Andy Saberi
1045 Airport Boulevard
South San Francisco, CA 94080

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

Re: 1230 14th Street, Oakland, California
ACEH Case No. 433

Dear Mr. Wickham:

I, Mr. Andy Saberi, have retained Pangea Environmental Services, Inc. (Pangea) as an environmental consultant for the project referenced above. Pangea is submitting the attached report on my behalf.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached report are true and correct to the best of my knowledge.

If you have any questions, please call me at (650) 588-3088.

Sincerely,

Andy Saberi

June 27, 2014

VIA ALAMEDA COUNTY FTP SITE

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

Re: **Soil and Soil Gas Sampling Workplan**
Former Shell Service Station
1230 14th Street
Oakland, California
Fuel Leak Case No. RO0000433

Dear Mr. Wickham:

On behalf of property owner Andy Saberi, Pangea Environmental Services, Inc has prepared this *Soil and Soil Gas Sampling Workplan* (Workplan). This Workplan was requested in a March 3, 2014 letter from Alameda County Environmental Health (ACEH) (Appendix A) to compare site conditions to the State Water Resources Control Board's *Low-Threat Case Closure Policy*. Consistent with the ACEH letter, this Workplan proposes shallow soil sampling and soil gas sampling to evaluate potential human health impacts via direct contact with contaminated soil and petroleum vapor intrusion to indoor air under reasonably expected future site uses.

If you have any questions, please contact me at (510) 435-8664 or email briddell@pangeaenv.com.

Sincerely,
Pangea Environmental Services, Inc.

Bob Clark-Riddell, P.E.
Principal Engineer

Attachment: *Soil and Soil Gas Sampling Workplan*

cc: Andy Saberi, 1045 Airport Blvd., South San Francisco, California 94080
Perry Pineda, Shell Oil Products US, 20945 S. Wilmington Avenue, Carson, CA 90810-1039
SWRCB Geotracker (electronic copy)

SOIL AND SOIL GAS SAMPLING WORKPLAN

Former Shell Service Station
1230 14th Street
Oakland, California
Fuel Leak Case No. RO0000433

June 27, 2014

Prepared for:

Andy Saberi
1045 Airport Boulevard
South San Francisco, California 94080

Prepared by:

Pangea Environmental Services, Inc.
1710 Franklin Street, Suite 200
Oakland, California 94612

Written by:

Elizabeth DeRubeis
Staff Geologist

Bob Clark-Riddell, P.E.
Principal Engineer

INTRODUCTION

On behalf of property owner Andy Saberi, Pangea Environmental Services, Inc has prepared this *Soil and Soil Gas Sampling Workplan* (Workplan). This Workplan was requested in a March 3, 2014 letter from Alameda County Environmental Health (ACEH) (Appendix A) to compare site conditions to the State Water Resources Control Board's *Low-Threat Case Closure Policy*. Consistent with the ACEH letter, this Workplan proposes shallow soil sampling and soil gas sampling to evaluate potential human health impacts via direct contact with contaminated soil and petroleum vapor intrusion to indoor air under reasonably expected future site uses.

SITE BACKGROUND

The former Shell-branded service station is located at the northeast corner of 14th Street and Union Street in Oakland, California (Figure 1). Currently, an abandoned one-story station building and a pump-island canopy occupy the site, and much of the property is paved except for the former UST excavation. Land use in the surrounding area is currently residential to the north, south, and east, and is commercial/industrial to the west and southwest. The site topography is essentially flat.

Site History

According to prior reports, the current site building was constructed in 1958 and gas station operations at the site reportedly began in 1958 and ceased in 1993. Petroleum hydrocarbons were first discovered in site soil near the underground storage tanks (USTs) during the completion of three borings at the site in February 1991. Four gasoline USTs and one waste oil storage tank were removed from the site on August 24, 1993. The current property owner, Mr. Andy Saberi, purchased the property in the mid 1980s.

