Attachment 8: Quality Assurance

PASSIVE SOIL GAS SAMPLING AND ANALYSIS

- A Sample Collection Kit containing all equipment to collect desired field samples will be provided to Zone 7 Water Agency by the PSG contractor selected for collection of soil gas samples following the protocols of ASTM D7758-2011 passive gas sampling method.

- The PSG contractor will provide a soil gas specialist to lead the installation of PSG samplers and provide retrieval and return shipment procedures to the Zone 7 personnel assisting with installation of the samplers.

- A trip blank, which will remain with the other PSG samples during preparation, shipment, and storage, will be included with each batch of up to 30 field samples.

- It is not necessary to use ice or preservatives during shipment; however, the samplers are sealed and shipped under strict chain-of-custody procedures.

- A chain-of-custody will accompany the field samples at all times from the time the samples are collected until final analysis. Field kits are shipped with custody seals to ensure that samplers are not tampered with during transport. Once samples are received at the PSG contractor laboratory, the sample custodian receives the samples and logs the samples into the laboratory's sample receipt log.

- The PSG contractor laboratory is maintained in a safe and secure manner at all times. The facility is locked when not occupied and is monitored for fire and unauthorized access. Personnel escort all visitors at all times while inside the facility.

- Soil gas samples will be analyzed by the contractor using gas chromatography/mass spectrometry (GC/MS) instrumentation, following EPA Method 8260C procedures. The laboratory will perform appropriate calibrations. Other specific analytes may be targeted, if requested by Zone 7 prior to analysis. Two sets of adsorbent cartridges are included in each sampler for duplicate or confirmatory analysis. At the Zone 7's option, the PSG laboratory will analyze field sample duplicates from selected sample locations identified on the chain-of-custody.

GROUNDWATER SAMPLING AND LABORATORY ANALYSIS

Zone 7 has adopted internal quality assurance procedures that will assure the collection of defensible, high quality data. These Standard Operating Procedures are presented below.

- Groundwater Level Measurement Procedures: For groundwater level data, Zone 7 measures depth-to-water from a surveyed reference point in each well. Reference point elevations are surveyed to ±0.01'. Mean sea level is used as a common datum for all monitoring wells. Several different devices are used to measure the depth to water. Each device is calibrated routinely to assure the accuracy of these measurements. Measurements are made to within 0.1' and recorded on field data sheets. The elevation of the water surface in the well is computed by subtracting the depth to water from the reference point elevation. The field data is then entered into a database and made available to staff for further analysis.

- Only appropriate equipment in good working condition will be brought into the field including sample containers, sampling equipment, container labels, chain of custody sheets, and field sheets. Sample containers are provided by the laboratory with the appropriate preservative, if any is required. Containers are labeled with the site, date, time and sampler. Sample timing will be coordinated with the laboratory so that samples can be analyzed within the specified holding time for that analysis. Zone 7's Water Quality Laboratory supplies clean sample collection containers appropriate for each of the analyses.

- Depth to water, sample temperature, specific conductance, and pH are measured in the field using handheld meters that are calibrated to standards daily. Calibration notes are included with daily field logs.

- Groundwater samples are collected in preserved 40 milliliter screw cap vials with a Teflon-faced silicone septum. No head space or bubbles should remain in the vial after the sample is taken. Samples are kept in a portable cooler at 4˚ Celsius, +/- 2˚ C and transported to Zone 7's Water Quality laboratory on the same day. Samples are analyzed within the appropriate hold time.

- A Chain-of-Custody form is completed for each set of samples and is submitted to the laboratory along with the samples. Samples are delivered to the laboratory within the recommended holding times for the appropriate analysis.

- Zone 7's Water Quality Laboratory is certified under by the California Department of Public Health's (CDPH) Environmental Laboratory Accreditation Program (ELAP Certificate included as an attachment to the Work Plan). The laboratory Minimum Reporting Levels (MRLs) are equal or less than applicable CDPH established Detection Limits for Purposes of Reporting (DLRs). The standard EPA laboratory analytical methods for PCE are also included in the ELAP certification. The Zone 7 Water Quality Laboratory practices stringent QA/QC guidelines consistent with ELAP. Laboratory certification includes the following five fields of testing:

    - E101 Microbiology of Drinking Water
    - E102 Inorganic Chemistry of Drinking Water
    - E103 Toxic Chemical Elements of Drinking Water
    - E104 Volatile Organic Chemistry of Drinking Water
    - E105 Semi-volatile Organic Chemistry of Drinking Water
    - E106 Radiochemistry of Drinking Water

- Zone 7 uses a proprietary database and Geographical Information Systems (GIS) program, GIS\Key, specifically designed for storing and presenting environmental and geologic data (http://www.giskey.com/core.htm). All data collected from the borings and wells installed and tested for this project will be entered into Zone 7's GIS\Key database in a manner consistent with previous data collected and entered for Zone 7's monitoring programs.

