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Date: August 31, 2015 Reference No.: 241501

To: Jerry Wickham
 Alameda County Environmental Health
 1131 Harbor Bay Parkway, Suite 250
 Alameda, California 94502-6577

Subject: Former Shell Service Station, 461 8th Street, Oakland, California

No. of Copies	Description/Title	Drawing No./ Document Ref.	Issue
1	Subsurface Investigation Work Plan		

Issued for: Your information As requested Construction Quotation
 Your approval/comments Returned to you For re-submission

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Remarks:
 If you have any questions regarding the contents of this document, please call the GHD project manager Peter Schaefer at (510) 420-3319 or the Shell program manager Perry Pineda at (425) 413-1164.

Copy to: Perry Pineda, Shell Oil Products US

Leroy Griffin, Fire Prevention Bureau

Signature Land Advisors, Inc.
 (property owners)

Completed by: Peter Schaefer
 [Please Print]

Signed: *Peter Schaefer*

Filing: Correspondence File



Mr. Jerry Wickham
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Shell Oil Products US
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Re: **461 8th Street, Oakland, California**
PlaNet Site ID USF04642
PlaNet Project ID 27481
ACEH Case No. RO0000343

Dear Mr. Wickham:

The attached document is provided for your review and comment. Upon information and belief, I declare, under penalty of perjury, that the information contained in the attached document is true and correct.

As always, please feel free to contact me directly at (425) 413-1164 with any questions or concerns.

Sincerely,
Shell Oil Products US

A handwritten signature in black ink, appearing to read "Perry Pineda", is located below the typed name.

Perry Pineda
Senior Environmental Program Manager



Subsurface Investigation Work Plan

Former Shell Service Station

461 8th Street
Oakland, California

PlaNNet Site ID	USF04642
PlaNNet Project ID	27481
Agency No.	RO0000343

Shell Oil Products US

5900 Hollis Street Suite A Emeryville California 94608 USA
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1. Introduction

GHD Services Inc. (GHD) prepared this work plan on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell), as discussed in our March 5, 2015 meeting with Alameda County Environmental Health (ACEH) and Signature Land Advisors, Inc.'s representatives.

The Site is currently a paved parking lot located at the southwestern corner of the intersection of 8th Street and Broadway in a primarily commercial area of Oakland, California (Figure 1). The former station layout included an underground storage tank complex and dispenser islands (Figure 2).

Redevelopment plans approved by the City of Oakland call for construction of a five-story building with a garage and commercial spaces on the ground floor and residential units on the upper floors. The approved building will be completed at or near current grade, with the exception of two bays of parking structures (car stackers) to be located in the western-central and southwestern portions of the Site (Figure 2), which will be installed to approximately 14 feet below grade (fbg).

A summary of previous work performed at the Site and additional background information is contained in Appendix A.

2. Work Tasks

2.1 Permits

GHD will obtain drilling permits from the Alameda County Public Works Agency (ACPWA) and an encroachment permit from the City of Oakland.

2.2 Health and Safety Plan (HASP)

GHD will prepare a HASP to protect Site workers. The plan will be kept on Site during field activities and will be reviewed and signed by each Site worker.

2.3 Utility Clearance

GHD will mark the proposed drilling locations, and the locations will be cleared through Underground Service Alert and a private line locator service prior to drilling.

2.4 Monitoring Well and Soil Vapor Probe Destruction

To make way for proposed Site redevelopment, GHD proposes to properly destroy 19 monitoring wells (S-8, S-9, S-10, S-12, S-13, S-14R, S-17 through S-20, S-21A, S-21B, S-22A, S-22B, S-23, IP-1, IP-2, IP-3, and OW-1) and 11 soil vapor probes (VP-2 through VP-12).

The wells will be pressure grouted and soil vapor probes VP-2, VP-3, and VP-5 through VP-11 will be drilled out to their original depths. Soil vapor probes VP-4 and VP-12 are in the area of the car stackers and will be completely removed during Site redevelopment excavation. Well boxes will be left in place, as they will be removed during Site redevelopment.

2.5 Subsurface Investigation

To provide continued monitoring of petroleum hydrocarbon impact to groundwater, two on-Site borings and one off-Site boring will be drilled using hollow-stem augers and converted to groundwater monitoring wells S-24 through S-26, as shown on Figure 2.

