Chevron U.S.A. Inc.
2410 Camino Ramon, San Ramon, California • Phone (415) 842-9500
Mail Address: P.O. Box 5004, San Ramon, CA 94583-0804

Marketing Operations

R. B. Bellinger
Manager, Operations
S. L. Patterson
Area, Manager, Operations
C. G. Trimbach
Manager, Engineering

June 21, 1991

Mr. Rafat Shahid
Alameda County
Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Re: Chevron Service Station #9-1740
6550 Moraga Avenue
Oakland, CA 94611

Dear Mr. Shahid:

Enclosed we are forwarding the Soil and Groundwater Investigation Report dated June 13, 1991, prepared by our consultant Pacific Environmental Group, Inc. for the above referenced site. This report documents the installation of four (4) groundwater monitor wells to characterize the subsurface and groundwater beneath the site. The soil samples collected form the drill cuttings were analyzed for total petroleum hydrocarbons as gasoline (TPH-G), total petroleum hydrocarbons as diesel (TPH-D) and BTEX. The drill cuttings from monitor well C-1 located near the waste oil tank were also analyzed for oil & grease. The results reported non-detectable to negligible concentrations of TPH-G and TPH-D in all soils samples with the exception of monitor well C-1 which detected TPH-G, TPH-D, and oil & grease at concentrations of 422, 410, and 770 ppm, respectively. These concentrations were detected at the sample depth of approximately 4-feet below grade.

Depth to groundwater was measured at approximately 3 to 5-feet below grade in monitor wells C-1, C-3 and C-4. Depth to groundwater was measured at approximately 22-feet below grade in monitor well C-2. This anomalous level may be due to smearing during the drilling of well C-2. We are evaluating the redevelopment of this well. Groundwater samples collected were analyzed for TPH-G, TPH-D, BTEX, and Oil & Grease from monitor well C-1 only. The results reported Benzene concentrations ranging from ND to 240 ppm. All monitor wells reported non-detect for TPH-D and Oil & Grease.

Based on the low concentrations of petroleum hydrocarbon contaminants detected, Chevron recommends that a quarterly sampling and monitoring program be initiated at this site as the appropriate remedial approach. At completion of one (1) year of sampling, the data will be evaluated and appropriate next actions recommended. Chevron will implement this recommendation under self direction unless otherwise informed by your office.

If you have any questions or comments please do not hesitate to call me at (415) 842 - 9581.

Very truly yours,
CHEVRON U.S.A. INC.

Nancy Vukelich
Environmental Engineer

Enclosure

cc: Mr. Rich Hiett, RWQCB-Bay Area
Mr. S.A. Willar
File (#9-1740A1 Listing)

PACIFIC
ENVIRONMENTAL
GROUP, INC.

June 13, 1991
Project 320-94.01

Ms. Nancy Vukelich
Chevron USA, Inc.
P.O. Box 5004
San Ramon, California 94583

Re: Chevron USA Station 9-1740
6550 Moraga Avenue
Oakland, California

Dear Ms. Vukelich:

This letter presents the results of the soil and groundwater investigation recently performed at the site referenced above. This work was performed by Pacific Environmental Group, Inc. (PACIFIC), as a consultant for Chevron USA, Inc. (Chevron). The purpose of this investigation was to evaluate soil and groundwater conditions at the site prior to property relinquishment. Included in this report are discussions of the site background, the Scope of Work for the current investigation, and a discussion of findings and conclusions.

BACKGROUND

Site Description

The site is located at 6550 Moraga Avenue in Oakland, California (Photo 1 and Figures 1 and 2). The site is owned by Chevron USA and is currently an active Chevron service station scheduled for abandonment in August 1991. Product storage tanks piping and all other improvements will be removed during the abandonment.

The service station currently has four underground fuel storage tanks (three 8,000-gallon fiberglass gasoline storage tanks and one 10,000-gallon fiberglass diesel tank). An underground waste oil tank (1,000-gallon steel) is located west of the service station building. The waste oil, diesel and gasoline tanks were installed in 1964, 1979, and 1981, respectively. The station layout is shown on Figure 2.

1601 Civic Center Drive, Suite 202, Santa Clara, California 95050 (408) 984-6536 FAX: (408) 243-3911
620 Contra Costa Boulevard, Suite 209, Pleasant Hill, California 94523 (415) 825-0855 FAX: (415) 825-0882

The diesel and gasoline tanks, and associated product lines were last tested on October 19, 1989, and the waste oil tank was last tested on June 27, 1990. All tanks and associated piping tested tight. The only recorded test failure occurred in 1977 when the product lines failed to hold pressure, which resulted in the replacement of the lines. The station's records indicated no product loss.

Hydrogeologic Setting

The site lies on the western base of the Berkeley Hills in Oakland, California, at an elevation of approximately 600 feet above mean sea level. The area is of moderate relief and is located within close proximity to the Hayward Fault Zone (Figure 1). The Hayward Fault is a right-lateral strike-slip fault which trends northwest-southeast along the eastern edge of San Francisco Bay. The fault zone creates a depression in which recent alluvium collects from its source drainages. The site slopes toward the southwest, and according to regional data is underlain by coarse and medium grained Quaternary alluvial and colluvial deposits (Figure 1).

The most significant natural drainage near the site is Shephard Creek located approximately 1,400 feet southeast of the site. Shephard Creek is an unlined perennial stream which flows southwest into the northern portion of San Francisco Bay. Regional groundwater flow in the vicinity of the site, based on topography and groundwater level data is to the southeast.

SCOPE OF WORK

In order to characterize soil and groundwater conditions beneath the site prior to property relinquishment, PACIFIC performed the following Scope of Work:

- Installed four on-site groundwater monitoring wells (C-1 through C-4) to a maximum depth of 30 feet.
- Performed laboratory analysis of selected soil samples for total petroleum hydrocarbons (TPH) calculated as gasoline and diesel, oil and grease, volatile organics, and benzene, toluene, ethylbenzene, and xylenes (BTEX compounds).
- Developed, sampled, and surveyed the four groundwater monitoring wells. Laboratory analysis of the water samples included TPH-gasoline, TPH-diesel, and BTEX compounds. Well C-1 was also analyzed for oil and grease.

Field and laboratory procedures are described in Attachment A.

FINDINGS

Subsurface Conditions

PACIFIC installed Monitoring Wells C-1 through C-4 on March 20 and 21, 1991. The monitoring well boreholes were drilled to approximately 25 to 30 feet in depth. Moist to wet fine-grained soils were encountered from ground surface to the total depth explored in all wells, with the exception of asphalt and minor fill near ground surface. The soil encountered typically consisted of dark clays of moderate to high plasticity with low amounts (usually 10 to 20 percent) of fine to medium-grained sand. Highly weathered serpentine clasts were commonly encountered during drilling of all wells. Boring logs with more detailed geology and well construction information are presented in Attachment B. Groundwater was first encountered at a depth of approximately 10 feet.

Soil Analytical Results

Selected soil samples collected from Wells C-1 through C-4 at the 3-1/2 to 5, 8-1/2 to 10, and 13-1/2 to 15 foot depth intervals were analyzed for TPH-gasoline, TPH-diesel, and BTEX compounds. Oil and grease analysis was performed in the soil samples collected from Well C-1 which is located adjacent to the waste oil tank. The 8-1/2 to 10 foot sample from Well C-1 was also analyzed for volatile organic compounds (EPA 8240).

The highest hydrocarbon concentrations were present in the soil samples from Well C-1, which contained 422 parts per million (ppm) TPH-gasoline, 410 ppm TPH-diesel, and 770 ppm oil and grease at the 3-1/2 to 5 foot depth interval. These concentrations decreased to none detected at the 8-1/2 to 10 foot interval. No volatile organic compounds were detected in the 8-1/2 to 10 foot sample.

Soil samples analyzed from Well C-3 contained no detectable concentrations of any of the analyzed compounds. Low concentrations of TPH-gasoline and BTEX compounds were detected in the soil samples analyzed from Wells C-2 and C-4 and ranged from none detected to 5 ppm TPH-gasoline. Diesel was also detected in the 3-1/2 to 5 foot sample from C-4 at 10 ppm.

