

A Report Prepared for  
Shell Oil Company  
P. O. Box 4023  
Concord, California 94524

QUARTERLY TECHNICAL REPORT  
FIRST QUARTER 1990  
SHELL SERVICE STATION  
6039 COLLEGE AVENUE  
OAKLAND, CALIFORNIA

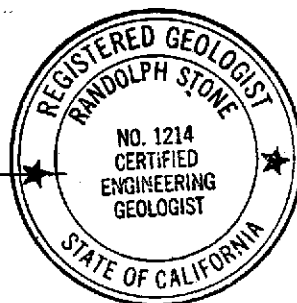
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HLA Job No. 4022,233.03

by

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April 13, 1990

## INTRODUCTION

This Quarterly Technical Report by Harding Lawson Associates (HLA) presents results of our continuing environmental investigation at and near the Shell Oil Company (Shell) service station at 6039 College Avenue in Oakland, California. The site location is shown on Plate 1. This report discusses the site history and investigation progress through the first quarter of 1990, along with anticipated activities for the second quarter of 1990.

## SUMMARY OF PREVIOUS WORK

A Shell service station has occupied this property since 1940. As shown on Plate 2, various sizes of underground fuel tanks have existed at different locations across the site. Table 1 summarizes the dates of construction, tank installation or removal, and current site inventories.

Shell retained HLA to perform a site assessment after an unauthorized release from an underground storage tank (UST). According to the report filed with the Alameda County Department of Environmental Health on September 6, 1989, the source of the release was a slight weep noted at the piping connection to the submersible pump for the tank holding premium gasoline.

HLA prepared a Work Plan for a soil and groundwater investigation that was submitted to the appropriate agencies in January 1990. We gathered information on site history from

construction plot plans dated 1940, 1957, and 1978 provided by Shell.

The station had a full service garage from 1940 to 1978. Plot plans indicate that until 1957, a waste oil tank was located adjacent to the old building, in the present location of the fuel tanks. The 1957 construction plot plan indicates an intent to replace the old waste oil tank with a larger tank, previously used to store fuel; however, no new location is indicated on the plan. The tank was most likely placed in the old excavation near the building, and removed when the present tanks were installed.

We also examined aerial photographs dated 1947, 1959, 1969, 1979, and 1988 in the offices of Pacific Aerial Surveys. We observed that since 1947, the majority of the area surrounding the site has been in commercial and residential use. Information obtained from the photographs regarding previous on-site locations of tanks, buildings, and canopies appeared to be consistent with data from the plot plans.

On November 8, 1989, we checked three existing backfill monitoring points for the presence of groundwater and free product; neither was present. The following total depths were measured:

<u>Monitoring Point</u>	<u>Depth (ft)</u>
OBS-1	8.75
OBS-2	11.44
OBS-3	4.68

Nine USTs within 1/4 mile of the Shell station are cited in the San Francisco Regional Water Quality Control Board (SFRWQCB) Hazardous Substances Container Information Program. These include four tanks at the Union 76 station, 6201 Claremont Avenue; four at the Chevron station, 5800 College Avenue; and one at Dreyer's Grand Ice Cream, 5929 College Avenue. The tank locations and contents are listed in Table 2.

#### ACCOMPLISHMENTS DURING THE FIRST QUARTER, 1990

In January 1990, six soil borings were advanced to depths of 25 feet, or the top of the saturated zone, at locations shown in Plate 3. The soil borings were drilled and soil samples taken to evaluate lithologies in the vadose zone and near the groundwater surface, and to evaluate the presence and limits of detectable concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPH). The borings were located in areas that were potential sources of hydrocarbons, as described below:

<u>Boring</u>	<u>Rationale</u>
B-1	Location of 1940 pump island
B-2	Location of 1940 and 1957 fuel tanks
B-3 and B-6	Location of former waste oil tank and present fuel tanks (near source)
B-4 and B-5	Location of 1957 pump islands and adjacent to present pump islands

The shallow subsurface materials consist of sandy lean clays and silts, with occasional thin silty sand and gravel lenses.