Previous Environmental Work

Previous environmental work has included site assessment, a sensitive receptor evaluation/well survey, risk evaluation, two rounds of feasibility testing (in 2000 and 2006), and several remedial actions. Remedial action included injection of oxygen releasing compound (ORC) into site wells in 1997, groundwater extraction (GWE) and dual-phase extraction (DPE) from 2002 to 2004 (performed with mobile equipment for approximately 11 separate days removing 6.0 lbs aqueous phase and 5.6 lbs vapor phase hydrocarbons), and hydrogen peroxide injection into site wells in 2003. Groundwater monitoring has been performed at the site since 1996.

In January 2008, Pangea submitted a *Draft Corrective Action Plan and Pilot Test Work Plan* (Draft CAP/Test Workplan) as required by Alameda County Environmental Health (ACEH). In June 2008, with ACEH approval, Pangea installed new remediation test wells, repaired damaged remediation wells, and destroyed one remediation well, as detailed in the *Well Installation and Destruction Report* dated October 6, 2008. In early July 2008, Pangea conducted the approved pilot testing using the newly installed remediation test wells to determine whether SVE or DPE would most effectively remove contaminants and capture hydrocarbon vapors resulting from air sparging. In the *SVE/DPE Pilot Test Report* dated October 7, 2008, Pangea recommended DPE/AS as the most effective remedial approach for the site. In a letter dated October 29, 2008, ACEH approved implementation of DPE/AS remediation at the site. On June 15, 2009, the California UST Cleanup Fund completed a 5-year review of the claim and recommended implementation of site remediation. DPE remediation system operation started in April 2011 and AS system operation commenced in October 2011.

To enhance DPE/AS remedial effectiveness, Pangea began pilot testing bio-organic catalyst (BOC) injection in select site wells. The pilot testing was performed as detailed in the *Workplan for Enhanced Site Remediation* dated March 6, 2012, and as approved by the ACEH in a letter dated April 17, 2012. In a letter dated September 10, 2012, ACEH rescinded their BOC pilot test approval due to concerns about offsite migration of site contaminants. On September 25, 2012, Pangea submitted the *Groundwater Monitoring and Remediation Report – First Half 2012,* which described Pangea's efforts to demonstrate control of any hydrocarbon migration initiated by desorption effects of BOC. Continued implementation of enhanced site remediation using BOC was approved by ACEH in a letter dated October 8, 2012. Site remediation was temporarily discontinued on February 15, 2013 to conduct post-remediation groundwater monitoring.

PROPOSED INVESTIGATION

The objective of the proposed investigation is to evaluate shallow soil contamination and the potential for vapor intrusion into the onsite building, adjacent buildings and potential future site buildings. Future site use will likely involve construction of new commercial and/or residential building on the site. The proposed scope of work to accomplish the investigation objective is detailed below.

Task 1 - Pre-Field Activities

Prior to initiating field activities, Pangea will conduct the following tasks:

- Obtain drilling permits from Alameda County Public Works Agency;
- Pre-mark the boring locations with white paint and notify Underground Service Alert (USA) of the drilling and sampling activities at least 48 hours before work begins;

- Prepare a site-specific health and safety plan to educate personnel and minimize their exposure to potential hazards related to site activities; and

- Coordinate with drilling and laboratory subcontractors and other involved parties.

Task 2 – Soil Borings and Soil Gas Probe Installation

To facilitate evaluation of shallow soil and soil gas conditions, Pangea proposes to conduct soil and soil gas sampling from five (5) semi-permanent shallow soil gas sample probe locations. Pangea will also sample from existing vapor monitoring probe VMP-1. As shown on Figure 2, soil gas probe VMP-1 is located along the northern edge of the site behind the former station building. Proposed soil gas probes SG-1 through SG-4 will be located just outside the former UST cavity into native soil. Soil gas probe SG-5 will be located inside the former UST area.

To facilitate shallow soil sampling, the soil gas probe boreholes will be advanced with a 2.25-inch diameter hand auger to a total depth of approximately 6 ft bgs. At each location boring location, soil samples will be collected at approximately 3 and 6 below grade surface (bgs). Soil samples will be collected within new brass or stainless steel liners driven into undisturbed soil with a slide-hammer. The soil samples will be classified according to the United Soil Classification System (USCS) and screened for field indications of petroleum hydrocarbons using visual and olfactory observations. All site investigation activities will be performed under the supervision of a California Registered Civil Professional Engineer (P.E.). Additional soil and assessment procedures are presented in our Standard Operating Procedures (SOPs) for Soil Borings in Appendix B.