A GHD geologist will supervise the drilling and describe encountered soils using the Unified Soil Classification System and Munsell Soil Color Charts. After clearing each boring to 5 fbg with an air- or water-knife, soil samples will be collected continuously. Soil samples will be screened in the field for organic vapors using a photo-ionization detector (PID). GHD will prepare a boring log for each well boring, and PID measurements will be recorded on the boring logs. GHD will retain soil samples for chemical analyses from the well borings based on field indications of impacted soil (e.g., staining, odors, or elevated PID readings).

GHD will perform this work under the supervision of a professional geologist or engineer.

2.6 Monitoring Well Installation

Well borings S-24 through S-26 will be completed to approximately 35 fbg and will be screened from approximately 5 feet above to 10 feet below first-encountered groundwater (approximately 25 fbg based on groundwater monitoring data).

All wells will be constructed using 2-inch-diameter Schedule 40 PVC casing. A filter pack that will be placed from the bottom of the well screen up to 2 feet above the top of the well screen, followed by a 2-foot-thick bentonite seal, and cement grout to grade. Actual well construction details will be based on soil types and field conditions encountered during drilling. The wells will be secured with a locking cap under a traffic-rated well box.

2.7 Well Development and Sampling

Upon waiting at least 72 hours after well installations, Blaine Tech Services, Inc. (Blaine) of San Jose, California will develop the new groundwater monitoring wells. At least 72 hours after well development, Blaine will sample the Site's groundwater monitoring wells according to the existing sampling schedule and chemical analysis protocol.

2.8 Chemical Analyses

Selected soil samples and the initial groundwater samples from wells S-24 through S-26 will be analyzed for total petroleum hydrocarbons as gasoline, benzene, toluene, ethylbenzene, total xylenes using EPA Method 8260B. Groundwater samples from the existing wells will be analyzed per the existing protocol.

2.9 Wellhead Survey

A licensed surveyor will survey the wellhead elevations relative to mean sea level and the wells' latitudes and longitudes.

2.10 Report Preparation

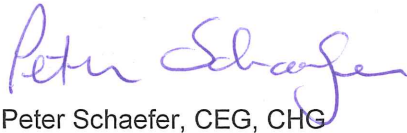
Following the completion of the well destructions and receipt of analytical results from the laboratory for the well installations, GHD will prepare a written report which will include field procedures, laboratory results, and boring logs.

3. Schedule

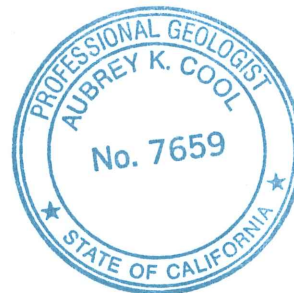
GHD will begin work upon receiving ACEH's written approval of this work plan, drilling permits from ACPWA, and an encroachment permit from the City of Oakland. The well and vapor probe destructions are tentatively scheduled for September 8 through 11, 2015 and installation of off-Site well S-26 is tentatively scheduled for September 14, 2015. Installation of on-Site wells S-24 and S-25 will be completed concurrent with Site redevelopment, which is scheduled to start September 15, 2015.

All of Which is Respectfully Submitted,

GHD


Peter Schaefer, CEG, CHG


Aubrey K. Cool, PG



Appendix A Site History

Site History

The property was leased by American Oil Company from at least 1965 until 1972, when the lease was assigned to Shell Oil Products US (Shell). A Shell-branded service station operated on the property from 1972 to 1980. The underground storage tanks (USTs) associated with the former Shell service station were removed after Shell terminated operations at the site in May 1980.

1978 - 1980 Separate Phase Hydrocarbons (SPHs) Discovered in Bay Area Rapid Transit's (BART's) KE Line Tunnel: In January 1979, BART notified Shell that they had found SPHs in a tunnel under the intersection of 7th Street and Broadway. Shell tested the product lines at the subject Site and found a pressure leak. Shell replaced the product lines in January 1979. Shell also tested the USTs' tightness, and they passed. According to BART's January 10, 1979 to December 3, 1981 *Bart Recovery Project Log* and Groundwater Technology, Inc.'s (GTI's) 1981 *Considerations on Infiltration of Gasoline into BART KE Line* report, one observation well was installed to a depth of 25 feet below grade (fbg) concurrent with piping replacement, and no contamination was reported. SPH analyses conducted in January 1979 and in May 1981 identified the SPHs in the BART tunnel as Shell Regular gasoline. Between October 1979 and April 1980, approximately 4,400 gallons of water and gasoline were removed from the BART tunnel. The Shell-branded station discontinued operations in May 1980, and all existing improvements, tanks, and piping were removed. No UST removal or piping removal reports are available.

