SILTY SAND medium brown to light brown, fine to coarse grained sand, gravel to about 2" diameter, loose, saturated — H Nu = 50 ppm Weak Hydrocarbon odor	GC-SM	
30			Bottom of Well: 28.5 feet		
35			* Note: The weather was overcast and raining. Therefore, H Nu readings are questionable due to the probable affect of humidity and moisture within the instrument.		

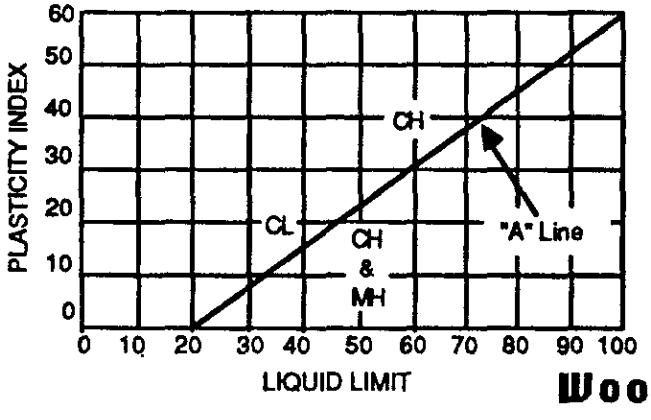
LOG OF MONITORING WELL NO. S-3 SHEET 1 OF 1

SAMPLE CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION SHCEME				
MAJOR DIVISIONS		**SYMBOLS**	**GRAPHIC COLUMN**	**TYPICAL NAMES**
COARSE GRAINED SOILS (More than 1/2 of soil > no. 200 sieve size)	GRAVELS (More than 1/2 of coarse fraction > no. 4 sieve size)	GW		Well-graded gravels and gravel-sand mixtures, little or no fines
		GP		Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM		Silty gravels, gravel-sand-silt mixtures
		GC		Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 1/2 of coarse fraction < no. 4 sieve size)	SW		Well-graded sands or gravelly sands, little or no fines
		SP		Poorly-graded sands or gravelly sands, little or no fines
		SM		Silty sands, sand-silt mixtures
		SC		Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (More than 1/2 of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL		Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LL > 50	MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH		Inorganic clays of high plasticity, fat clays
		OH		Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt		Peat and other highly organic soils

CLASSIFICATION MODIFIERS	
TRACE	0 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
AND	35 - 50%
± MODIFIERS	

PLASTICITY CHART



GRAIN SIZE CLASSIFICATION		
CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL coarse (c) fine (f)	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND coarse (c) medium (m) fine (f)	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

Woodward-Clyde Consultants

SAMPLE CLASSIFICATION CHART

MOISTURE CONTENT

DRY	- LITTLE/NO PERCEPTIBLE MOISTURE
DAMP	- SOME PERCEPTIBLE MOISTURE, NOT COMPACTABLE
MOIST	- COMPACTABLE
WET	- ABOVE COMPACTABLE RANGE
SATURATED	- PORES, VOIDS FILLED WITH WATER
▼	- WATER TABLE (AT TIME OF DRILLING)

SORTING ($So = P_{75} / P_{25}$)

	So
EXTREMELY WELL	1.0-1.1
VERY WELL	1.1-1.2
WELL	1.2-1.4
MODERATELY	1.4-2.0
POORLY	2.0-2.7
VERY POORLY	2.7-5.0

SOIL CONSISTANCY

SAND OR GRAVEL	BLOWS/FT	SILT OR CLAY	BLOWS/FT	THUMB PENETRATION
Very loose	< 5	Very Soft	<3	Very easily - inches
Loose	5 - 15	Soft	3 - 5	Easily - inches
Medium Dense	16 - 40	Medium (firm)	6 - 10	Moderate effort - inches
Dense	41 - 65	Stiff	11 - 20	Indented easily
Very Dense	> 65	Very Stiff	21 - 40	Indented by nail
		Hard	> 40	Difficult by nail

SOIL BORING AND WELL CONSTRUCTION LEGEND


MODIFIED CALIFORNIA SAMPLE RECOVERY


WATER LEVEL OBSERVED IN BORING


STATIC WATER LEVEL MEASURED IN WELL


BLANK CASING


SCREENED CASING


CEMENT GROUT


BENTONITE


SAND PACK

NOTE: BLOW COUNT (BLOWS/FT) REPRESENTS THE NUMBER OF BLOWS OF A 140 - POUND HAMMER FALLING 30 INCHES PER BLOW REQUIRED TO DRIVE A SAMPLER THROUGH THE LAST 12 INCHES OF AN 18 - INCH PENETRATION

NOTE: THE LINE SEPARATING STRATA ON THE LOGS REPRESENTS APPROXIMATE BOUNDARIES ONLY. THE ACTUAL TRANSITION MAY BE GRADUAL. NO WARRANTY IS PROVIDED AS TO THE CONTINUITY OF SOIL STRATA BETWEEN BORINGS. LOGS REPRESENT THE SOIL SECTION OBSERVED AT THE BORING LOCATION ON THE DATE OF DRILLING ONLY.

Woodward-Clyde Consultants

INTERNATIONAL TECHNOLOGY CORPORATION

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545

May 12, 1988

ATTN: Christa Lopez

Following are the results of analyses on the samples described below.

