R02853

Denis L. Brown

Shell Oil Products US
HSE – Environmental Services
20945 S. Wilmington Ave.
Carson, CA 90810-1039
Tel (707) 865 0251
Fax (707) 865 2542
Email denis.l.brown@shell.com

July 6, 2005

Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: Subsurface Investigation Work Plan
Shell-branded Service Station
506-510 International Boulevard (510 East 14th Street)
Oakland, California
SAP Code 135695
Incident No. 97601734

Dear Mr. Wickham:

Attached for your review and comment is a copy of the *Subsurface Investigation Work Plan* for the above referenced site. Upon information and belief, I declare, under penalty of perjury, that the information contained in the attached document is true and correct.

If you have any questions or concerns, please call me at (707) 865-0251.

Sincerely,

Denis L. Brown
Sr. Environmental Engineer

CAMBRIA

July 6, 2005

Mr. Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Subsurface Investigation Work Plan**
Shell-branded Service Station
506-510 International Boulevard (510 East 14th Street)
Oakland, California
Incident # 97601734
Cambria Project # 247-0898-006

Dear Mr. Wickham:

On behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell), Cambria Environmental Technology, Inc. (Cambria) has prepared this *Subsurface Investigation Work Plan* in response to the May 26, 2005 letter from the Alameda County Health Care Services Agency (ACHCSA). To assess the extent of hydrocarbon-impacted soil and to determine if contaminated groundwater is present at the site, Cambria proposes a soil and discrete-depth groundwater investigation to vertically profile the site's lithology and to determine the nature and extent of contamination. Cambria will also use information collected during this investigation to determine screened intervals that will provide the most accurate monitoring of contaminant concentrations at any groundwater monitoring wells subsequently deemed necessary. Also, as requested, additional reports and documents found in Shell's and Cambria's files are attached.

SITE CHARACTERISTICS AND HISTORY

Site Description: The site is an active Shell-branded service station located at the International Boulevard (formerly East 14th Street) and 5th Avenue intersection in Oakland, California (Figures 1 and 2). City property records indicate the parcel's address is listed as 506 14th Street in the County Assessor's records. The area surrounding the site is of mixed commercial and residential use. The service station layout includes a station building, two dispenser islands, and a gasoline underground storage tank (UST) complex (Figure 2).

1989 through 1993 Quarterly Site Reports: Attachment A presents copies of quarterly reports that Weiss Associates (Weiss) of Emeryville, California submitted on behalf of Shell to the California Regional Water Quality Control Board between September 1989 and October 1993.

Cambria Environmental Technology, Inc.

5900 Hollis Street
Suite A
Emeryville, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170

1990 Subsurface Investigation: On September 19, 1990, Weiss submitted a letter to Shell presenting a scope of work for a subsurface investigation to determine if a 550-gallon underground waste oil storage tank was still present at the site. The proposed scope of the investigation included removal of a concrete pad and probing of the subsurface. Weiss states in the letter that Shell would be notified if the tank was present and that a scope of work for its removal would be submitted. Neither of these documents has been located. No other documents in Shell's or Cambria's files indicate whether the proposed investigation was conducted. A copy of the scope of work letter is included in Attachment A.

1993 Tank Excavation Sampling: On March 30, 1993, the 550-gallon underground waste oil storage tank was removed from the site. No holes or leaks were identified during the removal. Weiss collected two soil samples from the floor of the excavation under the direction of an Alameda County Department of Environmental Health inspector. The samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), benzene, toluene, ethylbenzene, and xylenes (BTEX), and oil and grease. There were no detections of the analytes at concentrations in excess of the laboratory reporting limits in either sample. Details of the excavation sampling are included in Weiss' August 17, 1993 *Tank Excavation Sampling* report (included in Attachment A). Weiss concluded that no hydrocarbons had been released from the waste oil tank and requested closure. An August 26, 1993 letter from ACHCSA to Shell stating that no further site remediation was necessary at that time is also included in Attachment A.

1998 Upgrade Site Inspection: On March 24, 1998, Cambria completed an inspection of the turbine sumps and tank pit areas at the site during a fuel-system upgrade that added secondary containment to the turbine sumps. No field indications of hydrocarbons, such as staining or odor, were observed during the site visit. Therefore, no sampling was performed at the site and no additional investigation of the turbine sump area was determined to be necessary. Cambria's April 9, 1998 *1998 Upgrade Site Inspection Report* presents investigation details. An unsigned copy of the report is included in Attachment A.

February 2004 Well Survey: In February 2004, at Shell's request, Cambria prepared a well receptor survey of the site vicinity. No potential receptor wells were identified within a ½-mile radius of the site (Figure 1).

2004 Upgrade Activities: Fuel dispensers at this Shell-branded service station were upgraded in late June through mid-July 2004 by Paradiso Mechanical, Inc. (Paradiso) of San Leandro, California. Paradiso upgraded under-dispenser containment at the dispensers and installed enhanced vapor recovery equipment and improved sumps on the UST fuel fill ports. At the direction of the City of Oakland Fire Services Agency, Cambria collected soil samples within 1 to 2 feet of native soil beneath each dispenser and at the 90-degree elbows of exposed product piping on July 22, 2004 (Figure 2). Laboratory analysis of the samples indicated the presence of

hydrocarbons in soils in and around the dispenser locations. As a result, Shell filed an Underground Storage Tank Unauthorized Release Report Form with the City of Oakland Fire Department's Office of Emergency Services on July 29, 2004. Cambria's October 4, 2004 *Dispenser and Piping Upgrade Sampling Report* includes details of the upgrade sampling.

PROPOSED SCOPE OF WORK

Cambria proposes to advance seven borings using direct-push technology to investigate the vertical and lateral extent of petroleum hydrocarbons in soil and groundwater beneath the site (Figure 2). Cambria proposes advancing five borings in the assumed downgradient direction and two borings in the assumed upgradient direction from the existing UST complex and dispensers. Based on topography and the location of the nearby Oakland Inner Harbor, it is anticipated that groundwater flows in a southeasterly to westerly direction (Figure 1). Upon ACHCSA approval of this work plan, Cambria will complete the following tasks:

Permits: Cambria will obtain required permits for boring advancement.

Site Safety Plan: Cambria will prepare a comprehensive site safety plan to protect site workers. The plan will be kept on site during field activities and signed by each site worker.

Utility Clearance: Cambria will mark proposed drilling locations, and the locations will be cleared through Underground Service Alert prior to drilling. Additionally, a private utility locator will be used to identify subsurface obstacles to drilling.

Soil Borings: Cambria proposes to advance seven borings to further investigate the vertical and lateral extent of petroleum hydrocarbons in groundwater beneath the site. Assuming the absence of overhead and subsurface obstructions, Cambria will advance borings at the approximate locations shown on Figure 2. Cambria proposes to advance an initial soil boring at each location to approximately 25 feet below grade (fbg), using direct-push technology. Under the supervision of a California registered geologist or civil engineer, a Cambria geologist will direct the borings. Borings will be logged continuously to provide detailed lithologic profiles. Soil samples will be collected for laboratory analysis every 5 feet above the water table. A second boring will be advanced adjacent to the initial boring using direct-push technology and a 'dual tube' sampling system to collect discrete grab groundwater samples, where sufficient groundwater is available, at 5-foot intervals from first-encountered groundwater to approximately 25 fbg. Between groundwater sampling events, drill rods and the stainless steel bailer used to collect groundwater samples will be decontaminated to prevent cross contamination from one zone to another. Upon sampling completion, the borings will be grouted from the bottom to the surface with neat Portland cement and surfaced to match the existing grade. Soil and groundwater samples will be

transported to a State-of-California-approved analytical laboratory for chemical analysis. Cambria's standard field procedures for soil borings are presented as Attachment B

A Cambria geologist will supervise the borings, and borings will be continuously logged to provide detailed lithologic profiles. Soil samples for laboratory analysis will be retained in the Geoprobe® liner and will be covered on both ends with Teflon sheets and plastic end caps. Groundwater samples will be collected with disposable bailers and transferred into vials containing hydrochloric acid preservative with no head space. Soil and groundwater samples will be labeled, entered onto a chain-of-custody record, and placed into a cooler with ice for transport to a State-certified laboratory for analysis.

