FINAL

SAMPLING AND ANALYSIS PLAN ADDENDUM FOR INSTALLATION OF SWMU B-3 WESTBAY WELLS, INSTALLATION OF SWMU B-3 INJECTION WELL, SWMU B-3 REMOVAL ACTION, SWMU B-3 BIOREACTOR O&M, CS-MW16-CC PUMPING TEST, AND AOC-65/SWMU B-3 SVE SYSTEM EXPANSION

CAMP STANLEY STORAGE ACTIVITY BOERNE, TEXAS

Addendum Specific to Field Sampling Plan For Task Order (TO) 0006 (TO0006)

SECTION 1 INTRODUCTION

This document is provided as an amendment to the existing Camp Stanley Storage Activity (CSSA) Sampling and Analysis Plan (SAP), **Sampling and Analysis Plan and Quality Assurance Project Plan**, **Volume 1-4**, **CSSA Environmental Encyclopedia**, and details sampling and analysis activities planned under Task Order 0006 (TO-06). These procedures are to be followed during the installation of multi-port monitoring well systems, installation of an injection well, SWMU B-3 removal action, SWMU B-3 bioreactor construction, SWMU B-3 bioreactor operation and maintenance (O&M), CS-MW16-CC pumping test, and expansion of the SWMU B-3 and AOC-65 SVE systems, including O&M. The purpose of this addendum is to identify and address specifics for the TO-06 field activities and verify that the procedures are explained in either the original SAP or previous addenda.

This addendum to the SAP is prepared in accordance with applicable state regulations for installation, completion, development, and utilization of monitoring and injection wells, piezometer installation, recirculation of extracted groundwater for remediation purposes, and waste characterization. Guidance for these procedures and techniques was adapted from the Air Force Center for Environmental Excellence (AFCEE) Model Field Sampling Plan (MFSP). Input and recommendations from the U.S. EPA-Region 6 and the TCEQ were also considered and incorporated into the planning documents.

1.1 FIELD ACTIVITIES

Construction tasks such as installing the Outfall 001 Re-use System and upgrading the Above-Ground Fuel Storage Tank Systems, and SWMU B-3 bioreactor construction remain outside the scope of this SAP, which refers only to environmental data collection activities at CSSA. Field activities to be completed under TO0006, which will involve elements of data collection, are described below. The quantities included in the description are based on the

technical approach prepared to complete CSSA's scopes of work (SOWs) for the original task order award, Modification 01 (asphalt removal), and Modification 02 of the task order.

1. Drilling and well construction,
   a) Installation of four (4) multi-port monitoring well systems (MPMWs) at SWMU B-3;
   b) Installation of approximately eight (8) vapor extraction wells (VEWs) for inclusion into expanded Soil Vapor Extraction (SVE) systems at SWMU B-3 and AOC-65;
   c) Drilling and installation of one (1) injection well at SWMU B-3, suitable for tracer and substrate injection;
   d) Completion of geophysical logging, optical televiewer logging, analog video surveys in MPMW boreholes, and injection packer testing in at least one borehole;
   e) Installation of approximately eight (8) piezometers within the SWMU B-3 bioreactor;
   f) Collection of qualitative discrete interval groundwater and soil vapor samples (subsurface packer sampling) from well boreholes at depths determined from review of geophysical and lithologic logs;
   g) Collection, characterization, and proper disposal of both liquid and solid investigation derived waste (IDW); and
   h) Interim sealing of boreholes by FLUTE™ liner, including liner maintenance.

2. Substrate injection pilot testing,
   a) Baseline monitoring at the four new MPMWs and other selected nearby wells;
   b) Perform groundwater mixing with tracer and substrate for injection at SWMU B-3;
   c) Perform post injection aquifer testing within the contaminant plume underlying SWMU B-3; and
   d) Continue to operate Well-16 LGR throughout duration of pilot test to maintain a hydraulic gradient toward Well-16 from SWMU B-3.

3. SVE systems expansions,
   a) Testing new VEWs to existing SVE systems at SWMU B-3 and AOC-65;
   b) Replacement of the current blower unit at SWMU B-3 SVE system, and installation of a new blower unit and associated housing for VEWs west of the concrete drainage swale at AOC-65 and associated startup testing; and
   c) Testing and O&M of the expanded SVE systems as per the revised and approved SVE O&M manual.