The sediments become saturated from 15 to 18 feet below land surface. The borings were grouted to the surface with a cement-bentonite grout.

Soil samples exhibiting the highest organic vapor readings were sealed and transported to an analytical laboratory, under chain-of-custody documentation, for analysis of BTEX and TPH as gasoline, using EPA Test Methods 8020 and 8015. Soil samples collected near the former waste oil tank were also analyzed for TPH as diesel fuel and motor oil (EPA Test Method 8015); oil and grease (SM 503 D&E); halogenated volatile organic compounds (VOCs) (EPA Test Method 8010); and cadmium, chromium, zinc, and lead (EPA TEST Methods 6010 and 7421). Results of analyses are presented in Table 3.

Because the results of soil analyses indicated high concentrations of petroleum hydrocarbons in soils near the groundwater surface (B-3 and B-6), a groundwater investigation was implemented in early February 1990. Four monitoring wells (MW-1 through MW-4) were installed at locations shown on Plate 4, and completed to a depth of 25 feet. The borehole for MW-1 was advanced to a depth of 50 feet to further characterize the shallow stratigraphy.

Soil samples were collected from the downgradient well borings (MW-2, -3, and -4) at depths of approximately 10, 15, and 20 feet. These samples were analyzed for BTEX and for TPH as gasoline, diesel fuel, and motor oil to further delineate the lateral and vertical extent of soil contamination. Soil samples

collected from well borings near the former waste oil tank location (MW-3 and MW-4) were also analyzed for polychlorinated biphenyls (PCBs) (EPA Test Method 8080). Free-phase hydrocarbons were observed at a depth of 20 feet during drilling of MW-4. Results of analyses on these soil samples are presented in Table 4.

An HLA geologist logged all borings according to the Unified Soil Classification System. Drill cuttings were transported by Petroleum Waste, Inc., a licensed waste hauler and were disposed of at a Class I landfill.

Water levels were measured to the nearest 0.01 foot and the wells were surveyed for vertical elevations. A potentiometric contour map is presented on Plate 5. The wells were developed by removing approximately seven well volumes.

The wells were sampled after purging three well volumes and water samples were submitted for laboratory analysis of BTEX; TPH as gasoline, diesel fuel, and motor oil; organic lead (CA LUFT Manual 12/87); and ethylene dibromide (EDB) (EPA Test Method 8010). Results are presented in Table 5. No free product was observed in the monitoring wells.

## DISCUSSION OF RESULTS

Hydrogeology

The shallow lithology at the site is summarized below:

<u>Soil</u>	<u>Approximate Depth (ft)</u>
Sandy silt	0 to 10
Sandy clay	10 to 15
Sandy silt	15 to 25
Interbedded clays, silts, and sand	25 to 50

Sediments are saturated below a depth of approximately 15 to 18 feet. Based on the February 1990 groundwater levels, general groundwater flow direction appears to be south southwest.

Chemical Results

In soil samples from the borings, total BTEX concentrations were either not detected or were present at less than 15 parts per million (ppm). In the samples from Borings B-3 and B-6, concentrations of TPH as gasoline, diesel fuel, and motor oil ranged between 71 and 110,000 ppm. Total oil and grease levels in those samples varied from 91 to 1,100 ppm. No halogenated VOCs were detected. Metals tested were either not detected or appeared in concentrations within background levels for typical soils\*.