Chemical Analyses: A State-approved analytical laboratory will analyze soil and groundwater samples for TPHg, BTEX, methyl tertiary butyl ether, tert-butyl alcohol, di-isopropyl ether, ethyl tert butyl ether, and tert amyl methyl ether using EPA Method 8260.

Report Preparation: Within 60 days following the receipt of analytical results from the laboratory, Cambria will prepare a written report which will include field procedures, laboratory results, boring logs, conclusions and recommendations.

SCHEDULE

Upon receiving written work plan approval, Cambria will acquire permits and schedule field activities. An investigation report will be submitted approximately 60 days after completing the field activities.

CLOSING

If you have any questions regarding the scope of work outlined in this work plan, please call David Gibbs at (510) 420-3363.

Sincerely,
Cambria Environmental Technology, Inc.

David M. Gibbs, P.G.
Project Geologist

Matthew W. Derby, P.E.
Senior Project Engineer

Figures: 1 - Site Vicinity /Well Survey Map
2 - Soil and Groundwater Sample Location Map

Attachments: A - Historical Reports and Correspondence
B - Standard Field Procedures for Geoprobe® Soil and Groundwater Sampling

cc: Denis Brown, Shell Oil Products US, 20945 S. Wilmington Ave., Carson, CA 90810

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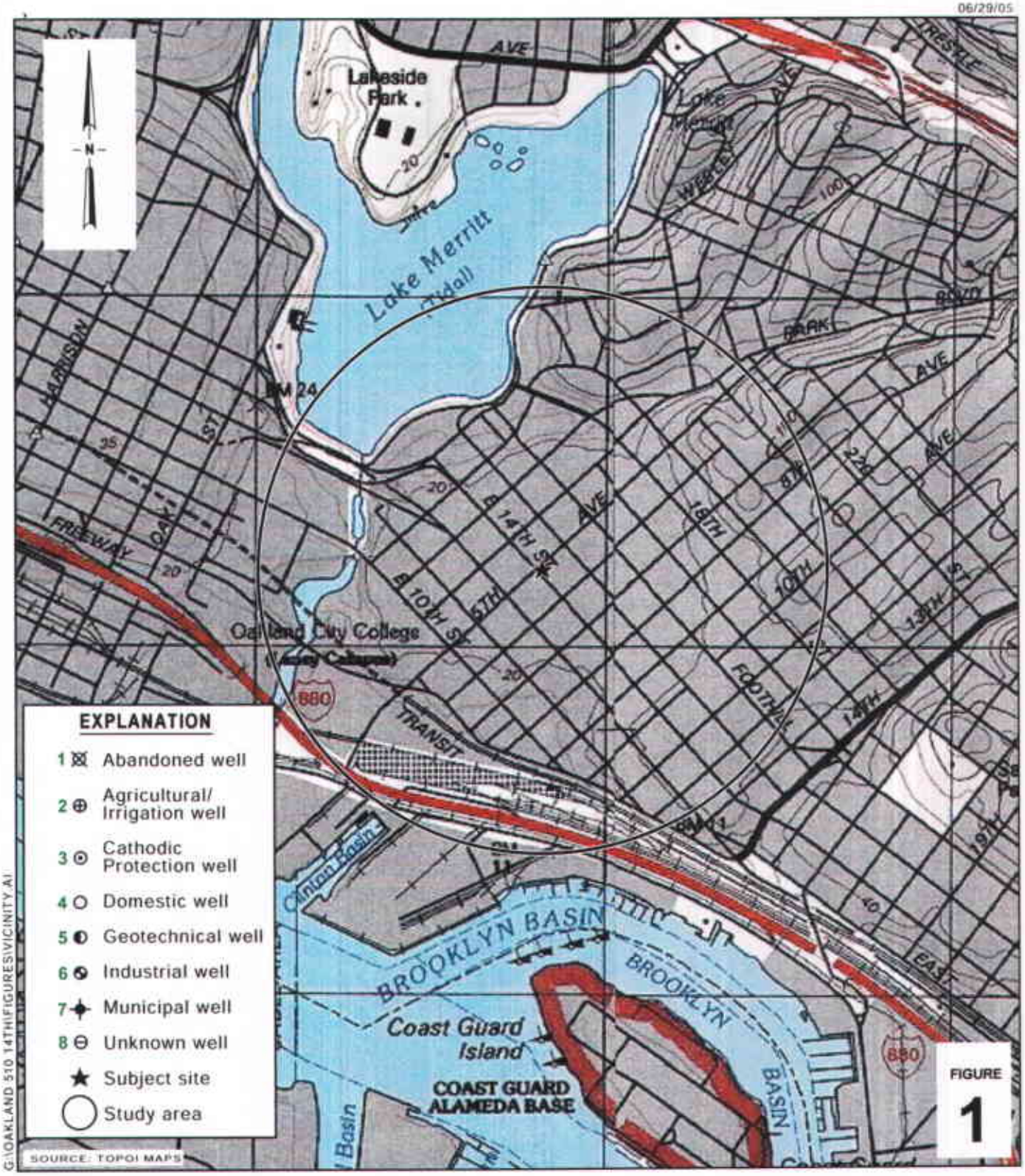
06/29/05