Tables 1 and 2 present a summary of soil analytical results for low- and high-boiling hydrocarbons, respectively. Certified analytical reports and chain-of-custody documentation are presented in Attachment C.

Groundwater Sampling

PACIFIC sampled Monitoring Wells C-1 through C-4 on March 25, 1991. Depth to groundwater was measured at approximately 3 to 5 feet below ground surface in

Wells C-1, C-3, and C-4. Well C-2 was dry on the day of installation, and groundwater has since recovered to a level approximately 22 feet below ground surface. The anomalous groundwater level in Well C-2 may be due to partial sealing of the borehole during drilling operations. Further well development may be necessary. No separate-phase hydrocarbons were noted in any well. Groundwater elevation contours (based on mean sea level) were constructed for the site using the March 25, 1991, water level data and are presented on Figure 3. The groundwater flow direction was to the south at a gradient of approximately 0.05. Groundwater sampling procedures are described in Attachment A. A summary of groundwater elevation data is presented in Table 3.

Groundwater from Wells C-1 through C-4 was analyzed for gasoline and BTEX compounds. Dissolved gasoline was detected at a concentration of 54 parts per billion (ppb) in Well C-1 and 2,700 ppb in Well C-4. No gasoline was detected in Wells C-2 and C-3. Benzene was detected in Wells C-1, C-2, and C-4 at concentrations of 0.7, 1, and 240 ppb, respectively. No BTEX compounds were detected in Well C-3, with the exception of 0.5 ppb xylenes. Groundwater analytical results for low-boiling hydrocarbons are presented on Figure 4 and summarized in Table 4.

Groundwater from all wells was also analyzed for high-boiling hydrocarbons, calculated as diesel. Groundwater from Well C-1, located adjacent to the former waste oil tank, was additionally analyzed for oil and grease. No high-boiling hydrocarbons were detected in any of the wells. Oil and grease was not detected in Well C-1. A summary of results for high-boiling hydrocarbons in groundwater is presented in Table 5. Laboratory analytical reports are presented in Attachment C.

CONCLUSIONS

Four groundwater monitoring wells (C-1 through C-4) were installed at the site on March 22, 1991. The following is a summary of findings and conclusions concerning the initial investigation performed by PACIFIC:

- The soil analytical results indicated that high concentrations of hydrocarbon-affected soils appear to be limited to the 3-1/2 to 5 foot interval from Well C-1 which is located adjacent to the waste oil tank.
- The results from soil samples analyzed from the remainder of the wells (C-2 through C-4) indicate that soils impacted by hydrocarbons are minimal throughout the site.

- Hydrocarbon concentrations in the soils decreased to non-detectable levels **at 15 feet in all four wells**, with the exception of very low BTEX concentrations. Based on these results, the vertical extent of hydrocarbons in the soils on site has been delineated.
- Analytical results of groundwater samples collected from the site indicated the highest dissolved concentrations (**2,700 ppb TPH**-gasoline and 240 ppb benzene) **occur in the furthest downgradient Well C-4**. The upgradient extent of dissolved hydrocarbons has been defined based on non-detectable levels encountered in Well C-3.

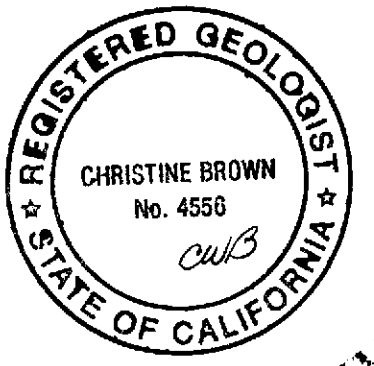
If you have any questions, please do not hesitate to call.

Sincerely,

Pacific Environmental Group, Inc.

Jerry W. Mitchell
Project Geologist

Christine W. Brown
Senior Geologist
RG 4556



Attachments:

Table 1	Summary of Soil Analytical Results: Low-Boiling Hydrocarbons
Table 2	Summary of Soil Analytical Results: High-Boiling Hydrocarbons
Table 3	Summary of Groundwater Elevation Data
Table 4	Summary of Groundwater Analytical Results: Low-Boiling Hydrocarbons
Table 5	Summary of Groundwater Analytical Results: High-Boiling Hydrocarbons
Photo 1	Site Photo
Figure 1	Site Location Map
Figure 2	Site Map
Figure 3	Groundwater Elevation Map
Figure 4	Gasoline/Benzene Concentration Map
Attachment A	Field Methods and Laboratory Procedures
Attachment B	Boring Logs and Well Elevations
Attachment C	Laboratory Analytical Reports and Chain-of-Custody Documentation

Table 1
Summary of Soil Analytical Results

Low-Boiling Hydrocarbons

Chevron USA Station 9-1740
6550 Moraga Avenue
Oakland, California

Boring Number	Sample Depth (feet)	TPH Gasoline (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)
C-1	3.5-5	422	2	16	5	[illegible]
	8.5-10	ND	0.010	0.021	ND	0.034
	13.5-15	ND	0.007	0.010	ND	0.015
C-2	3.5-5	4	0.480	0.007	0.008	0.021
	8.5-10	ND	ND	ND	ND	ND
	13.5-15	ND	0.039	0.012	0.010	0.049
C-3	8.5-10	ND	ND	ND	ND	ND
	13.5-15	ND	ND	ND	ND	ND
C-4	3.5-5	5	0.210	0.016	0.041	0.018
	8.5-10	3	0.290	0.008	0.110	0.029
	13.5-15	ND	ND	0.013	ND	0.016

TPH = Total petroleum hydrocarbons
ppm = Parts per million
ND = Not detected
See certified analytical results for detection limits.

Table 2
Summary of Soil Analytical Results

High-Boiling Hydrocarbons

Chevron USA Station 9-1740
6550 Moraga Avenue
Oakland, California

Well Number	Sample Depth (feet)	TPH Diesel (ppm)	Oil and Grease (ppm)
C-1	3.5-5	410	770
	8.5-10	ND	ND
	13.5-15	ND	ND
C-2	3.5-5	ND	NA
	8.5-10	ND	NA
	13.5-15	ND	NA
C-3	8.5-10	ND	NA
	13.5-15	ND	NA
C-4	3.5-5	10	NA
	8.5-10	ND	NA
	13.5-15	ND	NA

TPH = Total petroleum hydrocarbons
ppm = Parts per million
ND = Not detected
NA = Not analyzed
See certified analytical results for detection limits.

Table 3
Summary of Groundwater Elevation Data

Chevron USA Station 9-1740
6550 Moraga Avenue
Oakland, California

Well Number	Date	Well Elevation (feet, MSL, TOB)	Depth to Water (feet)	Groundwater Elevation (feet, MSL)
C-1	03/25/91	595.82	[illegible]	592.54
C-2	03/25/91	594.57	[illegible]	571.68
C-3	03/25/91	597.14	5.16	591.98
C-4	03/25/91	593.10	4.45	588.65

TOB = Top of box
MSL = Mean sea level

Table 4
Summary of Groundwater Analytical Results

Low-Boiling Hydrocarbons

Chevron USA Station 9-1740
6550 Moraga Avenue
Oakland, California

Well Number	Sample Date	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (ppb)
C-1	03/25/91	54	0.7	ND	ND	2
C-2	03/25/91	ND	1	ND	ND	2
C-3	03/25/91	ND	ND	ND	ND	0.5
C-4	03/25/91	2,700	240	16	ND	350

TPH = Total petroleum hydrocarbons
ppb = Parts per billion
ND = Not detected
See certified analytical results for detection limits.