No petroleum hydrocarbons were detected in soil samples from MW-2, except for 1.1 ppm TPH as diesel fuel in the sample from 20.5 feet. Samples taken from MW-3 at 10 and 20.5 feet had low

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\* Kabat-Pendias, A. and H. Pendias, 1984. Trace Elements in Soils and Plants. CRC Press, Inc., Boca Raton, Florida.

or no detectable concentrations of BTEX or TPH as motor oil; concentrations of TPH as gasoline and diesel fuel were below 30 ppm. The soil sample from 10.5 feet in MW-4 had no detectable concentrations of petroleum hydrocarbons except for diesel fuel, which appeared at 1.2 ppm. The sample from 15.5 feet in MW-3, however, and the samples from 15.5 and 20.5 feet in MW-4 contained considerable concentrations of TPH as gasoline, diesel fuel, and motor oil. Of the TPH range measured, motor oil registered highest in those two borings, varying from 1,800 ppm in MW-3 to 46,000 ppm in MW-4.

Neither lead nor EDB were detected in groundwater samples. Samples from MW-2 and MW-4 contained no detectable concentrations of BTEX. Water from MW-1 contained no benzene and less than 5 parts per billion (ppb) of remaining BTEX compounds, but showed TPH concentrations ranging from 95 to 770 ppb. Water from MW-2 contained 560 ppb TPH as motor oil. The MW-3 sample contained 320 ppb of benzene and concentrations of TPH ranging up to 10,800 ppb. The total TPH concentration in the sample from MW-4 was 4,200 ppb.

#### ANTICIPATED ACTIVITIES FOR THE SECOND QUARTER, 1990

During the second quarter of 1990, HLA intends to perform the following activities at the subject Shell service station:

- Install two off-site monitoring wells to evaluate the lateral and vertical extent of dissolved petroleum hydrocarbons in the groundwater



- Sample new and existing monitoring wells for BTEX and for TPH as gasoline, diesel fuel, and motor oil.
- Conduct aquifer testing to further characterize the permeable sediments.

Proposed monitoring well locations are shown on Plate 4. We will place the two wells directly downgradient of the former waste oil tank and the present fuel tank locations.

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Table 1. Site History and Tank Inventory

<u>Year Constructed</u>	<u>Underground* Tanks</u>	<u>Contents</u>	<u>Structures*</u>
1940	3 1,000-gallon 1 550-gallon 1 110-gallon	Leaded gasoline Leaded gasoline Waste oil	Full service garage and one pump island
1957	3 5,000-gallon 1 1,000-gallon	Leaded gasoline Waste oil	Full service garage and two pump islands with canopies
Unknown but between 1957 and 1978	1 8,000-gallon	Leaded or Unleaded gasoline	
1978	3 10,000-gallon fiberglass	Unleaded gasoline	Cashier counter and Mini- Mart, two pump islands with canopies

\* Approximate locations shown on Plate 2

Table 2. Underground Storage Tanks  
within 1/4 Mile of  
6039 College Avenue Shell

<u>Location</u>	<u>Number of Tanks</u>	<u>Material in Tanks</u>
1. Union 76 6201 Claremont Avenue	4	Unleaded and Premium unleaded Gasoline Waste oil Oil/water Mix
2. Chevron 5800 College Avenue	4	Unknown
3. Dreyers Grand Ice Cream	1	Diesel fuel

Table 3 Soil Analytical Results - Borings  
 Shell 6039 College Avenue  
 Concentrations in Parts Per Million (ppm)

