ENVIRONMENTAL
MANAGEMENT SERVICES, INC.

September 13, 2013

Mr. Tony Russell, Chief
Assessment Remediation Branch
Mississippi Department of Environmental Quality
515 East Amite Street
Jackson, Mississippi 39201

Re: Kuhlman Electric Corporation
Soil Vapor Extraction Final Design and
Quality Assurance Project Plan
Crystal Springs, Mississippi

Dear Mr. Russell:

Environmental Management Services, Inc. (EMS) has prepared the Soil Vapor Extraction Final Design and Quality Assurance Project Plan for the Kuhlman Electric Corporation in Crystal Springs, Mississippi dated September 13, 2013. Please find the enclosed copy of the aforementioned report.

Please contact EMS at (601) 544-3674 if you should have any question or comments concerning the enclosure.

Sincerely,
Environmental Management Services, Inc.

Stephanie Kilgore

Stephanie Kilgore, P.E.
Senior Engineer

Enclosure: Soil Vapor Extraction Final Design and Quality Assurance Project Plan

cc:
Allen Gearhart, KEC
Melody Christopher, ABB, Inc.
Virginia Munford, CMS

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SOIL VAPOR EXTRACTION FINAL DESIGN AND QUALITY ASSURANCE PROJECT PLAN

KUHLMAN ELECTRIC CORPORATION

CRYSTAL SPRINGS, MISSISSIPPI

Prepared by:

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

P.O. Box 15369

Hattiesburg, MS 39404

(601) 544-3674

September 13, 2013

EMS Project No. KUH0-12-014

Project #	KUH0-12-014
Project Name	SVE
Revision No.	01

The report contained herein has been prepared by Environmental Management Services, Inc. (EMS) under the direct supervision of the environmental professionals indicated below. To the best of our knowledge all appropriate standards of care and practices were utilized to collect and report the data contained within this document. Services performed by EMS were conducted in a manner consistent with that degree of care and skill ordinarily exercised by reputable members of the same profession as EMS practicing in the same locality under similar conditions as exists at the time the service was provided. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this proposal, or any report, opinion, document or otherwise as a result of, or part of the work by EMS, its subcontractors, or vendors.

Prepared By:

FOR:

Christopher T. Johnson, P.E., P.S.
EMS Project Manager

13-SEPT-2013
Date

Reviewed and Approved By:

Clyde Woodward, Jr.
EMS Quality Assurance Manager

9-13-13
Date

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1.0 DISTRIBUTION LIST

The following individuals comprise the distribution list for reports submitted during the Kuhlman Electric Company Soil Vapor Extraction project. Reports are anticipated to be issued as a Draft, Final Draft, and Final Report copy. Reports will be distributed in hard copy to each individual noted. An electronic copy of the Final Report will accompany the hard copy to the Mississippi Department of Environmental Quality (MDEQ).

Christopher T. Johnson, P.E., P.S
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Hattiesburg, MS 39404

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Crystal Springs, MS 39059

Melody Christopher
ABB, Inc.
5 Waterside Crossing
Windsor, Connecticut 06095

2.0 PROJECT/TASK ORGANIZATION

The following section identifies the individuals and organizations participating in the Soil Vapor Extraction project. Their respective roles and responsibilities are briefly summarized.

Mr. Chris Johnson, P.E., P.S. will serve as the Environmental Management Services, Inc. (EMS) Project Manager for this soil remediation project. Mr. Johnson is a Mississippi Registered Professional Engineer and will be responsible for the sound execution of technical aspects of the project, as well as managing the day to day resource issues as they arise. Mr. Johnson will be responsible for developing and maintaining Quality Assurance Project Plans (QAPP) throughout the project, and ensuring field and analytical procedures are accomplished in accordance with applicable regulatory standards and guidance. He will be responsible for scheduling field equipment and personnel, and coordinating required laboratory analytical services. He will be the principal author of the project reports generated during and upon completion of the project, and will be responsible for review of graphical and tabular data summaries and presentations.

Mr. Clyde Woodward, Jr. will serve as the EMS Quality Assurance/Quality Control (QA/QC) Officer for the project. Mr. Woodward will serve in an independent capacity within the project organization and will be responsible for the review and approval of the QA/QC elements of the project plan. Mr. Woodward will ensure all QA/QC protocol specified in this Final Design and QAPP is in compliance with Environmental Protection Agency (EPA) and internal EMS policies and procedures, and he has the authority to stop any work or procedures that do not achieve the specified level of QA/QC as documented in this Final Design and QAPP.