Table 5
Summary of Groundwater Analytical Results

High-Boiling Hydrocarbons

Chevron USA Station 9-1740
6550 Moraga Avenue
Oakland, California

Well Number	Sample Date	TPH Diesel (ppb)	Oil and Grease (ppb)
C-1	03/25/91	ND	ND
C-2	03/25/91	ND	NA
C-3	03/25/91	ND	NA
C-4	03/25/91	ND	NA

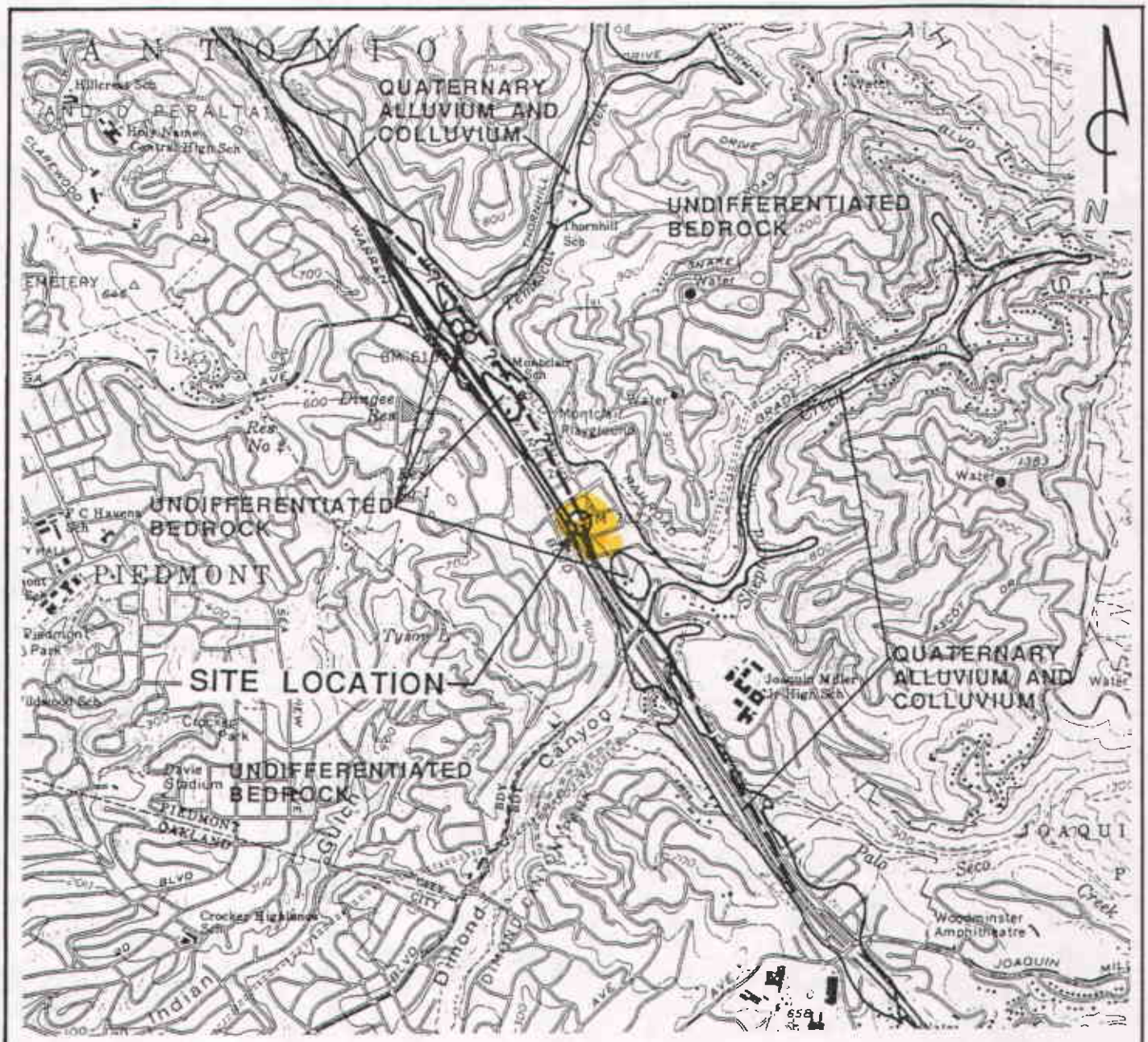
TPH = Total petroleum hydrocarbons
ppb = Parts per billion
ND = Not detected
NA = Not analyzed
See certified analytical results for detection limits.

PACIFIC ENVIRONMENTAL GROUP INC.

CHEVRON USA SERVICE STATION 9-1740
6550 Moraga Avenue and Mountain Boulevard
Oakland, California

SITE PHOTO

PHOTO:
1
PROJECT:
320-94.01



LEGEND

HAYWARD FAULT

GEOLOGIC CONTACT

QUADRANGLE LOCATION

REFERENCES

HAYWARD FAULT ZONE: Oakshott, Gordon B.; "Hayward Fault Zone and a Western Outlier of the Coast Range Thrust in the Montclair District of Oakland, California" special publication 62, (Fig. 1, p. 56) California Division of Mines and Geology, 1962

GEOLOGY: Radbroch, Dorothy H.; "Aerial and Engineering Geology of the Oakland East Quadrangle, California"; USGS Map GQ-769; 1969

REFERENCES:

USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: OAKLAND EAST, CALIFORNIA
DATED: 1959 REVISED: 1980

SCALE

2000 0 2000 FEET

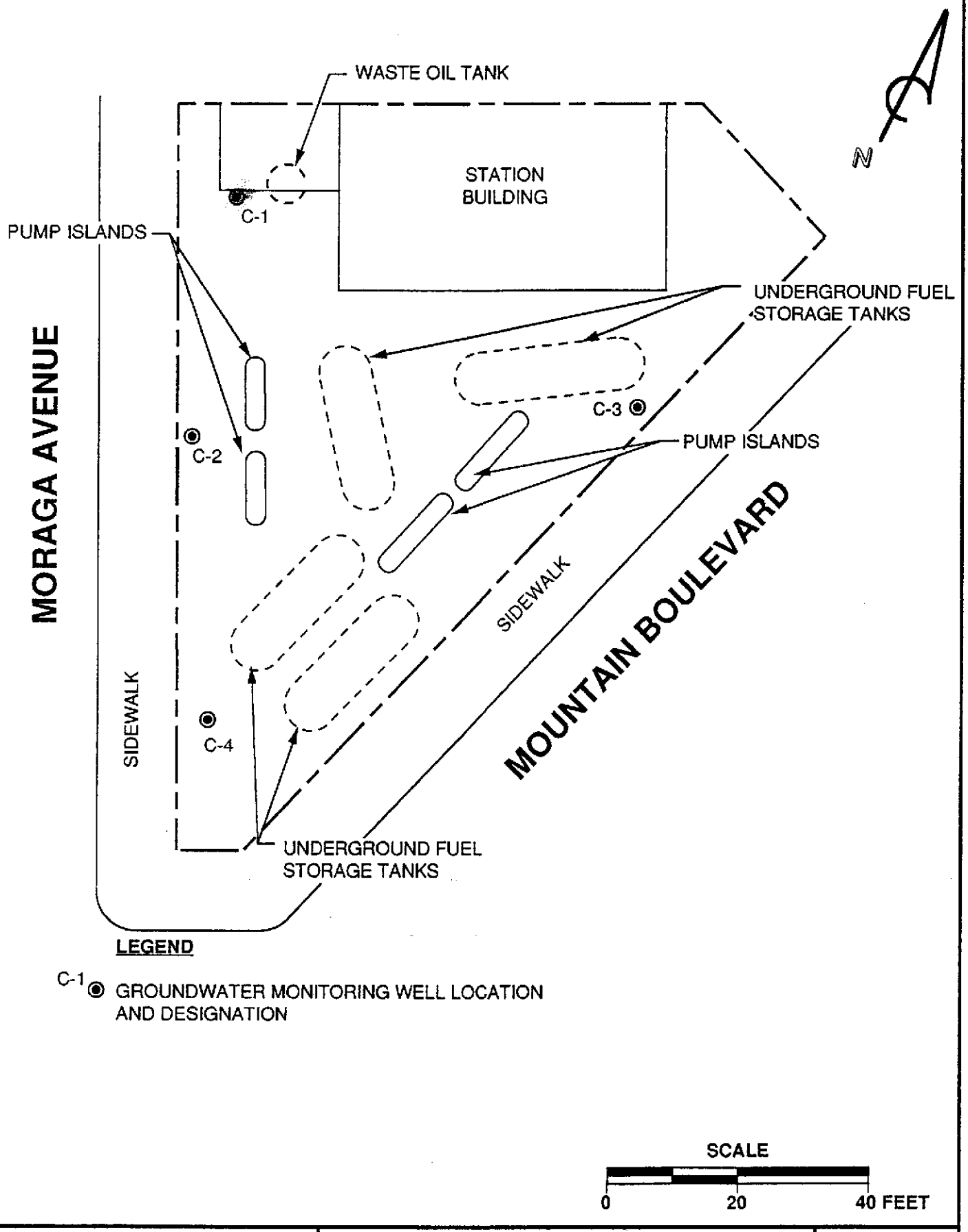
PACIFIC ENVIRONMENTAL GROUP INC.

