CONESTOGA-ROVERS
& ASSOCIATES

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April 23, 2008

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

Re: **Pilot Test Work Plan**
Shell-branded Service Station
1784 150th Avenue
San Leandro, California
SAP Code 136019
Incident No. 98996068
ACHCSA File No. RO0000367

Dear Mr. Wickham:

Conestoga-Rovers & Associates (CRA), submits this *Pilot Test Work Plan* (Work Plan) on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell) for the referenced site. Preparation of this Work Plan was requested in Alameda County Health Care Services Agency's (ACHCSA's) January 18, 2008 letter (Attachment A). This Work Plan was written to comply with California Code of Regulations, Title 23, Division 3, Chapter 16, Underground Storage Tank Regulations. Based on an evaluation of current site conditions, CRA proposes to pilot test groundwater extraction (GWE) and multi-phase extraction (MPE) at the site. This Work Plan summarizes the scope of services for these tests.

SITE BACKGROUND

The site is an operating Shell-branded service station located at the southern corner of 150th Avenue and Freedom Avenue in San Leandro, California (Figure 1). The area surrounding the site is mixed commercial and residential. The site layout (Figure 2) includes a station building, two dispenser islands, and three fuel underground storage tanks (USTs). One waste oil UST was removed from the site on May 25, 2006. There are currently 6 on-site and 7 off-site groundwater monitoring wells. A summary of previous work performed at the site is provided in Attachment B.

PILOT TEST WORK PLAN

Remediation at the site would be performed to achieve one or both of the following objectives: 1) controlling migration of dissolved hydrocarbon impacts from the site and 2) removing hydrocarbons that are apparently sorbed into the soil matrix beneath the site. To assess the feasibility of meeting these objectives, CRA proposes performing GWE and MPE testing. GWE is typically implemented by

utilizing submersible pumps placed in wells to remove groundwater containing dissolved hydrocarbons. GWE can be quite effective at controlling the migration of dissolved hydrocarbon plumes, but is generally ineffective at removing sorbed hydrocarbon mass in soil. Alternatively, MPE utilizes GWE to expose hydrocarbons that are sorbed to soil below the normal water table. A vacuum is concurrently applied to the soil formation to volatilize the exposed hydrocarbons and to remove the hydrocarbon-bearing vapors from the subsurface. The vacuum can also act to enhance GWE rates thereby increasing the rate of dissolved mass removal, and widen the zone of dewatering. Specific goals of these tests are to:

1) Determine aquifer hydraulic properties;
2) Measure hydrocarbon concentrations and extraction rates in extracted groundwater and soil vapor to properly size and select treatment equipment in a final system design;
3) Estimate capture zone from groundwater pumping using either GWE or MPE to properly design an extraction well network in a final system design;
4) Determine whether saturated soils containing sorbed hydrocarbon mass can be adequately dewatered using MPE; and,
5) Estimate the vacuum radius of influence (ROI) and dewatering ROI achieved while using MPE to properly design an extraction well network in a final system design.

To accommodate testing, CRA proposes to drill and install two 4-inch diameter extraction wells, EW-1 and EW-2, at the locations shown on Figure 3. EW-1 will be installed in the southern corner of the site near monitoring well MW-1, and EW-2 will be installed in the eastern corner of the site near monitoring well MW-11. These locations have been chosen because of the soil and groundwater impacts apparent in the vicinity of the two existing monitoring wells. Two separate extraction wells have also been proposed because of the apparent differences in lithology at these two locations. Testing at both locations will allow for collecting a range of feasibility data representative of all subsurface conditions at the site. To ensure that complete and appropriate data is collected during testing, CRA also proposes installing four pairs of temporary 2-inch piezometers, P-1A/B, P-2A/B, P-3A/B, and P-4A/B at the locations show on Figure 3. The piezometer locations will be tightly-spaced at varying distances from the proposed extraction wells in order to gather accurate groundwater dewatering and vacuum ROI data in the crucial area within 20 feet of each extraction well. The A-level piezometer at each location will be completed and screened to monitor vacuum ROI data above the water table during MPE testing. The B-level piezometers will be completed and screened to monitor for groundwater dewatering ROI during both GWE and MPE testing, as well as to additionally monitor vacuum ROI during MPE testing.

The GWE testing will include a step-drawdown test and a recovery test at each proposed extraction well to evaluate the hydraulic properties of the saturated zone in both locations. The step drawdown tests will be conducted to determine the sustainable GWE flow rates (aquifer yield) at each extraction well location. The step testing at each well will be immediately followed by a recovery test. Field data collected from

the recovery test will be used to estimate hydraulic properties of the aquifer. MPE testing will be performed separately at each of the proposed extraction wells for a minimum of 24 hours at each well location. Following the individual well MPE tests, a combined test of both wells will be performed for a minimum of 24 hours. The combined duration of MPE testing will not exceed 5 consecutive days. The following sections list the tasks and provide more detail about the scope of the proposed pilot testing:

Pre-Field and Drilling Tasks

Permits and Notifications: CRA will obtain the required drilling permit from the Alameda County Health Care Services Agency ACHCSA. As required, CRA will notify the Bay Area Air Quality Management District (BAAQMD) regarding the proposed MPE test. An air discharge permit is not required for a MPE pilot test of no more than 5 days in duration. Soil vapor extracted during the MPE test will be abated to comply with BAAQMD requirements.

Site Health and Safety Plan: CRA will prepare a comprehensive site health and safety plan (HASP) for the field work.

Underground Utility Location and Clearance: CRA will mark proposed drilling locations and the locations will be cleared through Underground Service Alert (USA) prior to drilling. CRA will also subcontract a private utility locator to identify subsurface obstacles prior to drilling. CRA will consult as-built plans for station to identify any other unmarked underground facilities. Each well location will be cleared to eight feet below grade (fbg) using an air-knife and/or water-knife assisted vacuum truck to detect any unknown utilities prior to drilling.

Drilling, Sampling, and Well Installation: Two extraction wells (EW-1 and EW-2) and four piezometer pairs (P-1 A/B through P-4 A/B) are proposed at the locations shown in Figure 3. Drilling and installation of these wells will occur concurrently with the drilling activities proposed in CRA's *Well Destruction and Installation Work Plan*. This document was submitted to ACHCSA on March 13, 2008, but has not been approved as of this date. The wells proposed for installation and destruction in the March 13, 2008 document are also illustrated in Figure 3.

The exploratory borings for the extraction wells will be drilled using 10-inch diameter hollow-stem auger equipment and will be converted to extraction wells. The depth of the borings and the screened intervals of the wells are shown in the following table. The total depth of these wells may be changed based on observed lithology and depth to water. Also, the screen intervals may change based on the field screening for hydrocarbon impacts described below. These wells will be completed with a 4-inch diameter casing with a 0.010-inch slotted screen. The filter pack will consist of #2/12 Monterey Sand and will be placed in the annulus from the bottom of the boring to two feet above the screen interval. The well annulus will

have a 2-foot bentonite seal above the filter pack, and the remaining annulus will be filled with neat Portland cement. Each well will be protected with a traffic-rated well box set in concrete flush with ground surface.