Mr. Hank Roberts will serve as the EMS Health and Safety Officer for this project. He will be responsible for development of site specific health and safety plans, insuring personnel have proper training and certifications to perform the work and oversight of the field efforts where health and safety concerns and procedures are required. Mr. Roberts will serve in an independent capacity reporting to the EMS Project Manager. He will have authority to stop work for any health and safety issues that may arise and jeopardize worker safety.

3.0 EXISTING CONDITIONS/BACKGROUND

3.1 Historical Information Summary

The KEC facility is located at 101 Kuhlman Drive in Crystal Springs, Mississippi, as shown in Figure 1, and has operated as an electrical transformer manufacturing plant since its construction in the 1950's. In April of 2000, Polychlorinated Biphenyl (PCB)-contaminated soil was discovered on-site during sub-surface construction activities. This discovery initiated several phases of environmental assessments and remediation projects, some of which are currently ongoing. During these investigations and remediation projects it was discovered that the groundwater on and off KEC property was impacted with Volatile Organic Compounds (VOCs), principally 1,1-dichloroethene (DCE) and the semi-volatile constituent 1,4-dioxane (dioxane).

In connection with the environmental assessments at the site and in accordance with MDEQ requirements, groundwater monitoring has been performed on and off KEC facility property since 2004, on a quarterly to semi-annual schedule since 2005, and is presently ongoing. A total of forty-three permanent groundwater monitoring wells are used to monitor the groundwater plume.

An investigation was performed to determine the source of the groundwater impacts and was documented in the April 30, 2009 *Groundwater Assessment Report, Kuhlman Electric Corporation, Crystal Springs, Mississippi* prepared by Martin & Slagle Geoenvironmental Associates, LLC (Martin & Slagle) for BorgWarner (hereafter referred to as the April 2009 *Groundwater Assessment Report*). These efforts included a soil vapor study. The soil vapor study detected VOCs in the soil vapors from 3 feet to 12 feet deep below the plant floor. Soil samples were also collected from beneath the building from 0 feet to 62 feet below ground surface (bgs) and analyzed for VOCs. VOCs were detected in soil.

A source area for the VOCs and dioxane constituents in groundwater has been identified beneath the plant floor within subsurface soil. This area is near the western portion of the plant building beneath the Winding Department process area, the Break Room, and a former rail pit located west of the IT Test Department, as shown on the April 2009 *Groundwater Assessment Report* Figures 12 and 13 provided in Appendix A for reference.

These investigations beneath the building footprint confirmed that commingled plumes of DCE and dioxane extend from upgradient of the source area, beneath the plant building, to the southwest and offsite.

The presence of dioxane is presumed to be related to its use as a stabilizer in 1,1,1-trichloroethane (TCA), a solvent used in the past at the KEC site. DCE is a breakdown product of TCA. DCE and dioxane have been identified as the primary Constituents of Concern (COC) at this site. Other COC include TCA and carbon tetrachloride (CT).

3.2 Project Objective

As a result of the discovery of the groundwater contamination and subsequent investigations of soil and groundwater, Borg Warner submitted the Corrective Action Plan (CAP) dated March 2011 (Arcadis) to MDEQ. The CAP was approved by MDEQ on March 1, 2012. The CAP targeted an area beneath the building as the source area contributing to the groundwater impact by the COC as shown in Figure 2. It presented three objectives to mitigate impacts to the COC contaminant plume. The three objectives are listed below:

1. Ensure COC concentrations in soil and groundwater in the contaminant source area beneath the KEC manufacturing building are at levels protective of site workers.
2. Reduce COC concentrations in soil in the contaminant source area beneath the KEC manufacturing building to the extent that remaining concentrations no longer contribute to, or exacerbate COC concentrations in off-site groundwater.
3. Reduce COC concentrations in off-site groundwater to levels protective of downgradient groundwater receptors.

A pilot study was performed at the site May 12-13, 2012, to determine the viability of soil vapor extraction as a remedial strategy. The *Soil Vapor Extraction Pilot Study Report* (revised May 1, 2013) detailing the outcome of the study and proposing the use of Soil Vapor Extraction (SVE) to reduce COC concentrations was approved by MDEQ July 12, 2013. The purpose of this Final Design and QAPP is to describe a detailed remedial approach as described in the *Soil Vapor Extraction Pilot Study Report* to achieve the goals identified in the CAP.