Sample Depth	B-1-22.5'	B-2-18'	B-2-24'	B-3-19'	B-3-21'	B-4-18.5'	B-4-25'	B-5-22'	B-5-23'	B-6-19.5'	B-6-22.5'
Approx. GW Depth	21'	22'	22'	18'	18'	20'	20'	19'	19'	18'	18'
Sample Date	01/04/90	01/05/90	01/05/90	01/05/90	01/05/90	01/04/90	01/04/90	01/04/90	01/04/90	01/05/90	01/05/90
<hr/>											
Parameter /Method											
Benzene	ND @ 0.05	0.62	ND @ 0.05	0.24	0.19	0.57	ND @ 0.05	ND @ 0.05	ND @ 0.05	0.28	ND @ 0.05
Toluene	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.18	ND @ 0.1	0.11	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1
Ethylbenzene	ND @ 0.1	0.48	ND @ 0.1	4.1	0.53	0.65	ND @ 0.1	ND @ 0.1	ND @ 0.1	1.3	ND @ 0.1
Xylenes	ND @ 0.1	1.2	ND @ 0.1	9.8	0.68	1.3	ND @ 0.1	ND @ 0.1	ND @ 0.1	2.1	ND @ 0.1
/EPA 802											
TPH as Gasoline	8.1	130	1.8	610	71	170	ND @ 1	ND @ 1	4.4	260	ND @ 1
TPH as Motor Oil	---	---	---	110000	14000	---	---	---	---	12000	320
TPH as Diesel	---	---	---	5900	750	---	---	---	---	600	16
/EPA 8015											
Oil and Grease /SM 503 D&E	---	---	---	810	380	---	---	---	---	1100	91
Halogenated VOCs /EPA 8010	---	---	---	ND @ 0.5 to 2.5	ND @ 0.5 to 0.25	---	---	---	---	ND @ 0.05 to 0.25	ND @ 0.005 to 0.025
Cadmium	---	---	---	ND @ 0.5	ND @ 0.5	---	---	---	---	ND @ 0.5	ND @ 0.5
Chromium	---	---	---	48	61	---	---	---	---	86	73
Zinc	---	---	---	51	54	---	---	---	---	52	60
/EPA 6010											
Lead/EPA 7241	---	---	---	13	7.6	---	---	---	---	8.1	9.2

--- = Analysis not performed on sample  
 ND = Not present above the stated detection limit

Table 4. Soil Analytical Results - Well Borings  
 Shell 6039 College Avenue, Oakland  
 Concentrations in parts per million (ppm)

Sample/Depth	MW-2-11'	MW-2-15.5'	MW-2-20.5'	MW-3-10'	MW-3-15.5'	MW-3-20.5'	MW-4-10.5'	MW-4-15.5'	MW-4-20.5'
Approx. GW Depth	17'	17'	17'	16'	16'	16'	17'	17'	17'
Sample Date	2/08/90	2/08/90	2/08/90	2/07/90	2/07/90	2/07/90	2/07/90	2/07/90	2/07/90
Parameter /Method									
Benzene	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05	1.1	ND @ 0.05	ND @ 0.05	0.31	0.06
Toluene	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.7	ND @ 0.1	ND @ 0.11	0.34	ND @ 0.1
Ethylbenzene	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	3.1	ND @ 0.1	ND @ 0.1	0.92	0.46
Xylene	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.11	1.9	ND @ 0.1	ND @ 0.1	2.6	0.57
/EPA 8020									
TPH as Gasoline	ND @ 1	ND @ 1	ND @ 1	12	230	28	ND @ 1	140	72
TPH as Motor Oil	ND @ 10	ND @ 1	ND @ 10	ND @ 10	1,800	ND @ 10	ND @ 1	6,400	46,000
TPH as Diesel	ND @ 1	ND @ 1	1.1	4.4	200	9.9	1.2	61	2200
/EPA 8015									
PCBs/EPA 8080	---	---	---	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05

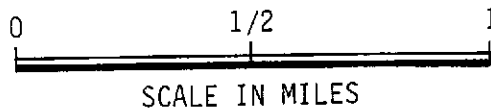
--- = Analysis not performed on sample  
 ND = Not present above the stated detection limit

Table 5 Groundwater Analytical Results  
 Shell 6039 College Avenue, Oakland  
 Concentrations in Parts Per Billion (ppb)