Well #	Total Depth of Proposed Boring*	Screened Interval of Proposed Well*
EW-1	36 fbg	21-36 fbg
EW-2	34 fbg	18-33 fbg

*based on 12/26/07 groundwater data

The exploratory borings for the A-level piezometers will be drilled using 6-inch diameter hollow-stem auger equipment and will be converted to piezometers. The depth of the borings and the screened intervals of the piezometers are shown in the following table. The total depth of these wells may be changed based on observed lithology and depth to water. The A-level piezometers have been designed to extend minimally into the water-bearing zone. The total depth of these piezometers may be changed based on observed lithology and depth to water. These wells will be constructed using 0.010-inch slotted screen. The filter pack will consist of #2/12 Monterey Sand and will be placed in the annulus from the bottom of the boring to two feet above the screen interval. The well annulus will have a 2-foot bentonite seal above the filter pack, and the remaining annulus will be filled with neat Portland cement. Each well will be protected with a traffic-rated well box set in concrete flush with ground surface.

Piezometer	Total Depth of Proposed Boring *	Screened Interval for proposed Piezometer*
P-1A	27 fbg	12-27 fbg
P-2A	27 fbg	12-27 fbg
P-3A	23 fbg	8-23 fbg
P-4A	23 fbg	8-23 fbg

*based on 12/26/07 groundwater data

The exploratory borings for the B-level piezometers will be drilled using 6-inch diameter hollow-stem auger equipment and will be converted to piezometers. The depth of the borings and the screened intervals of the piezometers are shown in the following table. The total depth of these wells may be changed based on observed lithology and depth to water. The B-level piezometers have been designed so that the top of the well screen is at approximately the static water table. The total depths match the proposed depths of the extraction wells. These wells will be constructed using 0.010-inch slotted screen. The filter pack will consist of #2/12 Monterey Sand and will be placed in the annulus from the bottom of the boring to two feet above the screen interval. The well annulus will have a 2-foot bentonite seal above the filter pack, and the remaining annulus will be filled with neat Portland cement. Each well will be protected with a traffic-rated well box set in concrete flush with ground surface.

Piezometer	Depth of Boring *	Screened Interval *
P-1B	36 fbg	26-36 fbg
P-2B	36 fbg	26-36 fbg
P-3B	32 fbg	23-33 fbg
P-4B	32 fbg	23-33 fbg

*based on 12/26/07 groundwater data

For all wells, soil lithology will be continuously logged and screened using a photoionization detector at approximately 2-foot intervals. Soil samples will be selected for chemical analyses based on field screening for hydrocarbon vapors using a photo-ionization detector (PID), visual observation of soil characteristics such as discoloration, sample depth relative to the capillary fringe, and soil-texture considerations. CRA's standard field procedure for monitoring well installation is presented in Attachment C.

Well Development and Groundwater Sample Collection: The extraction wells will be developed no less than 72 hours following their installation using surge-block agitation and bailer or pump evacuation. The temporary piezometers will not be developed. Groundwater samples for laboratory analysis will be collected from both of the extraction wells after they are developed.

Well Elevation Survey: The top of casing elevation of the extraction wells will be surveyed by a California licensed land surveyor to mean sea level datum. The survey will use a nearby benchmark as a reference datum. Horizontal well coordinates will be measured in compliance with AB2886 (GeoTracker), and uploaded into GeoTracker. The temporary piezometers will not be surveyed.

GWE Pilot Test Protocol and Equipment

At each extraction well, CRA will perform step-drawdown tests followed by rising head groundwater recovery tests. Based on previous remediation events at this site, CRA anticipates GWE rates of approximately 3 to 5 gallons per minute (gpm). The step-drawdown test will consist of two to four steps to estimate the maximum sustainable GWE rate. During the step-test, the pumping rate will be incrementally increased (stepped) after the groundwater level in the pumping well stabilizes. The pumping rate will be incrementally increased starting at 1 gpm and stepped to approximately 2, 3, 4 and 5 gpm or until the sustainable groundwater extraction rate can be determined. Subsequent flow steps will be predicated on data collected from the previous step and the height of the remaining water column in the well.

After completion of the step-drawdown tests, groundwater recovery tests will be conducted at each well. The purpose of a recovery test is to obtain additional data to estimate the hydraulic conductivity and transmissivity of soil in the immediate site vicinity. The groundwater recovery test will be performed by measuring the rising groundwater level at regular intervals. Groundwater level measurements will be collected every 30 seconds during the first 5 minutes of the test, followed by every 60 seconds during the next 5 to 15 minutes of the test, and finally every 5 minutes until the groundwater level in the respective well has recovered to 90% of its pre-pumping water level.

Groundwater will be extracted from each well using an electric submersible pump. The following parameters will be monitored and recorded during each test: elapsed time, GWE flow rate, volume extracted, well drawdown, and recharge. Except for drawdown and recharge, this data will be collected every 15 minutes, but the frequency may decrease if the data stream stabilizes. CRA will use a flow totalizer and a rotameter to monitor the total gallons pumped and the flow rate. Drawdown and recharge will be calculated from pressure head measurements collected from the extraction well using a MiniTroll™ pressure transducer/data logger. Submersible pressure transducers will also be installed in the B-level piezometers and other existing nearby monitoring wells. The transducers will be installed and programmed, and recording will begin a minimum of 24 hours before the GWE test. The pressure transducers will be programmed to collect a data point every 1 to 5 minutes. Water level will also be checked manually with an electronic water level indicator from the respective extraction well to confirm

pressure transducer readings and provide backup documentation. Test data will be compiled on test-specific field data sheets.

MPE Pilot Test Protocol and Equipment

At each extraction well, CRA will perform an MPE test to assess MPE's feasibility at the site. As during the GWE test, groundwater will be extracted from each well using an electric submersible pump. The initial GWE rate for the respective well will be based on the maximum sustainable yield determined during GWE pilot testing. A vacuum will be applied to the well to remove hydrocarbon-bearing soil vapor. The vacuum will likely increase the yield at each well, so the GWE rate will be increased to maintain maximum drawdown in the respective well. Testing at these conditions will be continued until there is no change in vacuum and dewatering influence at the observation points. After each extraction well has been tested individually, a combined test using both wells will be performed for the duration of the 5 day test period.

Critical components for MPE testing include an extraction device, water storage, and a vapor abatement device. A mobile unit equipped with a liquid-ring pump, or equivalent, as a vacuum source and a thermal oxidizer to abate vapors prior to discharge to the atmosphere will be used for testing. The mobile unit will be powered by a propane or diesel-fired generator. Propane will also likely be used as an auxiliary fuel for the thermal oxidizer; therefore a propane tank will be placed on-site. The mobile unit will be equipped with a vapor-liquid separator to remove entrained groundwater from the vapor stream, as necessary. Groundwater will be pumped to a temporary storage tank for storage during the test.

Following the GWE pilot test, the submersible pressure transducers will remain in the extraction wells, piezometers, and other observation wells to continue to gather water table elevation data prior to and during MPE testing. During the test, CRA will also measure parameters such as elapsed time, GWE flow rate, groundwater volume extracted, the applied wellhead vacuum, hydrocarbon concentration in extracted vapor, and extracted vapor flow rate. Induced vacuum at the piezometers and other observation wells will be measured periodically. A Horiba gas analyzer, calibrated to isobutylene, will be used to field measure hydrocarbon vapor concentrations from the extraction well. A Thomas Industries vacuum pump will be used to collect soil vapor samples in one-liter Tedlar bags for laboratory analysis to compare with field readings. A TSI thermoanemometer will be used to measure vapor extraction airflow rates and air temperature. Magnahelic gauges will be used to measure the vacuum applied at the wellhead and induced in the observation wells. Water level will also be checked manually at the piezometers and other observation wells periodically with an electronic water level indicator to confirm pressure transducer readings and provide backup documentation. Test data will be compiled on test-specific field data sheets.