4.0 PROJECT/TASK DESCRIPTION

4.1 SVE System

The SVE project will consist of three extraction wells located in the source area of the contaminant plume to encourage the movement of the contaminants to the center of the plume for extraction. The extraction wells will have a total depth of 24 feet bgs with 20 feet of screen. The shallow extraction well used during the SVE pilot study (SVE-EXT-SHAL) will be used for the SVE system, and two additional extraction wells will be installed as shown on Figure 3. The extraction well SVE-EXT-SHAL is constructed of with 20 feet of 10-slot, 4-inch diameter PVC well screen and 4 feet of riser. Two additional extraction wells (SVE-EXT-02 and SVE-EXT-03) will be constructed with 20 feet of 4-inch diameter stainless steel wire wrapped screen and 4 feet of stainless steel riser, i.e. 24 feet total depth. SVE-EXT-02 and SVE-EXT-03 will be constructed of stainless steel wire wrapped screen. An example extraction well detail is shown in Figure 4. During the installation of the extraction wells, soil samples will be collected and tested for VOCs and dioxane.

The area around each extraction well will be saw-cut to remove a 3-foot by 3-foot section of concrete as shown on Figure 5. An area measuring approximately 2 feet by 2 feet by 2 feet around each extraction well will be excavated without damaging or disturbing the integrity of the extraction wells to facilitate installation of the steel well vaults. Immediately after cutting the concrete, steel well vaults measuring 2 feet by 2 feet by 2 feet will be installed at the location of each of the three extraction wells. The tops of the steel vaults shall be set level with the floor. Minimum specifications for the three steel vaults shall be 10-gauge carbon steel walls and ¼-inch checkered plate covers. Steel vaults will be shop primed with one coat of red oxide primer, and shop painted gloss black with one coat of oil-base enamel paint. Piping installation from the wells to the SVE system will be coordinated with the well vault installation to minimize the time that the subsurface will be exposed. After the vaults and piping have been installed, concrete will be poured in the bottom of each of the extraction well vaults at a minimum thickness of 3 inches. The area surrounding the outside of the vaults will be reinforced using 10-inch sections of reinforcing bar, drilled and grouted into the existing concrete. The bar will be placed horizontally inside the existing concrete to a depth of 4 inches, and will extend 6 inches to the vault. Concrete will be poured in the section between the well vault and the existing concrete. The concrete surface will then be finished to match the existing concrete surface. A typical vault detail is shown in Figure 5.

Piping will be installed from the extraction wells to the SVE system, as shown in Figure 3. Trenches will be excavated for piping from each extraction well to the nearest support column in the building, and the piping will be attached to each column for support. The piping will consist of 3-inch diameter, high density polyethylene SDR-11 pipe. The piping will be dual containment pipe. Every effort will be made to install continuous piping runs and minimize the use of pipe fittings. Pipe fittings, when required, will be long-radius 90-degree elbows or 45-degree elbows. The concrete will be saw cut and neatly removed along the trench route leaving a straight edge on existing concrete. The trenches will be excavated 1-foot wide by 1-foot deep, exercising extreme caution to prevent damage to existing underground piping and conduit. All rock, broken concrete, and any other foreign material shall be removed from the trench prior to placing piping in the trench. The bottom of the trench shall be graded smooth to remove high points and to provide continuous support for piping. Piping placed in the trenches shall have a minimum cover of 2 inches of fill material. All trenches will be backfilled to within 6 inches of the surface with the excavated material and compacted. The trenches will then be poured with a 6-inch thickness of concrete, with a minimum compressive strength of 3,000 pounds per square inch. The concrete surface will be finished to match the existing concrete surface.

Each extraction well will be piped independently to the SVE unit utilizing a manifold to allow for optimum control of the vacuum and flow in the system. The SVE unit will be located in a skid-mounted 4-foot by 8-foot, sound insulated, building. The unit will utilize a 20 horsepower Tuthill Model 5009 positive displacement blower with a 450 standard cubic feet per minute capacity (at 8 inches of mercury vacuum). The blower will be equipped with a temperature gauge and high temperature switch. The unit will also have a 200-gallon vertical air/water separator with conductivity probe level switches which will drain to a 500 gallon condensate holding tank equipped with a high level shutoff of the SVE system to prevent overfilling of the tank. The soil vapor exiting the SVE system will be routed through two 2,000-pound carbon treatment units connected in series as a pollution control device. The carbon treatment units will be monitored individually and replaced as necessary if breakthrough is determined. The SVE unit and associated equipment will be protected by barriers to prevent incidental impacts related to facility traffic. A process and instrument drawing depicting the SVE unit is shown in Figure 6.

The SVE control system will consist of the following:

- Magnetic motor starters;
- Safety switches;

- Manual, off, on, and automatic switch controls;
- Alarm indicators;
- 8 output channels;
- Hard-wired relay logic;
- Run time totalizing hour meter; and
- Emergency light LED indicator.

The system will also utilize a telemetry system with a potential 32 analog inputs and 4 digital outputs with real time monitoring. The telemetry system will have the capability to dial out to 8 phone numbers, based on pre-programmed alarm conditions.