PROJECT REVIEW, DATA ANALYSIS AND CONCLUSIONS, AND CONTRACTOR MANAGEMENT

- Zone 7 is responsible for all work performed for this project. Work is completed in accordance with all applicable federal, state, and local regulations and standards.

- All permits or required approvals to perform the work are obtained, reviewed, and accepted by Zone 7.

- Contractors perform work under the direction and supervision of Zone 7 personnel. All field work determinations (boring locations, etc.) are assessed and approved by Zone 7 staff before work proceeds.

- A daily log book is kept to record all field work activities.

- Laboratory analytical data, CPT/MIP, and PSG results are reviewed upon receipt. Zone 7 staff approve the data quality prior to incorporation into the GIS\Key database and/or data reported in Quarterly and Annual Reports.

- All reports and related documents receive a complete and rigorous review process before final versions are published. This includes a thorough peer review for all reports prior to submitting to Zone 7 management for final review.

  Personnel responsible for ensuring that complete and accurate information is present throughout the project are the following:

  - Matt Katen, PG, CHG, 32 years experience, including 20 years in hydrogeology;
  - Tom Rooze, PG, CEG, 23 years geology and hydrogeology experience;
  - Colleen Winey, PG, 16 years geology and hydrogeology experience.

CPT/MIP INVESTIGATION ACTIVITIES

- Site activities performed by the drilling contractor are in accordance with all applicable federal, state, and local regulations and standards

- All MIP instruments are to be tuned and calibrated to the manufacturers recommended conditions by the drilling contractor prior to beginning work each day. The trip time is calibrated using a PCE standard each day. The CPT probe depth indicator is field tested above grade first to ensure proper calibration before subsurface use. Zone 7 may require additional on-site tests from the drilling contractor prior to and during subsurface logging to ensure proper instrument performance.

- The drilling contractor keeps a daily activity log book to record all on-site activities, personnel, and observations. Detailed soil and groundwater sampling data is recorded on log forms and reviewed for completeness and accuracy after every work day by both the drilling contractor and Zone 7 personnel.

HEALTH AND SAFETY

- A site health and safety plan is developed by Zone 7 to perform work in the safest manner possible consistent with good environmental sampling and field work practices. All contractors and Zone 7 personnel read and follow the site health and safety plan.

- All PSG soil gas specialists and drilling crew members must be 40-hour HAZWOPER and OSHA certified (in accordance with 29 CFR 1910).

- All field personnel use appropriate personal protection equipment (PPE) while working on the project. Field work is anticipated to be completed in Level D PPE (*e.g.*., steel-toe work boots, safety glasses, hearing protection, safety vests, leather gloves, nitrile gloves, and hard hats, as required.). Should site conditions warrant a higher level of PPE, work will cease until an assessment can be made and an appropriate level of PPE can be identified.

- Daily tailgate safety meetings with all working crew members are required. All personnel present will review safety protocol, as outlined in the site health and safety plan, and identify possible site hazards. At this point possible mitigations and/or changes to the work plan can be discussed, if necessary.

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

Zone 7 Water Quality Laboratory
601 East Vallecitos Road
Livermore, CA 94550
Phone: (925) 447-0534

Certificate No.: 1403
Renew Date: 12/31/2012

Field of Testing: 101 - Microbiology of Drinking Water			
101.010	001	Heterotrophic Bacteria	SM9215B
101.011	001	Heterotrophic Bacteria	SimPlate
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
101.120	001	Total Coliform (Enumeration)	SM9221A,B,C
101.130	001	Fecal Coliform (Enumeration)	SM9221E (MTF/EC)
101.160	001	Total Coliform (Enumeration)	SM9223
101.200	001	E. coli (Enumeration)	SM9223B
Field of Testing: 102 - Inorganic Chemistry of Drinking Water			
102.030	001	Bromide	EPA 300.0
102.030	002	Chlorate	EPA 300.0
102.030	003	Chloride	EPA 300.0
102.030	005	Fluoride	EPA 300.0
102.030	006	Nitrate	EPA 300.0
102.030	007	Nitrite	EPA 300.0
102.030	008	Phosphate, Ortho	EPA 300.0
102.030	010	Sulfate	EPA 300.0
102.100	001	Alkalinity	SM2320B
102.121	001	Hardness	SM2340C
102.130	001	Conductivity	SM2510B
102.140	001	Total Dissolved Solids	SM2540C
102.163	001	Chlorine, Free and Total	SM4500-Cl G
102.170	001	Chloride	SM4500-Cl- B
102.260	001	Total Organic Carbon	SM5310B
102.261	001	DOC	SM5310B
102.280	001	UV254	SM5910B
102.500	002	Magnesium	SM3111B
102.500	004	Sodium	SM3111B
102.532	002	Potassium	SM3500-K D
102.540	001	Calcium	SM3500-Ca B (20th)
102.541	002	Magnesium	SM3500-Mg B
102.543	002	Silica	SM4500-SiO2 D
102.551	002	Chlorine, Free, Combined, Total	SM4500-Cl G
Field of Testing: 103 - Toxic Chemical Elements of Drinking Water			
103.140	001	Aluminum	EPA 200.8

