



ENVIRONMENTAL  
PROTECTION  
98 MAR 11 PM 2:50

March 9, 1998

Barney Chan  
Alameda County Department  
of Environmental Health  
1131 Harbor Bay Parkway, Suite 250  
Alameda, California 94502

Re: **Response to Request for Technical Reports**  
Shell Service Station  
4255 MacArthur Boulevard  
Oakland, California  
WIC #204-5510-0600  
Cambria Project #240-0524

Dear Mr. Chan:

On behalf of Shell Oil Products Company (Shell), Cambria Environmental Technology, Inc. (Cambria) has prepared this response to the February 18, 1998 letter to Shell from the Alameda County Department of Environmental Health (ACDEH) requesting technical reports for the site referenced above. Presented below is our schedule for submission of the requested technical reports.

## **SCHEDULE**

### **Soil Vapor Extraction (SVE) Test Report**

The requested SVE test report was issued to the ACDEH on February 23, 1998.

### **Subsurface Investigation and Report**

The work plan for subsurface investigation to provide additional definition of the extent of hydrocarbons in soil and ground water was approved by the ACDEH in a letter to Shell dated December 5, 1997. The drilling activities were completed according to schedule on February 13, 1998 and the analytical results from the subsurface investigation were received on March 6, 1998. **A subsurface investigation report will be issued by the March 19, 1998 deadline.**

CAMBRIA  
ENVIRONMENTAL  
TECHNOLOGY, INC.  
1144 65TH STREET,  
SUITE B  
OAKLAND,  
CA 94608  
PH: (510) 420-0700  
FAX: (510) 420-9170

Barney Chan  
March 9, 1998

CAMBRIA

### Remedial Work Plan

Cambria will review analytical soil and ground water results from the February 13, 1998 subsurface investigation, SVE pilot test data and additional site history and data collected from previous investigations. Cambria will issue a remedial work plan within 45 days of the March 19, 1998 technical report deadline.

~ May 5, 1998.

### CLOSING

Cambria looks forward to working with you on this project. Please call us if you have any questions or comments.

Sincerely,  
**Cambria Environmental Technology, Inc.**



John Espinoza  
Project Engineer

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



February 23, 1998

Barney Chan  
Alameda County Department  
of Environmental Health  
1131 Harbor Bay Parkway, Suite 250  
Alameda, California 94502

Re: **Soil Vapor Extraction Test Report**  
Shell Service Station  
4255 MacArthur Boulevard  
Oakland, California  
WIC #204-5510-0600  
Cambria Project #24-524

Dear Mr. Chan:

On behalf of Shell Oil Products Company (Shell), Cambria Environmental Technology, Inc. (Cambria), performed a soil vapor extraction (SVE) test at the site referenced above (Figure 1). The SVE test work plan addendum was approved by the Alameda County Department of Environmental Health (ACDEH) in a letter to Shell dated July 25, 1997. The objective of the SVE test was to determine the feasibility of utilizing SVE as a remedial option at the site. Presented below are a site background, the SVE test procedures, equipment, results, and our conclusions.

## **SITE BACKGROUND**

CAMBRIA  
ENVIRONMENTAL  
TECHNOLOGY, INC.  
1144 65TH STREET,  
SUITE B  
OAKLAND,  
CA 94608  
PH: (510) 420-0700  
FAX: (510) 420-9170

**Site Location and Topography:** The site is an active Shell service station located at the intersection of MacArthur Boulevard and High Street in mixed commercial and residential area of Oakland, California (Figure 1). An active Unocal service station and a former Chevron service station are located east of the site. A trailer park and adjacent California Department of Transportation (Caltrans) access to Interstate 580 are located immediately southwest of the site. Topography slopes toward the west, with a 5 feet (ft) elevation difference between grade at the Shell Station and the trailer park property, and an additional 5 ft elevation difference between grade at the trailer park property and the Caltrans property.

**Site Lithology:** The lithology beneath the site and vicinity typically consists of 12 to 15 ft of silts and clays, underlain by silty/clayey sands. Based on the boring logs for wells MW-1, MW- 2 and MW-4, the transition zone from the shallow fine-grained soil to the silty/clayey sand follows topography, sloping toward the west at 12 to 15 ft depth.

**Well Locations:** Ground water monitoring wells MW-1 and MW-3 are located on the Shell site, well MW-2 is installed at the trailer park property, and well MW-4 is installed further down gradient at the Caltrans property. Additionally, four horizontal wells HW-1 through HW-4 were installed in or near high permeability fill adjacent to the dispenser islands and underground storage tanks (USTs) (Figure 1).

## SVE TESTING

### SVE Test Procedures

Cambria performed a 1-hour and 0.5-hour SVE test on horizontal vapor extraction wells HW-1 and HW-2 through HW-4, respectively, followed by approximately 1.5 hour tests on monitoring wells MW-2 and MW-3 (Figure 1). Cambria measured vapor extraction flow rates, the vacuum applied to the wellheads, and the vacuum influence in nearby wells. Extracted soil vapor samples were analyzed from each well for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene and xylenes (BTEX). To comply with the test notification requirements, Cambria notified Mr. Robert Cave of the Bay Area Air Quality Management District (BAAQMD) on September 23, 1997 about the test procedures, scope and dates.

### SVE Test Equipment

A VR Systems Model V3 internal combustion engine (ICE) was used to extract and treat soil vapor. A Foxboro Model No. 128 flame ionization detector (FID) was used to measure hydrocarbon concentrations in extracted vapor in the field. A TSI Model No. 8330 VelociCalc air mass flow meter was used to measure vapor extraction flow rates. A Thomas Industries Model No. 107CDC20 vacuum pump was used to collect the vapor samples. Magnahelic differential pressure gauges were used to measure the vacuum applied at the wellheads and induced in nearby monitoring wells.