4. MW16-CC Pumping Test,
   a) Pre-test water level survey of pumping well and observation wells;
   b) Conduct pumping test from MW16-CC for 72 hours, obtaining drawdown levels incrementally from observation wells;
   c) Conduct pumping test from MW16-LGR for 72 hours, obtaining drawdown levels incrementally from observation wells;
   d) Measure recovery of pumping wells and observation wells for 24 hours following the shut-down of the pumping wells; and
   e) Test activated carbon in Well 16 to assess remaining capacity of granular activated carbon and for determining proper disposition, if necessary.
   f) Collect influent sample prior to granular-activated carbon (GAC) treatment from the respective pumping well (CS-16-LGR or CS-MW16-CC) and analyze for standard CSSA groundwater list. Collect two samples per week from treated GAC effluent, in accordance with the CSSA Texas Pollution Discharge Elimination System (TPDES) permit (it is anticipated that a total of 2 influent and 4 effluent samples will be collected over the course of the two pumping tests).

5. SWMU B-3 Removal Action
   a) Characterization of excavated materials from SWMU B-3 per CSSA's Waste Management Plan (WMP) for determining waste classification and profiling with receiving landfill(s);
   b) Quality assurance for the bioreactor construction planned in the SWMU B-3 excavation, including determination of constructed limits of the bioreactor; and
   c) Testing of material selected for reuse as backfill on top of the constructed bioreactor. Sample every 250 cubic yards (CY) to ensure no waste materials are placed back into the excavation.
   d) Characterize media/waste that contains potential contaminants of concern (COCs) greater than 20 times the regulated TCLP criteria (*i.e.*, 20 times rule) at a rate of 1 TCLP sample per 200 cubic yards (CY). For materials excavated that have no exceedances of the 20 times rule, sample frequency will be at 1 sample per 500 CY of media/waste.
   e) Collect characterization samples using a five aliquot composite routine for all analyses. Grab samples may be collected for general site data purposes.

6. SWMU B-3 Bioreactor O&M,
   a) Monitoring and sampling of SWMU B-3 piezometers and MPMW;
   b) Monitoring groundwater recirculated from Well 16 to bioreactor; and

c) Monitoring water levels in bioreactor and evaluating impact of precipitation on water levels within bioreactor by comparing weather station, water level, and recirculation data to determine water mass balance within the bioreactor.

SECTION 2
INSTALLATION OF WELLS

2.1 WELL DETAILS

New wells will be installed in portions of the Middle Trinity aquifer underlying CSSA in and around AOC-65 and SWMU B-3. The current drilling program includes the following:

- Four (4) MPMWs on the perimeter of the SWMU B-3 site (CS-WB-05 to CS-WB-08);
- Four (4) or more VEWs arranged within SWMU B-3 (CS-VEW-21 to CS-VEW-24) depending on cumulative footage of each VEW;
- Approximately four (4) VEWs arranged within AOC-65 (CS-VEW-25 to CS-VEW-28) depending on cumulative footage of each VEW;
- One monitoring well (CS-B3-MW01 or "injection well") suitable for injection at the SWMU B-3 site;
- Approximately eight (8) piezometers in the SWMU B-3 bioreactor; and
- Two hundred feet of allotted VEW construction footage may be used to construct one nested VEW string in a planned borehole next to the dock and SVE manifold alongside Building 90, within AOC-65.

Actual drilling depth will be a function of each well's location, land surface elevation, and observations made during drilling and soil gas packer sampling at each borehole. **Figures 1** and **2** illustrate the proposed MPMW drilling locations and the AOC-65 VEW locations. Exact VEW and piezometer locations will be dependent upon observations and data gathered during MPMW installation and SWMU B-3 excavation. The estimated drilling depths of the new wells are:

- 325 feet below ground surface (bgs) for each Lower Glen Rose (LGR) MPMW well, and 480 feet bgs for the Cow Creek (CC) MPMW;
- 50 to 200 feet bgs for each VEW;
- 200 feet bgs for the injection well; and
- approximately 20 feet for each SWMU B-3 piezometer.

Other activities will include geophysical logging, downhole video camera surveys, optical televiewer logging, and packer injection testing. In addition, discrete interval soil-vapor and groundwater samples will be obtained from boreholes via straddle packer apparatus to evaluate the occurrence and stratification of contaminants within the geologic horizon under investigation.

2.2 CONTINGENCY PLANNING

Unforeseen contingencies may arise which will require deviations or modifications to the SAP. Some events may require immediate action, while others may be less severe and can be handled in a roundtable fashion with CSSA, AFCEE, USEPA, and the TCEQ (see the Contingency Planning section of the **TO-42 SAP Addendum**).