Sample	MW-1	MW-2	MW-3	MW-3-D	MW-4	Trip Blank
Sample Date	2/13/90	2/13/90	2/13/90	2/13/90	2/13/90	2/13/90
Parameter /Method						
Benzene	ND @ 0.3	ND @ 0.3	320	380	ND @ 0.3	ND @ 0.3
Toluene	0.67	ND @ 0.3	29	31	ND @ 0.3	ND @ 0.3
Ethylbenzene	0.37	ND @ 0.3	110	160	ND @ 0.3	ND @ 0.3
Xylenes	3.2	ND @ 0.3	33	57	ND @ 0.3	ND @ 0.3
/EPA 8020						
TPH as Gasoline	95	ND @ 30	4700	4600	ND @ 30	ND @ 30
TPH as Motor Oil	770	560	3000	8300	3000	---
TPH as Diesel	650	ND @ 50	3100	4500	1200	---
/EPA 8015						
Organic Lead/CA LUFT Manual 12/87	ND @ 50	ND @ 50	ND @ 50	ND @ 50	ND @ 50	---
Ethylene Dibro- mide/EPA 8010	ND @ 0.5	ND @ 0.5	ND @ 0.5	ND @ 0.5	ND @ 0.5	---

--- = Analysis not performed on sample

ND = Not present above the stated detection limit



PLATE

**1**



**Harding Lawson Associates**  
Engineering and  
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**Site Location Map**  
Shell Service Station  
6039 College Avenue  
Oakland, California

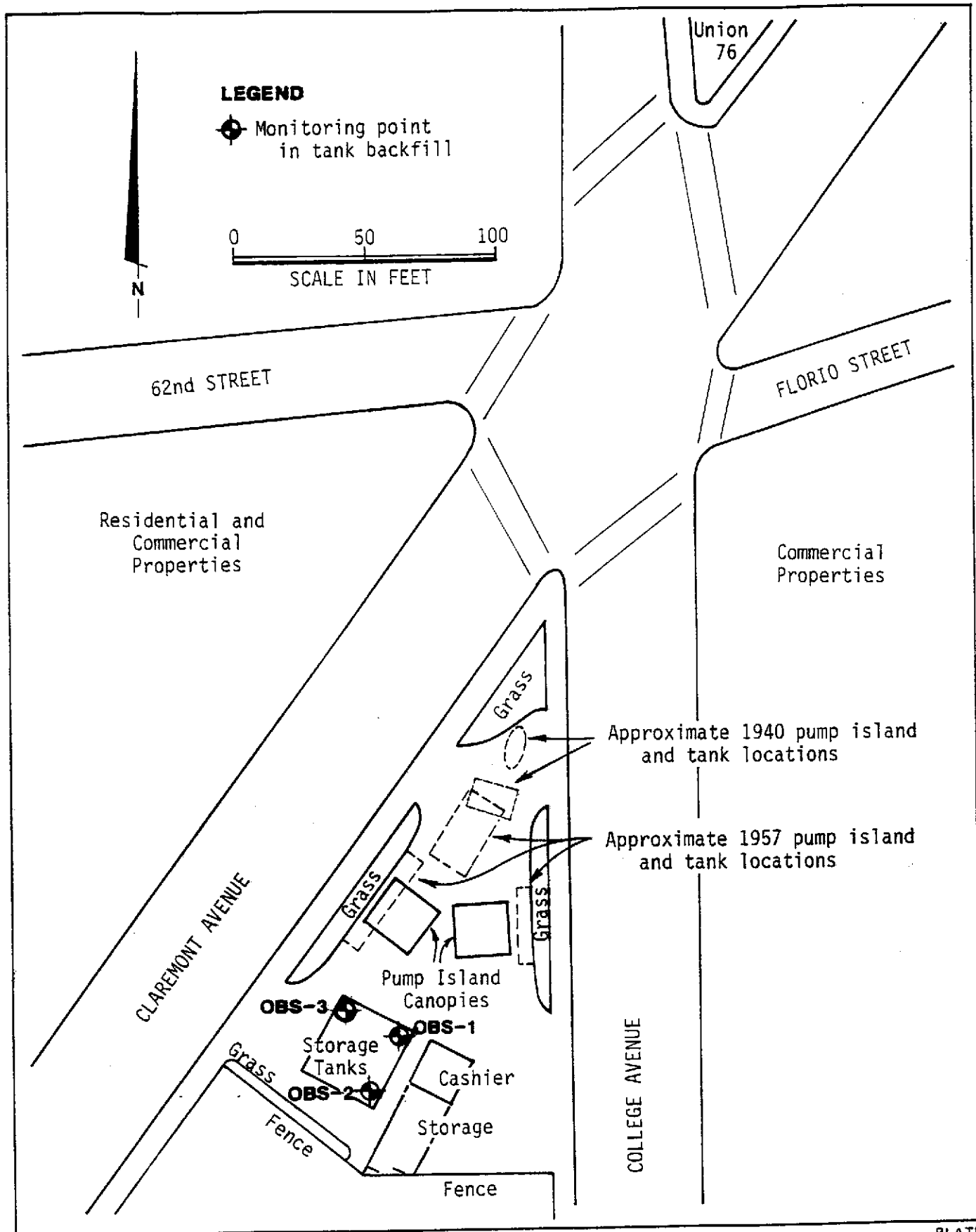
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DATE 11/89