The SVE system will be equipped with a 100-amp fused main disconnect mounted to the outside of the SVE building. Power will be supplied by the facility (100-amp, 120/240-volt 3-phase 4-wire service). A licensed electrical contractor will connect the power to the SVE unit according to NFPA 70 code.

4.2 SVE Operations and Maintenance

After installation of the SVE system is complete, leak tests will be performed on the SVE system piping utilizing the pressure gauges located on the system. Each month during routine maintenance checks, the vacuum will be monitored to determine if there are any leaks in the system's piping so immediate repairs can be made.

Groundwater will be sampled from six existing monitoring wells (MW-10A, MW-10B, MW-10C, MW-30, and MW-31) initially and on a quarterly basis for the first year of the SVE system operation. Five observation wells (SVE-OBS-SHAL-01, OBS-SHAL-02, OBS-SHAL-03, OBS-SHAL-04, and OBS-SHAL-05) were installed at a depth of 28 feet bgs during the SVE pilot study. Four observation wells will be added in the approximate locations noted on Figure 3. The observation wells will be one-inch diameter wells consisting of 20 feet of PVC, 10-slot screen and four feet of PVC riser. The observation wells will be finished with flush mount cement casings at the surface. An example observation well detail is shown in Figure 7. During the installation of the observation wells, soil samples will be collected and tested for VOCs and dioxane. The soil vapors in the observation wells will monitored initially, one month after

startup, and quarterly thereafter using a photoionization detection (PID) meter to compare the approximate relative concentration of the VOCs in the soil over time to determine the effectiveness of the SVE system. The observation wells will also be monitored on the same schedule for vacuum response imposed by the SVE system to determine the approximate extent of effectiveness of the SVE system and confirm the zone of influence.

Indoor air quality will be evaluated during well installation, one week after startup, and on a monthly basis during the first year of operation to confirm worker safety is not compromised while operating the SVE system. A PID meter will be used to monitor the indoor air quality while installing the extraction and observation wells and during the startup operations of the SVE system. Summa canister sample containers equipped with a calibrated 8-hour flow valve will be placed in the area around the SVE extraction wells inside the KEC facility to collect ambient air samples. During well installation one lab supplied Summa canister will be used during each day of well installation. The canister will be placed near the well locations. During the initial startup of the SVE system, two lab supplied Summa canisters will be used during each day of operation for the first week of operation to collect ambient air samples. After startup of the system, the ambient air will be sampled using laboratory supplied Summa canisters over an eight hour period monthly during the first year of operation. The sample locations (Air Monitoring Area 1 and Air Monitoring Area 2) are noted on Figure 3.

4.3 Laboratory Methodology

Samples collected during this project for laboratory analysis will be analyzed according to EPA approved methodology for the chosen parameters. Protocol for analysis will follow the Solid Waste 846 (SW 846) methodology using the 7000, 8000, and 9000 series of testing procedures for soil and groundwater and EPA Method TO-15 for vapor as appropriate.

4.4 Waste Disposal

Hazardous waste regulations in 40 CFR Part 260-265 will be adhered to when storing or disposing any waste generated as a result of this project.

4.5 Project Schedule

Based on the tasks defined in this Final Design and QAPP, a proposed project schedule is presented as Figure 8. This schedule contains significant milestones that may impact the overall completion of the project within the timeframes specified. The schedule illustrates anticipated start and end dates along with duration of those major milestones. The proposed schedule is

subject to change according to MDEQ approval, coordination with facility activities, and subcontractors' availability.

5.0 DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA

This section describes the performance/measurement criteria for all information to be collected during the SVE project. The project action limits and laboratory detection limits are defined below.

5.1 Project Action Limits

The project action limits are currently defined for the individual COC based on current applicable regulatory standards that define the allowable concentrations of contaminants in the environment. The SVE system's effectiveness ultimately will be compared to Site Specific Target Remediation Goals that are under development.

5.2 Laboratory Detection Limits

The analytical testing accomplished in this project will be performed by accredited laboratory facilities using standard EPA approved methodology. Specifically, the methods will include:

- EPA Method TO-15 (vapor);
- EPA Method 8260B (VOCs); and
- EPA Method 8270C (dioxane).

In no case will the standard method detection limit exceed the TRG concentration for a particular compound unless special circumstances in the laboratory dictate a higher detection limit (dilution, matrix interference, etc.), and in those cases a narrative of the reason for the higher than normal detection limits will be given with the analysis and the estimated value flagged in the data report.

5.3 Accuracy and Precision

Accuracy denotes the nearness of a measurement to its accepted true value and is expressed in terms of error. Precision refers to the reproducibility of results. It is the agreement between the numerical value of two or more measurements that have been made in an identical fashion. Discussion of accuracy and precision and their measurements in this project is contained in Section 12.4.