Operational data parameters will be initially collected every 15 to 30 minutes during testing, then in longer (approximately hourly) intervals after operational data has stabilized. While the equipment will operate continuously during the 5-day pilot testing period, data parameters will only be monitored during typical working hours (approximately 7 AM to 5 PM).

Post-Field Tasks

Sample Collection and Chemical Analyses: Soil samples will be collected during the advancement of the soil borings for the extraction and observation wells as described above. Groundwater samples will be collected from the extraction well prior to and subsequent to both GWE and MPE pilot testing. During testing, influent soil vapor samples will be collected at least two times each day (at the beginning and the end of the monitoring period each day) in 1-liter Tedlar bags. Samples of extracted groundwater will be collected once per day during testing for laboratory analysis. A State-certified analytical laboratory will analyze selected soil samples and all groundwater, and soil vapor samples for total petroleum hydrocarbons in the gasoline range (TPHg), benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl tertiary butyl ether (MTBE) by EPA Method 8260B, or the equivalent for soil vapor analysis.

Soil and Water Disposal/Recycling: Soil and water produced during drilling activities will be temporarily stored in 55-gallon drums on-site. Groundwater extracted during GWE and MPE pilot testing will be temporarily stored in an appropriately-sized storage tank. The extracted groundwater will be disposed of appropriately following sampling and profiling.

GWE Test Data Analysis: GWE test data will be evaluated, including background groundwater table fluctuations, which will be compared with background barometric pressure readings. If a correlation is observed between the changes in pressure and the groundwater table, a correction factor will be applied to the groundwater drawdown data. The pump test data will be evaluated using AquiferTest for Windows® version 3.02 software from Waterloo Hydrogeologic, Inc. Using this software, CRA will analyze:

- Aquifer yield - estimated as the maximum observed flow rate coinciding with a stabilized water level; and
- Step drawdown test and constant rate recovery test data using the Theis Recovery method to estimate the hydraulic conductivity and transmissivity.

The results of these analyses, noting the assumptions of the analysis method, will be presented in a report and will be used in sizing the appropriate full-scale remediation equipment.

Reporting: Upon completion of drilling and pilot test activities, CRA will prepare a summary report, which, at minimum, will include:

- A summary of the site background and history,
- A summary of the drilling and well installation activities;
- Boring logs and well construction diagrams;
- A summary of GWE and MPE pilot test activities;
- A summary of GWE test data analysis
- Tabulated soil, groundwater, and soil vapor analytical results,
- Analytical reports and chain-of-custody forms,
- Soil and water disposal records, and
- Conclusions and recommendations regarding the feasibility of GWE and MPE at the site.

SCHEDULE

CRA will implement the proposed Work Plan upon receiving written approval from the ACHCSA. Well installation activities are expected to be completed approximately 45 to 60 days following Work Plan approval. GWE and MPE pilot testing activities will be performed approximately 30 to 60 days following well installation. Final laboratory analytical reports should be received approximately 15 days following the conclusion of MPE testing. A final report of well installation and pilot test activities will be completed approximately 60 days after receipt of the final laboratory analytical reports.

CLOSING

If you have any questions or comments, please call Peter Schaefer at (510) 420-3319 or Ana Friel at (707) 268-3812.

Sincerely,

Conestoga-Rovers & Associates

Peter Schaefer, CEG, CHG
Acting Project Manager

Daniel N. Lescure, PE
Senior Engineer

Figures: 1 – Site Vicinity Map
2 – Site Plan
3 – Site Plan with On-site Insert

Attachments: A – Regulatory Letter
B – Site Background
C – CRA Standard Field Procedures for Well Installation

cc: Denis Brown, Shell Oil Products US, 20945 S. Wilmington Ave., Carson, CA 90810
City of San Leandro, Environmental Division, 835 East 14th Street, San Leandro, CA. 94577

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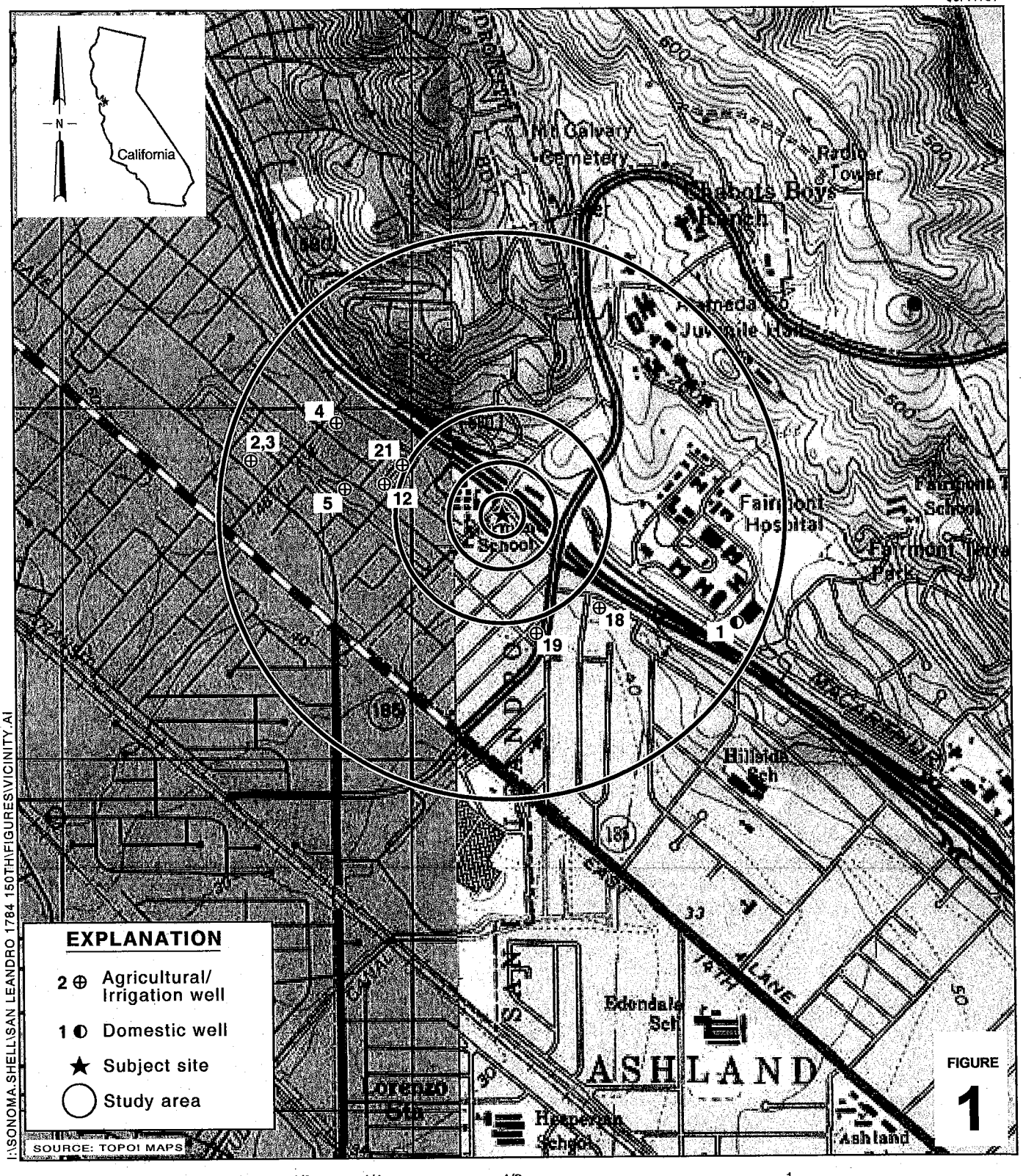