Aerial Photo Date: 2003

- Proposed WestbayÆ Well Location
- Proposed Injection Well Location
- Approximate Groundwater Flow Direction, Sept. 2004
- Faults (USGS)
- Creeks (Dashed where intermittent)
- Water Well Locations
- SWMU Boundary

Figure 1

Proposed Well Location Map

Camp Stanley Storage Activity

PARSONS

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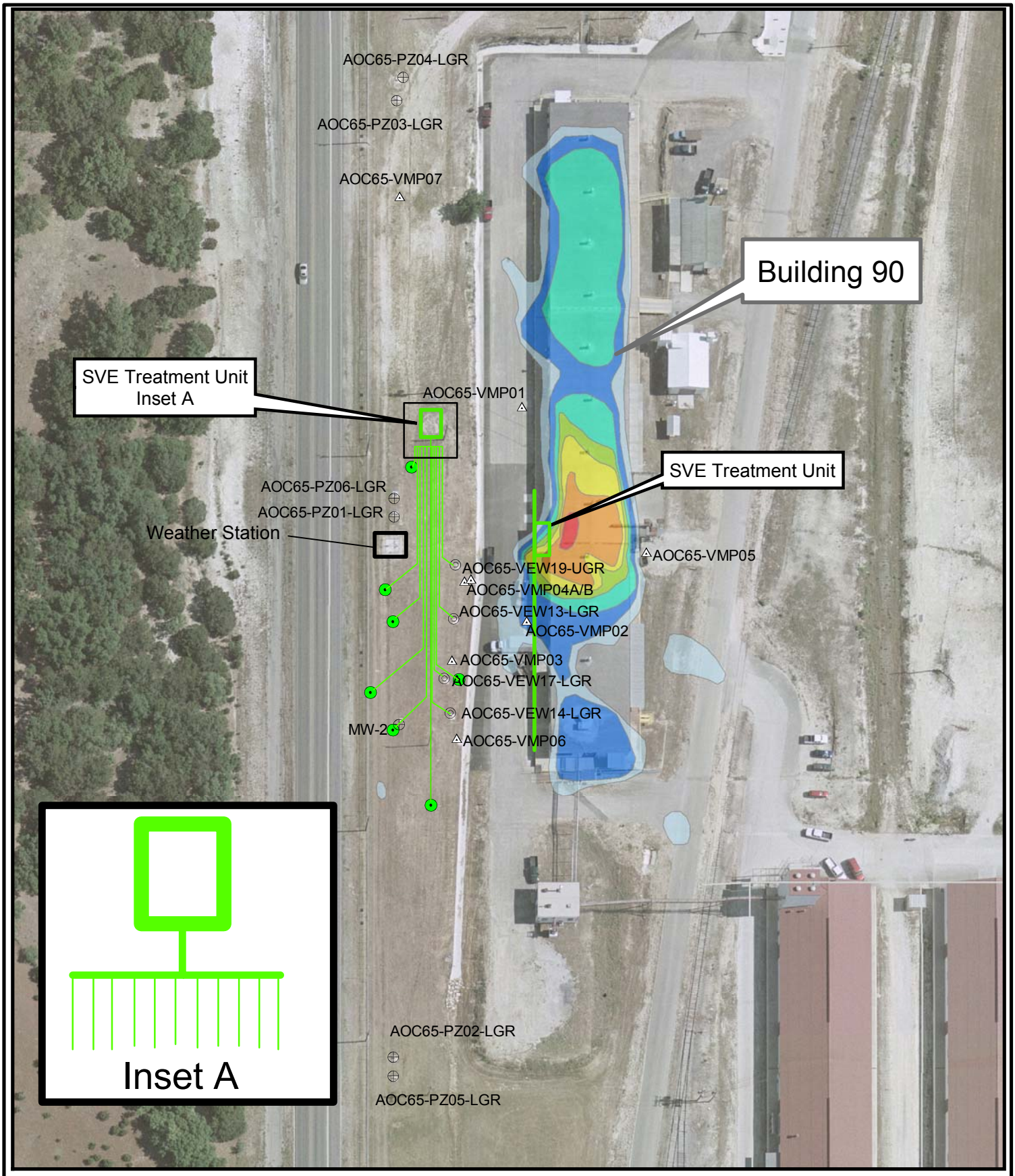

Figure 2

AOC-65 SVE System
Camp Stanley Storage Activity

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2.3 TOTCO VERTICAL DRIFT INDICATOR

A single shot declination tool will be used to check the plumbness and alignment of the boreholes and monitoring wells, as described in the ***TO-42 SAP Addendum***. The declination tool will be run in the borehole after every 50 feet of advancement. All monitor wells will be plumb within 2 degrees of vertical unless otherwise approved by AFCEE. Wells drilled under TO0006 not meeting straightness or plumbness specifications will be redrilled or reconstructed.