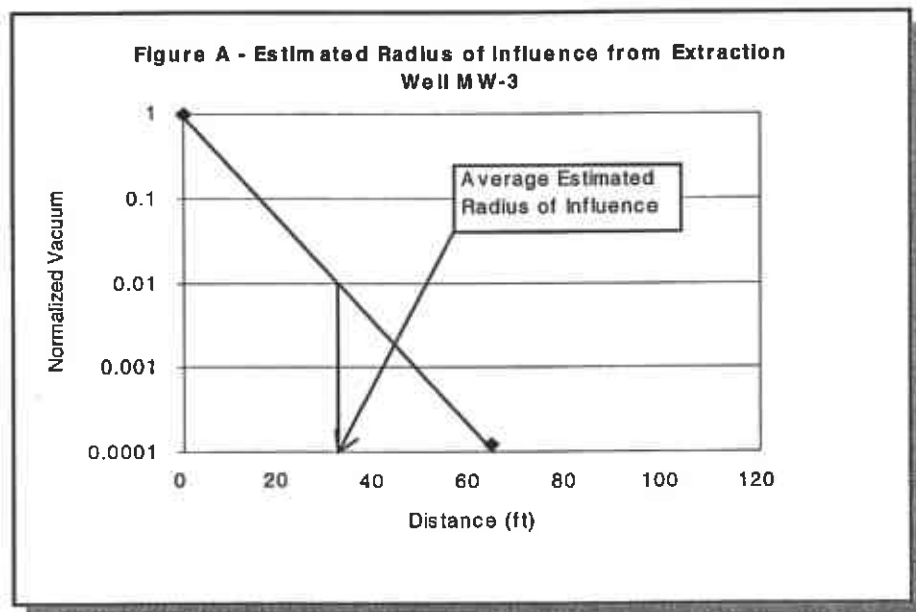
### SVE Test Results

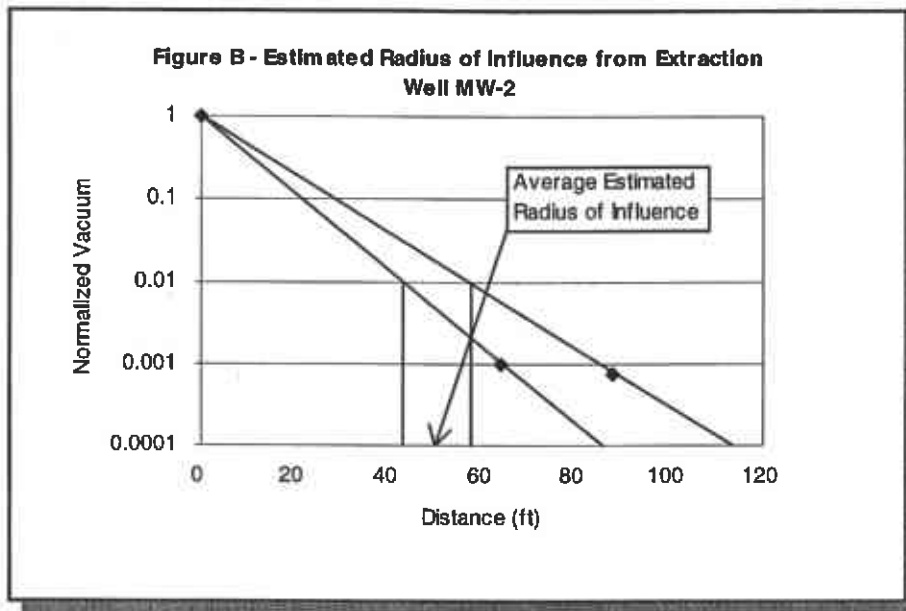
**Horizontal Wells HW-1 and HW-2 through HW-4:** As presented in Table 1, the TPHg concentrations in soil vapor ranged from 3,400 to 4,200 parts per million by volume (ppmv). The highest benzene concentration in extracted vapor was 90 ppmv in horizontal wells HW-2 through HW-4. Vapor extraction flow rates ranged from 68 to 74 cubic feet per minute (cfm) for applied vacuum of about 10 inches of water. TPHg removal rates ranged from 70 to 100 pounds per day (ppd). SVE test results and soil gas concentrations are presented in Table 1. Analytic results for extracted soil vapor are included in Attachment A.

**Monitoring Wells MW-2 and MW-3:** TPHg concentrations in soil vapor for wells MW-2 and MW-3 ranged from 420 to 2,400 ppmv. The highest benzene concentration in extracted vapor was 71 ppmv in well MW-2. Vapor extraction flow rates ranged from 8 to 14 cfm for an applied vacuum of about 100 inches of water. TPHg removal rates ranged from 1 to 11 ppd.

## Estimated SVE Radius of Influence

Cambria measured vacuum influence in monitoring wells MW-1, MW-2 and MW-3 and horizontal wells HW-1 and HW-2 through HW-4 during SVE testing (Table 1). Although some vacuum influence was measured in horizontal wells HW-1 and HW-2 through HW-4 during testing, the data was not used to calculate the radius of influence due to the difficulty in determining the precise location of vacuum influence in the horizontal piping. Therefore, Cambria used traditional vacuum influence data collected from monitoring wells MW-1, MW-2 and MW-3 to calculate the effective radius of influence. To determine the effective radius of influence, we estimated the effective radius of influence according to "A Summary of Nationwide Vapor Extraction System Performance Study," T.E. Buscheck, T. R. Peargin, November 1991. This approach first involves normalizing the vacuum data by dividing the vacuum observed at the wellhead and at the monitoring wells by the vacuum observed at the wellhead. The log of the normalized vacuum data is then plotted against the distance to the vacuum influence monitoring wells. The effective radius of influence is frequently considered to be the distance corresponding to 1% of the normalized vacuum. The applied vacuum was then compared to the vacuum observed in nearby wells during testing of each of the wells. As shown in Figures A and B below and in Table 1, the theoretical radius of vacuum influence using this method ranged from 35 to 50 ft during testing of wells MW-3 and MW-2, respectively.





## CONCLUSIONS

The relatively high TPHg removal rates measured in horizontal wells HW-1 and HW-2 through HW-4 were most likely temporary, and are not believed to be representative of site conditions due to extensive well screen in permeable fill material. Based on our experience at similar sites, the hydrocarbon removal rates from the horizontal wells would most likely reach low, asymptotic levels within a few days of continued SVE operation.