CHEVRON USA STATION #1740
6550 Moraga Avenue at Mountain Boulevard
Oakland, California

SITE LOCATION MAP

FIGURE: 1

PROJECT: 320-94.01

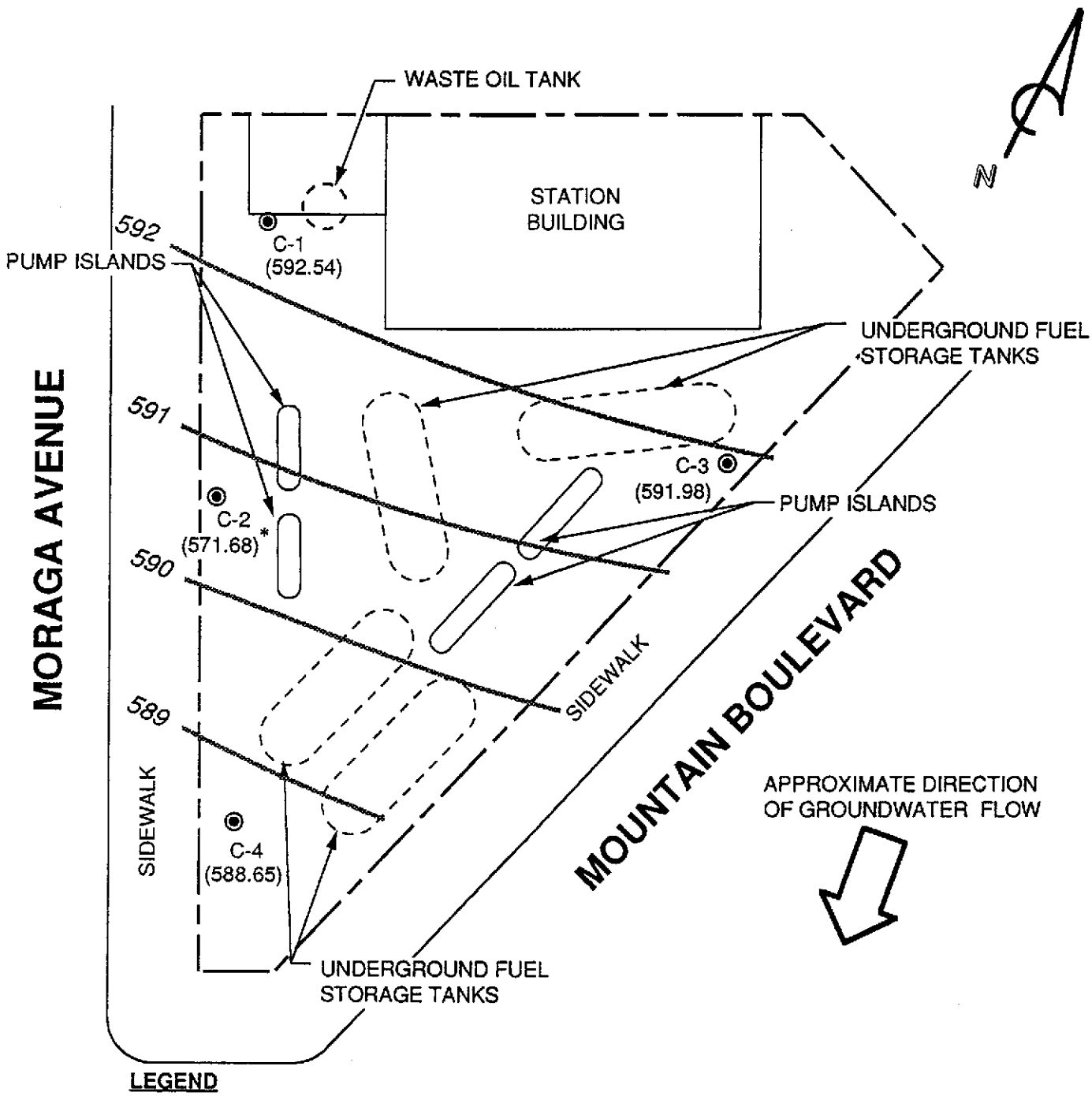


PACIFIC ENVIRONMENTAL GROUP, INC.

CHEVRON SERVICE STATION #1740
6550 Moraga Avenue and Mountain Boulevard,
Oakland, California