All soil samples will be analyzed for the following: total petroleum hydrocarbons as diesel (TPHd) with silica gel cleanup and total petroleum hydrocarbons as gasoline (TPHg) by EPA Method 8015C; and volatile organic compounds by EPA Method 8260B.

Following soil sampling, the semi-permanent soil gas probes will be constructed with a stainless steel Geoprobe™ implant connected to new ¼-inch diameter Teflon tubing and capped with a Swagelok® type fitting. The implant will be placed in a 0.5 ft thick sand pack with 0.5 ft of dry granular bentonite above, followed by hydrated bentonite. The probe sampling interval will be approximately 5.5 to 6.0 ft bgs.

Task 3 - Soil Gas Probe Sampling

Soil gas samples will be collected within Summa canisters and submitted to a state-certified laboratory for analysis. Soil gas samples will be analyzed for total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, xylene(s) (BTEX), methyl-tertiary butyl ether (MTBE), and naphthalene by Total Organics Method 15 (TO-15); and for percent oxygen, carbon dioxide, methane and helium (leak check compound) by Method ASTM D-1946. The oxygen analysis will help evaluate the potential for future

degradation and attenuation of detected hydrocarbons, and will help assess soil column characteristics (>= 4% oxygen in soil gas is referenced in the SWRCB's Underground Storage Tank Low-Threat Site Closure Policy). Additionally, for naphthalene analysis by TO-15, the analytical laboratory will utilize procedures for recovery, carryover, canister cleanliness, age, and matrix spikes and matrix spike duplicates as outlined in the *April 2012 Cal/EPA Advisory* Appendix E.

An analytical laboratory will provide sampling assemblies and certified Summa canisters for sampling. The Summa canisters will come under a complete vacuum of approximately 30 inches of mercury. Prior to sample collection a shut in test will be conducted on the sampling assembly with a vacuum pump to confirm no leak and the maintenance of the initial vacuum in the sampling manifold system. After shut in testing, the probe will be connected to the sampling assembly using a Swagelok fitting and Teflon tubing, then a shroud will be placed over the probe and Helium will be introduced to a concentration of 20 to 30%. The helium concentration will be monitored periodically using a helium detector and the vacuum pump will be started to purge the manifold/probe assembly. During purging, vapor from the probe will be routed to a Tedlar bag within a vacuum chamber to check for helium within the probe/sampling assembly and to qualitatively screen for volatile contaminants using a PID. Upon completion of purging of approximately three times the ambient volume of air in the assembly/probe and void space, the sampling Summa canister will be opened for sample collection. The pre-set valve will regulate the vapor flow to approximately 150 milliliters of air per minute, which equates to approximately 5 minutes to fill the 1-liter canister. Sample collection is typically discontinued when the vacuum decreases to between 5 and 4 inches of mercury. For further quality assurance, a duplicate sample will be collected during each sampling event.

Additionally, Tedlar bag samples are collected after sample collection to check for helium in the sampling assembly. This method allows Pangea to monitor for leaks from the sample probe before and after sample collection and correct problems before sending the samples to the laboratory. The subslab/soil gas sampling will be conducted in general accordance with procedures described in California EPA's *Advisory Active Soil Gas Investigations* April 2012.

Task 4 – Waste Management and Disposal

Soil cuttings and other investigation-derived waste will be stored onsite in Department of Transportation (DOT)-approved 55-gallon drums. The drums and their contents will be held onsite pending laboratory analytical results. Upon receipt of the analytical reports, the waste will be transported to an appropriate disposal/recycling facility.

Task 5 – Report Preparation

Upon completion of assessment activities, Pangea will prepare a technical report. The report will describe the investigation activities, present tabulated analytical data, and offer conclusions and recommendations.