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FIGURE 1

Shell-branded Service Station
1784 150th Avenue
San Leandro, California

Vicinity Map

CONESTOGA-ROVERS & ASSOCIATES

04/17/08

Site Plan

EXPLANATION

- EW-1 — Proposed extraction well location
- P-1A/B — Proposed piezometer pair location
- MW-1B — Proposed deeper groundwater monitoring well
- MW-1A — Proposed groundwater monitoring well
- MW-1 — Well proposed for destruction
- CPT-1 — CPT location (CRA, 8/29-30/07)
- B-1 — Soil boring location (CRA, 9/14/07)
- SVP-1 — Soil vapor probe location (CRA, 8/28/07)
- WO-1-6.5 — Soil sample location (Cambria, 5/25/06)
- S-19 — Soil boring location (Cambria, 5/23-25/06)
- MW-4 — Monitoring well location
- MW-6 — Monitoring well location
- D-1-5.0 — Soil sample location (Cambria, 04/05/05)
- D-1-3.5 — Soil sample location (Cambria, 03/22/05)
- SB-17 — Soil boring location (Cambria, 9/04)
- SB-10 — Soil boring location (Cambria, 6/03)
- SB-9 — Soil boring location (Cambria, 10/02)
- SVS-11 — Soil boring location (Cambria, 11/98)
- SVS-1 — Soil boring location (Cambria, 7/96)
- BH-7 — Soil boring location (Weiss, 3/95)
- A — Dispenser soil sample location (Weiss, 3/95)
- BH-1 — Soil boring location (Weiss, 6/94)
- 1 — Dispenser number
- Product piping

I-580

I-580 OFF-RAMP

FREEDOM AVENUE

PORTOFINO CIRCLE

PORTOFINO DRIVE

150TH AVENUE

brick sound wall

BH-1 located 215' SE

BH-6 located 360' SE

BH-4

BH-2

BH-5

BH-3

BH-7

BH-8

BH-9

SB-10

SB-11

SB-12

SB-13

SB-14

SB-15

SB-16

SB-17

SB-18

SB-19

SB-20

SB-21

SB-22

SB-23

MW-1

MW-1A

MW-1B

MW-2

MW-3

MW-4

MW-5

MW-6

MW-7

MW-8

MW-9

MW-10

MW-11

MW-14

SB-24/MW-12

SB-25/MW-13

CPT-1

CPT-2

CPT-3

CPT-5

CPT-6

EW-1

EW-2

P-1A/B

P-2A/B

P-3A/B

P-4A/B

SVP-1

SVP-2

SVP-3

SVP-4

SVP-5

SVS-1

SVS-2

SVS-3

SVS-4

SVS-5

SVS-6

SVS-7

SVS-8

SVS-9

SVS-10

SVS-11

SVS-12

SVS-13

SVS-14

SVS-15

SVS-16

Shell Station
1784 150th Ave.

Former Dispenser Island

Station Building

Dispenser Islands

USTs

air comp.

Former W/O UST

parking lot

Denny's Restaurant
15015 Freedom Ave.

Residential

Residential (Townhouses)

Residential (Townhouses)

Residential (Townhouses)

Residential

Private (Gated Driveway)

MH

MH

MH

D-2-3.5
D-2-5.0
P-2-3.5,
P-2-5.0
P-1-2.5,
P-1-5.0
D-4-3.5
D-4-5.0
D-3-3.5
P-3-3.0
D-1-5.0
D-1-3.5
P-4-2.5
P-4-5.0

0 20 40 80

Scale (ft)

CONESTOGA-ROVERS & ASSOCIATES

Shell-branded Service Station

1784 150th Avenue

San Leandro, California

FIGURE

2

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04/17/08

Site Plan with On-Site Insert

EXPLANATION

- EW-1 — Proposed extraction well location
- P-1A/B — Proposed piezometer pair location
- MW-1B — Proposed deeper groundwater monitoring well
- MW-1A — Proposed groundwater monitoring well
- MW-1 — Well proposed for destruction
- MW-4 — Monitoring well location
- MW-6 — Monitoring well location
- ❶ — Dispenser number
- Product piping

I-580

I-580 OFF-RAMP

PORTOFINO CIRCLE

brick sound wall

MW-9

SB-25/ MW-13

Residential

MW-7

SB-24/MW-12

MW-8

Residential

MH

MW-4

PORTOFINO DRIVE

Residential

150TH AVENUE

FREEDOM AVENUE

Former Dispenser Island

MW-3

MW-10

Shell Station
1784 150th Ave.

Station Building

parking lot

Denny's Restaurant
15015 Freedom Ave.

MW-14

Dispenser Islands

W

P-2A/B

air comp.

Former W/O UST

USTs

MW-2

EW-1

MW-1

MW-11

P-1A/B

EW-2

P-3A/B

P-4A/B

MW-1A

MW-1B

Residential (Townhouses)

Residential (Townhouses)

0 20 40 80

Scale (ft)

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CONESTOGA-ROVERS & ASSOCIATES

Shell-branded Service Station

1784 150th Avenue
San Leandro, California

FIGURE

3

ATTACHMENT A

Regulatory Letter

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

JAN 2 2 2008
RECEIVED

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

January 18, 2008

Mr. Denis Brown
Shell Oil Products US
20945 S. Wilmington Ave.
Carson, CA 90810-1039

Bhushan K. Bansal
Bansal, Inc.
1784 150th Avenue
San Leandro, CA 94578-1826

Subject: Fuel Leak Case No. RO0000367 and Geotracker Global ID T0600101230, Shell#13-6017, 1784 150th Avenue, San Leandro, CA 94578

Dear Mr. Brown and Mr. Bansal:

Alameda County Environmental Health (ACEH) staff has reviewed the fuel leak case file for the above-referenced site including the documents entitled, "Supplemental Subsurface Investigation Report," dated December 17, 2007 and "Groundwater Monitoring and Remediation Report – Third Quarter 2007," dated November 9, 2007. Both reports were prepared on Shell's behalf by Conestoga-Rovers & Associates.

The Supplemental Subsurface Investigation Report presents results from five cone penetration test (CPT) borings, one direct push soil boring, and five soil vapor probes. Total petroleum hydrocarbons as gasoline (TPHg) were detected in soil vapor from three of the five soil vapor probes at concentrations that exceed Environmental Screening Levels (San Francisco Bay Regional Water Quality Control Board November 2007) for residential land use. TPHg, benzene, and MTBE were detected in grab groundwater samples collected from the CPT borings at concentrations up to 3,600, 41, and 1,100 micrograms per liter (µg/L), respectively. The Supplemental Subsurface Investigation Report recommends destruction and replacement of wells MW-1 and MW-2, installation of a shallow zone monitoring well near boring B-1, and re-sampling vapor probes SVP-1 through SVP-5. As discussed in the technical comments below, we generally concur with these recommendations.