2.4 BOREHOLE GEOPHYSICAL SURVEYS

Standard borehole geophysical techniques employed for this project include resistivity (both short [8 and 16-inch] and long [32 and 64-inch]), spontaneous potential (SP), natural gamma ray, and caliper logging. The MPMWs will also undergo video, electromagnetic, and optical televiewing (OTV) surveys. Portions of the SWMU B-3 injection well may also be videoed. Piezometers will be constructed in the backfilled bioreactor and will not be logged.

Geophysical logging will be performed in boreholes to identify rock types before surface casing is installed and any packer sampling or tests are performed. Gross-count natural gamma ray logging will be conducted with resistivity and SP methods, and OTV in the MPMWs to augment identification and correlation of strata or rock types between boreholes. Requirements, procedures, and specific explanations for the standard borehole geophysical surveys are found in Section 2.7 of the **TO-42 SAP Addendum**.

The OTV provides high resolution for fracture and feature analysis in boreholes. This technology is based on direct optical observation of the borehole wall. Measurements of dip angle and direction of bedding and joint planes, along with other geological analyses, are possible in air and clear fluid filled portions of boreholes. A small light ring illuminates the borehole wall allowing a camera to make a 360-degree survey of the borehole wall. As the optical televiewer tool is lowered down the hole, the video signal from the camera is transmitted via wireline to the surface for display and analysis on a computer. The images are then highlighted to show the fractures, bedding planes and orientation of features encountered during the downhole survey. A mechanical compass is imaged along with the analog signal to insure proper orientation of the digital image. The optical televiewer image is an oriented, unwrapped 2-D picture of the borehole wall. Orientations are generally based on magnetic north and are corrected for declination. The log is useful for strata and fracture delineation, which may reveal potential pathways and direction for contaminant transport.

The borehole geophysical logging will be conducted by a qualified individual and supervised by the onsite Parsons geologist. Downhole geophysical tools, cables, probes, and other equipment will be decontaminated before and after being lowered into a borehole. Geophysical data are stored in hard-copy (paper and video cassette) and electronic formats. After logging, a reproducible copy of the field strip-chart log with a heading specifying project, borehole number, location and depth, geophysical equipment types, and equipment settings will be maintained in the project file.

2.5 DISCRETE INTERVAL SAMPLING

2.5.1 Groundwater Sampling

Discrete interval groundwater samples (DIGWSs) will be collected from the new multi-port well boreholes. Each borehole will undergo discrete sampling after cleaning by the driller, and prior to installation of the well material. Discrete sampling intervals or features will be selected by the site geologist and project manager based on lithologic and geophysical logs. Intervals will be selected based on their perceived degree of groundwater occurrence and movement relative to project plume management and remediation goals. An interval may contain individual strata, or geologic features such as single fractures, fracture zones, fault zones, reef zones, or sedimentary subunits.

In a borehole, a wireline-guided double packer system will be used to straddle the screened inlet section of a bladder pump or a section of perforated pipe containing the pump inlet. The wireline is the means for lowering and raising the packer assembly in the borehole. The packer assembly will be attached to wireline, airline and pump tubing. The apparatus is set at a depth corresponding to the section of borehole from which a groundwater sample is to be extracted. The packers are inflated with nitrogen gas against the borehole wall. The section of the borehole between the packers then becomes temporarily isolated from other water-bearing zones and features of the formation above and below the apparatus. The packer system's open interval should not exceed 12 feet. When the formation freely yields groundwater as determined by the site geologist, a pump internal to the apparatus will be used to purge and collect discrete groundwater samples from the interval or feature. When the formation does not freely yield groundwater, the test zone will be purged via air lifting, followed by sample collection with a ¾ or 1-inch diameter bailer. The minimum purge volume will be 1.5 pore volumes. Ideally, three volumes will be removed before sampling. The site geologist may require greater volumes to be removed to reduce turbidity or improve other quality parameters prior to sample collection.

Conditions may warrant collection of discrete groundwater samples as drilling progresses and prior to achieving TD. A packer system for this type of situation consists of a single packer set above a pump inlet with no check valve. The current bottom depth of the borehole will serve as the lower isolation point for the discrete sample; therefore, this method of sampling would occur as drilling progresses in depth. Purging volumes and sample collection methods are the same as with the above-mentioned packer system, and are entirely dependent upon the amount of water the discrete interval yields.