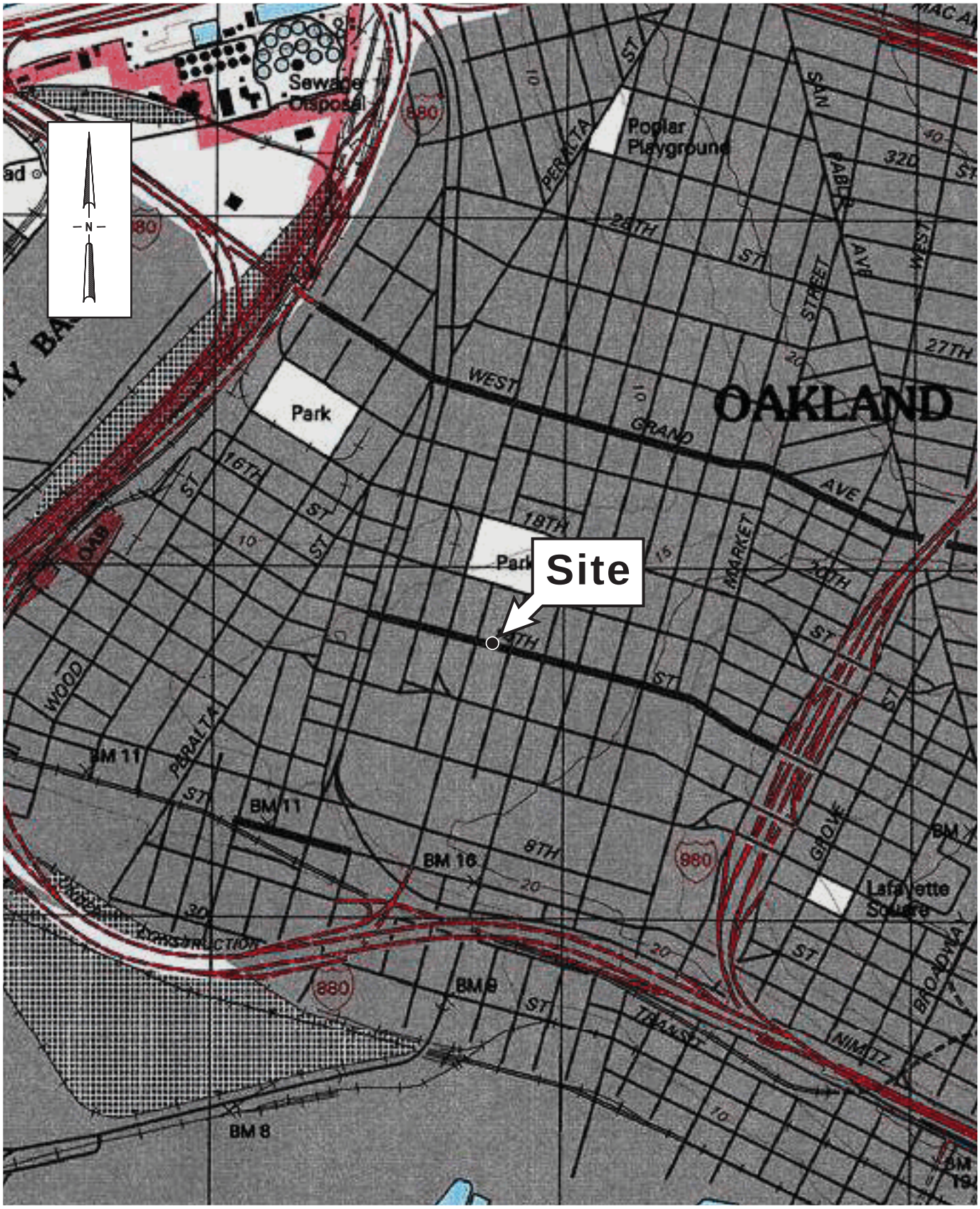
REFERENCES

California EPA, 2012, *Advisory-Active Soil Gas Investigation*, California Environmental Protection Agency, Department of Toxic Substances Control, Los Angeles Regional Water Quality Control Board, San Francisco Regional Water Quality Control Board, April.