Project:	G-R #9761/WCC #8820011A, Shell, Telegraph, Berkeley
Lab Numbers:	S8-04-234-01 thru S8-04-234-04
Number of Samples:	4
Sample Type:	soil
Date Received:	4/26/88
Analyses Requested:	Low Boiling Hydrocarbons

The method of analysis for low boiling hydrocarbons is taken from E.P.A. Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photo-ionization detector.

The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Fred Rouse

FR/ksr

1 Page Following - Table of Results

IT/Santa Clara to Gettler-Ryan
ATTN: Christa Lopez

May 12, 1988

Summary of Results

Project: G-R #9761/WWC #882ØØ11A, Shell, Telegraph, Berkeley

nd = none detected

Lab Number	Sample Identification	Parts per Million - (Dry Soil Basis) Low Boiling Hydrocarbons (Gasoline)	Benzene	Toluene	Ethyl benzene and xylenes
S8-Ø4-234-Ø1	S-2/1, 5-5.5', A	1,4ØØ.	4.	36.	23Ø.
Detection Limit		1ØØ.	1.	2.	1Ø.
S8-Ø4-234-Ø2	S-2/2, 1Ø-1Ø.5', A	1,1ØØ.	4.	8.	15Ø.
Detection Limit		1ØØ.	1.	2.	1Ø.
S8-Ø4-234-Ø3	S-3/1, 5-5.5', A	5.	nd	Ø.1	nd
Detection Limit		5.	Ø.Ø5	Ø.1	Ø.4
S8-Ø4-234-Ø4	S-3/2, 1Ø-1Ø.5', A	4,8ØØ.	38.	4ØØ.	87Ø.
Detection Limit		5ØØ.	5.	1Ø.	4Ø.

INTERNATIONAL TECHNOLOGY CORPORATION

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545

May 18, 1988

ATTN: Christa Lopez

Following are the results of analyses on the samples described below.

Project:	G-R 9761/BTS #88123F1, Shell, 2800 Telegraph Ave., Berkeley
Lab Numbers:	S8-05-017-01 thru S8-05-017-04
Number of Samples:	4
Sample Type:	water
Date Received:	5/2/88
Analyses Requested:	Low Boiling Hydrocarbons, High Boiling Hydrocarbons

The method of analysis for low boiling hydrocarbons is taken from E.P.A. Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photo-ionization detector.

The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

The method of analysis for high boiling hydrocarbons in water is taken from E.P.A. Method 3510. The sample is partitioned with hexane and the resulting extract is examined by gas chromatography using a flame ionization detector.

Fred Rouse

FR/ksr

2 Pages Following - Tables of Results

cc: Rich Blaine, Blaine Tech Services

IT Santa Clara to Gettler-Ryan
ATTN: Christa Lopez

May 18, 1988

Lab Number: S8-Ø5-Ø17-Ø1
Sample Identification: S-1
Project: G-R 9761/BTS #88123F1, Shell,
2800 Telegraph Ave., Berkeley

Results - Micrograms per Liter

Total Petroleum Hydrocarbons	Detected	Detection Limit	Calculated as
Low Boiling Hydrocarbons	None	50.	Gasoline
Benzene	Ø.5	Ø.5	---
Toluene	None	1.	---
Xylenes and ethyl benzene	None	4.	---
High Boiling Hydrocarbons	None	100.	Diesel
High Boiling Hydrocarbons	None	500.	Oil

Woodward-Clyde Consultants

500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

Chain of Custody Record

PROJECT NO.
88200111A (Gettler Ryan)

SAMPLERS: (Signature)
Simon Bluestone

DATE	TIME	SAMPLE NUMBER	General Mineral	Priority Pollutant Metals	EPA Method 624	EPA Method 625	EPA Method 608	Gas	BTEX				Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
4/22		S-2/1-GR#9761/Shell-(Telegraph)						L	L				1	normal TAT
		Berkeley/88200111A/S-5.5A												
4/22		S-2/2-GR#9761/Shell-(Telegraph)						L	L				1	
		Berkeley/88200111A/10-10.5A												
4/22		S-3/1-GR#9761/Shell-(Telegraph)						L	L				1	
		Berkeley/88200111A/5-5.5A												
4/22		S-3/2-GR#9761/Shell-(Telegraph)						L	L				1	
		Berkeley/88200111A/10-10.5A												

TOTAL NUMBER OF CONTAINERS: 4

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
Simon Bluestone	4/22 16:00	Helen Nuckolls	Helen Nuckolls	4/26 13:20	

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
				4-26-88 1345 Hrs

IT Santa Clara to Gettler-Ryan
ATTN: Christa Lopez

May 18, 1988

Project: G-R 9761/BTS #88123F1, Shell,
2800 Telegraph Ave., Berkeley

Summary of Results

ND = None Detected

Lab Number	Sample Identification	Micrograms per Liter: Low Boiling Hydrocarbons (Gasoline)	Benzene	Toluene	Ethyl benzene and xylenes
S8-05-017-02	S-2	1,600.	79.	89.	480.
Detection Limit		200.	2.	5.	20.
S8-05-017-03	S-3	46,000.	2,700.	10,000.	10,000.
Detection Limit		10,000.	100.	200.	1,000.
S8-05-017-04	Trip Blank	ND	ND	ND	ND
Detection Limit		50.	0.5	1.	4.