The results of the short-term testing indicate that SVE achieves only low hydrocarbon removal rates in wells MW-2 and MW-3, which are more representative of native soil conditions. Although well MW-2 has historically contained separate-phase hydrocarbons (SPH), the well yielded a hydrocarbon removal rate of only 11 ppd. Although an effective radius of influence ranging from 35 to 50 ft was measured during the testing of wells MW-2 and MW-3, the high vacuum applied indicates that vadose zone soil is relatively impermeable to vapor migration.

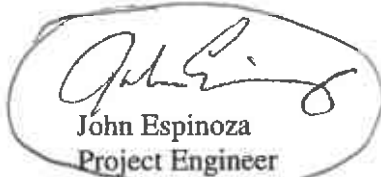
Barney Chan  
February 23, 1998

CAMBRIA

**CLOSING**

Cambria appreciates this opportunity to work with you on this project. Please call us if you have any questions or comments.

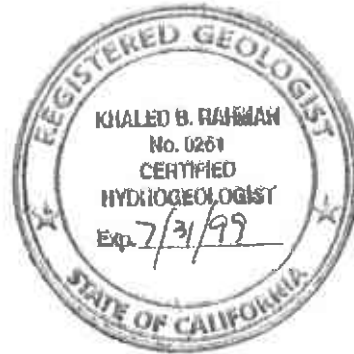
Sincerely,  
**Cambria Environmental Technology, Inc.**



John Espinoza  
Project Engineer



Khaled B. Rahman, R.G., C.H.G.  
Senior Geologist



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Attachments: A - Analytic Results for Soil Vapor

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

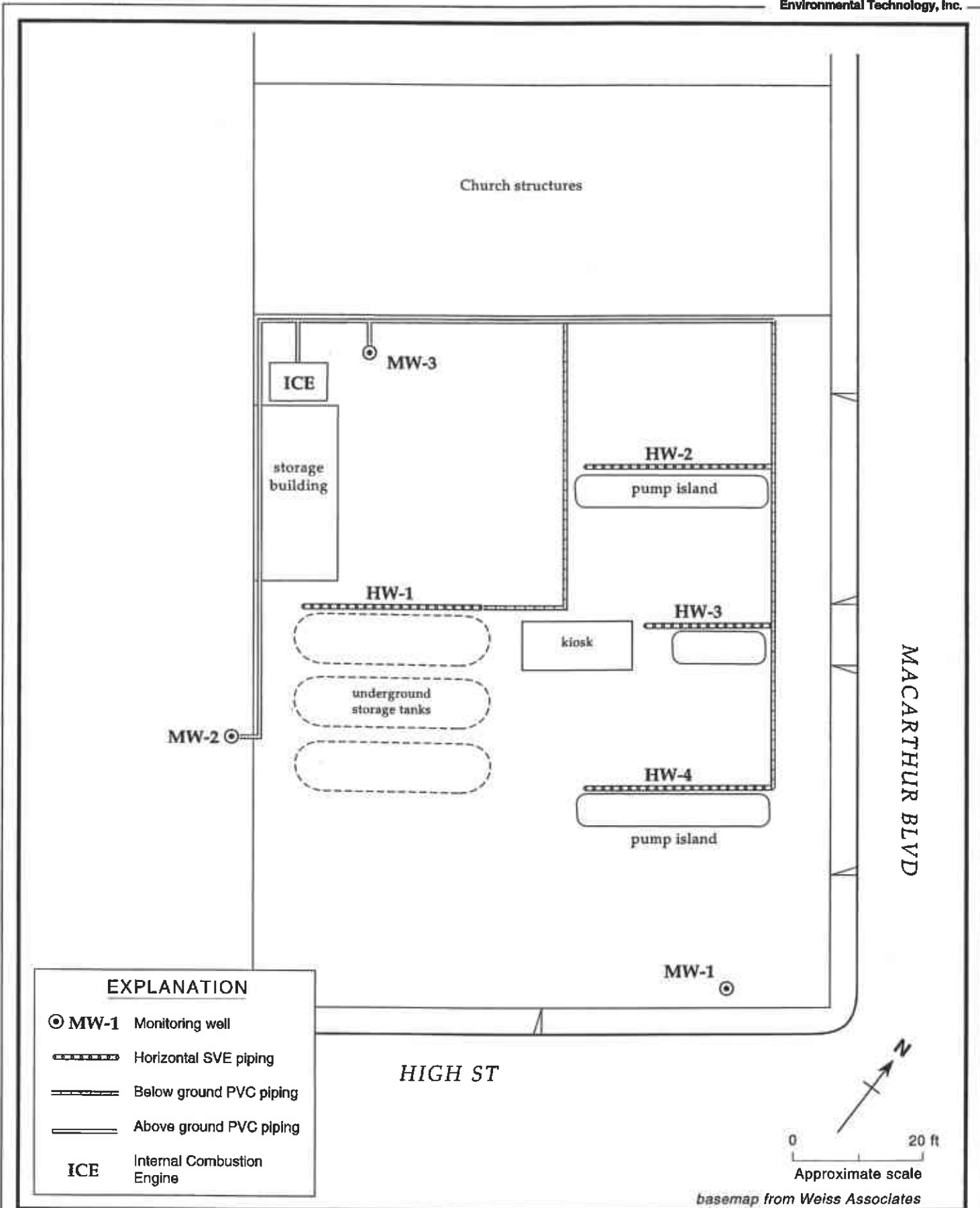


Figure 1. SVE Test System Schematic Layout - Shell Service Station WIC #204-5510-0600, 4255 MacArthur Boulevard, Oakland, California