1981 – 1988 Subsurface Investigations: In August and September 1981, GTI installed seven monitoring wells (L-1 through L-7) to delineate the extent of hydrocarbons in groundwater. Based on groundwater sampling results, in December 1981, Gettler-Ryan, Inc. (G-R) installed a recovery well adjacent to well L-6. Wells L-1 through L-3 were destroyed during construction of the BART tunnels in the mid-1980s. Well destruction records are not available. Wells L-4, L-5, and L-6 were renamed S-4, S-5, and S-6. G-R began gauging wells S-4 through S-6 in 1986 and collecting groundwater samples for analysis in 1988. GeoStrategies Inc.'s (GSI's) September 14, 1993 *Work Plan* summarizes groundwater extraction (GWE) associated with the recovery well. Enviro's, Inc.'s (Enviro's) November 2, 1993 *Work Plan for Soil and Groundwater Sampling* summarizes other investigation activities.

1982 – 2004 GWE: From February 1982 to August 1982, G-R conducted GWE from the recovery well located adjacent to well L-6. Enviro's November 2, 1993 *Work Plan for Soil and Groundwater Sampling* summarizes the GWE system operation.

In October 1987, G-R conducted mobile GWE from well S-5 and reportedly pumped approximately 50 gallons of SPHs from the well. G-R's January 9, 1989 monitoring report summarizes this GWE event.

In the third quarter of 1992, GSI conducted mobile GWE from well S-5, which removed approximately 200 gallons of groundwater containing less than one percent SPHs. This event is mentioned in GSI's January 12, 1993 status report.

In May 1993, Crosby and Overton, Inc. conducted mobile GWE from well S-5, which removed approximately 150 gallons of groundwater and SPHs. This event is summarized in GSI's July 6, 1993 *Quarterly Report*.

From July 1993 to July 2004, periodic mobile GWE was conducted from wells S-5 and S-6, which removed approximately 6,754 gallons of groundwater containing approximately 2.8 pounds of total petroleum hydrocarbons as gasoline (TPHg) and 0.64 pounds of benzene. Cambria Environmental

Technology, Inc.'s (Cambria's) *Groundwater Monitoring Report – Second Quarter 2004* provides tabulated GWE data for this period.

1987 BART Tunnel Inspection: In November 1987, G-R conducted an inspection of the KE line tunnel with BART personnel. No gasoline seepage was observed. G-R's January 9, 1989 monitoring report summarizes the inspection results.

1993 Phase I Assessment: GSI's June 30, 1993 *Phase I Preliminary Site Assessment* identified seven sites with known UST leaks within a one-quarter mile radius of the site including an Oakland Police Department (OPD) site located down gradient (southwest). The *Bart Recovery Project Log* noted that leaking USTs were replaced at the OPD site in October 1979 and that OPD had received product deliveries from a local Shell gasoline distributor. In addition, a permit to repair the product lines and dispensers at the OPD site was obtained in 1984 by Egan and Paradiso Company, but no additional information was available. The OPD site is not listed in Geotracker or on Alameda County Environmental Health's website.

1994 Subsurface Investigation: During July 1994, Enviro's drilled nine soil borings (B-1 through B-9) in the vicinity of the former pump islands and the former USTs. Soil samples collected from the borings near the dispenser islands contained up to 15 milligrams per kilogram (mg/kg) TPHg and 0.24 mg/kg benzene. No TPHg or benzene was detected in soil samples from borings drilled in the area of the former piping or the former USTs. This investigation is described in Enviro's August 16, 1994 *Site Investigation Report*.

1994 - 1995 Subsurface Investigation: During December 1994, Enviro's installed three monitoring wells (S-8, S-9, and S-10). Soil samples collected from the well borings contained up to 760 mg/kg TPHg (S-10 at 11.5 fbg) and 0.014 mg/kg benzene (S-8 at 21.5 fbg). Enviro's February 14, 1995 *Site Investigation Report and Quarterly Monitoring Report – First Quarter 1995* provides investigation results.

1995 SPH Removal: From January 1995 to October 1995, Blaine Tech Services, Inc. (Blaine) removed approximately 3.1 liters of SPHs by bailing. SPH removal details are provided in Enviro's quarterly monitoring reports for this period.