ATTACHMENTS

Figure 1 – Vicinity Map
Figure 2 – Proposed Soil Gas Sampling Locations

Appendix A – Regulatory Correspondence
Appendix B – Standard Operating Procedures



0 1/8 1/4 1/2 1

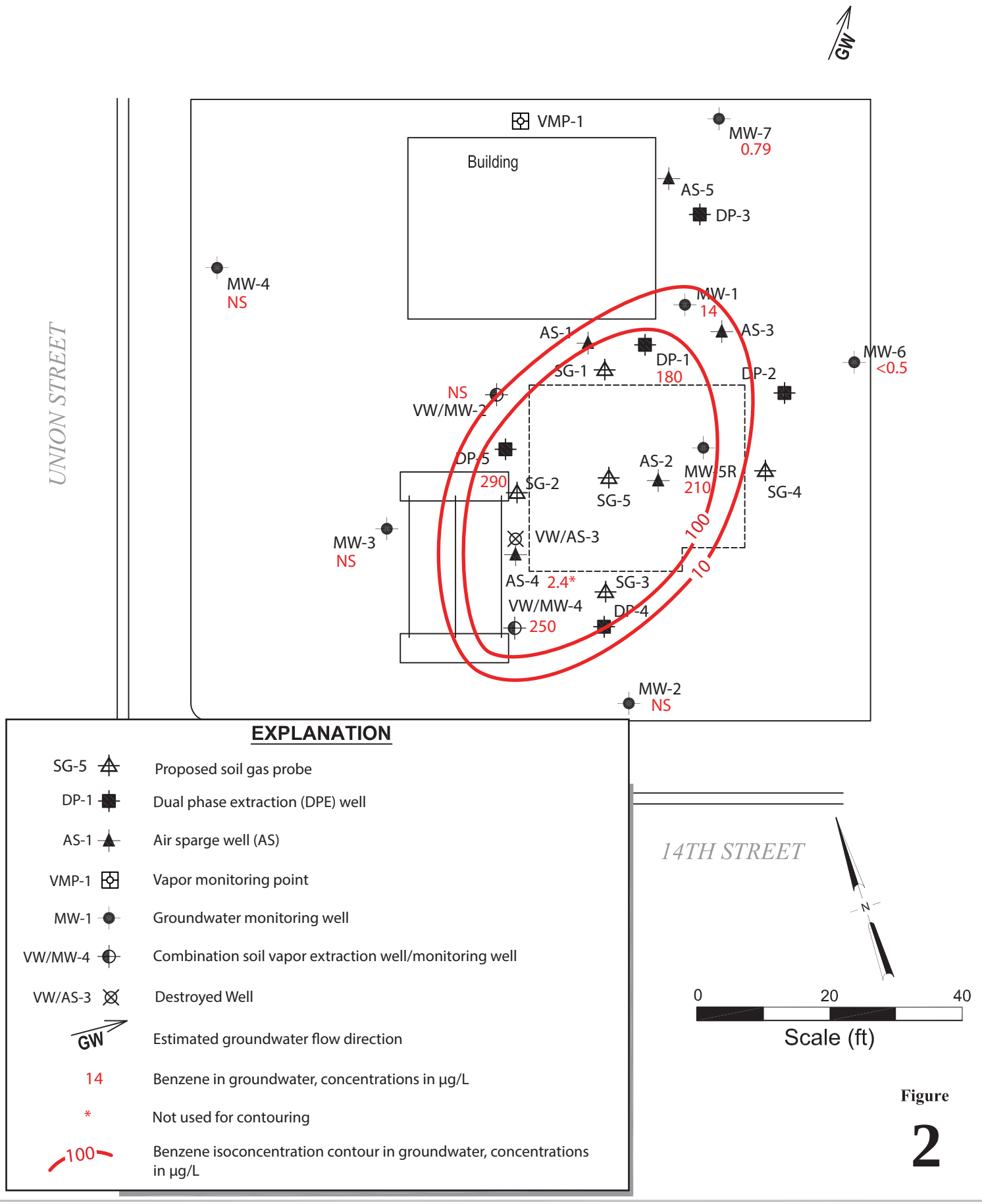
SCALE : 1" = 1/4 MILE

Figure 1

Former Shell Service Station
1230 14th Street
Oakland, California

PANGEA

Vicinity Map



EXPLANATION

SG-5	Proposed soil gas probe
DP-1	Dual phase extraction (DPE) well
AS-1	Air sparge well (AS)
VMP-1	Vapor monitoring point
MW-1	Groundwater monitoring well
VW/MW-4	Combination soil vapor extraction well/monitoring well
VW/AS-3	Destroyed Well
GW	Estimated groundwater flow direction
14	Benzene in groundwater, concentrations in µg/L
*	Not used for contouring
100	Benzene isoconcentration contour in groundwater, concentrations in µg/L