Interim groundwater extraction was conducted periodically at the site from July 2002 to August 2007. Periodic groundwater extraction was discontinued at the site because periodic extraction was not effective in reducing the concentrations of dissolved hydrocarbons and oxygenates. ACEH concurred with discontinuation of periodic groundwater extraction on August 14, 2007. During the most recently reported groundwater sampling event on September 11, 2007, TPHg, benzene, and MTBE were detected in groundwater at concentrations up to 45,000, 8,100, and 5,700 µg/L, respectively. Remediation is required for this site in order to address the elevated concentrations of fuel hydrocarbons and oxygenates that persist in soil and groundwater at the site. We request that you submit a Pilot Test Work Plan or Draft Corrective Action Plan **by April 25, 2008.**

We request that you address the following technical comments, perform the proposed work, and send us the reports described below.

TECHNICAL COMMENTS

1. **Destruction and Replacement of Wells MW-1 and MW-2.** We concur with the proposed destruction and replacement of long screen wells MW-1 and MW-2. Please present plans for these activities in the Work Plan for Well Decommissioning and Well Installation requested below.

2. **Installation of Additional Monitoring Well near Boring B-1.** We have no objection to installation of an additional monitoring well to monitor shallow groundwater near boring B-1. Please present plans for well installation in the Work Plan for Well Decommissioning and Well Installation requested below.

3. **Re-Sampling of Soil Vapor Probes.** Based on the elevated concentrations of TPHg detected in soil vapor samples from probes SVP-1 through SVP-5, additional sampling of soil vapor probes SVP-1 through SVP-5 is required. Please present the results from re-sampling of the probes **no later than March 28, 2008.**

4. **TPHg Concentration in Soil Vapor from SVP-5.** We do not agree with the conclusion in the Executive Summary of the Supplemental Subsurface Investigation Report that the UST system at the site is not the likely source of the elevated concentration of TPHg detected in soil vapor from probe SVP-5. The Supplemental Subsurface Investigation Report postulates that an unknown source of petroleum contamination exists in the vadose zone in the area of MW-12. In reviewing historical data for the site, we find little indication of a separate source of contamination in this area. Five soil samples were collected on May 26, 2006 from soil boring SB-24, which is the soil boring associated with well MW-12. The highest concentration of TPHg (848 mg/kg) was detected in the soil sample collected from the capillary fringe at a depth of 24 feet bgs. Soil samples collected at shallower depths contained less than 2.39 mg/kg of TPHg. These results indicate that soil contamination in this off-site area is more likely the result of groundwater migration from the site. Elevated concentrations of BTEX were detected in soil vapor samples previously collected from locations SVS-7 through SVS-9 in the off-site area west of 150th Avenue. Soil vapor samples were collected from four depths in SVS-9. The highest concentrations of benzene were detected in the two lowermost soil vapor samples. These results are also consistent with contamination that has migrated with groundwater rather than a separate vadose zone source.

5. **Site Remediation.** Interim groundwater extraction has not reduced the concentrations of dissolved hydrocarbons at the site. Based on both historic and recent site assessment activities, a significant source of fuel hydrocarbons and oxygenates remains at the site. Therefore, we request that you submit a Pilot Test Work Plan or Draft Corrective Action Plan **by April 25, 2008** to initiate site cleanup.

TECHNICAL REPORT REQUEST

Please submit technical reports to Alameda County Environmental Health (Attention: Jerry Wickham), according to the following schedule:

- **March 28, 2008** – Work Plan for Well Decommissioning and Well Installation and Sampling Results from Soil Vapor Probes SVP-1 through SVP-5
- **April 25, 2008** – Pilot Test Work Plan or Draft Corrective Action Plan
- **45 days after end of each quarter** – Quarterly Monitoring Reports

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

ELECTRONIC SUBMITTAL OF REPORTS

The Alameda County Environmental Cleanup Oversight Programs (LOP and SLIC) require submission of all reports in electronic form to the county's ftp site. Paper copies of reports will no longer be accepted. The electronic copy replaces the paper copy and will be used for all public information requests, regulatory review, and compliance/enforcement activities. Instructions for submission of electronic documents to the Alameda County Environmental Cleanup Oversight Program ftp site are provided on the attached "Electronic Report Upload (ftp) Instructions." Please do not submit reports as attachments to electronic mail.

Submission of reports to the Alameda County ftp site is an addition to existing requirements for electronic submittal of information to the State Water Resources Control Board (SWRCB) Geotracker website. Submission of reports to the Geotracker website does not fulfill the requirement to submit documents to the Alameda County ftp site. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for groundwater cleanup programs. For several years, responsible parties for cleanup of leaks from underground storage tanks (USTs) have been required to submit groundwater analytical data, surveyed locations of monitor wells, and other data to the Geotracker database over the Internet. Beginning July 1, 2005, electronic submittal of a complete copy of all necessary reports was required in Geotracker (in PDF format). Please visit the SWRCB website for more information on these requirements (http://www.swrcb.ca.gov/ust/cleanup/electronic_reporting).

PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 6835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, later reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

If you have any questions, please call me at (510) 567-6791 or send me an electronic mail message at jerry.wickham@acgov.org.

Sincerely,

Jerry Wickham, California PG 3766, CEG 1177, and CHG 297
Senior Hazardous Materials Specialist

Enclosure: ACEH Electronic Report Upload (ftp) Instructions

cc: Peter Schaefer, Conestoga-Rovers & Associates, 5900 Hollis Street, Suite A
Emeryville, CA 94608

Ana Friel, Conestoga-Rovers & Associates, 19449 Riverside Drive, Suite 230
Sonoma, CA 95476

Donna Drogos, ACEH
Jerry Wickham, ACEH
File

ATTACHMENT B

Site Background

PREVIOUS WORK

1986 Waste Oil Tank Removal: According to an October 13, 1989 letter from Weiss Associates (Weiss) of Emeryville, California to Shell, Petroleum Engineering of Santa Rosa, California removed a 550-gallon waste-oil tank from the site in November 1986). Immediately following the tank removal, Blaine Tech Services, Inc. (Blaine) of San Jose, California collected soil samples (Soil #1 and Soil #2) beneath the former tank at 8 and 11 feet below grade (fbg). Soil #1 and Soil #2 contained petroleum oil and grease at 196 and 167 parts per million (ppm), respectively. The tank pit was over-excavated to a total depth of 16 fbg, but no additional soil samples were reportedly collected. Groundwater was not encountered in the tank excavation. A new 550-gallon fiberglass waste-oil tank was installed in the same location. Table 1 includes historical soil analytical results.

1990 Well Installation: In March 1990, Weiss advanced soil boring BH-A, which was converted to groundwater monitoring well MW-1, adjacent to the waste-oil tank (Figure 2). In a soil sample collected at 29 fbg, 35 ppm total petroleum hydrocarbons as gasoline (TPHg) and 0.23 ppm benzene were detected.

1992 Well Installations: In February 1992, Weiss advanced soil borings BH-B and BH-C, which were converted to monitoring wells MW-2 and MW-3. A soil sample collected near the water table from the boring for well MW-2 (21.5 fbg) contained 79 ppm TPHg. Soil samples from boring BH-C, which is located over 100 feet cross-gradient of the tanks, contained up to 68 ppm TPHg at 31.5 fbg.