REVISED DATE





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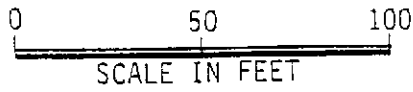
**Site Plan Map**  
 Shell Service Station  
 6039 College Avenue  
 Oakland, California

PLATE  
**2**

DRAWN KH	JOB NUMBER 4022,233.03	APPROVED <i>[Signature]</i>	DATE 11/89	REVISED DATE
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**LEGEND**

⊗ Proposed Boring Location



N

Union  
76

62nd STREET

FLORIO STREET

Residential and  
Commercial  
Properties

Commercial  
Properties

CLAREMONT AVENUE

COLLEGE AVENUE

Grass

B-1

B-2

B-5

B-4

B-3

B-6

Storage  
Tanks

Cashier

Storage

Pump Island  
Canopies

Fence

Fence

Grass

Grass

PLATE



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**Soil Boring Locations**  
Shell Service Station  
6039 College Avenue  
Oakland, California

**3**

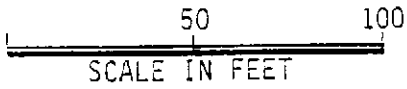
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DATE 11/89 REVISED DATE

**LEGEND**

- ⊕ Monitoring well location
- Proposed monitoring well location



N

Union  
76

62nd STREET

FLORIO STREET

Residential and  
Commercial  
Properties

Commercial  
Properties

CLAREMONT AVENUE

COLLEGE AVENUE

Grass  
MW-1

Grass

Grass

Pump Island  
Canopies

MW-3

Storage  
Tanks

Cashier

MW-2

Storage

MW-4

Fence

●

●



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**Monitoring Well Locations**

Shell Service Station  
6039 College Avenue  
Oakland, California

PLATE

**4**

DRAWN  
KH





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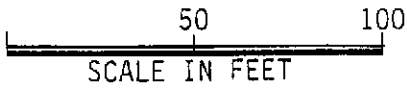
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**LEGEND**

-  Monitoring Well Location
-  178.2' Approximate Potentiometric Surface Elevation
-  178.0' Potentiometric Surface Contour
-  General Groundwater Flow Direction



N

Union  
76

62nd STREET

FLORIO STREET

Residential and  
Commercial  
Properties

Commercial  
Properties

CLAREMONT AVENUE

COLLEGE AVENUE

Grass

178.2'

MW-1

178.0'

Grass

177.5'

Pump Island  
Canopies

MW-3

176.7'

Storage  
Tanks

Cashier

MW-2

177.4'

Storage

MW-4

176.6'

Fence


177.0'



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**Potentiometric Surface  
Shallow Sediments - February 15, 1990**  
6039 College Avenue  
Oakland, California

PLATE  
**5**

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