SITE MAP

FIGURE:
2
PROJECT:
320-94.01



LEGEND

C-1 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

(591.98) GROUNDWATER ELEVATION IN FEET - MSL, 3-25-91

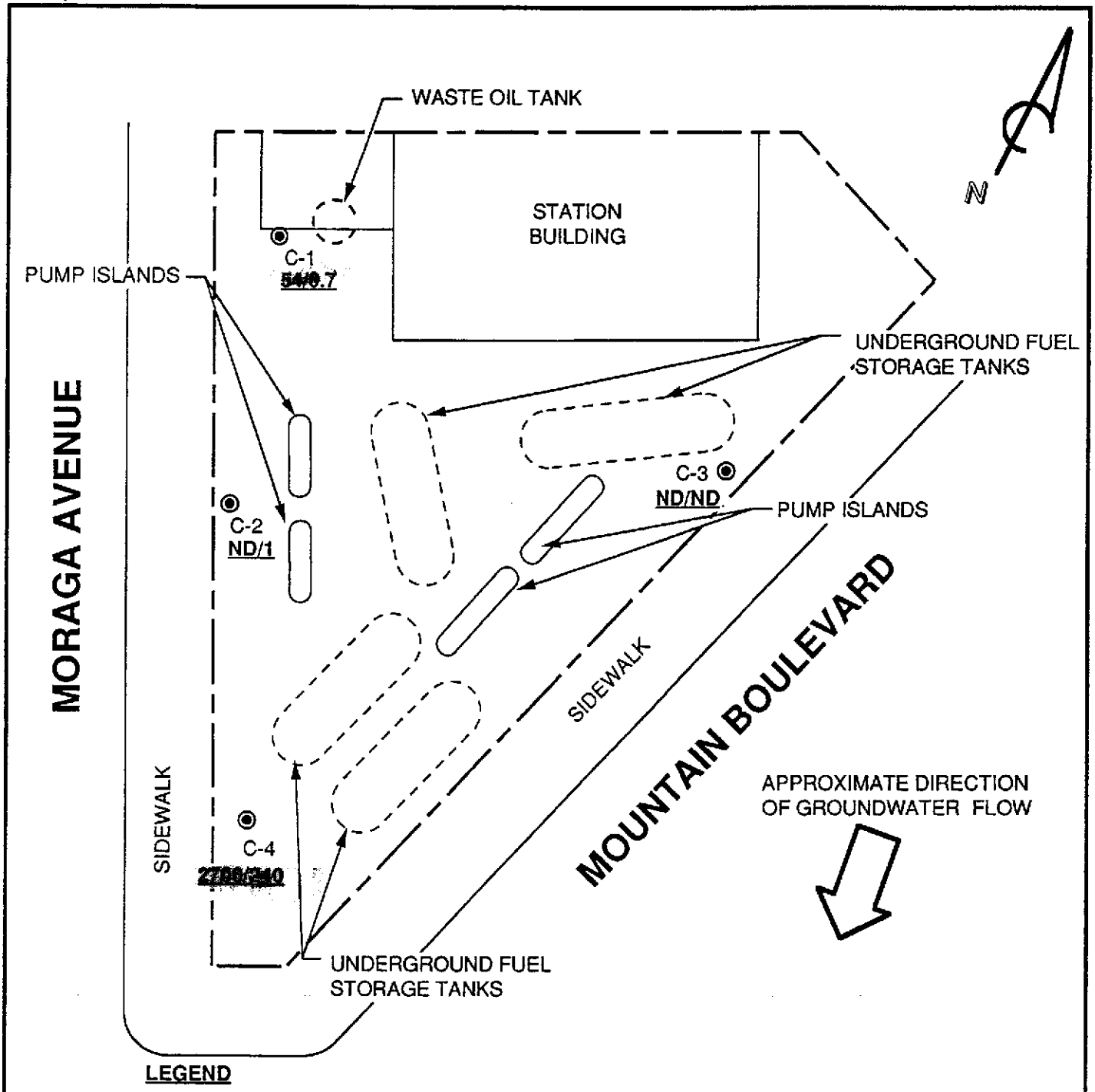
589 GROUNDWATER ELEVATION CONTOUR IN FEET - MSL, 3-25-91

* DATA NOT USED IN CONTOURING

SCALE

0 20 40 FEET

PACIFIC ENVIRONMENTAL GROUP, INC.	**CHEVRON SERVICE STATION #1740** 6550 Moraga Avenue and Mountain Boulevard, Oakland, California	FIGURE: **3**
	GROUNDWATER ELEVATION MAP	PROJECT: 320-94.01



LEGEND

C-1 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

54/0.7 GASOLINE/BENZENE CONCENTRATION IN GROUNDWATER, IN PARTS PER BILLION, 3-25-91

ND NONE DETECTED

SCALE

0 20 40 FEET

PACIFIC ENVIRONMENTAL GROUP, INC.	**CHEVRON SERVICE STATION #1740** 6550 Moraga Avenue and Mountain Boulevard, Oakland, California	FIGURE: **4**
	GASOLINE/BENZENE CONCENTRATION MAP	PROJECT: 320-94.01

ATTACHMENT A

FIELD METHODS AND LABORATORY PROCEDURES

ATTACHMENT A
FIELD METHODS AND LABORATORY PROCEDURES

Drilling and Well Construction Procedures

The soil borings were drilled using 8-inch diameter hollow-stem auger drilling equipment and were logged by a PACIFIC geologist using the Unified Soil Classification System and standard geologic techniques. Soil samples for logging and chemical analysis were collected at 5-foot depth intervals by advancing a California-modified split-spoon sampler with brass liners into undisturbed soil beyond the tip of the auger. The sampler was driven a maximum of 18 inches using a 140-pound hammer with a 30-inch drop. Soil samples for chemical analysis were retained in brass liners, capped with aluminum foil and plastic end caps, and sealed in clean glass containers. These samples were placed on ice for transport to the laboratory, accompanied by chain-of-custody documentation. All drilling equipment was steam-cleaned following the completion of each soil boring.

Four soil borings were converted to groundwater monitoring wells by the installation of 2-inch diameter, Schedule 40 PVC casing and 0.020-inch factory slotted screen. Screen was placed from the bottom of each boring to approximately 5 feet below ground surface. The annular space was packed with Lonestar 2 x 16 sand across the entire screened interval, extending 1 foot above the top of the screen. The well was then sealed with a 1/2 foot of bentonite above the sand pack, and cement grout to the ground surface. A locking, watertight cap and protective vault box were installed at each wellhead.

Organic Vapor Analysis Procedures

Soil samples collected in the field were analyzed using the HNU Model PI 101 photo-ionization detector with a 10.2 eV lamp. The test procedure involved measuring approximately 30 grams from an undisturbed soil sample, placing this sub-sample in a clean glass jar, and sealing the jar with aluminum foil secured under a ring-type threaded lid. The jar was warmed for approximately 20 minutes, then the foil was pierced and the head-space within the jar tested for total organic vapor, measured in

parts per million as benzene (ppm; volume/volume). The instrument was previously calibrated using a 100 ppm isobutylene standard (in air) and a sensitivity factor of 0.7 which relates the photo-ionization sensitivity of benzene to the sensitivity of isobutylene. The results of these tests were recorded on the boring logs.

Groundwater Sampling Procedures

The sampling procedure consisted of first measuring the water level in each well with an electronic water-level indicator, and checking each well for the presence of separate-phase hydrocarbons using a clear Teflon bailer. The wells were then purged of approximately four casing volumes of water (or until dry) using a centrifugal pump, during which time temperature, pH, and electrical conductivity were monitored to indicate that a representative sample was obtained. After purging, the water levels in the wells were allowed to restabilize. Groundwater samples were then collected using a Teflon bailer, placed into appropriate EPA-approved containers, labeled, logged onto chain-of-custody documents, and transported on ice to the laboratory. All well development and purge water was stored on site in DOT approved 55-gallon drums pending disposal. The water was then transported to Gibson Oil in Bakersfield, California for recycling.

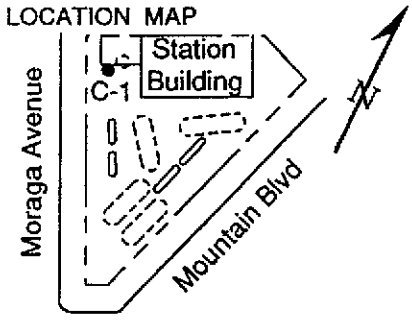
Laboratory Analysis Procedures

Soil samples collected during drilling were analyzed for low-boiling hydrocarbons (calculated as gasoline) by modified EPA Methods 8015 and 5030, for benzene, toluene, ethylbenzene, and xylenes (BTEX compounds) by EPA Method 8020, and for high-boiling hydrocarbons (calculated as diesel) by EPA method 8015. Soils from Well C-1 were additionally analyzed for oil and grease and volatile organic compounds by EPA Methods 503E and 8240, respectively. Groundwater samples collected from site monitoring wells were analyzed for the presence of gasoline by modified EPA Methods 8015 and 5030, for BTEX compounds by EPA Method 8020 and for high-boiling hydrocarbons (calculated as TPH diesel) by EPA Method 8015. The water sample from Well C-1 was additionally analyzed for oil and grease by EPA Methods 503E. The samples were examined using the purge and trap technique, with final detection by gas chromatography. All analyses were performed by a State-certified laboratory.

ATTACHMENT B

BORING LOGS AND WELL ELEVATIONS

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

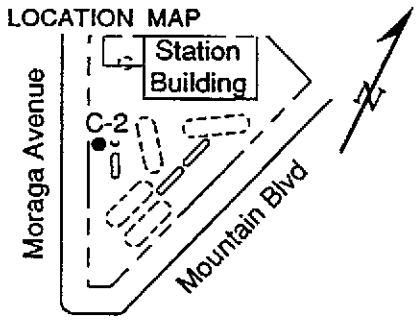
WELL / C-1
BORING NO.
PAGE 1 OF 1

PROJECT NO. 320-94.01
LOGGED BY: TG
DRILLING METHOD: HSA
SAMPLING METHOD: Split Spoon
CASING TYPE: Sch 40 PVC
SLOT SIZE: 0.020"
GRAVEL PACK: 2 x 16 SAND

CLIENT: Chevron USA
DATE DRILLED: 3-20-91
LOCATION: 6550 Moraga, Oakland
HOLE DIAMETER: 8"
HOLE DEPTH: 25'
WELL DEPTH: 25'
WELL DIAMETER: [redacted]