**Table 1. Soil Vapor Extraction Test Summary - Shell Service Station, WIC # 204-5510-0600, 4255 MacArthur Boulevard, Oakland, California**

| Extraction Well  | Date    | Test Duration (hours) | Applied Vacuum <sup>1</sup> ("H2O) | Flow Rate <sup>2</sup> (cfm) | Hydrocarbon Concentrations <sup>3</sup> (ppmv) |       |         | TPHg Removal Rate <sup>4</sup> (#/day) | Vacuum Influence <sup>5</sup> |               |      |               | Estimated Radius of Influence <sup>6</sup> (ft) |               |      |
|------------------|---------|-----------------------|------------------------------------|------------------------------|--|-------|---------|--|-------------------------------|---------------|------|---------------|---|---------------|------|
|                  |         |                       |                                    |                              | Influent                                       |       |         |  | Vacuum ("H2O)                 | Distance (ft) | Well | Vacuum ("H2O) |   | Distance (ft) | Well |
|                  |         |                       |                                    |                              | FID  | TPHg  | Benzene |  |                               |               |      |               |   |               |      |
| HW-1             | 9/25/97 | 1                     | 8                                  | 59                           | 8,900  | ---   | ---     | ---                                    | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
|                  |         |                       | 8                                  | 59                           | 7,900  | ---   | ---     | ---                                    | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
|                  |         |                       | 10                                 | 69                           | 5,400  | ---   | ---     | ---                                    | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
|                  |         |                       | 10                                 | 74                           | 4,400  | 4,200 | <0.3    | 100                                    | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
| HW-2, HW-3, HW-4 | 9/25/97 | 0.5                   | 10                                 | 63                           | 450  | ---   | ---     | ---                                    | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
|                  |         |                       | 10                                 | 68                           | 1,875  | 3,400 | 90      | 70                                     | -0.11                         | 97            | MW-1 | ---           | ---   | ---           | ---  |
| MW-2             | 9/25/97 | 1.8                   | 20                                 | 0.8                          | 40,000   | ---   | ---     | ---                                    | 0.00                          | 88            | MW-1 | 0.00          | 64  | MW-3          | ---  |
|                  |         |                       | 50                                 | 2                            | 30,000   | ---   | ---     | ---                                    | -0.03                         | 88            | MW-1 | -0.05         | 64  | MW-3          | ---  |
|                  |         |                       | 80                                 | 4                            | 10,000   | ---   | ---     | ---                                    | -0.06                         | 88            | MW-1 | -0.09         | 64  | MW-3          | 50   |
|                  |         |                       | 100                                | 8                            | 8,000  | 420   | 3.4     | 1                                      | -0.02                         | 88            | MW-1 | -0.08         | 64  | MW-3          | ---  |
|                  |         |                       | 50                                 | 10                           | 4,000  | ---   | ---     | ---                                    | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
|                  |         |                       | 80                                 | 14                           | 4,000  | ---   | ---     | ---                                    | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
|                  |         |                       | 80                                 | 14                           | 3,800  | 2,400 | 71      | 11                                     | ---                           | ---           | ---  | ---           | ---   | ---           | ---  |
| MW-3             | 9/25/97 | 1.3                   | 10                                 | 1                            | 200  | ---   | ---     | ---                                    | 0.25                          | 114           | MW-1 | 0.00          | 64  | MW-2          | ---  |
|                  |         |                       | 30                                 | 4                            | 3,500  | ---   | ---     | ---                                    | 0.02                          | 114           | MW-1 | 0.00          | 64  | MW-2          | ---  |
|                  |         |                       | 50                                 | 6                            | 5,000  | ---   | ---     | ---                                    | ---                           | 114           | MW-1 | 0.00          | 64  | MW-2          | ---  |
|                  |         |                       | 80                                 | 12                           | 30,000   | ---   | ---     | ---                                    | 0.05                          | 114           | MW-1 | 0.32          | 64  | MW-2          | ---  |
|                  |         |                       | 100                                | 14                           | 30,000   | 920   | 27      | 4                                      | 0.05                          | 114           | MW-1 | -0.012        | 64  | MW-2          | 35   |

**Notes and Abbreviations:**

- 1 - The applied vacuum is the vacuum measured at the wellhead.
- 2 - The flow rate measured with an anemometer was converted to standard cubic feet per minute (scfm) based on pressure and temperature.
- 3 - Concentrations based on flame ionization detector (FID), TPHg and benzene by Modified EPA Methods 8015 and 8020. Concentrations reported as micrograms per cubic meter are converted to parts per million by volume (ppmv) by dividing by the molecular weight (78 for benzene and 86 for TPHg as Hexane), and multiplying by 24.45 (the volume one gram-mole of perfect gas occupies at standard temperature and pressure).
- 4 - The hydrocarbon removal rate is based on the Bay Area Air Quality Management District's Procedures for Soil Vapor Extraction. Rate = concentration (ppmv) x flow rate (scfm) x 1 lb-mole/386ft<sup>3</sup> x molecular weight x 1440 min/day.
- 5 - Vacuum influence measured at monitoring point wellhead. Positive values represent actual positive pressure measured. Negative values represent actual vacuum influence measured and used to calculate radius of influence.
- 6 - Estimated radius of influence based on "A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil-Venting Systems", P. C. Johnson et al, Ground Water Monitoring Review, Spring 1990.

CAMBRIA

**ATTACHMENT A**

Analytic Results for Soil Vapor



# Sequoia Analytical

680 Chesapeake Drive  
404 N. Wiget Lane  
819 Striker Avenue, Suite 8

Redwood City, CA 94063  
Walnut Creek, CA 94598  
Sacramento, CA 95834

(650) 364-9600  
(510) 988-9600  
(916) 921-9600

FAX (650) 364-9233  
FAX (510) 988-9673  
FAX (916) 921-0100

Cambria  
1144 65th St. Suite C  
Oakland, CA 94608  
Attention: John Espinoza

Project: Shell 4255 MacArthur Blvd.