5.4 Sample Bias

The sampling design employed in this project will apply an authoritative (biased) sampling approach. Based on previous investigations and recent groundwater monitoring results, the groundwater and the soil vapor in the area surrounding the designated source area of the contaminant plume will be monitored to assess the effectiveness of the project.

5.5 Representativeness

The sample representativeness refers to the characteristic of a sampling program design where the samples collected will yield the data that is expected or needed. In this project previous investigations have demonstrated the source area is located beneath the manufacturing building, and the sample collection methods and analytical techniques employed will yield the analytical data necessary to demonstrate the effectiveness of the remedial strategy.

5.6 Completeness

Completeness refers to the degree of successfully being able to use the data from the selected number of sampling locations in the sampling design. Factors that will affect the completeness of the sampling program in this project include the movement of the contaminant plume and laboratory quality control procedures. The degree of completeness is calculated as a percentage of the total number of samples considered “usable” to the number of samples “planned to be usable”. This sampling program contains a specified number of sampling locations for each operation, of which 95% completeness must be considered valid or usable to produce the desired result.

5.7 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Data from this phase of site remediation will be comparable with other similar studies by using EPA approved sampling techniques and analytical methods.

6.0 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

Special certifications and training required for this project include those related to hazardous waste operations (HAZWOPER) as well as First Aid and CPR. EMS personnel maintain current OSHA HAZWOPER certifications per 29 CFR 1910.120 for routine work required on contaminated sites. Additionally, EMS personnel are certified by the American Red Cross to perform adult first aid and CPR.

The EMS Site Health and Safety Officer will be responsible for ensuring field personnel have the appropriate current training and certification to perform the tasks outlined in this Final Design and QAPP. Documentation of the appropriate health and safety related compliance certifications for EMS personnel is kept in a central file in the EMS Hattiesburg, Mississippi office maintained by the EMS Training Coordinator. Tailgate Safety Meetings held at the beginning of each operating day will document the personnel on site and their appropriate certification to enable them to work on the project.

The laboratories utilized during this project will have the necessary laboratory certifications to perform their respective analyses per the EPA protocol and requirements, including the National Environmental Laboratory Accreditation Program (NELAP). Supervision of the field efforts, sample collection, data interpretation, and report preparation will be supervised and certified by a Mississippi Registered Professional Geologist and/or Professional Engineer as appropriate.

7.0 DOCUMENTATION AND RECORD KEEPING

One of the most important aspects of this project will be the proper documentation of events and results to ensure the work was accomplished in a consistent and traceable manner. The documentation for this project will include a comprehensive set of records from, but not limited to, field forms and logs, laboratory analytical data, appropriate tables, figures, photographs and charts used to interpret the data, the complete final project report upon completion. The semi-annual reports will incorporate all pertinent project information into a detailed description of the project activities and interpretation of the results.

A listing of the pertinent records, forms, information, etc. that will be used to perform this project is presented below with a brief description of each.

7.1 Quality Assurance Records and Reports

The quality assurance records and reports required for this project will comprise several categories of documentation. The major categories of documentation include office-generated records and plans and field-generated forms and records. Documents generated in the office setting include:

- Contract documents;
- Property background information, maps, surveys, etc.;
- Regulatory correspondence;
- Applicable technical and health and safety information;
- Project set-up forms;
- Quality Assurance Project Plan drafts and revisions; and
- Other documentation as acquired or generated.

Office-generated documents for this project will be maintained under a sequential project number in the central files in the EMS Hattiesburg, Mississippi office. Electronic documents related to the project are maintained in a categorized project directory on the internal server in the EMS Hattiesburg office, and are backed up on a weekly basis via a tape backup system. Tapes are stored in a fireproof and secured location. KEC project files will be maintained indefinitely, until such time as the client instructs EMS otherwise.

Personnel listed on the distribution page of the Final Design and QAPP will be forwarded a dated copy of the most current version of the Final Design and QAPP by the EMS Project Manager. Internal copies of the Final Design and QAPP are maintained in report form in the project files, with a "working copy" kept in the Project Manager's personal files.