2.5.2 Subsurface Vapor Sampling

Subsurface vapors will be sampled during the discrete extraction packer sampling at new VEWs drilled for the SWMU B-3 and AOC-65 SVE systems expansions, and may also be collected from selected vadose intervals of multiport well boreholes prior to their completion. Two levels of soil gas sampling data will be collected, field screening and qualitative sampling. The packer assembly and general procedures to be used for this sampling will be the same or very similar to the equipment described above for DIGWS collection. The only major difference being that a 1/6 horse power vacuum pump at the wellhead will draw air samples up instead of a downhole water pump pushing water from below. A brief description of qualitative soil gas sample collection for soil gas surveys, and sample screening, is described in the CSSA

Environmental Encyclopedia, Volume 1-4.2, SAP, Sections 1.1.3.2. and 1.1.3.3, respectively. Further details regarding subsurface vapor sampling procedures and equipment are in Sections 7.4 and 7.7 of the ***AOC-65 Treatability Study Sampling and Analysis Plan, TO-58 Addendum***, Volume 1-4.2 of the CSSA Environmental Encyclopedia.

2.6 GROUNDWATER SAMPLING BY BAILER

The SWMU B-3 piezometers will be sampled by bailers. On occasion, VEWs or other shallow perched aquifer boreholes not equipped with any pumping apparatus may also require sampling by bailer. Some shallow bores at CSSA may not freely yield water, and may be purged to dryness before attaining any minimum purging requirement. Samples are collected by bailer after a sufficient volume of groundwater has accumulated within the well or borehole to obtain adequate sample volume. One clean, disposable Teflon bailer will be used per sample. Complete bailer sampling requirements and procedures are outlined in ***TO-42 SAP Addendum***, Subsection 3.2.2.

2.7 INJECTION PACKER TEST PROCEDURES

Injection packer testing is planned under TO-06 for the deep, multi-port monitoring well proposed for completion into the Cow Creek Formation at SWMU B-3, and may be performed on additional well boreholes pending results of the initial injection tests. Packer injection tests for this project will be hydraulic tests of packer-isolated portions of completed boreholes. Intervals to be tested will be selected based on the lithologic descriptions and downhole geophysical results. The packer assembly and general procedures to be used for this sampling will be the same or very similar to the equipment described above for DIGWS collection. The difference being that flow is reversed and clean water will be injected into the interval or feature through controlled pumping. Other equipment, instructions, procedures, and worksheets for injection tests are described in Section 2.8 and Appendix C of the **TO-42 SAP Addendum**.

SECTION 3
SUBSTRATE INJECTION TREATABILITY TESTING

3.1 TREATABILITY TEST DESCRIPTION

A substrate injection treatability test will be performed at SWMU B-3 by injecting an organic substrate into an injection well installed between SWMU B-3 and CS-Well 16 location. The treatability and tracer test is described in detail in the **Work Plan for Enhanced Anaerobic Biodegradation Pilot Test at SWMU B-3**, prepared as a companion document to this SAP addendum. The primary objective of the treatability test is to evaluate enhanced anaerobic biodegradation as a viable remedial option to address chlorinated aliphatic hydrocarbons (CAHs) in groundwater migrating from the SWMU B-3 site.

The pilot test work plan provides specific treatability testing information related to injection well locations, injection construction details, selection of sodium lactate and vegetable oil substrates, tracers to be injected for the study, methodology for mixing and injecting the substrate and tracers, and monitoring requirements.

3.2 GENERAL MONITORING REQUIREMENTS

After completion of MPMW and GIW installations, baseline conditions at SWMU B-3 will be established for volatile organic compounds (VOCs), monitored natural attenuation (MNA) parameters, and hydraulic pressure gradients by up to three rounds of monitoring the MPMWs and other nearby monitoring wells. The monitoring will occur on a flexible monthly basis. Significant climatic changes (*e.g.*, precipitation) or results from previous sampling events may prompt adjustments to the monitoring schedule. The profiling data obtained from the wells will document local changes or static conditions of individual hydrogeologic zones within the monitored portion of the aquifer resulting from the injection of substrate via the new injection well or bioreactor at SWMU B-3. The SWMU B-3 baseline monitoring network will include the new MPMW wells, the new injection well, and existing CS-D, CS-MW1-LGR, and CS-MW16-LGR. Preliminary monitoring results and climatic conditions may also warrant widening the network to possibly include CS-MW2-LGR, CS-MW3-LGR, CS-MW5-LGR, CS-MW16-CC, CS-2, or CS-4.

Well monitoring will also be conducted during and after mixing and injection of the substrate mixture. The monitored points will include the same wells as for the baseline program and any other wells, which may become relevant after analysis of results. Monitoring frequency and overall schedule is detailed in the **Work Plan For Enhanced Biodegredation Pilot Test At SWMU B-3**. Further discussion of monitoring and sampling methods can be found in the **TO-42 SAP Addendum**.

The chemical analysis data generated by the pilot test will be used for screening purposes only. The DQOs pertaining to the treatability test are in the ***TO-06 WP Addendum***. Samples (trip blanks, optional duplicates) for QA/QC purposes will be minimal. Additional, specific quality control measures relative to the injection test are outlined in the ***Work Plan For Enhanced Biodegredation Pilot Test At SWMU B-3***.