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0 1/8 1/4 1/2 1

SCALE : 1" = 1/4 MILE

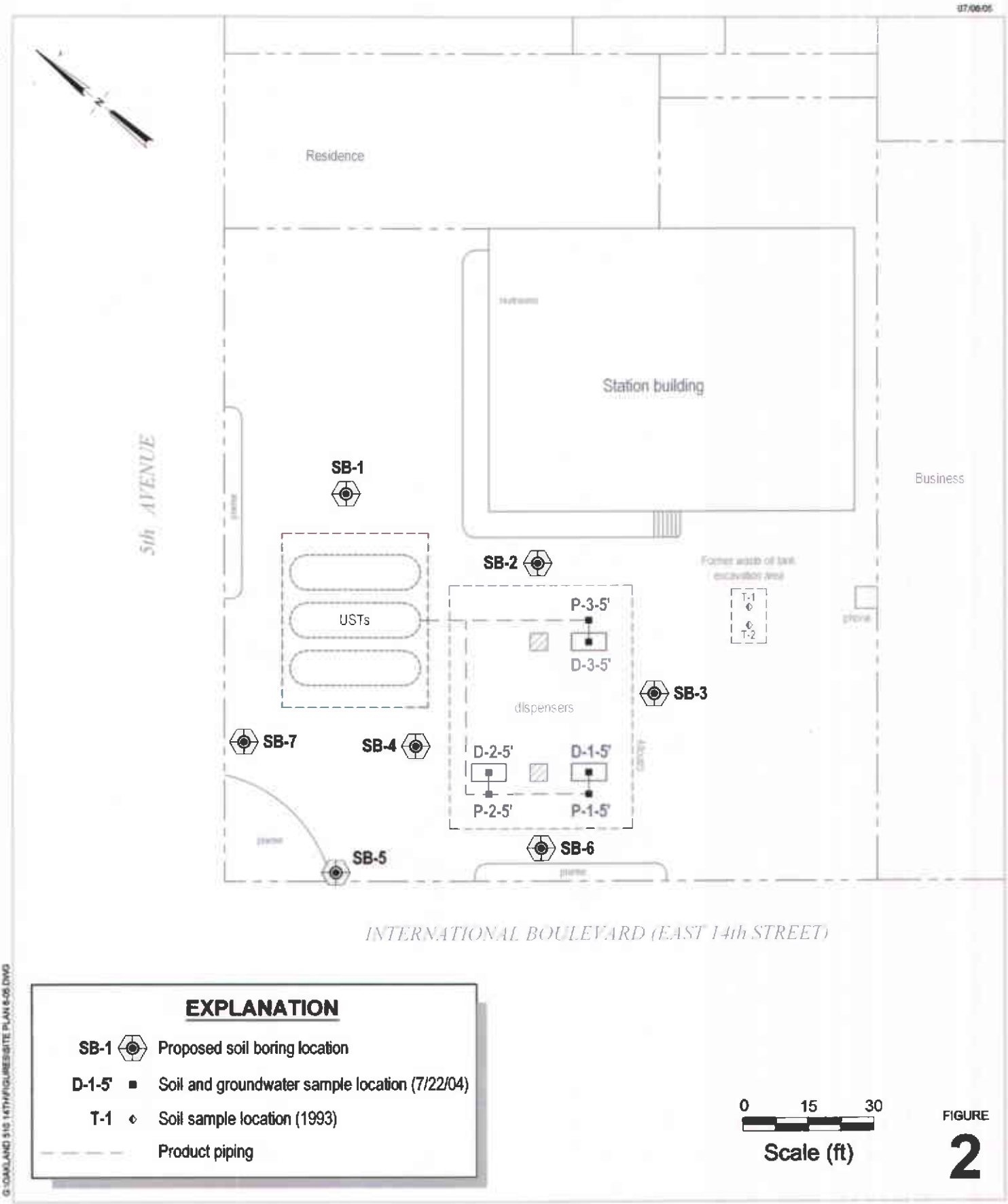
Shell-branded Service Station

506-510 International Boulevard (510 E. 14th St.)
Oakland, California

Site Vicinity/Well Survey Map

(1/2 Mile Radius)

CAMBRIA



EXPLANATION

- SB-1 — Proposed soil boring location
- D-1-5' — Soil and groundwater sample location (7/22/04)
- T-1 — Soil sample location (1993)
- Product piping

0 15 30

Scale (ft)

FIGURE 2

Shell-branded Service Station
506-510 International Boulevard (510 E. 14th St.)
Oakland, California

CAMBRIA

Soil and Groundwater Sample Location Map

ATTACHMENT A

Historical Reports and Correspondence

204-5508-60

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: September 11, 1989

Service Station WIC Number:	204-5508-60
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Researched Shell Oil, tank contractor, and Agency files.

Actions planned for next three months:

Prepare third quarter 1989 monitoring report. Submit Phase 1 recommendations to achieve closure.

Soil Contamination defined? Y\N	N
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Oakland, California.

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: June 15, 1990

Service Station WIC Number:	20455086007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

No action in last three months.

Actions planned for next three months:

Prepare and submit work plan and begin investigation.

Soil Contamination defined? Y\N	N
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: September 17, 1990

Service Station WIC Number:	20455086007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

No action in last three months.

Actions planned for next three months:

Prepare and submit work plan and begin subsurface investigation.

Soil Contamination defined? Y\N	N
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

WEISS ASSOCIATES

Fax: 415-547-5043 Phone: 415-547-5420

5500 Shellmound Street, Emeryville, CA 94608

91 work

September 19, 1990

ENVIRONMENTAL
SEP 25 1990
ENGINEERING

Re: Shell Service Station
WIC #204-5508-6007
510 East 14th Street
Oakland, California
WA Job #81-421-02

Dear Mr. Hayes:

This letter presents Weiss Associates (WA) Scope of Work (SOW) for a subsurface investigation of a possible former waste oil tank excavation at the Shell service station at 510 East 14th Street in Oakland, California (Figure 1). Although Shell engineers indicate that a waste oil tank may have been removed from this site within the last five years, no record of a waste oil tank removal at the site is available in Shell files. In addition, none of the Shell tank removal contractors recall a waste oil tank removal. It is, therefore, unclear whether the waste oil tank was removed. The objective of this investigation is to determine whether or not the waste oil tank has been removed from the site. Presented below are a site history summary and an outline of our proposed SOW.

SITE HISTORY

The site is currently an operating Shell convenience store/retail gasoline station. Three 10,000-gallon underground fuel tanks were removed in September 1989 and replaced with new tanks. The only information available to WA regarding the waste oil tank are Shell site engineering plans dated June 18, 1971 and July 24, 1984. The plans show a 550-gallon waste oil tank covered by a 10' x 35' concrete pad. Currently on-site is a 10' x 35' concrete pad at the location pictured on the site plans. The pad contains no visible holes or patches.