1992 Well Survey: In 1992, Weiss reviewed the California Department of Water Resources (DWR) and Alameda County records to identify water wells within a ½-mile radius of the site. A total of 21 wells were identified: 12 monitoring wells, 8 irrigation wells and 1 domestic well. No municipal wells were identified. The 8 irrigation wells and 1 domestic well are more than 1,000 feet from the site.

1994 Subsurface Investigation: In June 1994, Weiss advanced six soil borings (BH-1 through BH-6) on and off site. No hydrocarbons were detected in soil samples from any borings, except for 0.013 ppm benzene in boring BH-3 at 16 fbg. No hydrocarbons were detected in grab groundwater samples from borings BH-1, BH-4, BH-5, and BH-6. The maximum concentrations of 120,000 parts per billion (ppb) TPHg and 25,000 ppb benzene were detected in the grab groundwater sample collected from boring BH-3. Table 2 presents historical grab groundwater analytical results.

1995 Well Installation: In February and March 1995, Weiss advanced four soil borings (BH-7 through BH-10) and converted BH-10 to monitoring well MW-4. No petroleum hydrocarbons were detected in any of the soil samples. Up to 100 ppb TPHg and 1.0 ppb benzene were detected in grab groundwater samples from BH-7 and BH-9. No TPHg or benzene was detected in the grab groundwater sample from BH-10. Groundwater was not encountered in soil boring BH-8.

1996 Soil Vapor Survey and Soil Sampling: In July 1996, Weiss conducted a subsurface investigation to obtain site-specific data for a risk-based corrective action (RBCA) evaluation of the site. Soil vapor and soil samples were collected from the vadose zone at 10 on- and off-site locations (SVS-1 through SVS-10). The highest soil vapor hydrocarbon concentrations were detected near the northwest corner of the UST complex (sample SVS-5 at 3.0 fbg, which contained 7,600 parts per million by volume [ppmv] benzene). No TPHg, benzene, toluene, ethylbenzene, and xylenes (BTEX), or methyl tertiary-butyl ether (MTBE) was detected in any of the soil samples except for 1.1 ppm TPHg detected in sample SVS-5 at 18 to 20 fbg. Weiss concluded that depleted oxygen concentrations and elevated carbon dioxide and methane concentrations in the vadose zone indicated that biodegradation was occurring.

1997 RBCA Evaluation: In 1997, Weiss prepared a RBCA evaluation for the site. RBCA analysis results indicated that BTEX, MTBE, 1,2-dichloroethane, and tetrachloroethylene concentrations detected in soil and groundwater beneath the site did not exceed a target risk level of 10^{-5} for residential indoor or outdoor air exposure pathways. However, a risk threshold exceedance was identified associated with ingestion of groundwater from a hypothetical well 25 feet down gradient of the source.

1997 Dispenser and Turbine Sump Upgrade: The dispensers and turbine sumps at the station were upgraded in December 1997. Cambria collected soil samples Disp-A through Disp-D from beneath the dispenser islands during upgrade activities. Up to 590 ppm TPHg (Disp-C at 4.5 fbg), 1.8 ppm benzene (Disp-C at 2.0 fbg) and 1.4 ppm MTBE (Disp-C at 2.0 fbg) were detected.

1998 Soil Vapor Survey and Soil Sampling: In November 1998, Cambria conducted a subsurface investigation to obtain site-specific data for an updated RBCA evaluation of the site. Soil samples, soil vapor samples, and grab groundwater samples were collected from the vadose zone at three on-site and three off-site locations (SVS-11 through SVS-16). In soil vapor, maximum concentrations of 2.7 ppmv TPHg (C5+ hydrocarbons) and 0.17 ppmv TPHg (C2-C4 hydrocarbons) were detected at 10 fbg in borings SVS-14 and SVS-15, respectively. A maximum concentration of 0.0099 ppmv benzene was detected in SVS-16 at 5 fbg. In soil, 1.6 ppm TPHg and 0.0050 ppm benzene were detected in boring SVS-11 at 19.5 fbg. No TPHg or benzene was detected in any other soil samples. MTBE was reported at 0.029 ppm in boring SVS-14 at 19 fbg using EPA Method 8020; however, MTBE was not detected in this sample using EPA Method 8260. TPHg and benzene were detected using EPA Method 8020 in groundwater from borings SVS-11 and SVS-12 at concentrations up to 130,000 ppb TPHg and 18,000 ppb benzene. MTBE was reported at a concentration of 1,500 ppb in boring SVS-11 by EPA Method 8020, but was not confirmed by EPA Method 8260.

1999 RBCA Evaluation: In September 1999, Cambria prepared a RBCA evaluation for the site. Cambria analyzed the following potential exposure pathways: off-site ingestion of groundwater, on-site ingestion of surficial soil, volatilization of benzene from soil or groundwater into on-site or off-site indoor air, and migration of benzene soil vapor to on-site or off-site outdoor air. Results of Tier 1 and Tier 2

RBCA analyses indicated that contaminants within soil and groundwater did not present significant health risks.

2001 Off-Site Monitoring Well Installation: Two monitoring wells (MW-5 and MW-6) were installed off site to the southwest. Soil sample results from this investigation indicated only minimal MTBE impact (0.012 ppm) to off-site soil southwest of the site. This finding was corroborated by Cambria's 1998 subsurface investigation, in which no TPHg or benzene and only low MTBE concentrations were detected in soil from three borings (SVS-14 through SVS-16) along the private driveway.

2002-2004 Mobile Groundwater Extraction (GWE): In July 2002, semi-monthly GWE was begun using monitoring well MW-2, and it continued on a monthly basis until March 2004. Beginning in March 2004, monthly GWE was performed using well MW-2 and MW-11 once per month each, so that GWE was conducted twice per month at the site. The GWE frequency was increased to weekly (from both MW-2 and MW-11) beginning in May 2004. Mobile GWE ceased on August 24, 2004. Approximately 19.6 pounds of TPHg, 3.45 pounds of benzene, and 5.12 pounds of MTBE had been removed during these activities.

2002 Off-Site Monitoring Well Installation: Two monitoring wells (MW-7 and MW-8) and one soil boring (SB-9) were installed off-site and northwest of the site in 150th Avenue. Soil sample results collected during this investigation indicated minimal TPHg and BTEX impact to off-site soil northwest of the site. Grab groundwater samples indicated elevated TPHg and benzene concentrations were present in groundwater northwest of the site beneath 150th Avenue.

2003 Soil and Groundwater Investigation: Six soil borings (SB-10 through SB-14 and SB-16) were advanced to the northwest of the site in both 150th Avenue and Portofino Circle; one boring (SB-15) was advanced on site (Figure 2). Initial groundwater was encountered between 24 and 28 fbg during drilling activities. During the investigation, MTBE was only detected in on-site grab groundwater sample SB-15-W at 40 ppb. The highest TPHg concentration was detected in SB-14-W at 67,000 ppb, and the highest benzene concentration was detected in SB-15-W at 530 ppb. TPHg was detected only in soil samples SB-11-30' and SB-15-36' at concentrations of 650 ppm and 1.4 ppm, respectively. Benzene was detected only in soil sample SB-15-35' at 0.10 ppm. Based on typical groundwater depths in nearby well MW-7, it was determined that samples SB-11-30' and SB-15-36' were saturated, and results may be more indicative of chemical concentrations in groundwater.