3.3 HYDRAULIC MONITORING

Specialized probes and sampling equipment will be used for monitoring of MPMWs. During each profiling and sampling event the field team will obtain pressure data from each zone. Pressure data will be converted into potential heads, also referred to as piezometric surfaces or water levels. The piezometric surface is the water level that would result from hydrostatic pressure within an interval if the well were constructed as a conventional well screened through that specific depth interval. The head data will be expressed in feet below ground surface, and as elevation in feet above mean sea level. Potential head varies over time as the hydraulic pressure of each zone changes in response to fluctuating hydrologic conditions.

The MPMW data will give a better understanding of the hydraulic characteristics of the local subsurface geology. Monitoring of the individual zones will help show the relationships between the various geologic strata and features, and how such relationships might influence groundwater occurrence and movement in the SWMU B-3 vicinity. This information will assist in optimizing remediation efforts and overall plume management.

Data that will be collected during hydraulic monitoring includes transducer data, hand measurement data, and Modular Subsurface Data Acquisition System (MOSDAX) string data. The MOSDAX and transducer data is electronic and is converted to water level measurements by translation of hydraulic head pressures. Hand measurements will be recorded in the field logbook.

SECTION 4
SWMU B-3 REMOVAL ACTION AND BIOREACTOR O&M

4.1 SWMU B-3 EXCAVATION

The purpose of the removal action is to excavate waste and mixed VOC-contaminated soil from SWMU B-3 landfill west trench and install a bioreactor in the resulting excavation. Prior to excavating buried debris, debris-free overburden soil will be removed to the extent practical and stockpiled for reuse. This stockpiled soil will be sampled in increments of 500 CY to determine its usefulness as backfill material. An estimated volume of 22,000 CY of Class 2 material will be excavated and disposed at an appropriate landfill. Estimations are based on voluminous observations and data collected from previous investigations at SWMU B-3.

Excavation will focus on the buried trash and loose soil/debris and will not extend into the surrounding limestone walls and bottom of the landfill trenches. No samples will be collected from excavation walls, sides, and bottom after the excavation is complete. The excavated landfill will be backfilled with 5-6 feet of bioreactor material (TO0006 Work Plan Addendum). Subsequent bioreactor operations are expected to treat the VOC impacted earth materials and groundwater being recirculated from Well 16.

Close observation will be maintained during all phases of waste excavation and earth-moving for indications of potentially hazardous materials based on strong odors, discolored or staining, presence of buried drums, or prior analytical data from SWMU B-3 investigations are SVE treatability studies that may indicate areas of contamination. All excavated material will be stockpiled for ex situ waste characterization. Materials different in type, odor, staining, texture, etc. will be segregated and stockpiled separately in 200 CY lots or smaller for waste characterization while excavated material that is consistent with the waste profile will be characterized in 500 CY lots. If any waste is determined to be characteristic hazardous due to toxicity, treatment and/or disposal options will be evaluated and the appropriate remedies will be implemented.

Characterization sample parameters will include toxicity characteristic leaching procedure (TCLP) VOCs and TCLP metals. All sampling will be conducted in accordance with other applicable CSSA SAPs and QAPPs.

Additional details of the removal action activities are included in the site-specific **SWMU B-3 Removal Action Work Plan** (Parsons, November 2005). Historical data relating to SWMU B-3 characterization can be found in various investigation reports in the **CSSA Environmental Encyclopedia**.

4.2 BIOREACTOR O&M

After excavation activities are complete, a bioreactor will be installed in the excavated area. The bioreactor will be composed of a 5 to 6-foot thick mulch and sand mixture. A minimum of eight piezometers will be installed into the bioreactor to enable testing of effectiveness of the bioreactor and to make adjustments as necessary to maintain the energized bioreactive processes within the bioreactor. Bioreactor O&M will consist of piezometer monitoring scheduled to coincide with SWMU B-3 Westbay monitoring. Piezometer samples will always be analyzed for

VOCs, and will be analyzed for additional bioreactor parameters during the baseline and final sampling events. Six sampling events scheduled over a six month O&M period. Groundwater for energizing the bioreactor will be pumped from CS-MW16-CC and will be sampled on a regular basis to monitor VOC concentrations. More details will be available in the **SWMU B-3 Bioreactor O&M Plan** (Parsons, 2005) which will be prepared after the bioreactor system has been installed and the injection control permit approved by TCEQ detailing the O&M testing and reporting requirements.