Figure

2

Former Shell Service Station
1230 14th Street
Oakland, California

PANGEA

Proposed Soil/Soil Gas Sampling Locations

APPENDIX A

Regulatory Correspondence

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
ALEX BRISCOE, Director

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

March 3, 2014

Mr. Andrew Saberi
Sabek, Inc.
1045 Airport Blvd.
South San Francisco, CA 94080

Mr. Som Gupta
c/o Glen Moss
Moss & Murphy
1297 B Street
Hayward, CA 94541

Perry Pineda
Shell Oil Products US
20945 S. Wilmington Ave.
Carson, CA 90810-1039
(*Sent via E-mail to: perry.pineda@shell.com*)

Subject: Case File Review for Fuel Leak Case No. RO0000433 and GeoTracker Global ID T0600101691, Shell/Sabek Inc, 1230 14th Street, Oakland, CA 94607

Dear Mr. Saberi, Mr. Pineda, and Mr. Gupta:

Alameda County Environmental Health (ACEH) staff has reviewed the fuel leak case file for the above-referenced site including the most recently submitted document entitled, "*Groundwater Monitoring and Remediation Report- Fourth Quarter 2013"* dated January 20, 2014 (Report). The Report, which was prepared by Pangea Environmental Services on behalf of property owner Andy Saberi, presents groundwater monitoring results and recommends additional actions following cessation of remediation activities. Site remediation using dual-phase extraction and air sparging (DPE/AS) was suspended in February 2013 apparently due to Underground Storage Tank Cleanup Fund budget limitations for this case.

The Report concludes that groundwater concentrations have rebounded slightly but remain below pre-remediation concentrations. Based on these results, we are not requesting resumption of remediation. However, we do request that one additional groundwater monitoring event be completed in the second quarter 2014 using the sampling procedures and analytes currently used in the groundwater monitoring program. The second quarter 2014 groundwater monitoring results will be used to further evaluate rebound and whether the site is eligible for closure under the State Water Resources Control Board (SWRCB) Low-Threat Closure Policy (LTCP).

The Report recommends soil and soil gas sampling to assess whether the site meets the vapor intrusion and direct contact/outdoor air criteria in the LTCP. We concur with this recommendation and request that you submit a Work Plan **no later than May 3, 2014** to conduct the recommended soil and soil gas sampling.

TECHNICAL REPORT REQUEST

Please upload technical reports to the ACEH ftp site (Attention: Jerry Wickham), and to the State Water Resources Control Board's GeoTracker website according to the following schedule and file-naming convention:

- **May 3, 2014** – Work Plan
  File to be named: WP_R_yyyy-mm-dd RO433

- **July 20, 2014** – Groundwater Monitoring Report
  File to be named: GWM_R_yyyy-mm-dd RO433

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.

If you have any questions, please call me at (510) 567-6791 or send me an electronic mail message at jerry.wickham@acgov.org. Case files can be reviewed online at the following website: http://www.acgov.org/aceh/index.htm. If your email address does not appear on the cover page of this notification ACEH is requesting you provide your email address so that we can correspond with you quickly and efficiently regarding your case.

Sincerely,

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

Attachment: Responsible Party(ies) Legal Requirements/Obligations

Enclosure: ACEH Electronic Report Upload (ftp) Instructions

cc: Leroy Griffin, Oakland Fire Department, 250 Frank H. Ogawa Plaza, Ste. 3341, Oakland, CA 94612-2032 2032 (*Sent via E-mail to: lgriffin@oaklandnet.com*)

Robert Clark-Ridell, Pangea, 1710 Franklin Street, Suite 200, Oakland, CA 94612 (*Sent via E-mail to: BRiddell@pangeaenv.com*)

Joan Mack, Caldwell, Leslie, & Proctor, 1000 Wilshire Blvd., Suite 600, Los Angeles, CA 90017-2463

William Paynter, Law Offices of William H. Paynter, 809 Broadway, Suite 6, Sonoma, CA 94576