As of 6/25/2012 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8
103.140	014	Silver	EPA 200.8
103.140	015	Thallium	EPA 200.8
103.140	016	Zinc	EPA 200.8
103.140	017	Boron	EPA 200.8
103.140	018	Vanadium	EPA 200.8
103.150	008	Iron	EPA 200.9
103.161	001	Mercury	EPA 245.2

Field of Testing: 104 - Volatile Organic Chemistry of Drinking Water

104.010	000	Volatile Organic Compounds	EPA 502.2
104.010	001	Benzene	EPA 502.2
104.010	007	n-Butylbenzene	EPA 502.2
104.010	008	sec-Butylbenzene	EPA 502.2
104.010	009	tert-Butylbenzene	EPA 502.2
104.010	010	Carbon Tetrachloride	EPA 502.2
104.010	011	Chlorobenzene	EPA 502.2
104.010	015	2-Chlorotoluene	EPA 502.2
104.010	016	4-Chlorotoluene	EPA 502.2
104.010	019	1,3-Dichlorobenzene	EPA 502.2
104.010	020	1,2-Dichlorobenzene	EPA 502.2
104.010	021	1,4-Dichlorobenzene	EPA 502.2
104.010	022	Dichlorodifluoromethane	EPA 502.2
104.010	023	1,1-Dichloroethane	EPA 502.2
104.010	024	1,2-Dichloroethane	EPA 502.2
104.010	025	1,1-Dichloroethene	EPA 502.2
104.010	026	cis-1,2-Dichloroethene	EPA 502.2
104.010	027	trans-1,2-Dichloroethene	EPA 502.2
104.010	028	Dichloromethane	EPA 502.2
104.010	029	1,2-Dichloropropane	EPA 502.2
104.010	033	cis-1,3-Dichloropropene	EPA 502.2
104.010	034	trans-1,3-Dichloropropene	EPA 502.2
104.010	035	Ethylbenzene	EPA 502.2
104.010	037	Isopropylbenzene	EPA 502.2

104.010	039	Naphthalene	EPA 502.2
104.010	040	N-propylbenzene	EPA 502.2
104.010	041	Styrene	EPA 502.2
104.010	043	1,1,2,2-Tetrachloroethane	EPA 502.2
104.010	044	Tetrachloroethene	EPA 502.2
104.010	045	Toluene	EPA 502.2
104.010	047	1,2,4-Trichlorobenzene	EPA 502.2
104.010	048	1,1,1-Trichloroethane	EPA 502.2
104.010	049	1,1,2-Trichloroethane	EPA 502.2
104.010	050	Trichloroethene	EPA 502.2
104.010	051	Trichlorofluoromethane	EPA 502.2
104.010	053	1,2,4-Trimethylbenzene	EPA 502.2
104.010	054	1,3,5-Trimethylbenzene	EPA 502.2
104.010	055	Vinyl Chloride	EPA 502.2
104.010	056	Xylenes, Total	EPA 502.2
104.015	001	Bromodichloromethane	EPA 502.2
104.015	002	Bromoform	EPA 502.2
104.015	003	Chloroform	EPA 502.2
104.015	004	Dibromochloromethane	EPA 502.2
104.015	005	Trihalomethanes	EPA 502.2
104.020	002	Methyl tert-butyl Ether (MTBE)	EPA 502.2
104.020	004	tert-Amyl Methyl Ether (TAME)	EPA 502.2
104.020	005	Ethyl tert-butyl Ether (ETBE)	EPA 502.2
104.020	006	Trichlorotrifluoroethane	EPA 502.2
104.030	001	1,2-Dibromoethane	EPA 504.1
104.030	002	1,2-Dibromo-3-chloropropane	EPA 504.1
104.030	003	1,2,3-Trichloropropane	EPA 504.1
104.040	000	Volatile Organic Compounds	EPA 524.2
104.040	001	Benzene	EPA 524.2
104.040	007	n-Butylbenzene	EPA 524.2
104.040	008	sec-Butylbenzene	EPA 524.2
104.040	009	tert-Butylbenzene	EPA 524.2
104.040	010	Carbon Tetrachloride	EPA 524.2
104.040	011	Chlorobenzene	EPA 524.2
104.040	015	2-Chlorotoluene	EPA 524.2
104.040	016	4-Chlorotoluene	EPA 524.2
104.040	019	1,3-Dichlorobenzene	EPA 524.2
104.040	020	1,2-Dichlorobenzene	EPA 524.2
104.040	021	1,4-Dichlorobenzene	EPA 524.2
104.040	022	Dichlorodifluoromethane	EPA 524.2
104.040	023	1,1-Dichloroethane	EPA 524.2
104.040	024	1,2-Dichloroethane	EPA 524.2
104.040	025	1,1-Dichloroethene	EPA 524.2