WELL COMPLETION	MOISTURE CONTENT	H-NU READING (PPM)	PENETRATION RESISTANCE (BLOWS/FT)	DEPTH (FEET)	SAMPLE	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
GROUT	Mst	2100	9	2			CL	FILL; asphalt. SANDY CLAY; black; low plasticity; 10-20% fine to coarse grained sand; trace coarse gravel; oily; stiff; strong product odor.
BENTONITE				4				
				6				
	Mst -Wt	240	6	8				
SAND				10				@10': mottled green to black; moderate to high plasticity; 10-20% fine to medium grained sand; firm; no product odor.
	Wt	8	13	12				
				14				@15': greenish gray; low to moderate plasticity; 10-15% fine to medium grained sand; dark green, coarse grained, angular cobble of serpentine at shoe; stiff; no product odor.
				16				
	Wt	200	15	18				@20': dark green to black; low plasticity; 10-20% fine to medium grained sand; 5-10% angular serpentine clasts; stiff; no product odor.
				20				
				22				
	Wt	ND	15	24				@25': dark brownish green; moderate plasticity; 10-15% fine grained sand; weathered and foliated serpentine layers(1"-2"); stiff; no product odor.
				26				BOTTOM OF BORING AT 25'
				28				
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

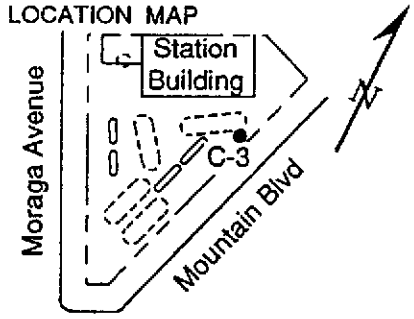
WELL / C-2
BORING NO.
PAGE 1 OF 1

PROJECT NO. 320-94.01
LOGGED BY: TG
DRILLING METHOD: HSA
SAMPLING METHOD: Split Spoon
CASING TYPE: Sch 40 PVC
SLOT SIZE: 0.020"
GRAVEL PACK: 2 x 16 SAND

CLIENT: Chevron USA
DATE DRILLED: 3-20-91
LOCATION: 6550 Moraga, Oakland
HOLE DIAMETER: 8"
HOLE DEPTH: 30'
WELL DEPTH: 30'
WELL DIAMETER: 2"

WELL COMPLETION	MOISTURE CONTENT	H-NU READING (PPM)	PENETRATION RESISTANCE (BLOWS/FT)	DEPTH (FEET)	SAMPLE	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
GROUT				0			CL	FILL; concrete.
	Mst	420	PUSH	4				SANDY CLAY; mottled green to black; moderate plasticity; 15-20% fine to medium grained sand; oily above 4.5'; very soft; moderate product odor.
BENTONITE	Mst -Wt	4	6	10				@10': mottled brown to black; low to moderate plasticity; 10-20% fine to medium grained sand; trace fine gravel; firm; faint product odor.
SAND	Mst -Wt	ND	6	14				@15': dark brown to black; moderate plasticity; 20-25% fine to medium grained sand; firm; no product odor.
	Mst -Wt	ND	18	20				@20': dark brown to black; high plasticity; 10-20% fine grained sand; small laminations of undulating, highly weathered serpentine; very stiff; no product odor.
	Mst -Wt	ND	16	24				
	Mst	ND	10	30				@30': dark gray; high plasticity; 5-10% medium grained serpentine sand; laminar bedding; stiff; no product odor.
								BOTTOM OF BORING AT 30'

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

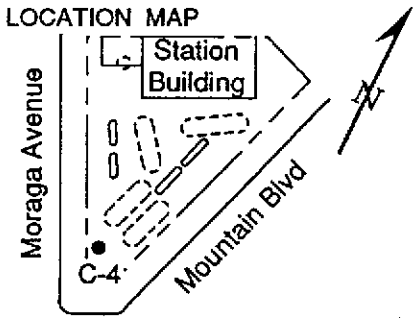
WELL / C-3
BORING NO.
PAGE 1 OF 1

PROJECT NO. 320-94.01
LOGGED BY: TG
DRILLING METHOD: HSA
SAMPLING METHOD: Split Spoon
CASING TYPE: Sch 40 PVC
SLOT SIZE: 0.020"
GRAVEL PACK: 2 x 16 SAND

CLIENT: Chevron USA
DATE DRILLED: 3-20-91
LOCATION: 6550 Moraga, Oakland
HOLE DIAMETER: 8"
HOLE DEPTH: 25'
WELL DEPTH: 25'
WELL DIAMETER: 2"

WELL COMPLETION	MOISTURE CONTENT	H-NU READING (PPM)	PENETRATION RESISTANCE (BLOWS/FT)	DEPTH (FEET)	SAMPLE	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
GROUT				2			CL	FILL; asphalt. SANDY CLAY; mottled brown to mottled dark brown; moderate to high plasticity; 10-15% fine sand; very soft; no product odor.
	Mst	5	PUSH	4				
				6				
BENTONITE				8				
	Wt	ND	7	10				@10': mottled dark brown; high plasticity; 15-20% fine to medium grained sand; 10% fine grained angular basalt cobbles; firm; no product odor.
				12				
	Wt	ND	5	14				@15': trace coarse sand; no basalt clasts; no product odor.
				16				
SAND				18				
	Wt	ND	5	20			CL	SILTY CLAY; mottled rust to gray; moderate plasticity; 15-20% fine to medium grained sand; firm; no product odor.
				22				
	Wt	ND	11	24				@25': mottled green to dark gray; moderate to high plasticity; interbedded serpentine clay and dark clay; stiff; no product odor.
				26				BOTTOM OF BORING AT 25'
				28				
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

WELL / C-4
BORING NO.
PAGE 1 OF 1

PROJECT NO. 320-94.01
LOGGED BY: TG
DRILLING METHOD: HSA
SAMPLING METHOD: Split Spoon
CASING TYPE: Sch 40 PVC
SLOT SIZE: 0.020"
GRAVEL PACK: 2 x 16 SAND

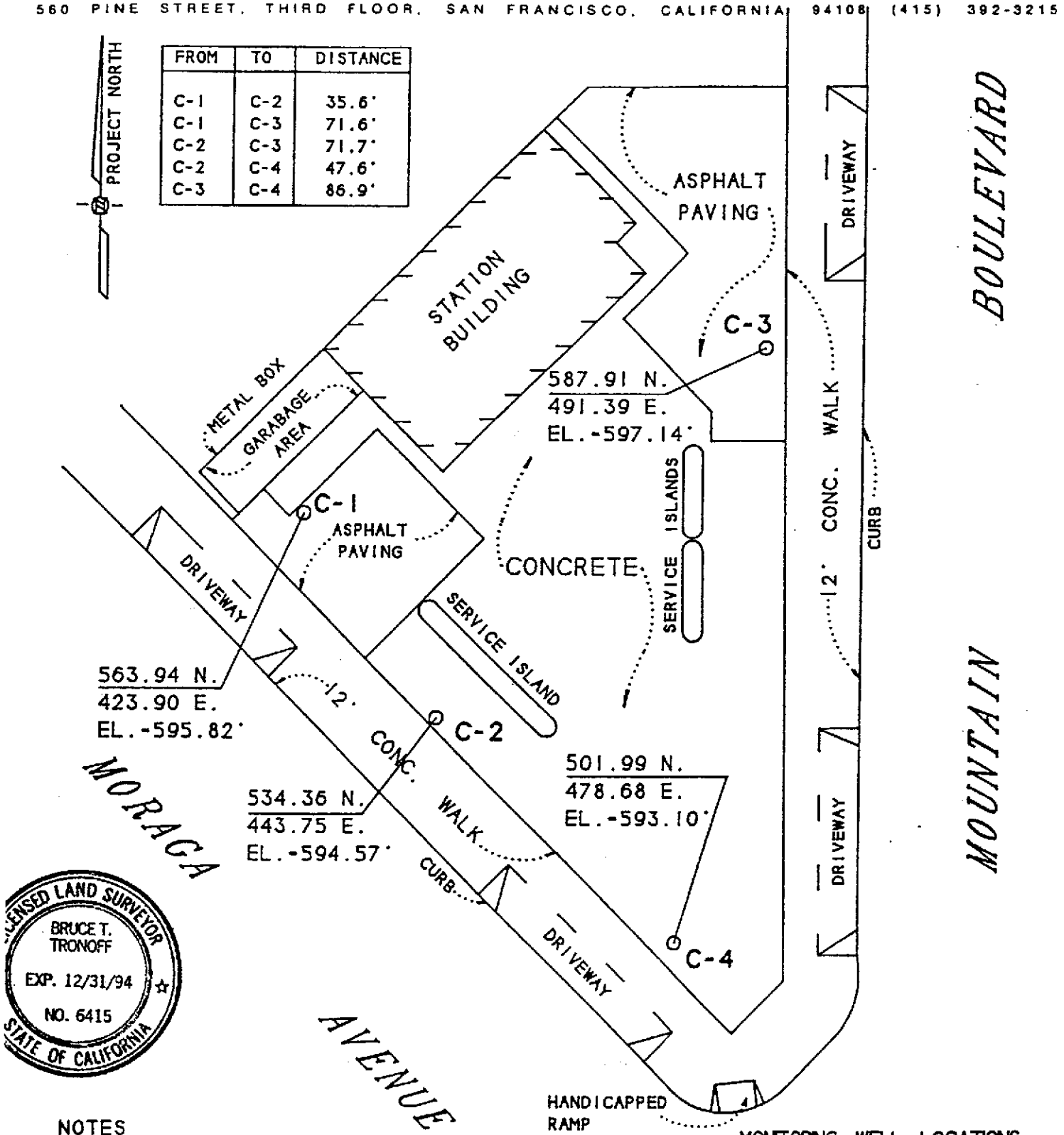
CLIENT: Chevron USA
DATE DRILLED: 3-21-91
LOCATION: 6550 Moraga, Oakland
HOLE DIAMETER: 8"
HOLE DEPTH: 25'
WELL DEPTH: 25'
WELL DIAMETER: 2"