2003 Sensitive Receptor Survey (SRS): In October 2003, Cambria completed an SRS at Shell's request. The SRS targeted the following as potential sensitive receptors: basements within 200 feet, surface water and sensitive habitats within 500 feet, hospitals, residential care, and childcare facilities within 1,000 feet, and water wells within ½ mile. No basements, surface water, sensitive habitats, or educational and childcare facilities were identified within the search radius. The Fairmont Hospital campus, located at

15400 Foothill Boulevard, is located approximately 1,100 feet from the site, just outside the target radius of 1,000 feet.

To update the 1992 well survey performed by Weiss, Cambria researched DWR records in September 2003 and located no additional well records for locations within ½ mile of the site. The closest identified water well potentially used for drinking water is a well installed in 1952 and listed as a "domestic well." This well is located at Fairmont Hospital, approximately 2,445 feet east-southeast of the site. The well is reportedly 138 feet deep and has a screened interval between 62 and 95 fbg. The well's status and operation frequency are unknown. Due to the well's distance from the site and the site's observed groundwater flow directions, it is unlikely that this well would be impacted by groundwater from the site.

2003 Monitoring Well Installation: On November 19 and 20, 2003, Cambria installed on-site and off-site wells MW-9, MW-10, and MW-11. Proposed off-site soil borings were not completed due to access agreement issues. MTBE was detected in two soil samples (MW-11-20' and MW-11-24.5') at concentrations of 0.039 and 1.4 ppm, respectively. TPHg was detected in four soil samples (MW-10-30', MW-10-31.5', MW-11-20', and MW-11-24.5') at concentrations of 14, 230, 1.8, and 330 ppm, respectively. All soil samples with detectable hydrocarbon and MTBE concentrations were saturated soil samples, so identified results appeared more indicative of chemical concentrations in groundwater than soil.

September 2004 Off-Site Investigation: Two soil borings (SB-17 and SB-18) were installed southeast of the site. No TPHg, BTEX, or fuel oxygenates were detected in soil samples from the borings. Grab groundwater samples collected contained up to 55 ppb TPHg, and no benzene or fuel oxygenates. Results of the investigation are reported in Cambria's December 17, 2004 *Soil and Water Investigation Report.*

2004 Temporary GWE System Installation: On September 13, 2004, Cambria completed installation and began operation of a temporary GWE system. The temporary GWE system was installed as an interim remedial measure to address the elevated petroleum hydrocarbon and MTBE concentrations in groundwater near the west corner of the site. On November 8, 2004, Cambria stopped the temporary GWE system to conduct interim remediation by dual phase extraction (DPE). During these temporary GWE activities approximately 0.448 pounds of TPHg, 0.036 pounds of benzene, and 0.121 pounds of MTBE were removed from the subsurface.

2004 DPE: During the period November 8 through November 13, 2004, DPE was conducted in on-site wells MW-2 and MW-11 as an interim remedial action to reduce hydrocarbon concentrations in groundwater near the western corner of the site and to progress the site toward closure. Based on operating parameters and vapor sample analytical results, the total TPHg, benzene, and MTBE vapor-phase masses removed from well MW-11 are estimated at 165 pounds, 0.291 pounds, and 0.063 pounds, respectively. The total TPHg, benzene, and MTBE vapor-phase masses removed from well MW-2 are

estimated at 0.073 pounds, 0.0002 pounds, and 0.001 pounds, respectively. The total TPHg, benzene and MTBE liquid-phase masses removed from wells MW-2 and MW-11 during interim remediation are estimated at 5.31 pounds, 0.193 pounds, and 0.143 pounds, respectively.

2005 Temporary GWE System: Upon completing the interim remedial action, Cambria intended to immediately resume operating the temporary GWE system. However, the restart was delayed due to repaving the site's parking lot. The temporary GWE system operated between January 10 and April 13, 2005. Because detected TPHg and MTBE concentrations were higher in well MW-11 than in well MW-2, MW-11 was chosen for extraction. During these activities, approximately 19.04 pounds of TPHg, 1.69 pounds of benzene, and 3.94 pounds of MTBE were removed from the subsurface. Because of facility upgrades work, Cambria removed the temporary GWE system between March and June 2005.

2005 Fuel System Upgrade: Under contract to Shell, Armer Norman of Pacheco, California replaced the fuel dispensers and piping and upgraded UST sumps between March and May 2005. On March 22 and April 4, 2005, soil samples were collected beneath each of the four dispensers and the product piping joints. TPHg was detected in 11 samples, with a maximum concentration of 4,100 ppm in sample P-4-5.0. Benzene was detected in six samples, with a maximum concentration of 11 ppm in sample P-4-2.5. MTBE was detected in five samples, with a maximum concentration of 0.18 ppm in sample D-1-3.5. Tertiary-butyl alcohol (TBA) was detected in sample D-3-3.5 at a concentration of 0.023 ppm. Lead was detected in four samples, with a maximum concentration of 75.7 ppm in sample D-1-3.5.

2005 Periodic GWE Restart: In September 2005, monthly GWE was re-instated using monitoring well MW-11, and because of the observed presence of SPH in well MW-1, bimonthly extraction from MW-1 was initiated in September 2006. These activities are ongoing as of December 2006 and are reported in the monitoring reports.

May 2006 Waste Oil Tank Removal: On May 25, 2006, Wayne Perry, Inc. (Wayne Perry) of Sacramento, California removed one 550-gallon, dual-wall fiberglass waste oil UST. Cambria collected one soil sample (WO-1-6.5) from the sidewall of the UST excavation at a depth of 6.5 fbg. The soil sample contained up to 45 parts per million (ppm) oil and grease, 4.3 ppm TPHd, 25.4 ppm chromium, 7.09 ppm lead, 19.0 ppm nickel, and 58.4 ppm zinc. Based on these concentrations, Shell submitted an Underground Storage Tank Unauthorized Release (Leak)/Site Contamination Report (Unauthorized Release Report) on June 6, 2006. All detections were below SFBRWQCB environmental screening levels for shallow soil (fewer than 3 meters below grade) where groundwater is a current or potential drinking water source for residential land use areas. Based on these results, no further investigation of waste oil constituents was conducted.

May 2006 Subsurface Investigation (SB-19 through SB-25; MW-12 & MW-13): The purpose of this investigation was to determine the vertical and horizontal extent of soil and groundwater impact. Seven

soil borings were advanced, two of which were converted to groundwater monitoring wells. Shallow soil samples collected from borings SB-19, SB-20, SB-21, SB-22, and SB-24 did not contain TPHg or BTEX concentrations exceeding applicable published San Francisco Bay Regional Water Quality Control Board environmental screening levels (ESLs). Up to 1,060 ppm TPHg and 1.38 ppb benzene were detected in soil samples collected from the capillary fringe zone in borings SB-19, SB-20, SB-21, SB-23, and SB-24. These detections are considered to be more indicative of groundwater conditions. Fuel oxygenate concentrations were near or below their respective reporting limits in all soil samples collected, and none of the low detections exceeded applicable ESLs. Based on this, the horizontal extent of petroleum hydrocarbons has been defined at the site, and the vertical extent has been defined to the typical groundwater table. TPHg, BTEX, and fuel oxygenate concentrations in grab groundwater samples collected from approximately 20 and 31 fbg in boring SB-25 were also near or below their respective reporting limits. None of the low detections in the grab groundwater samples collected exceed applicable ESLs. Based on this, the vertical extent of petroleum hydrocarbons in groundwater northwest of the site is defined.