Enclosed are the results from samples received at Sequoia Analytical on September 26, 1997.  
The requested analyses are listed below:

| <u>SAMPLE #</u> | <u>SAMPLE DESCRIPTION</u> | <u>DATE COLLECTED</u> | <u>TEST METHOD</u>        |
|-----------------|---------------------------|-----------------------|---------------------------|
| 9709F35 -01     | LIQUID, H-2,3,4 - 1237    | 09/25/97              | TPHGBA Purgeable TPH/BTEX |
| 9709F35 -02     | LIQUID, HW1 - 1400        | 09/25/97              | TPHGBA Purgeable TPH/BTEX |
| 9709F35 -03     | LIQUID, MW-3 - 1520       | 09/25/97              | TPHGBA Purgeable TPH/BTEX |
| 9709F35 -04     | LIQUID, MW-2 - 1750       | 09/25/97              | TPHGBA Purgeable TPH/BTEX |
| 9709F35 -05     | LIQUID, MW-2 - 1830       | 09/25/97              | TPHGBA Purgeable TPH/BTEX |

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

**SEQUOIA ANALYTICAL**

Project Manager





|   |   |   |
|---|---|---|
| Cambria<br>1144 65th St. Suite C<br>Oakland, CA 94608 | Client Proj. ID: Shell 4255 MacArthur Blvd.<br>Sample Descript: H-2,3,4 - 1237<br>Matrix: LIQUID<br>Analysis Method: 8015Mod/8020<br>Lab Number: 9709F35-01 | Sampled: 09/25/97<br>Received: 09/26/97<br>Analyzed: 09/23/97<br>Reported: 10/01/97 |
|---|---|---|

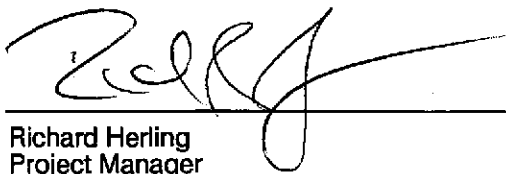
QC Batch Number: GC092697BTEX21A  
Instrument ID: GCHP21

**Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX**

| Analyte               | Detection Limit<br>ug/L | Sample Results<br>ug/L |
|-----------------------|-------------------------|------------------------|
| TPPH as Gas           | 25                      | 12000                  |
| Benzene               | 0.25                    | 290                    |
| Toluene               | 0.25                    | 30                     |
| Ethyl Benzene         | 0.25                    | N.D.                   |
| Xylenes (Total)       | 0.25                    | N.D.                   |
| Chromatogram Pattern: |                         | C6-C12                 |
| <b>Surrogates</b>     | <b>Control Limits %</b> | <b>% Recovery</b>      |
| Trifluorotoluene      | 70 130                  | 76                     |

Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL** - ELAP #1210

  
Richard Herling  
Project Manager





|   |   |   |
|---|---|---|
| Cambria<br>1144 65th St. Suite C<br>Oakland, CA 94608 | Client Proj. ID: Shell 4255 MacArthur Blvd.<br>Sample Descript: HW1 - 1400<br>Matrix: LIQUID<br>Analysis Method: 8015Mod/8020<br>Lab Number: 9709F35-02 | Sampled: 09/25/97<br>Received: 09/26/97<br>Analyzed: 09/26/97<br>Reported: 10/01/97 |
|---|---|---|

QC Batch Number: GC092697BTEX03A  
Instrument ID: GCHP03

**Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX**

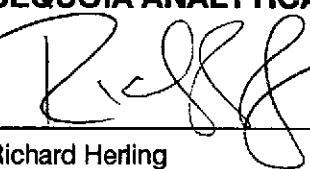
| Analyte                                  | Detection Limit<br>ug/L | Sample Results<br>ug/L |
|--|-------------------------|------------------------|
| TPPH as Gas                              | 100                     | 15000                  |
| Benzene                                  | 1.0                     | N.D.                   |
| Toluene                                  | 1.0                     | 75                     |
| Ethyl Benzene                            | 1.0                     | N.D.                   |
| Xylenes (Total)                          | 1.0                     | 43                     |
| Chromatogram Pattern:<br>Unidentified HC |                         | C6-C8                  |

| Surrogates       | Control Limits % | % Recovery |
|------------------|------------------|------------|
| Trifluorotoluene | 70 130           | 104        |

Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL - ELAP #1210**

  
Richard Herling  
Project Manager





|   |  |   |
|---|--|---|
| Cambria<br>1144 65th St. Suite C<br>Oakland, CA 94608<br>Attention: John Espinoza | Client Proj. ID: Shell 4255 MacArthur Blvd.<br>Sample Descript: MW-3 - 1520<br>Matrix: LIQUID<br>Analysis Method: 8015Mod/8020<br>Lab Number: 9709F35-03 | Sampled: 09/25/97<br>Received: 09/26/97<br>Analyzed: 09/26/97<br>Reported: 10/01/97 |
|---|--|---|

QC Batch Number: GC092697BTEX17A  
Instrument ID: GCHP17

**Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX**

| Analyte                                  | Detection Limit<br>ug/L | Sample Results<br>ug/L |
|--|-------------------------|------------------------|
| TPPH as Gas                              | 500                     | 3300                   |
| Benzene                                  | 5.0                     | 89                     |
| Toluene                                  | 5.0                     | N.D.                   |
| Ethyl Benzene                            | 5.0                     | 6.3                    |
| Xylenes (Total)                          | 5.0                     | N.D.                   |
| Chromatogram Pattern:<br>Unidentified HC |                         | C6-C8                  |
| <b>Surrogates</b>                        | <b>Control Limits %</b> | <b>% Recovery</b>      |
| Trifluorotoluene                         | 70 130                  | 223 Q                  |

Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL - ELAP #1210**

Richard Herling  
Project Manager





|   |  |   |
|---|--|---|
| Cambria<br>1144 65th St. Suite C<br>Oakland, CA 94608 | Client Proj. ID: Shell 4255 MacArthur Blvd.<br>Sample Descript: MW-2 - 1750<br>Matrix: LIQUID<br>Analysis Method: 8015Mod/8020<br>Lab Number: 9709F35-04 | Sampled: 09/25/97<br>Received: 09/26/97<br>Analyzed: 09/26/97<br>Reported: 10/01/97 |
|---|--|---|

QC Batch Number: GC092697BTEX21A  
Instrument ID: GCHP21

**Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX**

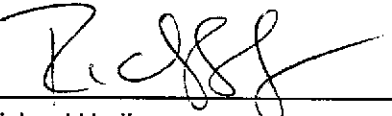
| Analyte               | Detection Limit<br>ug/L | Sample Results<br>ug/L |
|-----------------------|-------------------------|------------------------|
| TPPH as Gas           | 500                     | 1500                   |
| Benzene               | 5.0                     | 11                     |
| Toluene               | 5.0                     | N.D.                   |
| Ethyl Benzene         | 5.0                     | N.D.                   |
| Xylenes (Total)       | 5.0                     | 8.0                    |
| Chromatogram Pattern: |                         | C6-C12                 |

| Surrogates       | Control Limits % | % Recovery |
|------------------|------------------|------------|
| Trifluorotoluene | 70 130           | 73         |

Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL - ELAP #1210**

  
Richard Herling  
Project Manager





|   |  |   |
|---|--|---|
| Cambria<br>1144 65th St. Suite C<br>Oakland, CA 94608 | Client Proj. ID: Shell 4255 MacArthur Blvd.<br>Sample Descript: MW-2 - 1830<br>Matrix: LIQUID<br>Analysis Method: 8015Mod/8020<br>Lab Number: 9709F35-05 | Sampled: 09/25/97<br>Received: 09/26/97<br>Analyzed: 09/26/97<br>Reported: 10/01/97 |
| Attention: John Espinoza                              |  |   |


QC Batch Number: GC092697BTEX17A  
Instrument ID: GCHP17

**Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX**

| Analyte                                  | Detection Limit<br>ug/L | Sample Results<br>ug/L |
|--|-------------------------|------------------------|
| TPPH as Gas                              | 100                     | 8500                   |
| Benzene                                  | 1.0                     | 230                    |
| Toluene                                  | 1.0                     | N.D.                   |
| Ethyl Benzene                            | 1.0                     | N.D.                   |
| Xylenes (Total)                          | 1.0                     | 25                     |
| Chromatogram Pattern:<br>Unidentified HC |                         | C6-C8                  |
| <b>Surrogates</b>                        | <b>Control Limits %</b> | <b>% Recovery</b>      |
| Trifluorotoluene                         | 70 130                  | 125                    |

Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL - ELAP #1210**

  
Richard Herling  
Project Manager







Cambria Environmental Tech.  
1144 65th St., Ste. C  
Oakland, CA 94608  
Attention: John Espinoza

Client Project ID: Shell 4255 MacArthur Blvd.  
Matrix: Liquid

Work Order #: 9709F35 -01, 04

Reported: Oct 2, 1997

**QUALITY CONTROL DATA REPORT**

| Analyte:       | Benzene         | Toluene         | Ethyl<br>Benzene | Xylenes         | Gas             |
|----------------|-----------------|-----------------|------------------|-----------------|-----------------|
| QC Batch#:     | GC092697BTEX21A | GC092697BTEX21A | GC092697BTEX21A  | GC092697BTEX21A | GC092697BTEX21A |
| Analy. Method: | EPA 8020        | EPA 8020        | EPA 8020         | EPA 8020        | EPA 8015M       |
| Prep. Method:  | EPA 5030        | EPA 5030        | EPA 5030         | EPA 5030        | EPA 5030        |

|                   |             |             |             |             |             |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| Analyst:          | A. Miraftab | A. Miraftab | A. Miraftab | A. Miraftab | A. Miraftab |
| MS/MSD #:         | 9709A3206   | 9709A3206   | 9709A3206   | 9709A3206   | 9709A3206   |
| Sample Conc.:     | N.D.        | N.D.        | N.D.        | N.D.        | N.D.        |
| Prepared Date:    | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     |
| Analyzed Date:    | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     |
| Instrument I.D.#: | GCHP21      | GCHP21      | GCHP21      | GCHP21      | GCHP21      |
| Conc. Spiked:     | 10 µg/L     | 10 µg/L     | 10 µg/L     | 30 µg/L     | 60 µg/L     |
| Result:           | 9.5         | 9.5         | 9.6         | 28          | 53          |
| MS % Recovery:    | 95          | 95          | 96          | 93          | 88          |
| Dup. Result:      | 9.3         | 9.2         | 9.3         | 28          | 50          |
| MSD % Recov.:     | 93          | 92          | 93          | 93          | 83          |
| RPD:              | 2.1         | 3.2         | 3.2         | 0.0         | 5.8         |
| RPD Limit:        | 0-25        | 0-25        | 0-25        | 0-25        | 0-25        |

| LCS #:            | BLK092697 | BLK092697 | BLK092697 | BLK092697 | BLK092697 |
|-------------------|-----------|-----------|-----------|-----------|-----------|
| Prepared Date:    | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   |
| Analyzed Date:    | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   |
| Instrument I.D.#: | GCHP21    | GCHP21    | GCHP21    | GCHP21    | GCHP21    |
| Conc. Spiked:     | 10 µg/L   | 10 µg/L   | 10 µg/L   | 30 µg/L   | 60 µg/L   |
| LCS Result:       | 9.4       | 9.4       | 9.4       | 28        | 52        |
| LCS % Recov.:     | 94        | 94        | 94        | 93        | 87        |

|                |        |        |        |        |        |
|----------------|--------|--------|--------|--------|--------|
| MS/MSD         | 60-140 | 60-140 | 60-140 | 60-140 | 60-140 |
| LCS            | 70-130 | 70-130 | 70-130 | 70-130 | 70-130 |
| Control Limits |        |        |        |        |        |

**Please Note:**

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

\*\* MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9709F35.CCC <1>

**SEQUOIA ANALYTICAL**

Richard Herling  
Project Manager





Cambria Environmental Tech.  
1144 65th St., Ste. C  
Oakland, CA 94608  
Attention: John Espinoza

Client Project ID: Shell 4255 MacArthur Blvd.  
Matrix: Liquid

Work Order #: 9709F35-02

Reported: Oct 2, 1997

### QUALITY CONTROL DATA REPORT

| Analyte:       | Benzene         | Toluene         | Ethyl Benzene   | Xylenes         | Gas             |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| QC Batch#:     | GC092697BTEX03A | GC092697BTEX03A | GC092697BTEX03A | GC092697BTEX03A | GC092697BTEX03A |
| Analy. Method: | EPA 8020        | EPA 8020        | EPA 8020        | EPA 8020        | EPA 8015M       |
| Prep. Method:  | EPA 5030        | EPA 5030        | EPA 5030        | EPA 5030        | EPA 5030        |