Dorine Kohn, Poeschl & Kohn LLP, 825 Washington Street, Suite 301, Oakland, CA 94607

Ellen Wyrick-Parkinson, 1420 Magnolia Street, Oakland, CA 94607

M. Willingham, 1418-1420 Union Street, Oakland, CA 94607

Jerry Wickham, ACEH (*Sent via E-mail to: jerry.wickham@acgov.org*)

GeoTracker, eFile

Attachment 1

Responsible Party(ies) Legal Requirements/Obligations

REPORT/DATA REQUESTS

These reports/data are being requested pursuant to Division 7 of the California Water Code (Water Quality), Chapter 6.7 of Division 20 of the California Health and Safety Code (Underground Storage of Hazardous Substances), and Chapter 16 of Division 3 of Title 23 of the California Code of Regulations (Underground Storage Tank Regulations).

ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (Local Oversight Program [LOP] for unauthorized releases from petroleum Underground Storage Tanks [USTs], and Site Cleanup Program [SCP] for unauthorized releases of non-petroleum hazardous substances) require submission of reports in electronic format pursuant to Chapter 3 of Division 7, Sections 13195 and 13197.5 of the California Water Code, and Chapter 30, Articles 1 and 2, Sections 3890 to 3895 of Division 3 of Title 23 of the California Code of Regulations (23 CCR). Instructions for submission of electronic documents to the ACEH FTP site are provided on the attached "Electronic Report Upload Instructions."

Submission of reports to the ACEH FTP site is in addition to requirements for electronic submittal of information (ESI) to the State Water Resources Control Board's (SWRCB) Geotracker website. In April 2001, the SWRCB adopted 23 CCR, Division 3, Chapter 16, Article 12, Sections 2729 and 2729.1 (Electronic Submission of Laboratory Data for UST Reports). Article 12 required electronic submittal of analytical laboratory data submitted in a report to a regulatory agency (effective September 1, 2001), and surveyed locations (latitude, longitude and elevation) of groundwater monitoring wells (effective January 1, 2002) in Electronic Deliverable Format (EDF) to Geotracker. Article 12 was subsequently repealed in 2004 and replaced with Article 30 (Electronic Submittal of Information) which expanded the ESI requirements to include electronic submittal of any report or data required by a regulatory agency from a cleanup site. The expanded ESI submittal requirements for petroleum UST sites subject to the requirements of 23 CCR, Division, 3, Chapter 16, Article 11, became effective December 16, 2004. All other electronic submittals required pursuant to Chapter 30 became effective January 1, 2005. Please visit the SWRCB website for more information on these requirements. (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/)

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, 7835, 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, late 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.

Alameda County Environmental Cleanup Oversight Programs (LOP and SCP)	**REVISION DATE:** July 25, 2012
	ISSUE DATE: July 5, 2005
	PREVIOUS REVISIONS: October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010
SECTION: Miscellaneous Administrative Topics & Procedures	**SUBJECT:** Electronic Report Upload (ftp) Instructions

The Alameda County Environmental Cleanup Oversight Programs (petroleum UST and SCP) 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.

REQUIREMENTS

- **Please do not submit reports as attachments to electronic mail.**
- Entire report including cover letter must be submitted to the ftp site as **a single Portable Document Format (PDF) with no password protection**.
- It is **preferable** that reports be converted to PDF format from their original format, (e.g., Microsoft Word) rather than scanned.
- **Signature pages and perjury statements must be included and have either original or electronic signature.**
- **Do not password protect the document**. Once indexed and inserted into the correct electronic case file, the document will be secured in compliance with the County's current security standards and a password. **Documents with password protection will not be accepted**.
- Each page in the PDF document should be rotated in the direction that will make it easiest to read on a computer monitor.
- Reports must be named and saved using the following naming convention:

  RO#_Report Name_Year-Month-Date (e.g., RO#5555_WorkPlan_2005-06-14)

Submission Instructions

1) Obtain User Name and Password
   a) Contact the Alameda County Environmental Health Department to obtain a User Name and Password to upload files to the ftp site.
      i) Send an e-mail to .loptoxic@acgov.org
   b) In the subject line of your request, be sure to include **"ftp PASSWORD REQUEST"** and in the body of your request, include the **Contact Information, Site Addresses**, and the **Case Numbers (RO# available in Geotracker) you will be posting for**.