Field-generated documentation consists of various specific field forms customized for the field procedure implemented at the time or for general project notations. These documents include the following types of information:

- Health and Safety Forms
    - Tailgate Safety Meetings
    - Incident Reports
- General Field Forms
    - Groundwater sampling logs
    - Air monitoring logs
    - Field parameter logs
    - Investigative derived waste sampling logs
    - Soil boring logs
    - Survey and GPS files (electronic)
    - Vendor receipts for project expenses
    - Daily Field Activity Logs
    - Field logbook
- QA/QC Documentation
    - Chain of Custody forms
    - Custody seals
    - Calibration logs
    - Instrument manuals
    - Standard operating procedure manuals
    - Data validation forms

These records, documents, and forms are maintained by the project manager, field supervisor, or laboratory sampling coordinator as appropriate during field operations. Upon completion of particular phases of field work the appropriate logs and documentation are collected by the project manager and stored in dedicated files to transport to the central files in the EMS Hattiesburg office where they are maintained indefinitely in the manner described previously. Electronic logs and data generated are downloaded and printed in hard copy as well as electronically stored in the project directory under the specific project phase category. All records are maintained indefinitely either in hard copy files or as electronic files. Electronic files are archived on a regular basis once the project is complete, and can be retrieved immediately upon request.

7.2 Analytical Data

The analyzing laboratory will prepare and maintain records and analytical data reports in accordance with the procedures specified within its laboratory-specific Quality Assurance Manual. The laboratory will provide data in both hard copy and electronic formats. The Project Manager will maintain laboratory data at the EMS Hattiesburg, MS office through the extent of the project.

7.2.1 Hard Copy Analytical Data Packages

Hard copy analytical data packages will be delivered to the Project Manager within 60 days of completion of each sampling event during the project. At a minimum, the following information will be documented in the hard copy analytical data packages:

- Case Narrative;
- Signature of Lab Officer;
- Project Name;
- Sample ID/Description;
- Sample Receipt Date;
- Sample Collection Date;
- Sample Collection Time;
- Sample Analysis Date;
- Sample Extraction/Digestion Date;

- Sample Matrix;
- Analytical Method Number;
- CAS Number;
- Alphabetized Compound List;
- Resultant Value;
- Units of Measurement;
- Method Detection Limits;
- Reporting Limits;
- Data Qualifiers;
- Surrogate Recoveries;
- MS/MSD Results;
- Field Duplicate Results;
- QA/QC Report;
- Sample Receipt Checklist; and
- Chain-of-Custody Record.

7.2.2 Electronic Analytical Data Packages

Electronic analytical data packages will be submitted to the Project Manager within 60 days of completion of each sampling event during the project. At a minimum, the following information will be included in the electronic analytical data packages:

- Project Name;
- Sample ID/Description;
- Sample Collection Date;
- Sample Collection Time;
- Sample Matrix;
- Analytical Method Number;

- CAS Number;
- Alphabetized Compound List;
- Resultant Value;
- Field Duplicate Results;
- Units of Measurement;
- Method Detection Limits;
- Reporting Limits; and
- Data Qualifiers.

7.2.3 Data Validation Reports

Review of completed laboratory reports will be conducted by the laboratory QA Manager prior to submission to EMS. The EMS Project QA Officer will validate the analytical data as applicable to and in accordance with protocols set forth in EPA approved analytical method requirements

Review of the laboratory data by the QA Manager will be performed to assure that all applicable laboratory procedures have been conducted in accordance with EPA approved methodologies and the laboratory Standard Operating Procedures (SOP) and Quality Assurance Plan.

Data verification will include, but not be limited to, a review of the following items:

- Field QC samples (field and rinsate blanks and field duplicates) – to evaluate possible contamination sources and qualify field sample data as appropriate;
- Laboratory method blanks – to evaluate possible contamination sources resulting from laboratory activities;
- LCS/LCSD results – to evaluate the accuracy of the analytical method and the laboratory performance;
- MS/MSD data – to evaluate the presence of matrix interferences that may bias analytical data for a particular analyte;
- Surrogate recoveries – to evaluate the precision of the analytical method and the laboratory performance;

- Reporting limits – to ensure that site requirements are met;
- Holding time compliance – to ascertain the validity of the analytical results based on the holding time of the sample from the time of collection to the time of analysis;
- Data package completeness;
- Sample receipt information – to ensure adequate sample transfer procedures; and
- Chain-of-custody documentation – to ensure proper completion with signatures and dates and to ensure adequate sample transfer procedures.

7.3 Electronic Files

Electronic files produced in this project will include the groundwater sampling data measured in the field by the YSI multi-meter. The information from the YSI multi-meter instrument is stored in the instrument's memory until downloaded in the office upon completion of the field efforts. Once downloaded, the information is stored electronically on a laptop computer dedicated to the Field Supervisor and also in the EMS electronic filing system on the local area network. Paper copies of the information in the form of tables and graphs will be printed and stored in the permanent files in the EMS Hattiesburg office for inclusion in the final report.

Other electronic files produced during this project will include:

- Boring Logs (produced from field notes);
- Microsoft Excel® Data Tables;
- AutoCad® Civil 3D Release 2011 Figures;
- Microsoft Word 2010® Report Drafts;
- E-mail Correspondence;
- Laboratory Analytical Results;
- Groundwater Sampling Field Forms;
- Tailgate Safety Meetings;
- Air Monitoring Forms;
- Field Notes; and
- Photographs.