SECTION 5
SAMPLING FREQUENCY AND ANALYSIS

5.1 GROUNDWATER

Under this task order, approximately 18 discrete interval samples will be collected from the MPMW boreholes prior to well material installation. At least eight (8) rounds of groundwater sampling at the MPMWs and other MWs will occur following installation as part of the enhanced anaerobic biodegradation pilot test at SMWU B-3. The monitoring network will include the four MWPWs, the SWMU B-3 injection well, and up to five (5) other nearby VEWs or MWs. Following precompletion and initial postcompletion sampling, three (3) rounds of baseline sampling will be conducted approximately every 30 days; however, this time interval may be adjusted based on observations made during the initial discrete interval packer sampling, injection packer tests, and on preliminary tracer test data. Following initiation of the pilot substrate injection test, there will be additional sampling events to monitor the progress of anaerobic degradation of CAHs at the site. Samples will be analyzed according to the list in **Table 5.1**. SWMU B-3 groundwater samples will initially be analyzed for full list VOCs, metals, and general MNA parameters. Bioreactor piezometers will be sampled for VOCs each event, and for bioreactor indicator parameters at their initial baseline and final sampling events. Subsequent SWMU B-3 treatability test groundwater samples may be analyzed for a slightly abbreviated parameter list based on results of initial monitoring. The parameter list for the final rounds of SWMU B-3 pilot test sampling may be expanded beyond the abbreviated list to include all initial parameters. There are no groundwater chemical analyses planned for the CS-MW16-CC pumping test.

Sampling of the wells will be based on AFCEE Handbook procedures with exceptions as appropriate (MPMWs) for the hydrogeology at the site. Purge water will be contained and analyzed, and, if necessary, transported to the CSSA on-post GAC unit for treatment.

5.2 WATER LEVEL MEASUREMENTS

Water level measurements will be obtained prior to sample collection events at all wells and during all phases of the CS-MW16-CC pumping test. The depth to water will be measured to the nearest 0.01-foot with respect to the surveyed reference point on the top of the casing. If no clear reference point exists, the reading will be obtained from the north side of the well casing as a reference point. Pressure readings from the MPMW zones will be collected and converted to hydraulic head units, and expressed as feet below ground surface (bgs) as well as elevation in feet above mean sea level (msl). Data from existing Westbay wells, well transducers, and weather stations will also be periodically downloaded (under TO0008) for use in evaluating the results from the pumping test, the effect of the pumping planned during the substrate injection pilot study, and the recharge responses following precipitation events.

Table 5.1 Sample Requirements

Activity	Media	Estimated Quantity	Parameters
Pre-installation DIGWSs via packer assembly	Groundwater	**14** (2 wells x 4 ea.) (2 wells x 3 ea.)	Short List VOCs Acetone, Methyl Ethly Ketone, Cis-1,2-dichloroethene, Trans-1,2-dichloroethene, Perchloroethene, Trichloroethene, toluene, Isopropyl alcohol (TIC)
Pre-installation subsurface vapor via packer assembly	Air	**15** (3 wells x 4 ea.) (1 well x 3 ea.)	EPA TO-15 VOCs
Post-installation – one initial round	Groundwater	**29** (3 wells x 5 zones ea.) (1 well x 9 zones) (5 MWs x 1 ea.)	Full List VOCs, RSK 175
Baseline	Groundwater	**63** (3 rounds x 21 ea.)	Full List VOCs, cations/anions, carbonate/bicarbonate, methane, ethane, ethane, TOC, total iron, ferrous iron, nitrate/nitrite, sulfate, ORP, dissolved As and Mn, CO_2
Post Injection	Groundwater	**60** (3 rounds x 20 ea.)	Full List VOCs, (metals), cations/anions, carbonate/bicarbonate, methane, ethane, ethane, TOC, total iron, ferrous iron, nitrate/nitrite, sulfate, ORP, dissolved As and Mn, volatile fatty acids, CO_2
SVE initial startup (not including Bldg. 90 individual subslab VEWs)	Air	**32** (6 VEWs @B-3) (11 VEWs @ AOC-65) (2 after-manifold composites – stripper inflow & output) (1 subslab outflow composite) (12 inside Bldg. 90)	EPA TO-15 VOCs
SVE O&M (not including Bldg. 90 subslab)	Air	**31** (6 VEWs @B-3) (11 VEWs @ AOC-65) (1 after-manifold composites – stripper inflow & output) (1 subslab outflow composite) (3 emissions per 4 quarters)	EPA TO-15 VOCs
IDW	Groundwater	**8**	Short List VOCs
	Soil	**4**	Short List VOCs and metals