|                   |             |             |             |             |             |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| Analyst:          | A. Miraftab | A. Miraftab | A. Miraftab | A. Miraftab | A. Miraftab |
| MS/MSD #:         | 9709A3206   | 9709A3206   | 9709A3206   | 9709A3206   | 9709A3206   |
| Sample Conc.:     | N.D.        | N.D.        | N.D.        | N.D.        | N.D.        |
| Prepared Date:    | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     |
| Analyzed Date:    | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     |
| Instrument I.D.#: | GCHP3       | GCHP3       | GCHP3       | GCHP3       | GCHP3       |
| Conc. Spiked:     | 10 µg/L     | 10 µg/L     | 10 µg/L     | 30 µg/L     | 60 µg/L     |
| Result:           | 9.0         | 8.9         | 9.1         | 25          | 68          |
| MS % Recovery:    | 90          | 89          | 91          | 83          | 113         |
| Dup. Result:      | 9.0         | 9.0         | 9.2         | 26          | 69          |
| MSD % Recov.:     | 90          | 90          | 92          | 87          | 115         |
| RPD:              | 0.0         | 1.1         | 1.1         | 3.9         | 1.5         |
| RPD Limit:        | 0-25        | 0-25        | 0-25        | 0-25        | 0-25        |

| LCS #:            | BLK092697 | BLK092697 | BLK092697 | BLK092697 | BLK092697 |
|-------------------|-----------|-----------|-----------|-----------|-----------|
| Prepared Date:    | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   |
| Analyzed Date:    | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   |
| Instrument I.D.#: | GCHP3     | GCHP3     | GCHP3     | GCHP3     | GCHP3     |
| Conc. Spiked:     | 10 µg/L   | 10 µg/L   | 10 µg/L   | 30 µg/L   | 60 µg/L   |
| LCS Result:       | 9.1       | 9.0       | 9.1       | 25        | 68        |
| LCS % Recov.:     | 91        | 90        | 91        | 83        | 113       |

|                |        |        |        |        |        |
|----------------|--------|--------|--------|--------|--------|
| MS/MSD         | 60-140 | 60-140 | 60-140 | 60-140 | 60-140 |
| LCS            | 70-130 | 70-130 | 70-130 | 70-130 | 70-130 |
| Control Limits |        |        |        |        |        |

**Please Note:**

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Richard Herling  
Project Manager

\*\* MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9709F35.CCC <2>





Cambria Environmental Tech.  
1144 65th St., Ste. C  
Oakland, CA 94608  
Attention: John Espinoza

Client Project ID: Shell 4255 MacArthur Blvd.  
Matrix: Liquid

Work Order #: 9709F35-03, 05

Reported: Oct 2, 1997

**QUALITY CONTROL DATA REPORT**

| Analyte:       | Benzene         | Toluene         | Ethyl<br>Benzene | Xylenes         | Gas             |
|----------------|-----------------|-----------------|------------------|-----------------|-----------------|
| QC Batch#:     | GC092697BTEX17A | GC092697BTEX17A | GC092697BTEX17A  | GC092697BTEX17A | GC092697BTEX17A |
| Analy. Method: | EPA 8020        | EPA 8020        | EPA 8020         | EPA 8020        | EPA 8015M       |
| Prep. Method:  | EPA 5030        | EPA 5030        | EPA 5030         | EPA 5030        | EPA 5030        |

|                   |             |             |             |             |             |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| Analyst:          | A. Miraftab | A. Miraftab | A. Miraftab | A. Miraftab | A. Miraftab |
| MS/MSD #:         | 9709A3205   | 9709A3205   | 9709A3205   | 9709A3205   | 9709A3205   |
| Sample Conc.:     | N.D.        | N.D.        | N.D.        | N.D.        | N.D.        |
| Prepared Date:    | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     |
| Analyzed Date:    | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     | 9/26/97     |
| Instrument I.D.#: | GCHP17      | GCHP17      | GCHP17      | GCHP17      | GCHP17      |
| Conc. Spiked:     | 10 µg/L     | 10 µg/L     | 10 µg/L     | 30 µg/L     | 60 µg/L     |
| Result:           | 9.0         | 9.2         | 9.0         | 27          | 54          |
| MS % Recovery:    | 90          | 92          | 90          | 90          | 90          |
| Dup. Result:      | 9.5         | 9.5         | 9.6         | 29          | 58          |
| MSD % Recov.:     | 95          | 95          | 96          | 97          | 97          |
| RPD:              | 5.4         | 3.2         | 6.5         | 7.1         | 7.1         |
| RPD Limit:        | 0-25        | 0-25        | 0-25        | 0-25        | 0-25        |

|                   |           |           |           |           |           |
|-------------------|-----------|-----------|-----------|-----------|-----------|
| LCS #:            | BLK092697 | BLK092697 | BLK092697 | BLK092697 | BLK092697 |
| Prepared Date:    | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   |
| Analyzed Date:    | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   | 9/26/97   |
| Instrument I.D.#: | GCHP17    | GCHP17    | GCHP17    | GCHP17    | GCHP17    |
| Conc. Spiked:     | 10 µg/L   | 10 µg/L   | 10 µg/L   | 30 µg/L   | 60 µg/L   |
| LCS Result:       | 9.1       | 9.1       | 9.1       | 27        | 55        |
| LCS % Recov.:     | 91        | 91        | 91        | 90        | 92        |

|                |        |        |        |        |        |
|----------------|--------|--------|--------|--------|--------|
| MS/MSD         | 60-140 | 60-140 | 60-140 | 60-140 | 60-140 |
| LCS            | 70-130 | 70-130 | 70-130 | 70-130 | 70-130 |
| Control Limits |        |        |        |        |        |

**Please Note:**

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

\*\* MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9709F35.CCC <3>

**SEQUOIA ANALYTICAL**

Richard Herling  
Project Manager





**SHELL OIL COMPANY**  
RETAIL ENVIRONMENTAL ENGINEERING - WEST

**CHAIN OF CUSTODY RECORD**

Serial No: \_\_\_\_\_

Date: \_\_\_\_\_  
Page 1 of 1

Site Address:  
4255 MAX ARTHUR BLVD, OAKLAND CA

WIC#: 204-5510-0400

Shell Engineer: A. E. PENEZ  
Phone No.:  
Fax #:

Consultant Name & Address: CAMBRIA ENVIRONMENTAL  
1144 65th St. Suite C, Oakland, CA 94608