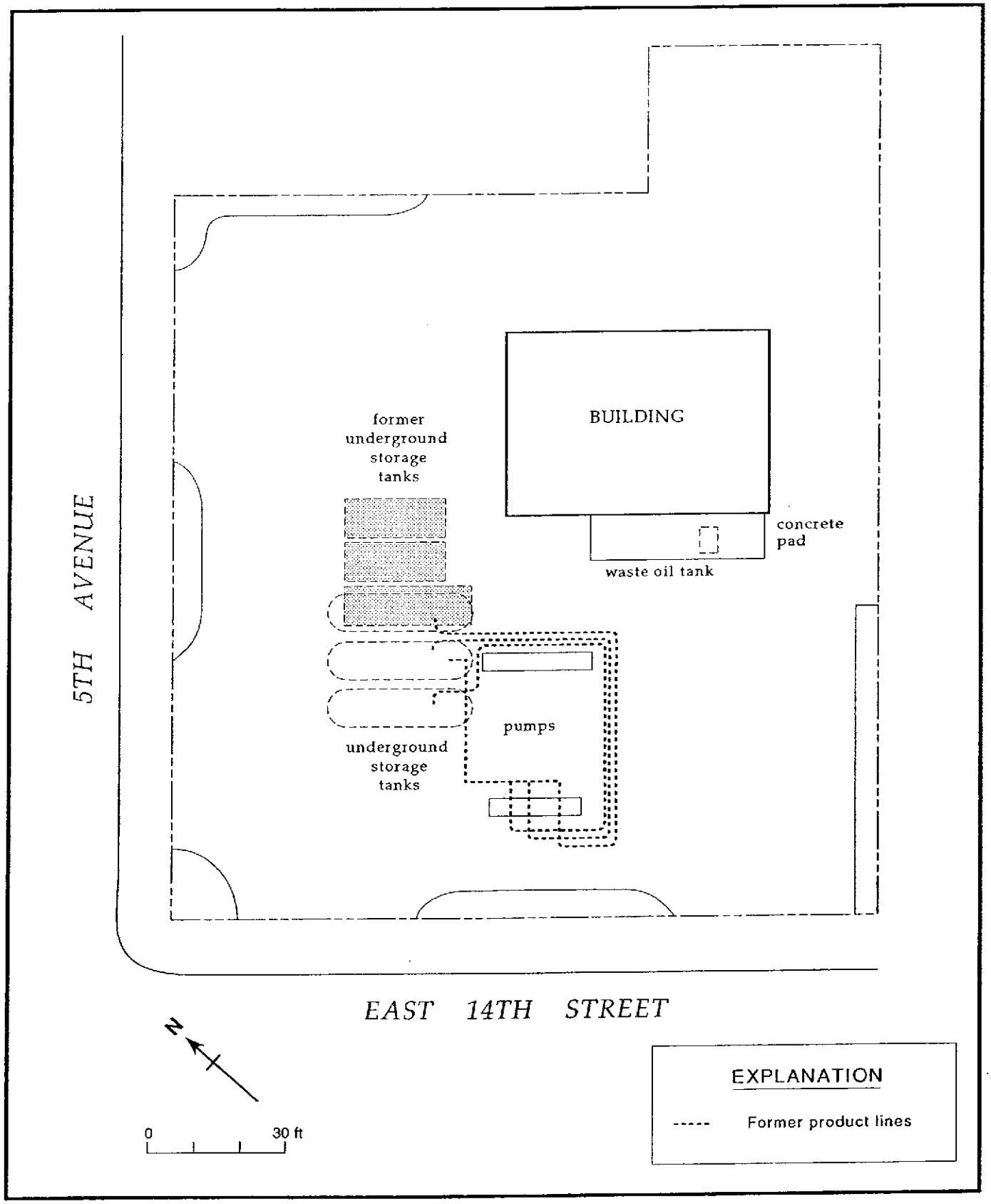


Figure 1. Site Base Map - Shell Service Station, WIC #204-5508-6007, 510 East 14th Street, Oakland, California

9/19/89

SCOPE OF WORK

To determine whether or not the waste oil tank was removed from the site, WA will cut through the existing concrete pad in four areas above the probable tank location and probe the material beneath the pad to a depth of four feet. We will also inspect the area for evidence of a remote fill pipe. If we are unable to find the fill pipe, we will probe the excavation further to try to locate the fill pipe. We will use this approach rather than geophysical exploration for the tank due to the lower cost and higher level of certainty of direct probing. If the tank is present, we will notify you in writing. If you choose to remove the tank, we will be pleased to submit a SOW to Shell for the task removal and for a subsurface investigation of the soil and ground water beneath the waste oil tank excavation.

We appreciate this opportunity to provide hydrogeologic consulting services to Shell and trust that this SOW meets your needs. Please feel free to call if you have any questions.

Sincerely,
Weiss Associates

Eleanor M. Hill
Senior Staff Geologist

Joseph P. Theisen EMH

Joseph P. Theisen, R.G.
Senior Project Hydrogeologist

EMH/JPT:jg
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OTK

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: December 17, 1990

Service Station WIC Number:	20455086007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Submitted monthly status reports and quarterly Calwater report.

Actions planned for next three months:

Prepare and submit work plan and begin subsurface investigation.

Soil Contamination defined? Y\N	N
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: December 17, 1991

Service Station WIC Number:	20455086007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Submitted monthly status reports.

Actions planned for next three months:

Update Shell site status documents.

Soil Contamination defined? Y\N	N
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: April 16, 1992

Service Station WIC Number:	204-5508-6007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Submitted quarterly status report.

Actions planned for next three months:

Update Shell site status documents.

Soil Contamination defined? Y\N	N
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: June 25, 1992

Service Station WIC Number:	204-5508-6007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Submitted quarterly status report.

Actions planned for next three months:

Update Shell site status documents.

Soil Contamination defined? Y\N	N
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: September 17, 1992

Service Station WIC Number:	204-5508-6007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Submitted quarterly status report.

Actions planned for next three months:

Update Shell site status documents.

Soil Contamination defined? Y\N	NA
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

DTK

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: April 9, 1993

Service Station WIC Number:	204-5508-6007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Submitted quarterly status report.

Actions planned for next three months:

Excavate waste oil tank, collect and analyze soil samples and submit tank removal report. Update Shell site status documents.

Soil Contamination defined? Y\N	NA
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: May 20, 1993

Service Station WIC Number:	204-5508-6007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Excavated waste oil tank. Collected and analyzed soils samples. Submitted tank removal report. Submitted quarterly status report.

Actions planned for next three months:

Update Shell site status documents.

Soil Contamination defined? Y\N	NA
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

Weiss Associates
Environmental and Geologic Services
5500 Shellmound Street, Emeryville, CA 94608-2411 Fax: 510-547-5043 Phone: 510-450-6000

August 17, 1993

Jennifer Eberle
Alameda County Department
of Environmental Health
80 Swan Way
Oakland, CA 94621

Re: Tank Excavation Sampling
Shell Service Station
510 East 14th Street
Oakland, California
WIC #204-5508-6007
WA Job #81-421-09

Dear Ms Eberle:

On behalf of Shell Oil Company, Weiss Associates (WA) is presenting the results of the March 30, 1993 tank removal and sampling activities at the Shell service station referenced above (Figure 1). The objectives of the work were to document the removal and condition of one 550-gallon underground waste oil storage tank (UST), and to assess whether hydrocarbons were in soil beneath the tank. The soil sampling and tank documentation were conducted in accordance with the California Administrative Code, Title 23, Chapter 3, Subchapter 16, UST and piping closure regulations, and Alameda County closure regulations. Our scope of work and the tank removal sampling results are presented below.

SCOPE OF WORK

WA's scope of work for this investigation was to:

- Observe the removal of the tank;
- Inspect and document the condition of the tank;
- Collect soil samples from the tank excavation;

- Analyze the soil samples for total petroleum hydrocarbons as gasoline (TPH-G), and as diesel (TPH-D), petroleum oil and grease (POG), and benzene, ethylbenzene, toluene and total xylenes (BETX);

- Backfill the excavation with clean fill, and

- Report the results.

BACKGROUND

Site Setting

Location: The site is located at the corner of East 14th street and 5th Avenue in Oakland, California (Figure 1).

Surroundings: Mixed commercial and residential.

Excavation and Sampling Results

Parties Present: WA geologist Jonathan Weingast and Alameda County Department of Environmental Health (ACDEH) inspector Jennifer Eberle were present during the tank removal.

Excavation Dates: On March 30, 1993, one 550-gallon waste oil tank was removed with a backhoe.

Tank Condition: No holes or leaks were observed in the waste oil tank.

Maximum Excavation Depth: 6.5 ft

Excavation Observations:

No hydrocarbon stained soil was observed in the tank excavation walls or floor.

Sediments Encountered:

Clayey to sandy silts.

Ground Water Depth:

Ground water was not encountered in the excavation.

Soil Sampling Method:

Samples were collected by driving 2-in diameter stainless steel tubes into soil collected from a backhoe bucket. The tubes were immediately sealed with Teflon sheeting, plastic caps and Teflon tape, and refrigerated for transport to Anametrix, Inc., in San Jose, a state-certified laboratory.

Number of Samples:

Two soil samples, T-1 and T-2, were collected from the floor of the excavation and analyzed (Figure 2).

Analytic Method for Soil:

The soil samples from the excavation floor were analyzed for TPH-G and TPH-D by Modified EPA Method 8015, BETX by EPA Method 8020 and POG by EPA Method 5520 E&F.

Soil Analytical Results:

No TPH-G, TPH-D, POG or BETX were detected in either soil sample.

Waste Disposal:

The excavated tank was transported by Erickson Engineering Inc. to their facility in Richmond, California. A copy of the tank transportation manifest is included in attachment B. Since no hydrocarbons were detected in a composite soil sample collected from the excavation stockpile, the soil was used to backfill the excavation after approval from the ACDEH[1].

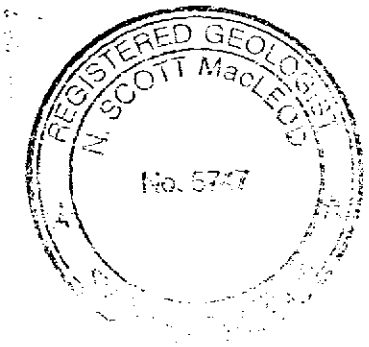
---

[1] Telephone conversation between Jennifer Eberle of the Alameda County Department of Environmental Health and Eric Anderson of Weiss Associates on March 31, 1993.