These and other records produced electronically are kept on a daily basis in a server file directory system grouped under the assigned EMS project number. These files are located on a Microsoft Small Business Server and are backed up on Friday of each week using a four (4) week rotational cassette tape backup system. These backup tapes are then stored in a fireproof safe in the EMS Hattiesburg office. The electronic project files produced in the EMS Hattiesburg office are never deleted and are currently stored as active files on the server. At such time it becomes necessary to archive or remove the active files from the server they will be stored on appropriate storage media to enable prompt recovery in the future.

Individuals identified in the distribution list in Section 1.0 will receive a draft of the most current Final Design and QAPP and revisions. A document control notation will be included as a header in the upper right hand corner of each page of the Final Design and QAPP listing the Project Number, Project Name, Revision No., Date, and Page Number. This practice will also be applied to project reports produced during this project. The EMS Project Manager will be responsible to work with the EMS Hattiesburg administrative staff to ensure the latest revisions are copied and distributed to the individuals in the distribution list.

7.4 Document Preparation

Project documents will be developed and revised by assigned program staff that has the expertise appropriate for the subject of the document. Project documents will be prepared with the involvement and assistance of quality assurance staff and reviewed by a senior professional who does not contribute to product preparation except to provide guidance to the Project Manager. All clients and contractors will be afforded an opportunity to review and comment on proposed project documents prior to their approval and implementation and/or submittal.

Upon completion of field activities and analytical data validation, the project final report will be prepared by the EMS Project Manager. The report will contain descriptions of all field activities, data validation reports, results of data evaluations, copies of field records, copies of analytical data packages, and supporting figures and data summary tables.

KEC project files are will be maintained indefinitely until such time as the client instructs EMS otherwise.

7.5 Data and Document Storage, Archiving, and Retrieval Procedures

All electronic and hard-copy documents are maintained in limited-access locked project file cabinets under the direct control of the Project Manager. Electronic copies are maintained on a

secure, password protected computer server. The information on the server is backed-up on Friday of each week using a four (4) week rotational cassette tape backup system. These backup tapes are then stored in a fireproof and secured location.

Project files are maintained by the Project Manager during the course of the project and are periodically reviewed to ensure that the most current copies are maintained as controlled documents. Obsolete documentation is purged from project flies when identified. At the point of project completion, the Project Manager is responsible for reviewing electronic and hard-copy files to ensure that they are current, accurate, and relevant prior to archiving.

EMS utilizes computer hardware and software to collect store, organize, acquire, and sort a wide variety of environmental information and project data. EMS's information management objectives include the following:

- Ensuring network security and controlling access to project files and data sets;
- Maintaining EMS's hardware infrastructure and capacity by establishing effective life cycle and replacement plans for computer hardware, including means to evaluate and augment EMS's computer network communications; and
- Utilizing software that allows EMS to develop databases and manage information that provides the highest levels of insulation from dependency on operating systems and hardware configurations in order to easily accommodate changes.

8.0 SAMPLING PROCESS DESIGNS

The sampling process design rationale was developed based on the ultimate goal of the remediation project to reduce the concentration of the COC in the source area in order to minimize exposure to workers and reduce the downgradient migration of contaminants. The ambient air inside the building, soil, and groundwater near the contaminant plume will be sampled and analyzed for VOCs and dioxane per EPA methods TO-15, 8260C, 8270D respectively.

As shown in Figure 2, there are six groundwater monitoring wells (MW-10A, MW-10B, MW-10C, MW-30, MW-31, and SVE-EXT-DEEP) that will be sampled on a quarterly basis for the first year of SVE operation. These samples will show a representation of the groundwater downgradient of the SVE system.

Four additional observation wells will be installed to augment the current observation wells installed during the SVE pilot study. The soil vapors in the observation wells will be monitored using a PID to compare the approximate concentration of the COC in the soil over time to determine the effectiveness of the SVE system and if any additional extraction wells are needed. The observation wells will also be monitored for vacuum response imposed by the SVE system to analyze the efficiency of the SVE system to assist in optimizing the system.

Indoor air quality will be evaluated on a monthly basis during the first year of operation to ensure worker safety is not compromised while operating the SVE system. The samples will be collected near the extraction well locations.