February 2007 Agency Response with Proposed Future Actions: Cambria responded to ACEH's August 29, 2006 letter which requested updated cross-sections and discussion of other issues. Cambria provided revised cross-sections A-A' and C-C', a discussion of delineation of the extent of petroleum hydrocarbons in soil and groundwater, and a risk evaluation based on these delineations. In addition, Cambria proposed delineation of the vertical extent of petroleum hydrocarbons in groundwater and a shallow soil vapor investigation at the site.

December 2007 Supplemental Subsurface Investigation Report: CRA drilled 5 cone penetrometer test borings (CPT-1 through CPT-3, CPT-5 and CPT-6) to delineate the vertical extent of petroleum hydrocarbons in groundwater, drilled on hollow-stem auger boring (B-1) to delineate the vertical extent of petroleum hydrocarbons in soil adjacent to the UST complex, and installed and sampled 5 soil vapor probes (SVP-1 through SVP-5). The investigation was conducted in response to ACEH's July 2, 2007 correspondence which concurred with CRA's February 2007 recommendations.

Shallow soil samples from SVP-1 through SVP-3, and SVP-5 did not contain detectable levels of TPHg, BTEX or MTBE, and the detection in SVP-4 and samples from B-1 were all below the SFBRWQCB ESLs for shallow and deep soil at residential properties where groundwater is not a potential source of drinking water (Tables B and D of November 2007 ESL document). Data from boring B-1 confirm the presence of residual source material in vadose zone soils in this area, however, the shallower concentrations were lower, and the deepest sample interval (29.5 fbg) was higher when compared with the data collected from nearby boring B-23 in 2006.

Groundwater grab sample analyses were all below the SFBRWQCB ESLs for sites where groundwater is not a current or potential source of drinking water. Based on the results from this investigation, the

horizontal extent of significant petroleum hydrocarbons was determined to be defined at the site, and the vertical extent was found to be confined to the shallower groundwater intervals. The deeper samples obtained from CPT-1 and CPT-3 indicated that the shallower zone (less than 30 fbg) was more impacted than deeper zones.

All soil vapor sample analyses were below SFBRWQCB ESLs for residential and commercial land use for the BTEX and MTBE constituents, and SVP-2 and SVP-3 were below the ESLs for TPHg. SVP-1, SVP-4, and SVP-5 exceeded the residential ESL and SVP-5 exceeded the commercial ESL for TPHg. Since the groundwater concentrations offsite are lower than those onsite, and since there was impacted vadose zone soil samples near SVP-5 (reported in boring MW-12), it appears that the TPHg concentration in soil gas reflects migration of vapors from shallow impacted soil rather than from the impacted groundwater at depth.

CRA recommended destruction of wells MW-1 and MW-2 due to overly long screen intervals, replacement of well MW-1 with an appropriately screened well in the shallow zone (4-inch diameter well) and a deeper screened well in the within the sandy unit encountered below 40 fbg (2-inch diameter well) and installation of a shallow-zone monitoring well at the location of boring B-1.

March 2008 Soil Vapor Probe Sampling Report: CRA resampled soil vapor probes SVP-1 through SVP-3 and SVP-5 in response to ACEH's January 18, 2008 letter. SVP-4 could not be sampled due to water in the probe's tubing. All soil vapor sample concentrations were below SFBRWQCB ESLs for residential and commercial land use, although some reporting limits were elevated. The TPHg concentrations in SVP-1 and SVP-5 have decreased since the September 25, 2007 sampling event.

Groundwater Monitoring Program: Groundwater quarterly groundwater sampling began in March 1990. Historically, the maximum concentrations of TPHg have been observed in well MW-1 (up to 790,000 ppb in June 1996); maximum concentrations of benzene have been observed in well MW-2 (up to 36,000 ppb in March 1993); and maximum concentrations of MTBE have been observed in well MW-2 (up to 32,000 ppb in February 2002). Separate phase hydrocarbons (SPH) have been observed intermittently in wells MW-1 and MW-2 historically. Since the September 2007 sampling event no SPH had been observed and the maximum dissolved phase concentrations of TPHg, benzene, and MTBE currently observed in onsite wells were 56,000 (MW-11), 8,600 (MW-1), and 5,300 (MW-1) ppb, respectively.

ATTACHMENT C

Standard Operating Procedures for Well Installation

Conestoga-Rovers & Associates

STANDARD FIELD PROCEDURES FOR MONITORING WELL INSTALLATION

This document presents standard field methods for drilling and sampling soil borings and installing, developing and sampling groundwater monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

SOIL BORINGS

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and to collect samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of a California Professional Geologist (P.G.) or Professional Engineer (P.E.).

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or direct-push technologies such as the Geoprobe®. Soil samples are collected at least every five ft to characterize the subsurface sediments and for possible chemical analysis. Additional soil samples are collected near the water table and at lithologic changes. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments at the bottom of the borehole.

Drilling and sampling equipment is steam-cleaned 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 Analysis

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

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable volatile vapor analyzer measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. Volatile vapor analyzer measurements are used along with the field observations, odors, stratigraphy and groundwater depth to select soil samples for analysis.

Water Sampling

Water samples, if they are collected from the boring, are either collected using a driven Hydropunch® type sampler or are collected from the open borehole using bailers. The groundwater 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. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may 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.

MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Well Construction and Surveying

Groundwater monitoring wells are installed to monitor groundwater quality and determine the groundwater elevation, flow direction and gradient. Well depths and screen lengths are based on groundwater depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 feet below and 5 feet above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three feet thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two feet above the well screen. A two feet thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I,II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

Well Development

Wells are generally developed using a combination of groundwater surging and extraction. Surging agitates the groundwater and dislodges fine sediments from the sand pack. After about ten minutes of surging, groundwater is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of groundwater are extracted and the sediment volume in the groundwater is negligible. This process usually occurs prior to installing the sanitary surface seal to ensure sand pack stabilization. If development occurs after surface seal installation, then development occurs 24 to 72 hours after seal installation to ensure that the Portland cement has set up correctly.

All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Groundwater Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of groundwater are purged prior to sampling. Purging continues until groundwater pH, conductivity, and temperature have stabilized. Groundwater samples are collected using bailers or pumps and 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. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

Waste Handling and Disposal

Soil cuttings from drilling activities are usually stockpiled onsite and covered by plastic sheeting. At least three individual soil samples are collected from the stockpiles and composited at the analytic laboratory. The composite sample is analyzed for the same constituents analyzed in the borehole samples in addition to any analytes required by the receiving disposal facility. Soil cuttings are transported by licensed waste haulers and disposed in secure, licensed facilities based on the composite analytic results.

Groundwater removed during development and sampling is typically stored onsite in sealed 55-gallon drums. Each drum is labeled with the drum number, date of generation, suspected contents, generator identification and consultant contact. Upon receipt of analytic results, the water is either pumped out using a vacuum truck for transport to a licensed waste treatment/disposal facility or the individual drums are picked up and transported to the waste facility where the drum contents are removed and appropriately disposed.