WELL COMPLETION	MOISTURE CONTENT	H-NU READING (PPM)	PENETRATION RESISTANCE (BLOWS/FT)	DEPTH (FEET)	SAMPLE	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
GROUT				2			CL	FILL; cement; large angular serpentine cobbles(3"-8") in clay matrix.
	Mst	150	PUSH	4				SANDY CLAY; dark brown to black; moderate plasticity; 15-20% fine to medium grained sand; rust; very soft to firm; moderate to strong product odor.
BENTONITE	Wt	50	6	10				@9.5': lightly mottled to brownish green; moderate plasticity; 20-25% fine to medium grained sand; firm; faint product odor.
SAND	Wt	ND	9	14				@15': dark gray; hgih plasticity; 5-10% fine to medium grained sand; stiff; no product odor.
	Wt	NA	15	20				@20': serpentine clast blocking sampler.
	Wt	ND	17	24				@25': dark gray; high plasticity; 5-10% fine to medium grained sand; abundant, highly weathered serpentine cobbles; stiff to very stiff; no product odor.
				26				BOTTOM OF BORING AT 25'
				28				
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				

TRONOFF ASSOCIATES

LAND SURVEYING • CONSTRUCTION ENGINEERING SURVEYS

560 PINE STREET, THIRD FLOOR, SAN FRANCISCO, CALIFORNIA 94108 (415) 392-3215



LICENSED LAND SURVEYOR
BRUCE T. TRONOFF
EXP. 12/31/94
NO. 6415
STATE OF CALIFORNIA

NOTES

1. VERTICAL DATUM: MEAN SEA LEVEL.
2. ELEVATIONS TAKEN AT PUNCH MARK PLACED ON NORTH RIM OF CHRISTY BOX.

SURVEY NO. 3870 PC

MONITORING WELL LOCATIONS
CHEVRON SERVICE STATION NO. 0740
6550 MORAGA AVENUE
OAKLAND, CALIFORNIA
FOR
PACIFIC ENVIRONMENTAL GROUP

SCALE 1" = 20' APRIL 22, 1991

ATTACHMENT C

LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I · SAN FRANCISCO, CA 94124 · PHONE (415) 647-2081 DHS #1332

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11657
CLIENT: Pacific Environmental Group
CLIENT JOB NO.: 320-94.01

DATE RECEIVED: 03/26/91
DATE REPORTED: 04/04/91

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11657- 1	C-1, 3.5'-5'	03/20/91	04/01/91
11657- 2	C-1, 8.5'-10'	03/20/91	04/01/91
11657- 3	C-1, 13.5'-15'	03/20/91	04/01/91
11657- 4	C-2, 3.5'-5'	03/20/91	04/01/91
11657- 5	C-2, 8.5'-10'	03/20/91	04/01/91
11657- 6	C-2, 13.5'-15'	03/20/91	04/01/91
11657- 7	C-3, 8.5'-10'	03/20/91	04/01/91
11657- 8	C-3, 13.5'-15'	03/20/91	04/01/91
11657- 9	C-4, 3.5'-5'	03/20/91	04/01/91
11657-10	C-4, 8.5'-10'	03/20/91	04/01/91

Laboratory Number:	11657 1	11657 2	11657 3	11657 4	11657 5
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	770	ND<50	ND<50	NA	NA
TPH/GASOLINE RANGE:	422	ND<1	ND<1	4	ND<1
TPH/DIESEL RANGE:	410	ND<10	ND<10	ND<10	ND<10
BENZENE:	2	0.010	0.007	0.480	ND<.005
TOLUENE:	16	0.021	0.010	0.007	ND<.005
ETHYL BENZENE:	5	ND<.005	ND<.005	0.008	ND<.005
XYLENES:	38	0.034	0.015	0.021	ND<.005

Laboratory Number:	11657 6	11657 7	11657 8	11657 9	11657 10
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	ND<1	5	3
TPH/DIESEL RANGE:	ND<10	ND<10	ND<10	10	ND<10
BENZENE:	0.039	ND<.005	ND<.005	0.210	0.290
TOLUENE:	0.012	ND<.005	ND<.005	0.016	0.008
ETHYL BENZENE:	0.010	ND<.005	ND<.005	0.041	0.110
XYLENES:	0.049	ND<.005	ND<.005	0.018	0.029

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081 DHS #1332

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11657 DATE RECEIVED: 03/26/91
CLIENT: Pacific Environmental Group DATE REPORTED: 04/04/91
CLIENT JOB NO.: 320-94.01

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11657-11	C-4, 13.5'-15'	03/20/91	04/01/91

Laboratory Number: 11657
11

ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)
OIL AND GREASE:	NA
TPH/GASOLINE RANGE:	ND<1
TPH/DIESEL RANGE:	ND<10
BENZENE:	ND<.005
TOLUENE:	0.013
ETHYL BENZENE:	ND<.005
XYLENES:	0.016

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081 DHS #1332

CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 11657

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = part per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 503E:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA-SW846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg
Standard Reference: 02/07/91

EPA-SW846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg
Standard Reference: 08/24/90

SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/kg
Standard Reference: 01/28/91

ANALYTE	REFERENCE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Oil & Grease	04/02/91	10mg	87/97	5	50-130
Diesel	02/07/91	1000ug	110/111	<1	75-125
Gasoline	08/24/90	200ng	86/89	3.5	58-120
Benzene	01/28/91	200ng	97/100	2.5	65-121
Toluene	01/28/91	200ng	92/93	1.6	65-120
Ethyl Benzene	01/28/91	200ng	95/96	1.6	65-122
Total Xylene	01/28/91	600ng	96/98	1.7	65-122

Richard Srna, Ph.D.
Cecilia G Jacquin (for)
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081 DHS #1332

CERTIFICATE OF ANALYSIS

LABORATORY NO. 11657-2
CLIENT: Pacific Environ.Group

DATE RECEIVED: 03/26/91
DATE REPORTED: 04/04/91
JOB NO. 320-94.01

EPA SW-846 METHOD 8240 - VOLATILE ORGANICS
by Gas Chromatography/ Mass Spectrometry

SAMPLE: C-1,8.5'-10'