2002 Sensitive Receptor Survey (SRS): In February 2002, Cambria submitted an SRS which identified a school approximately 1,300 feet west of the site and the Oakland Inner Harbor approximately 2,400 feet south-southwest of the site. Cambria's review of California Department of Water Resources well records did not identify any water-producing wells within one-half mile of the site. Cambria's review of utility records from the City of Oakland and the East Bay Municipal Utilities District did not identify any utilities which would provide preferential pathways for groundwater migration; however, five BART tunnels were identified which intercept groundwater in the vicinity. SRS details are provided in Cambria's February 11, 2002 *SRS, Well Survey, Conduit Study, and Cross-Sectional Diagram Report*.

2003 Subsurface Investigation: In October 2003, Cambria drilled one soil boring (HA-1) within 7th Street, south of the site. No TPHg, benzene, or methyl tertiary-butyl ether (MTBE) was detected in soil samples. A grab groundwater sample from the boring contained 6.3 micrograms per liter (µg/L) MTBE. Investigation activities are described in Cambria's December 16, 2003 *Subsurface Investigation Report*.

2004 Subsurface Investigation: During May 2004, Treadwell & Rollo, Inc. (T&R) drilled four soil borings (TR-1 through TR-4) and four soil vapor borings (TR-V1 through TR-V4) on site to collect soil and soil vapor samples. TPHg and volatile organic compounds were not detected in soil samples, and benzene,

toluene, ethylbenzene, and xylenes (BTEX) were not detected in soil vapor samples collected. Investigation results are summarized in T&R's March 27, 2006 *Subsurface Investigation* report.

2006 Subsurface Investigation: During December 2006, Cambria drilled 14 soil borings (B-10 through B-23) to determine the extent of hydrocarbon impacts in soil. Fuel oxygenates were not detected in any of the soil samples with the exception of up to 0.083 mg/kg of tertiary-butyl alcohol in three soil samples from borings B-13 and B-14. Lead scavengers (1,2-dichloroethane [1,2-DCA] and ethylene dibromide [EDB]) were not detected in soil samples. Grab groundwater samples contained up to 960,000 µg/L TPHg (B-22) and 24,000 µg/L benzene (B-10). No fuel oxygenates were detected in the grab groundwater samples. Up to 410 µg/L 1,2-DCA was detected in grab groundwater samples, and 52 µg/L EDB was reported in one grab groundwater sample (B-12). Investigation results are summarized in Cambria's March 2, 2007 *Subsurface Investigation Report*.

2007 – 2008 Subsurface Investigation and Pilot Testing: In November and December 2007, Conestoga-Rovers & Associates (CRA) drilled four soil borings (B-24 through B-27) and installed soil vapor probes (VP-1 through VP-4) in the borings, installed five monitoring wells (S-12 through S-16), and installed an air sparge well (AS-1). In January 2008, CRA conducted a dual-phase extraction (DPE) pilot test and an air sparging (AS) pilot test. CRA conducted the DPE pilot test using wells S-8, S-9, S-13, S-14, and S-16. The theoretical vacuum radius of influence was up to 60 feet, but more consistently around 45 feet with an average groundwater flow rate of 3.42 gallons per minute. All wells, except for well S-14, were dewatered to near the bottom of the well (30 to 35 fbg). CRA conducted the AS pilot test injecting into well AS-1. A flow rate of 20 cubic feet per minute was achieved at the maximum injection pressure of 25 pounds per square inch. Based on higher vapor concentrations detected during the AS pilot test, CRA concluded that vapor-phase mass removal would be greater with a soil vapor extraction and AS system than with a DPE system. These activities are documented in CRA's February 25, 2008 *Site Investigation and Pilot Test Report, and Corrective Action Plan*.

2008 Subsurface Investigation: In May 2008, CRA properly destroyed four wells (S-14, S-15, S-16, and AS-1) and installed three wells (S-17, S-18, and OW-1) to accommodate source area excavation. Soil samples from well borings S-17 and S-18 contained up to 5,200 mg/kg TPHg, 5.3 mg/kg benzene, 96 mg/kg toluene, 120 mg/kg ethylbenzene, and 630 mg/kg xylenes. No TPHg or BTEX was detected in soil samples collected from well OW-1. These activities are documented in CRA's August 20, 2008 *Well Destruction and Installation Report*.