CONCLUSIONS

Since no holes were observed in the removed waste oil tank and since no hydrocarbons were observed in soil or detected in the soil samples, no hydrocarbons appear to have been released from the waste oil tank. Therefore, on behalf of Shell Oil Company, WA would like to request case closure for the waste oil tank. We believe waste oil tank closure is applicable since there is no evidence that hydrocarbons were ever released from the waste oil tank.

We appreciate the opportunity to provide hydrogeologic consulting services on behalf of Shell Oil Company. Please call if you have any questions or comments.



Sincerely,
Weiss Associates

Eric W. Anderson
Senior Staff Geologist

N. Scott MacLeod, R.G.
Project Geologist

JCW/EWA:jcw

J:\HC-ENG\SHELL\OAK-421\421R1JN3.WP

Attachments: Figures
Table
A - Analytic Results
B - Tank Manifest

cc: Dan Kirk, Shell Oil Company, P.O. Box 5278, Concord, California, 94520-9998
Lester Feldman, California Regional Water Quality Control Board - San Francisco Bay Region, 1800 Harrison Street, Oakland, California, 94612

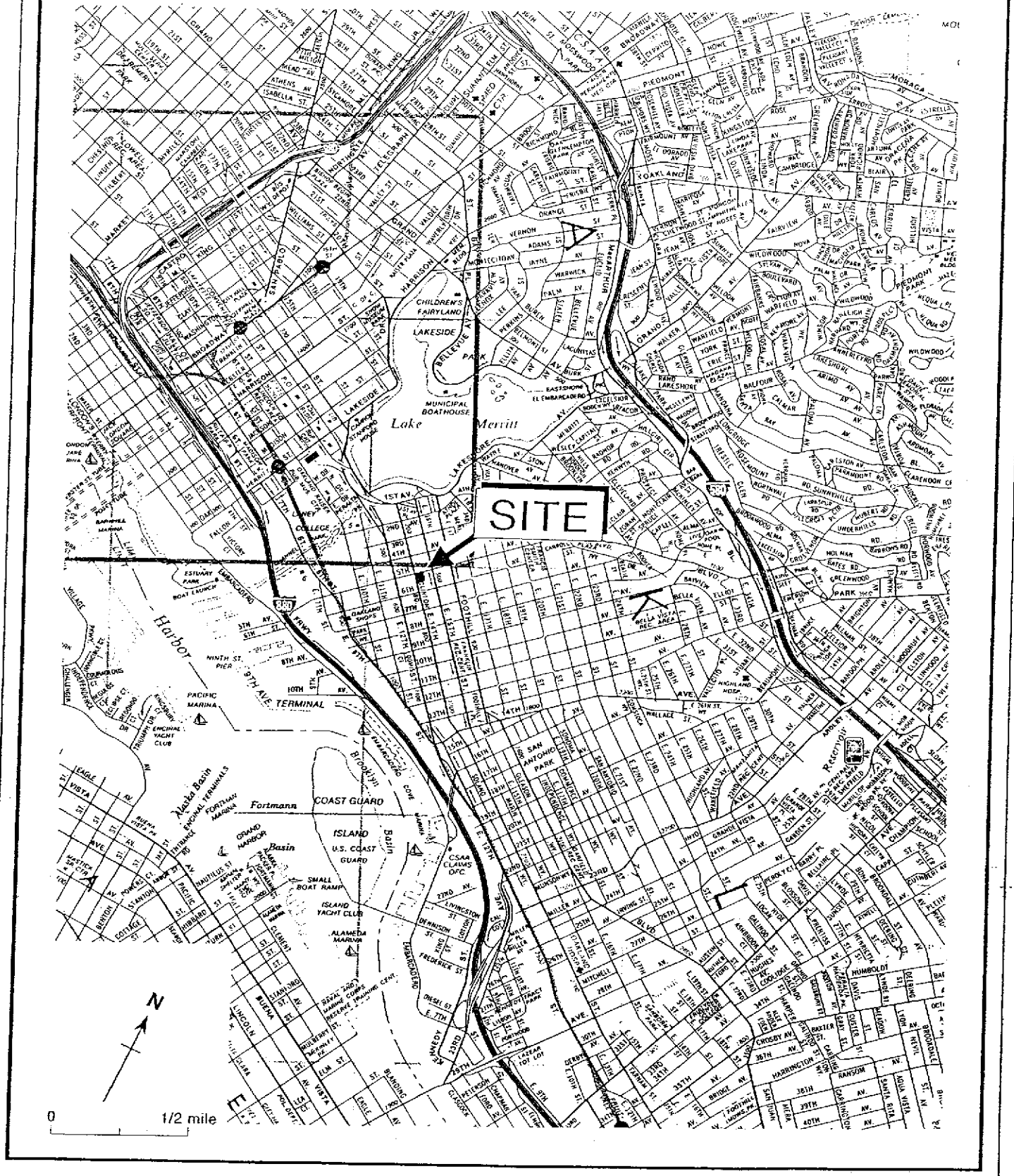


Figure 1. Site Location Map - Shell Service Station WIC# 204-5508-6007, 510 East 14th Street, Oakland, California