Compound	ug/kg	Compound	ug/kg
Chloromethane	ND<50	Cis-1,3-Dichloropropene	ND<15
Bromomethane	ND<50	Trichloroethene	ND<15
Vinyl Chloride	ND<50	Dibromochloromethane	ND<15
Chloroethane	ND<50	1,1,2-Trichloroethane	ND<15
Methylene Chloride	ND<50	Benzene	ND<10
Acetone	ND<50	Trans-1,3-Dichloropropene	ND<15
Carbon disulfide	ND<15	2-Chloroethyl vinyl ether	ND<15
Trichlorofluoromethane	ND<15	Bromoform	ND<15
1,1-Dichloroethene	ND<15	4-Methyl-2-Pentanone	ND<50
1,1-Dichloroethane	ND<15	2-Hexanone	ND<50
1,2-Dichloroethene (total)	ND<15	Tetrachloroethene	ND<15
Chloroform	ND<15	1,1,2,2-Tetrachloroethane	ND<15
1,2-Dichloroethane	ND<15	Toluene	ND<15
2-Butanone	ND<100	Chlorobenzene	ND<15
1,1,1-Trichloroethane	ND<15	Ethylbenzene	ND<15
Carbon Tetrachloride	ND<15	Styrene	ND<15
Vinyl Acetate	ND<50	Total Xylenes	ND<15
Bromodichloromethane	ND<15	1,3-Dichlorobenzene	ND<15
1,2-Dichloropropane	ND<15	1,2&1,4-Dichlorobenzenes	ND<15

ug/kg = part per billion (ppb)
QC DATA:

Surrogate Recoveries		QC Limits water	QC Limits soil
1,2-DCA-d4.....	96%	76-114	81-117
Toluene-d8.....	103%	88-110	81-140
Bromofluorobenzene.....	98%	86-115	74-121

comments:

Richard Srna, Ph.D.

Laboratory Director

OUTSTANDING QUALITY AND SERVICE

SF # 11657

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number CHEVRON SERVICE STATION #9-1740
Facility Address 6550 MORAGA AVE, OAKLAND CA
Consultant Project Number 320-94.01
Consultant Name PACIFIC ENVIRONMENTAL GROUP, INC.
Address 1601 CIVIC CENTER DR, SUITE 202 SANTA CLARA CA 95050
Project Contact (Name) TERRY GYRION
(Phone) (408) 984-6536 (Fax Number) (408) 243-3911

Chevron Contact (Name) NANCY VUKELICH
(Phone) (415) 842-9525
Laboratory Name SUPERIOR ANALYTICAL
Laboratory Release Number 4600980
Samples Collected by (Name) TERRY GYRION
Collection Date 3/20-21/91
Signature [signature]

Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Chlorinated HC (8010)	Non Chlorinated HC (8020)	Total Lead (AA)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	AROM. VOLATILES (8240)						Remarks
C-1, 3.5'-5'	1	S	G			YES	X	X	X											
C-1, 8.5'-10'	1	"	↓			"	↓	↓	"					X						
C-1, 13.5'-15'	1	"	↓			"	↓	↓	"											
C-2, 3.5-5'	1	↓	↓			"	↓	↓												
C-2, 8.5-10'	1	↓	↓			"	↓	↓												
C-2, 13.5-15'	1	↓	↓			↓	↓	↓												
C-3, 8.5'-10'	1	↓	↓			↓	↓	↓												
C-3, 13.5'-15'	1	↓	↓			↓	↓	↓												
C-4, 3.5'-5'	1	↓	↓			↓	↓	↓												
C-4, 8.5'-10'	1	↓	↓			↓	↓	↓												
C-4, 13.5'-15'	1	↓	↓			↓	↓	↓												

Please initial: (initials)
Samples Stored in ice. Y
Appropriate containers. Y
Samples preserved.
VOA's without headspace.
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
[signature] Terry Gyrion	P.E.G.	3/26/91 1035	Tom Hood	EX-IT	3/26 1035
Tom Hood	EX-IT	3/26 1120	K. Thompson	EX-IT	3/26 12:23
K. Thompson	EX-IT	3/26 1306	Received For Laboratory By (Signature): Laura Zabell		3/26/91

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
(As Contracted) — circled

COC-1.DWG/11 90/HCH

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081 DHS #1332

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11658
CLIENT: Pacific Environmental Group
CLIENT JOB NO.: 320-94.01

DATE RECEIVED: 03/26/91
DATE REPORTED: 04/04/91

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11658- 1	C-1	03/25/91	04/01/91
11658- 2	C-2	03/25/91	04/01/91
11658- 3	C-3	03/25/91	04/01/91
11658- 4	C-4	03/25/91	04/01/91
11658- 5	Rinsate	03/25/91	04/01/91
11658- 6	Trip Blank	03/25/91	04/01/91

Laboratory Number:	11658 1	11658 2	11658 3	11658 4	11658 5
ANALYTE LIST	Amounts/Quantitation Limits (ug/L)				
OIL AND GREASE:	ND<5000	NA	NA	NA	NA
TPH/GASOLINE RANGE:	54	ND<50	ND<50	2700	ND<50
TPH/DIESEL RANGE:	ND<50	ND<50	ND<50	ND<50	NA
BENZENE:	0.7	1	ND<0.5	240	ND<0.5
TOLUENE:	ND<0.5	ND<0.5	ND<0.5	16	ND<0.5
ETHYL BENZENE:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
XYLENES:	2	2	0.5	350	ND<0.5

Laboratory Number:	11658 6
ANALYTE LIST	Amounts/Quantitation Limits (ug/L)
OIL AND GREASE:	NA
TPH/GASOLINE RANGE:	ND<50
TPH/DIESEL RANGE:	NA
BENZENE:	ND<0.5
TOLUENE:	ND<0.5
ETHYL BENZENE:	ND<0.5
XYLENES:	ND<0.5

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I · SAN FRANCISCO, CA 94124 · PHONE (415) 647-2081 DHS #1332

CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 11658

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/l = part per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 503E:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA-SW846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/l
Standard Reference: 02/07/91

EPA-SW846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/l
Standard Reference: 08/24/90

SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.5ug/l
Standard Reference: 01/28/91

ANALYTE	REFERENCE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Oil & Grease	04/02/91	10mg	92	5	50-125
Diesel	02/07/91	1000ug	100	7	80-120
Gasoline	08/24/90	200ng	85/85	0	63-111
Benzene	01/28/91	200ng	92/91	0.5	72-119
Toluene	01/28/91	200ng	95/93	1.6	70-116
Ethyl Benzene	01/28/91	200ng	99/98	0.5	73-119
Total Xylene	01/28/91	600ng	100/99	0.7	71-118

Richard Srna, Ph.D.
Cecilia G. Jongwon (for)
Laboratory Director

JT # 1140

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number #1740
Facility Address 6550 Moraga Oakland
Consultant Project Number 320-94.01
Consultant Name Pacific Environmental Group
Address 1601 Civic Ctr #202 Santa Clara
Project Contact (Name) Lainie Demian
(Phone) 408-984-6536 (Fax Number) 408-243-3911

Chevron Contact (Name) Nancy Yukelich
(Phone)
Laboratory Name Superior
Laboratory Release Number 4600980
Samples Collected by (Name) Tina Soenksen
Collection Date 3/25/91
Signature Tina Soenksen

Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Chlorinated HC (8010)	Non Chlorinated HC (8020)	Total Lead (AA)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	Remarks
C-1	3	W	G	14:00	Hcl	Y	X							
C-1	2			14:00	N.P.			X	X					
C-2	3			14:10	Hcl		X							
C-2	2			14:10	N.P.			X						
C-3	3			13:07	Hcl		X							
C-3	2			13:07	N.P.			X						
C-4	3			13:30	Hcl		X							
C-4	2			13:30	N.P.			X						
Rinsate	3				Hcl		X							
Trip Blank	2				Hcl		X							

Please initial. TG
Samples Stored in ice. Y
Appropriate containers. Y
Samples preserved. Y+N
VOA's without headspace. Y
Comments: Rinsate + trips have headspace. Samples OK

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Tina Soenksen	P.E.G.	3/26/91 1030	Tom Hood	EX-IT	3/26 1035
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Tom Hood	EX-IT	3/26 1102	K. Thompson	EX-IT	3/26-1223
Relinquished By (Signature)	Organization	Date/Time	Recieved For Laboratory By (Signature)		Date/Time
K. Thompson	EX-IT	3/26 1306	Tom Hood		3/26/91

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

COC-1.DWG/11 BO/HCH