2008 Soil Excavation and In Situ Chemical Oxidation (ISCO) Piping Installation: In June 2008, G-R excavated soil to approximately 20 fbg in the southeastern portion of the Site. CRA collected 10 soil samples (EB-1 through EB-10) by potholing the excavation bottom to approximately 23 fbg. The soil samples contained up to 3,900 mg/kg TPHg, 22 mg/kg benzene, 230 mg/kg toluene, 85 mg/kg ethylbenzene, and 540 mg/kg xylenes. Following soil sampling, three ISCO injection galleries were placed in the excavation. G-R excavated approximately 1,340 tons of soil for proper off-Site disposal. CRA's September 17, 2008 *Soil Sampling and ISCO Piping Installation Report* provides details of the excavation and ISCO gallery installation.

2009 Subsurface Investigation: In September 2009, CRA installed four deep wells (S-19, S-20, S-21B, and S-22B) and four shallow wells (S-14R, S-19, S-20, and S-23) to facilitate planned ISCO pilot testing and drilled two soil borings (B-28 and B-29) to delineate vertical soil impact in the southern portion of the Site. Soil samples from the well and soil borings contained up to 7,100 mg/kg TPHg, 37 mg/kg benzene,

260 mg/kg toluene, 130 mg/kg ethylbenzene, and 760 mg/kg xylenes. This investigation is detailed in CRA's December 8, 2008 *Subsurface Investigation Report*.

2008 - 2010 ISCO Pilot Testing: In December 2008 and January 2009, CRA performed two rounds of ISCO pilot testing using the injection gallery to treat hydrocarbon impacts to soil within the source area. In March 2009, August 2009, and April 2010, CRA continued the ISCO pilot testing using injection into monitoring wells. CRA's July 17, 2009 *ISCO Pilot Test Report* details the three initial events ISCO injection events, and details of the August 2009 event are presented in CRA's November 30, 2009 *ISCO Pilot Test Report*. CRA's September 21, 2010 *ISCO Pilot Test Report* details the April 2010 ISCO event.

2010 Down-Gradient Receptor Survey: In March 2010, CRA conducted inquiries concerning potential receptors at BART and at buildings along Broadway between 6th and 8th Streets, which identified five buildings with basements. Three of the basements also contained sumps. No dewatering systems were identified. Survey results are summarized in CRA's March 30, 2010 *Down-Gradient Receptor Survey*.

2010 – 2011 Sump Sampling: In November 2010, CRA sampled two sumps in the OPD building located on the southwest corner of 7th Street and Broadway, and in February 2011, CRA sampled a sump in the BART tunnel below the southeast corner of 7th Street and Broadway. No chemicals of concern were detected in water samples from the BART sump and one of the sumps in the OPD building. The water sample collected from the second sump in the OPD building contained 93 µg/L TPHg, 38µg/L benzene, and 4.2µg/L ethylbenzene. The BART sump water sample contained 62,000 mg/L sulfate, and one OPD sump water sample contained 100 mg/L sulfate. CRA's April 13, 2011 *Sump Sampling Report* provides details of this investigation.

2011-2012 Subsurface Investigation: In November 2011, CRA installed eight nested soil vapor probes (VP-5 through VP-12). Soil vapor samples were collected from the probes in December 2011 and January 2012. TPHg, benzene, and toluene were not detected in soil vapor samples from the soil vapor probes. Detections of ethylbenzene and total xylenes were below San Francisco Bay Regional Water Quality Control Board (RWQCB) environmental screening levels¹ for commercial land use during the December 2011 and January 2012 sampling events. CRA's January 26, 2012 *Subsurface Investigation Report* provides soil vapor investigation details.

2013-2015 SPH Removal: Beginning in April 2013, Blaine has removed approximately 25 pounds of SPHs by bailing and using SPH-absorbent socks. SPH removal details are provided in CRA's and GHD Services Inc.'s groundwater monitoring reports for this period.

2015 Limited Human Health Risk Assessment (HHRA): CRA's February 27, 2015 *Limited Human Health Risk Assessment Report* evaluates the potential for soil vapor intrusion for approved Site redevelopment plans. Potential receptors identified were on-Site residents and on-Site commercial workers. Based on on-Site shallow soil vapor data and groundwater and soil data from the wells and borings located closest to the car stacker bays, CRA's HHRA did not identify any chemicals of potential concern. CRA concluded that soil vapor intrusion to indoor air does not pose an unacceptable risk to future residents or commercial workers in the approved building.

¹ *User's Guide: Derivation and Application of Environmental Screening Levels, RWQCB, Interim Final – 2013*

Groundwater Monitoring: Groundwater has been monitored since August 1981. Depth to groundwater has ranged from 12.82 to 28.12 fbg. Groundwater flow direction is typically southwesterly.