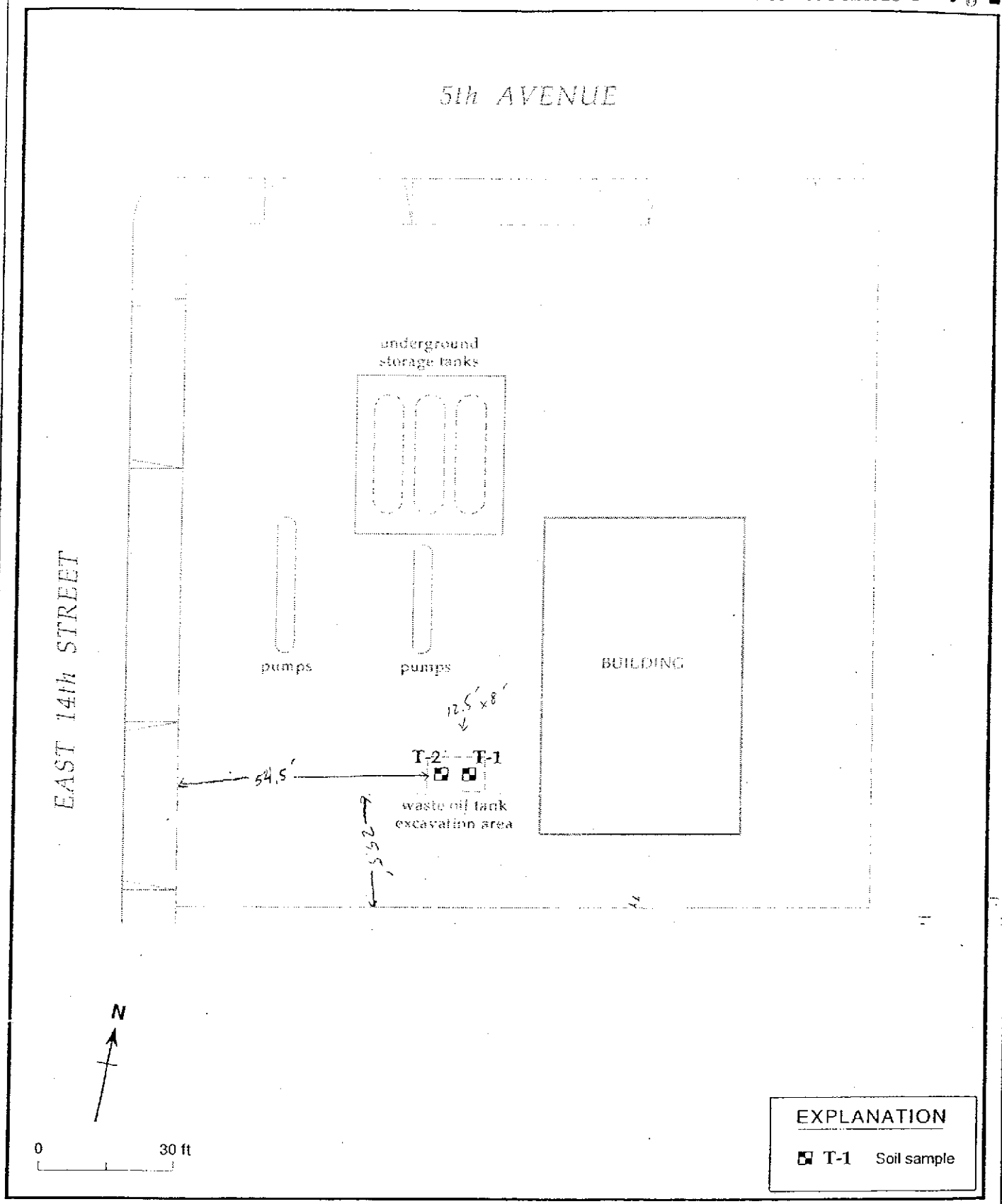


Figure 2. Soil Sample Locations - Shell Service Station WIC# 204-5508-6007, 510 East 14th Street, Oakland, California

Table 1. Analytic Results for Soil - Shell Service Station WIC #204-5508-6007, 510 East 14th Street, Oakland, California

Sample ID	Date	Approximate Depth (ft)	TPH-G	TPH-D	B	E	T	X	Oil & Grease
			<---------- parts per million (mg/kg) ---------->						
Waste Oil Tank									
T-1	03/30/93	7.5	<0.5	<10	<0.005	<0.005	<0.005	<0.005	<30
T-2	03/30/93	7.5	<0.5	<10	<0.005	<0.005	<0.005	<0.005	<30
Waste Oil Tank Stockpile									
C-1-4	03/30/93	---	<0.5	<10	<0.005	<0.005	<0.005	<0.005	<30

Abbreviations:

TPH-G = Total petroleum hydrocarbons as gasoline by Modified EPA Method 8015
TPH-D = Total petroleum hydrocarbons as diesel by Modified EPA Method 8015
B = Benzene by EPA Method 820
E = Ethylbenzene by EPA Method 8020
T = Toluene by EPA Method 8020
X = Xylenes by EPA Method 8020
Oil & Grease by EPA Method 5520E,F

Analytical Laboratory:

All samples analyzed by Anametrix, Inc., of San Jose, California

Notes:

--- = Not applicable

J:\hc_eng\SHELL\oak-421\421T1MY3.WP

ANAMETRIX INC
Environmental & Analytical Chemistry

Part of INCHCAPE ENVIRONMENTAL

REPORT

MR. ERIC ANDERSON
WEISS ASSOC./SHELL OIL
5500 SHELLMOUND STREET
EMERYVILLE, CA 94608

Workorder # : 9303384
Date Received : 03/31/93
Project ID : 204-5508-6007
Purchase Order: MOH-B813

The following samples were received at Anametrix, Inc. for analysis :

ANAMETRIX ID	CLIENT SAMPLE ID
9303384- 1	C1,2,3,4
9303384- 2	T-1
9303384- 3	T-2
9303384- 4	T-3
9303384- 5	T-4
9303384- 6	T-5
9303384- 7	T-6

This report consists of 11 pages not including the cover letter, and is organized in sections according to the specific Anametrix laboratory group or section which performed the analysis(es) and generated the data. The Report Summary that precedes each section will help you determine which Anametrix group is responsible for those test results, and will bear the signatures of the department supervisor and the chemist who have reviewed the analytical data. Please refer all questions to the department supervisor who signed the form.

Anametrix is certified by the California Department of Health Services (DHS) to perform environmental testing under Certificate Number 1234. A detailed list of the approved fields of testing can be obtained by calling our office, or the DHS Environmental Laboratory Accreditation Program at (415)540-2800.

If you have any further questions or comments on this report, please give us a call as soon as possible. Thank you for using Anametrix.

Sarah Schoen, Ph.D.
Laboratory Director

04-13-93
Date

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MR. ERIC ANDERSON
WEISS ASSOC./SHELL OIL
5500 SHELLMOUND STREET
EMERYVILLE, CA 94608

Workorder # : 9303384
Date Received : 03/31/93
Project ID : 204-5508-6007
Purchase Order: MOH-B813
Department : GC
Sub-Department: TPH

SAMPLE INFORMATION:

ANAMETRIX SAMPLE ID	CLIENT SAMPLE ID	MATRIX	DATE SAMPLED	METHOD
9303384- 1	C1,2,3,4	SOIL	03/30/93	TPHd
9303384- 2	T-1	SOIL	03/30/93	TPHd
9303384- 3	T-2	SOIL	03/30/93	TPHd
9303384- 1	C1,2,3,4	SOIL	03/30/93	TPHg/BTEX
9303384- 2	T-1	SOIL	03/30/93	TPHg/BTEX
9303384- 3	T-2	SOIL	03/30/93	TPHg/BTEX

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MR. ERIC ANDERSON
WEISS ASSOC./SHELL OIL
5500 SHELLMOUND STREET
EMERYVILLE, CA 94608

Workorder # : 9303384
Date Received : 03/31/93
Project ID : 204-5508-6007
Purchase Order: MOH-B813
Department : GC
Sub-Department: TPH

QA/QC SUMMARY :

- No QA/QC problems encountered for these samples.

Cheryl Balmer 4/7/93
Department Supervisor Date

Reggie Davison 4/8/93
Chemist Date

ANALYSIS DATA SHEET - TOTAL PETROLEUM HYDROCARBONS
(GASOLINE WITH BTEX)
ANAMETRIX, INC. - (408) 432-8192

Anametrix W.O.: 9303384
Matrix : SOIL
Date Sampled : 03/30/93

Project Number : 204-5508-6007
Date Released : 04/05/93

COMPOUNDS	Reporting Limit (mg/Kg)	Sample I.D.# C1,2,3,4 -01	Sample I.D.# T-1 -02	Sample I.D.# T-2 -03	Sample I.D.# BA0101E3 BLANK
Benzene	0.005	ND	ND	ND	ND
Toluene	0.005	ND	ND	ND	ND
Ethylbenzene	0.005	ND	ND	ND	ND
Total Xylenes	0.005	ND	ND	ND	ND
TPH as Gasoline	0.5	ND	ND	ND	ND
% Surrogate Recovery		75%	85%	85%	106%
Instrument I.D.		HP21	HP21	HP21	HP21
Date Analyzed		04/01/93	04/01/93	04/01/93	04/01/93
RLMF		1	1	1	1

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using modified EPA Method 8015 following sample purge and trap by EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA Method 8020 following sample purge and trap by EPA Method 5030.
RLMF - Reporting Limit Multiplication Factor.