104.040	026	cis-1,2-Dichloroethene	EPA 524.2
104.040	027	trans-1,2-Dichloroethene	EPA 524.2
104.040	028	Dichloromethane	EPA 524.2
104.040	029	1,2-Dichloropropane	EPA 524.2
104.040	033	cis-1,3-Dichloropropene	EPA 524.2
104.040	034	trans-1,3-Dichloropropene	EPA 524.2
104.040	035	Ethylbenzene	EPA 524.2
104.040	037	Isopropylbenzene	EPA 524.2
104.040	039	Naphthalene	EPA 524.2
104.040	041	N-propylbenzene	EPA 524.2
104.040	042	Styrene	EPA 524.2
104.040	044	1,1,2,2-Tetrachloroethane	EPA 524.2
104.040	045	Tetrachloroethene	EPA 524.2
104.040	046	Toluene	EPA 524.2
104.040	048	1,2,4-Trichlorobenzene	EPA 524.2
104.040	049	1,1,1-Trichloroethane	EPA 524.2
104.040	050	1,1,2-Trichloroethane	EPA 524.2
104.040	051	Trichloroethene	EPA 524.2
104.040	052	Trichlorofluoromethane	EPA 524.2
104.040	054	1,2,4-Trimethylbenzene	EPA 524.2
104.040	055	1,3,5-Trimethylbenzene	EPA 524.2
104.040	056	Vinyl Chloride	EPA 524.2
104.040	057	Xylenes, Total	EPA 524.2
104.045	001	Bromodichloromethane	EPA 524.2
104.045	002	Bromoform	EPA 524.2
104.045	003	Chloroform	EPA 524.2
104.045	004	Dibromochloromethane	EPA 524.2
104.045	005	Trihalomethanes	EPA 524.2
104.050	002	Methyl tert-butyl Ether (MTBE)	EPA 524.2
104.050	004	tert-Amyl Methyl Ether (TAME)	EPA 524.2
104.050	005	Ethyl tert-butyl Ether (ETBE)	EPA 524.2
104.050	006	Trichlorotrifluoroethane	EPA 524.2
104.050	007	tert-Butyl Alcohol (TBA)	EPA 524.2

Field of Testing: 105 - Semi-volatile Organic Chemistry of Drinking Water

105.050	005	Chlordane (total)	EPA 508.1
105.050	029	Toxaphene	EPA 508.1
105.090	001	Alachlor	EPA 525.2
105.090	003	Atrazine	EPA 525.2
105.090	004	Benzo(a)pyrene	EPA 525.2
105.090	006	Chlordane	EPA 525.2
105.090	008	Di(2-ethylhexyl) Adipate	EPA 525.2
105.090	009	Di(2-ethylhexyl) Phthalate	EPA 525.2
105.090	013	Endrin	EPA 525.2

105.090	014	Heptachlor	EPA 525.2
105.090	015	Heptachlor Epoxide	EPA 525.2
105.090	016	Hexachlorobenzene	EPA 525.2
105.090	017	Hexachlorocyclopentadiene	EPA 525.2
105.090	018	Lindane	EPA 525.2
105.090	019	Methoxychlor	EPA 525.2
105.090	022	Molinate	EPA 525.2
105.090	025	Simazine	EPA 525.2
105.090	028	Thiobencarb	EPA 525.2
105.090	029	Polynuclear Aromatic Hydrocarbons	EPA 525.2
105.090	030	Adipates	EPA 525.2
105.090	031	Phthalates	EPA 525.2
105.200	001	Bromoacetic Acid	EPA 552.2
105.200	003	Chloroacetic Acid	EPA 552.2
105.200	004	Dalapon	EPA 552.2
105.200	005	Dibromoacetic Acid	EPA 552.2
105.200	006	Dichloroacetic Acid	EPA 552.2
105.200	007	Trichloroacetic Acid	EPA 552.2
105.200	008	Haloacetic Acids (HAA5)	EPA 552.2

Field of Testing: 106 - Radiochemistry of Drinking Water

106.092	001	Uranium	EPA 200.8