Metals include: Ag, As, Ba, Br, Cd, Cr, Pb, Hg, Ni, Se

5.3 SOIL VAPOR

Subsurface vapor samples will be collected through a packer assembly during new well construction. Approximately 76 additional subsurface vapor samples will be collected through constructed ports at the SVE systems after completion of the SWMU B-3 and AOC-65 system expansions. Routine monitoring, direct vapor sampling methods, and procedures for the SVE systems are fully described in the updated **SVE O&M Manual** (Parsons, 2005). A complete round of sampling will be completed at the startup of the expanded systems. Quarterly sampling and O&M will proceed upon approval of the updated **SVE O&M Manual**. System expansion is planned for the SVE system at both AOC-65 and SWMU B-3 after completion of the SWMU B-3 removal action. After expansion of both systems is completed, the **SVE O&M Manual** will be further updated to include the new monitoring points. Vapor samples will be collected in summa canisters and analyzed by EPA Method TO15 for VOCs.

5.4 SOIL/ROCK

Based on current project DQOs, only waste characterization samples are planned from subsurface soil or rock. However, the on-site geologist is given authority to collect discretionary soil/rock samples if the material is suspected of being highly contaminated or of other unique interest, and, with the approval of the PM and CSSA, submit the sample(s) for analysis. Those samples will be collected based on strong odors, field measurement of volatiles (using a PID), visible contamination or staining, zones of fracturing, secondary porosity features, or intervals of saturation.

5.5 QUALITY CONTROL REQUIREMENTS

Analytical data collected during the task order activities will be analyzed by Gulf Coast Analytical Laboratories (GCAL), Inc., Baton Rouge, LA. The project required detection limits will be below regulatory criteria, according to GCAL laboratory-specific tolerances and limits. Sample analytical data will not be used for regulatory compliance purposes. Sample data collected for TO0006 activities will be considered screening data. No collection of field duplicates, matrix/matrix spike duplicates (MS/MSDs), or equipment blanks are planned. Trip blanks will be collected for each day that VOC analysis samples are sent to the laboratory at a rate of one trip blank per cooler shipped. Parsons chemists will monitor field quality assurance/quality control (QA/QC) procedures and validate the laboratory data as appropriate in accordance with the AFCEE and CSSA QAPPs. Most samples will be analyzed on a 21-day turn-around-time (TAT); however, 24-hour, 3-day, or 7-day TAT will be available based on the immediate need for the results, and must be marked as such on the chain of custody (COC).

5.6 DATA MANAGEMENT

For electronic data management, it is important that sample naming is consistent, following CHERPs protocols. For air and groundwater samples, the sample location will be the corresponding well or port from which the sample is collected. Sample date, time, and depth differentiate samples from the same location. Likewise, waste characterization samples will be identified by the corresponding roll-off number, and will also be differentiated by time and date.

The field logbook will document the source and final disposition of contents for each numbered roll-off box.

For those instances when a collected sample does not meet one of the designated CHERPs sample categories or matrices, field personnel will be required to contact the project or task manager to assign an appropriate sample location name. The manager will coordinate with the database manager to properly designate a previously assigned or new unique sample location information.

Field data collected during the course of the project will be stored and submitted to CSSA in electronic format. The purpose of the electronic data management program is to provide a method through which field information and data can be stored, reviewed, and managed in electronic format. The electronic files will be incorporated into a database specifically designed to manage anticipated field data collected at CSSA. The electronic files will be generated by either scanning field logbooks, inputting field measurements into electronic spreadsheets, or transferring data from field equipment. All field personnel involved in data collection activities will be familiarized with the electronic data management techniques that will be used under this task order.

SECTION 6
DECONTAMINATION PROCEDURES

Standard decontamination procedures are fully elaborated in the ***CSSA SAP*** and Section 4 of the **TO-42 SAP Addendum**.

SECTION 7
INVESTIGATION-DERIVED WASTE HANDLING

An estimated eight (8) fluid and five (5) soil IDW samples will be collected during TO0006 drilling operations. Water will be analyzed for short list VOCs. Drill cuttings will be analyzed for EPA TCLP VOCs and TCLP metals. A trip blank will accompany each IDW VOC sample submittal, but will be marked as "Hold for Analysis" on the COC. The trip blank will be analyzed only if results indicate the potential for cross contamination. IDW analysis will be conducted by GCAL.

In support of the TO0006 drilling, groundwater sample collection, and other SWMU B-3 interim remedial efforts, Parsons will operate the CSSA GAC unit located at Outfall 02. Operation of the GAC will include processing of IDW fluids, collection and analysis of effluent samples, recording through-put volumes, and general GAC maintenance, as needed. The granulated carbon presently contained in the GAC canisters will be replaced at the start of TO0006 fieldwork. Other routine GAC O&M and compliance sampling is currently allotted under TO0008.