Anametrix control limits for surrogate p-Bromofluorobenzene recovery are 53-147%.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

Peggie Davison 6/1/93
Analyst Date

Cheryl Bateman 6/1/93
Supervisor Date

ANALYSIS DATA SHEET - TOTAL PETROLEUM HYDROCARBONS AS DIESEL
ANAMETRIX, INC. (408) 432-8192

Anametrix W.O.: 9303384
Matrix : SOIL
Date Sampled : 03/30/93
Date Extracted: 04/01/93

Project Number : 204-5508-6007
Date Released : 04/05/93
Instrument I.D.: HP23

Anametrix I.D.	Client I.D.	Date Analyzed	Reporting Limit (mg/Kg)	Amount Found (mg/Kg)
9303384-01	C1,2,3,4	04/01/93	10	ND
9303384-02	T-1	04/01/93	10	ND
9303384-03	T-2	04/01/93	10	ND
DSBL040193	METHOD BLANK	04/01/93	10	ND

Note : Reporting limit is obtained by multiplying the dilution factor times 10 mg/Kg.
ND - Not detected at or above the practical quantitation limit for the method.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following sample extraction by EPA Method 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

Peggie Davison 4/8/93
Analyst Date

Cheryl Baeman 4/7/93
Supervisor Date

TOTAL VOLATILE HYDROCARBON LABORATORY CONTROL SAMPLE REPORT
EPA METHOD 5030 WITH GC/FID
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : LAB CONTROL SAMPLE
Matrix : WATER
Date Sampled : N/A
Date Analyzed : 04/01/93

Anametrix I.D. : LCSW0401
Analyst : RV
Supervisor : [illegible]
Date Released : 04/02/93
Instrument I.D.: HP21

COMPOUND	SPIKE AMT. (ug/L)	REC LCS (ug/L)	%REC LCS	% REC LIMITS
GASOLINE	375	457	122%	67-127
p-BFB			91%	61-139

* Quality control established by Anametrix, Inc.

TOTAL EXTRACTABLE HYDROCARBON LABORATORY CONTROL SAMPLE REPORT
EPA METHOD 3550 WITH GC/FID
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: LAB CONTROL SAMPLE	Anametrix I.D.	: LCSS0401
Matrix	: SOIL	Analyst	: RV
Date Sampled	: N/A	Supervisor	:
Date Extracted	: 04/01/93	Date Released	: 04/07/93
Date Analyzed	: 04/05/93	Instrument I.D.	: HP9

COMPOUND	SPIKE AMT (mg/Kg)	REC LCS (mg/Kg)	% REC LCS	% REC LIMITS
Diesel	125	99	79%	72-143

*Limits established by Anametrix, Inc.

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MR. ERIC ANDERSON
WEISS ASSOC./SHELL OIL
5500 SHELLMOUND STREET
EMERYVILLE, CA 94608

Workorder # : 9303384
Date Received : 03/31/93
Project ID : 204-5508-6007
Purchase Order: MOH-B813
Department : PREP
Sub-Department: PREP

SAMPLE INFORMATION:

ANAMETRIX SAMPLE ID	CLIENT SAMPLE ID	MATRIX	DATE SAMPLED	METHOD
9303384- 1	C1,2,3,4	SOIL	03/30/93	5520EF
9303384- 2	T-1	SOIL	03/30/93	5520EF
9303384- 3	T-2	SOIL	03/30/93	5520EF

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MR. ERIC ANDERSON
WEISS ASSOC./SHELL OIL
5500 SHELLMOUND STREET
EMERYVILLE, CA 94608

Workorder # : 9303384
Date Received : 03/31/93
Project ID : 204-5508-6007
Purchase Order: MOH-B813
Department : PREP
Sub-Department: PREP

QA/QC SUMMARY :

- No QA/QC problems encountered for these samples.

Department Supervisor 4/12/93 Date

Chemist 04/12/93 Date

ANALYSIS DATA SHEET - TOTAL RECOVERABLE PETROLEUM HYDROCARBONS
ANAMETRIX, INC. (408) 432-8192

Project # : 204-5508-6007
Matrix : SOIL
Date sampled : 03/30/93
Date extracted: 04/06/93
Date analyzed : 04/07/93

Anametrix I.D. : 9303384
Analyst : TS
Supervisor : [signature]
Date released : 04/12/93

Workorder #	Sample I.D.	Reporting Limit (mg/Kg)	Amount Found (mg/Kg)
9303384-01	C1,2,3,4	30	ND
9303384-02	T-1	30	ND
9303384-03	T-2	30	ND
BA06H1W9	METHOD BLANK	30	ND

ND - Not detected at or above the practical quantitation limit for the method.
TRPH - Total Recoverable Petroleum Hydrocarbons are determined by - Standard Method 5520EF.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS MATRIX SPIKE REPORT
STANDARD METHOD 5520EF
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 204-5508-6007,T-1	Anametrix I.D.	: HMM38402
Matrix	: SOIL	Analyst	: TS
Date sampled	: 03/30/93	Supervisor	:
Date extracted	: 04/06/93	Date Released	: 04/08/93
Date analyzed	: 04/07/93		

COMPOUND	SPIKE AMT (mg/Kg)	SAMPLE CONC (mg/Kg)	MS AMT (mg/Kg)	%REC MS	MD AMT (mg/Kg)	%REC MD	%RPD	% REC LIMITS
Motor Oil	300	7	300	98%	310	101%	3%	48-114%

* Quality control limits established by Anametrix, Inc.

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS LAB CONTROL SAMPLE REPORT
STANDARD METHOD 5520EF
ANAMETRIX, INC. (408) 432-8192

ample I.D. : LAB CONTROL SAMPLE
atrix : SOIL
ate sampled : N/A
ate extracted : 04/06/93
ate analyzed : 04/07/93

Anametrix I.D. : MA06H1W9
Analyst : TS
Supervisor : [signature]
Date Released : 04/08/93

OMPOUND	SPIKE AMT. (mg/Kg)	LCS (mg/Kg)	%REC LCS	%REC LIMITS
otor Oil	300	270	90%	68-113%

uality control established by Anametrix, Inc.

State of California—Environmental Protection Agency
Form Approved OMB No. 2050–0039 (Expires 9-30-94)
Please print or type. *Form designed for use on elite (12-pitch) typewriter.*

51664

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. [illegible] Manifest Document No. [illegible] 6

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
SHELL OIL COMPANY
HAZARDOUS WASTE DEPT.
P.O. BOX [illegible]
ANAHEIM, CA [illegible]

4. Generator's Phone ( ) [illegible]

A. State Manifest Document Number 92047427

B. State Generator's ID [illegible]

5. Transporter 1 Company Name [illegible]

6. US EPA ID Number CAD[illegible]

C. State Transporter's ID 310520 DC

D. Transporter's Phone

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID [illegible]

F. Transporter's Phone

9. Designated Facility Name and Site Address
[illegible]
[illegible]
RICHMOND, CA [illegible]

10. US EPA ID Number CA[illegible]

G. State Facility's ID CAD009466392

H. Facility's Phone [illegible]

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. [illegible]	001	T[illegible]	[illegible]	[illegible]	State / EPA/Other
b.					State / EPA/Other
c.					State / EPA/Other
d.					State / EPA/Other

J. Additional Descriptions for Materials Listed Above [illegible]

K. Handling Codes for Wastes Listed Above 01

15. Special Handling Instructions and Additional Information
AVOID CONTACT WITH EYES/SKIN
24 HOUR EMERGENCY PHONE NUMBER (800)-424-9300

FACILITY:
SERVICE STATION
510 E. FOURTEENTH STREET
OAKLAND, CA. 94606

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable federal, state and international laws.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
	ON BEHALF OF SHELL OIL CO.			

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
DANIEL CASTELLON	Daniel Castell	03	30	93

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
DAVID SATO	DAVE SATO	03	30	93

2045500007-3998 JS

DO NOT WRITE BELOW THIS LINE.