Consultant Contact: JOHN ESAMRA  
Phone No.: 510 420-0700  
Fax #: 420-9170

Comments: 9709F35

Sampled by: *[Signature]*

Printed Name: JOHN ESAMRA

**Analysis Required**

|                         |                            |                     |                              |                   |                                  |          |                |                  |               |
|-------------------------|----------------------------|---------------------|------------------------------|-------------------|----------------------------------|----------|----------------|------------------|---------------|
| TPH (EPA 8015 Mod. GCS) | TPH (EPA 8015 Mod. Diesel) | BTEX (EPA 8020/602) | Volatile Organics (EPA 8240) | Test for Disposal | Combination TPH 8015 & BTEX 8020 | Asbestos | Container Size | Preparation Used | Composite Y/N |
|                         |                            |                     |                              |                   | X                                |          |                |                  |               |
|                         |                            |                     |                              |                   | X                                |          |                |                  |               |
|                         |                            |                     |                              |                   | X                                |          |                |                  |               |
|                         |                            |                     |                              |                   | X                                |          |                |                  |               |
|                         |                            |                     |                              |                   | X                                |          |                |                  |               |
|                         |                            |                     |                              |                   | X                                |          |                |                  |               |

LAB: ESQUORA

| CHECK ONE (1) BOX ONLY  | CI/DI | TURN AROUND TIME                                     |
|---|-------|--|
| G.W. Monitoring <input type="checkbox"/>                        | 4461  | 24 hours <input type="checkbox"/>                    |
| Site Investigation <input type="checkbox"/>                     | 4441  | 48 hours <input type="checkbox"/>                    |
| Soil Classify/Disposal <input type="checkbox"/>                 | 4442  | 16 days <input checked="" type="checkbox"/> (Normal) |
| Water Classify/Disposal <input type="checkbox"/>                | 4443  | Other <input type="checkbox"/>                       |
| Soil/Air Rem. or Sys. O & M <input checked="" type="checkbox"/> | 4452  |  |
| Water Rem. or Sys. O & M <input type="checkbox"/>               | 4453  |  |
| Other <input type="checkbox"/>                                  |       |  |

NOTE: Notify Lab as soon as Possible of 24/48 hr. TAT.

UST AGENCY: \_\_\_\_\_

| Sample ID        | Date | Sludge | Soil | Water | Air | No. of conls. | TPH (EPA 8015 Mod. GCS) | TPH (EPA 8015 Mod. Diesel) | BTEX (EPA 8020/602) | Volatile Organics (EPA 8240) | Test for Disposal | Combination TPH 8015 & BTEX 8020 | Asbestos | Container Size | Preparation Used | Composite Y/N | MATERIAL DESCRIPTION | SAMPLE CONDITION/ COMMENTS |
|------------------|------|--------|------|-------|-----|---------------|-------------------------|----------------------------|---------------------|------------------------------|-------------------|----------------------------------|----------|----------------|------------------|---------------|----------------------|----------------------------|
|                  |      |        |      |       |     |               |                         |                            |                     |                              |                   |                                  |          |                |                  |               |                      |                            |
| 1 - A-2,3,4-1237 | 9/25 |        |      |       | X   | 1             |                         |                            |                     |                              |                   | X                                |          |                |                  |               |                      |                            |
| 2 - HW-1-1400    |      |        |      |       | X   | 1             |                         |                            |                     |                              |                   | X                                |          |                |                  |               |                      |                            |
| 3 - MW-3-1520    |      |        |      |       | X   | 1             |                         |                            |                     |                              |                   | X                                |          |                |                  |               |                      |                            |
| 4 - MW-3-1520    |      |        |      |       | X   | 1             |                         |                            |                     |                              |                   | X                                |          |                |                  |               |                      |                            |
| 5 - MW-2-1750    |      |        |      |       | X   | 1             |                         |                            |                     |                              |                   | X                                |          |                |                  |               |                      |                            |
| 6 - MW-2-1830    |      |        |      |       | X   | 1             |                         |                            |                     |                              |                   | X                                |          |                |                  |               |                      |                            |

|   |                           |                             |  |                         |                              |
|---|---------------------------|-----------------------------|--|-------------------------|------------------------------|
| Relinquished By (signature): <i>[Signature]</i> | Printed Name: JOHN ESAMRA | Date: 9/24/97<br>Time: 4:26 | Received (signature): <i>[Signature]</i> | Printed Name: PENAFLO   | Date: 9/24/97<br>Time: 4:50  |
| Relinquished By (signature): <i>[Signature]</i> | Printed Name: PENAFLO     | Date: 9/24/97<br>Time:      | Received (signature): <i>[Signature]</i> | Printed Name:           | Date:<br>Time:               |
| Relinquished By (signature):                    | Printed Name:             | Date:<br>Time:              | Received (signature): <i>[Signature]</i> | Printed Name: P. HUFANO | Date: 9/24/97<br>Time: 12:14 |

THE LABORATORY MUST PROVIDE A COPY OF THIS CHAIN-OF-CUSTODY WITH INVOICE AND RESULTS



**Sequoia  
Analytical**

680 Chesapeake Drive  
404 N. Wiget Lane  
819 Striker Avenue, Suite 8

Redwood City, CA 94063  
Walnut Creek, CA 94598  
Sacramento, CA 95834

(650) 364-9600  
(510) 988-9600  
(916) 921-9600

FAX (650) 364-9233  
FAX (510) 988-9673  
FAX (916) 921-0100

|   |  |  |
|---|--|--|
| Cambria<br>1144 65th St. Suite C<br>Oakland, CA 94608<br>Attention: John Espinoza | Client Proj. ID: Shell 4255 MacArthur Blvd.<br><br>Lab Proj. ID: 9709F35 | Received: 09/26/97<br><br>Reported: 10/01/97 |
|---|--|--|

**LABORATORY NARRATIVE**

In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of 11 pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

SEQUOIA ANALYTICAL  
 28 FEB 27 AM 11:13

**SEQUOIA ANALYTICAL**

*Richard Herling*  
 \_\_\_\_\_  
 Richard Herling  
 Project Manager