2) Upload Files to the ftp Site
   a) Using Internet Explorer (IE4+), go to ://alcoftp1.acgov.org
      (i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
   b) Click on Page located on the Command bar on upper right side of window, and then scroll down to Open FTP Site in Windows Explorer.
   c) Enter your User Name and Password. (Note: Both are Case Sensitive.)
   d) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
   e) With both "My Computer" and the ftp site open in separate windows, drag and drop the file(s) from "My Computer" to the ftp window.

3) Send E-mail Notifications to the Environmental Cleanup Oversight Programs
   a) Send email to .loptoxic@acgov.org notify us that you have placed a report on our ftp site.
   b) Copy your Caseworker on the e-mail. Your Caseworker's e-mail address is the entire first name then a period and entire last name @acgov.org. (e.g., firstname.lastname@acgov.org)
   c) The subject line of the e-mail must start with the RO# followed by **Report Upload**. (e.g., Subject: RO1234 Report Upload) If site is a new case without an RO#, use the street address instead.
   d) If your document meets the above requirements and you follow the submission instructions, you will receive a notification by email indicating that your document was successfully uploaded to the ftp site.

APPENDIX B

Standard Operating Procedures

STANDARD FIELD PROCEDURES FOR SOIL BORINGS

This document describes Pangea Environmental Services' standard field methods for drilling and sampling soil borings. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Objectives

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

Soil Classification/Logging

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

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

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or hydraulic-push technologies. At least one and one half ft of the soil column is collected for every five ft of drilled depth. Additional soil samples are collected near the water table and at lithologic changes. With hollow-stem drilling, samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments beyond the bottom of the borehole. With hydraulic-push drilling, samples are typically collected using acetate liners. The vertical location of each soil sample is determined by measuring the distance from the middle of the soil sample tube to the end of the drive rod used to advance the split barrel sampler or the acetate tube. All sample depths use the ground surface immediately adjacent to the boring as a datum. The horizontal location of each boring is measured in the field from an onsite permanent reference using a measuring wheel or tape measure.

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 Storage, Handling and Transport

Sampling tubes or cut acetate liners 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

Soil samples collected during drilling will be analyzed in the field for ionizable organic compounds using a photo-ionization detector (PID) with a 10.2 eV lamp. The screening procedure will involve placing an undisturbed soil sample in a sealed container (either a zip-lock bag, glass jar, or a capped soil tube). The container will be set aside, preferably in the sun or warm location. After approximately fifteen minutes, the head space within the container will be tested for total organic vapor, measured in parts per million on a volume to volume basis (ppmv) by the PID. The PID instrument will be calibrated prior to boring using hexane or isobutylene. PID measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

Water Sampling

Water samples collected from borings are either collected from the open borehole, from within screened PVC inserted into the borehole, or from a driven Hydropunch-type sampler. Groundwater is typically extracted using a bailer, check valve and/or a peristaltic pump. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory.

Pangea often performs electrical conductivity (EC) logging and/or continuous coring to identify potential water-bearing zones. Hydropunch-type sampling is then performed to provide discrete-depth grab groundwater sampling within potential water-bearing zones for vertical contaminant delineation. Hydropunch-type sampling typically involves driving a cylindrical sheath of hardened steel with an expendable drive point to the desired depth within undisturbed soil. The sheath is retracted to expose a stainless steel or PVC screen that is sealed inside the sheath with Neoprene O-rings to prevent infiltration of formation fluids until the desired depth is attained. The groundwater is extracted using tubing inserted down the center of the rods into the screened sampler.

Duplicates and Blanks

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

Grouting

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

Waste Handling and Disposal

Soil cuttings from drilling activities are usually stockpiled onsite on top of and covered by plastic sheeting. At least four individual soil samples are collected from the stockpiles for later compositing at the analytic laboratory. The composite sample is analyzed for the same constituents analyzed in the borehole samples. Soil cuttings are transported by licensed waste haulers and disposed in secure, licensed facilities based on the composite analytic results.

Ground water removed during sampling and/or rinsate generated during decontamination procedures are 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. Disposal of the water is based on the analytic results for the well samples. 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.