DTSC 8022A (12/91)
EPA 8700—22

Green: HAULER RETAINS

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

RAFAT A. SHAHID, ASST. AGENCY DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
State Water Resources Control Board
Division of Clean Water Programs
LUST Local Oversight Program
80 Swan Way, Rm 200
Oakland, CA 94621
(510) 271-4530

August 26, 1993
STID 202

Shell Oil Co.
PO Box 5500
San Bruno CA 94066
Attn: Tim Dahl

RECEIVED
SEP 10 1993
ENVIRO BAY AREA

RE: Shell Service Station #2
510 East 14th St.
Oakland CA 94606

Dear Mr. Dahl,

We have received a letter report from Weiss Associates dated 8/17/93, regarding tank excavation sampling at the above referenced site. As you probably know, a 550-gallon waste oil tank was removed from this site on 3/30/93. Two soil samples were taken from the bottom of the pit. No contamination was detected in either sample. The stockpiled soils were also analyzed; no contamination was detected. Stained soil was not observed in the tank excavation.

Based on the information outlined above, no further site remediation is needed at this time. Please be aware that this does not free present or future landowners or operators from cleanup responsibilities in the event that new information indicates a pollutant problem on the site or originating from the site.

If you have any questions, please contact me at 510-271-4530.

Sincerely,

Jennifer Eberle
Hazardous Materials Specialist

cc: Eric Anderson, Weiss Associates, 5500 Shellmound St., Emeryville CA 94608-2411
Dan Kirk, Shell Oil Co., PO Box 5278, Concord CA 94520-9998
Ed Howell/file

je

SHELL OIL CORPORATION

QUARTERLY REPORT TO

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Date of Report: October 29, 1993

Service Station WIC Number:	204-5508-6007
Site Address (Number, Street):	510 East 14th Street
City:	Oakland
County:	Alameda

Actions in the past three months:

Submitted waste oil tank removal report.
Submitted quarterly status report.
Submitted waste oil tank closure request.

Actions planned for next three months:

Update Shell site status documents.

Soil Contamination defined? Y\N	NA
Soil Clean-up in progress? Y\N	NA
Free-product plume defined? Y\N	NA
Free-product cleanup in progress? Y\N	NA
Dissolved constituent plume defined? Y\N	NA
Dissolved constituent cleanup in progress? Y\N	NA

Contractor: Weiss Associates, Emeryville, California.

April 9, 1998

Leroy Griffin
City of Oakland
Fire Department
505 14th Street, Suite 702
Oakland, California 94612

Re: **1998 Upgrade Site Inspection Report**
Shell Service Station
510 East 14th Street
Oakland, California
WIC #204-5508-6007
Cambria Project #240-0898

Dear Mr. Griffin:

On behalf of Shell Oil Products Company (Shell), Cambria Environmental Technology, Inc. (Cambria) is submitting this report summarizing the inspection at the site referenced above. Presented below are the site conditions, upgrade activities, and conclusions.

SITE CONDITIONS

The site is located at the intersection of East 14th Street and 5th Avenue in Oakland, California. The properties surrounding the site are commercial.

This Shell service station has recently been upgraded by Paradiso Mechanical of San Leandro, California (Paradiso). Paradiso added secondary containment to the turbine sumps.

UPGRADE ACTIVITIES

Personnel Present	*Title*	*Company*
John Riggi	Staff Geologist	Cambria
Al Garcia	Site Foreman	Paradiso

Leroy Griffin
April 9, 1998

Site Inspection Date: March 24, 1998.

Site Inspection Activities: Cambria inspected the turbine sumps and tank pit areas. No field indications of hydrocarbons, such as staining or odor, were observed during the site visit. Therefore, no sampling was required at this site.

CONCLUSIONS

Due to the absence of observable hydrocarbons, additional investigation of the turbine sump area is not warranted at this time.

CLOSING

We appreciate the opportunity to work with you on this project. Please call if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

Diane Lundquist, P.E.
Principal Engineer

cc: Mr. Tim Hargraves, Shell Oil Products Company, P.O. Box 8080, Martinez, CA 94553
Mr. A.E. (Alex) Perez, Shell Oil Products Company, P.O. Box 8080, Martinez, CA 94553

G:\Oak510\Upgrades\Upgrade Letter Report.WPD

ATTACHMENT B

Standard Field Procedures for Geoprobe® Soil and Groundwater Sampling

STANDARD FIELD PROCEDURES FOR GEOPROBE® SOIL AND GROUNDWATER SAMPLING

This document describes Cambria Environmental Technology's standard field methods for GeoProbe® soil and ground water sampling. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor odor or staining, estimate ground water depth and quality and to submit samples for chemical analysis.

Soil Classification/Logging

All soil samples are classified according to the Unified Soil Classification System by a trained geologist or engineer working under the supervision of a California Registered Geologist (RG) or a Certified Engineering Geologist (CEG). The following soil properties are noted for each soil sample:

- Principal and secondary grain size category (i.e., sand, silt, clay or gravel)
- Approximate percentage of each grain size category,
- Color,
- Approximate water or separate-phase hydrocarbon saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e., cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

Soil Sampling

GeoProbe® soil samples are collected from borings driven using hydraulic push technologies. A minimum of one and one half ft of the soil column is collected for every five ft of drilled depth. Additional soil samples can be collected near the water table and at lithologic changes. Samples are collected using samplers lined with polyethylene or brass tubes driven into undisturbed sediments at the bottom of the borehole. The ground surface immediately adjacent to the boring is used as a datum to measure sample depth. The horizontal location of each boring is measured in the field relative to a permanent on-site reference using a measuring wheel or tape measure.

Drilling and sampling equipment is steam-cleaned or washed prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Storage, Handling and Transport

Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon® tape and plastic end caps. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

After a soil sample has been collected, soil from the remaining tubing is placed inside a sealed plastic bag and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable GasTech® or photoionization detector measures volatile hydrocarbon vapor concentrations in the bag's headspace, extracting the vapor through a slit in the plastic bag. The measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

Grab Ground Water Sampling

Ground water samples are collected from the open borehole using bailers, advancing disposable Tygon® tubing into the borehole and extracting ground water using a diaphragm pump, or using a hydro-punch style sampler with a bailer or tubing. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4° C, and transported under chain-of-custody to the laboratory.

Discrete Depth Soil and Ground Water Sampling

Soil and groundwater samples are collected for lithologic and chemical analysis using a direct driven, dual tube soil coring system. A hydraulic hammer drives sampling rods into he ground to collect continuous soil cores. Two nested sampling rods are driven at the same time: a larger diameter outer rod to act as a temporary drive casing and a smaller inner rod to retrieve soil cores. As the rods are advanced the soil is driven into a sample barrel that is attached to the end of the inner rod. The outer rod ensures that the sample is collected from the desired interval by preventing sloughing of the overlying material. After reaching the desired depth the inner rods are removed from the boring and the sleeves containing the soil sample are removed from the inner sample barrel. Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon® tape and plastic end caps. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

When collecting groundwater samples, the sample barrel and inner rods are removed from the boring once the targeted water bearing zone has been reached. The drive casing is pulled up from 0.5 to 5 feet to allow groundwater to enter the borehole. Small diameter well casing and screen is then installed in the borehole to facilitate sample collection. The drive casing is then pulled up sufficiently to expose the desired length of screen and samples are collected using a bailer, peristaltic, bladder or inertial pump. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4° C, and transported under chain-of-custody to the laboratory.

Duplicates and Blanks

Blind duplicate water samples are usually collected only for monitoring well sampling programs, at a rate of one blind sample for every 10 wells sampled. Laboratory-supplied trip blanks accompany samples collected for all sampling programs to check for cross-contamination caused by sample handling and transport. These trip blanks are analyzed if the internal laboratory quality assurance/quality control (QA/QC) blanks contain the suspected field contaminants. An equipment blank may also be analyzed if non-dedicated sampling equipment is used.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe. If the dual tube system is used, the borings are filled to the ground surface with cement grout poured or pumped through the dual tube casing.