9.0 SAMPLING METHODS REQUIREMENTS

9.1 Sampling Methods and Requirements

The sampling methods to be implemented in this project will adhere to published EPA standard operating procedures and accepted techniques appropriate for each media. The EPA Region IV Science and Ecosystem Support Division Field Branches Quality System and Technical Procedures (SESD FBQSTP) is the primary source of reference for environmental field sampling procedures. Specifically, the following bulleted items indicate the references selected to accomplish this project, along with a brief description of each:

- SESD FBQSTP – Ambient Air Sampling – This section describes the strategies and considerations when planning and collecting ambient air samples. This section will be referred to during monitoring of the area for safety purposes.

- SESD FBQSTP – Field Sampling Quality Control - The material in this section is the guidance used for collection of environmental samples that ensure accurate and representative data are collected throughout the project. This section describes the type of samples and associated quality control samples necessary to ensure the data quality objectives are met.

- SESD FBQSTP – Groundwater Sampling - This section and associated subsections provide the standard operating procedures for groundwater sampling procedures to be followed during environmental projects. Pertinent portions of this section will be applicable to the specific groundwater sampling efforts in this project.

- SESD FBQSTP – Soil Sampling - This section and associated subsections provide the standard operating procedures for soil sampling procedures to be followed during environmental projects. Pertinent portions of this section will be applicable to the specific soil sampling efforts in this project related to the soil removed when installing additional extraction and observation wells.

- SESD FBQSTP – Waste Sampling - This section provides procedures and methods to be used in the characterization of wastes produced during the project.

9.2 Specific Sample Collection Methods

The following sections describe the specific data and sample collection methods to be employed in this project. References to specific guidance documents and publications are noted where appropriate.

9.2.1 Soil Samples

Soil samples will be collected during the installation of the extraction and observation wells. Each well boring will be advanced or pre-drilled using Geoprobe® direct-push technology. During installation four-foot undisturbed continuous intervals will be collected. A PID meter will be used to measure headspace vapor for soil samples collected in individual plastic resealable bags from each interval throughout the course of the drilling. In addition to resealable bags, a sample from each "push" will be placed in a laboratory supplied sample container using disposable spoons and placed on ice. Samples that correspond to the highest PID vapor readings will be selected and sent for laboratory analysis. The unused samples will disposed of as investigative derived waste (IDW).

9.2.2 Groundwater Samples

Once the well is accessed and monitored for the depth to water, the sampling process can begin for laboratory sample acquisition. The samples from the monitoring wells (MW-10A, MW-10B, MW-10C, MW-30, and MW-31) will be obtained using dedicated bladder or electrical Fultz pumps in each well by low-flow techniques as specified by MDEQ. Once the depth to water is gauged, the deep extraction well (SVE-ECT-DEEP) will be purged to the specifications outlined by MDEQ and sampled using low-flow techniques with an electrical Fultz pump.

Prior to sampling, the groundwater will be monitored for turbidity, temperature, conductivity, dissolved oxygen, pH, and oxidation reduction potential (ORP) utilizing an in-line flow cell with a YSI Multi-meter (or equivalent) during well purging to determine when the groundwater parameters have stabilized. After purging at least one well volume, and ensuring that the groundwater parameters have stabilized, samples will be collected in laboratory supplied (preserved if necessary) containers. QA/QC samples consisting of laboratory supplied trip blanks and blind duplicates will be collected in the field at 10% of the locations sampled. Matrix Spike and Matrix Spike Duplicate samples will be also be collected from 10% of the locations.

9.2.3 Soil Vapor Samples

The soil vapor exiting the SVE system will be monitored using a sample port on the SVE unit discharge before the vapor enters the carbon treatment unit. The SVE system will utilize two 2,000- pound carbon treatment vessels operated in series. The emissions from each carbon treatment unit will be monitored monthly. If breakthrough occurs in the first carbon unit, it will be replaced. The following describes the monitoring of the soil vapor.

- Perform calibration of the PID meter according to procedures;
- Attach tubing to the air valve and connect the PID meter to the tubing and slowly open the valve;
- Record the peak readings from the PID; and
- Close the air valve.

The soil vapors in the observation wells will also be monitored using a PID to compare the approximate concentration of the COC in the soil over time to determine the effectiveness of the SVE system and if any additional extraction wells are needed. The following describes the procedures that will be followed to monitor the soil vapor in the observation wells.

- Perform calibration of the PID meter according to procedures;
- Place tubing into the observation well where the end of the tubing is within the screened interval (approximately 15 feet bgs) and cover the well opening;
- Attach PID probe to tubing and allow to pump for a period of time sufficient to purge the tube and begin collecting vapors from the screened interval; and
- Record the peak readings from the PID.

9.2.4 Ambient Air Samples

Indoor air quality will be evaluated during well installation, one week after startup, and on a monthly basis during the first year of operation to confirm worker safety is not compromised while operating the SVE system. A PID meter will be used to monitor the indoor air quality while installing the extraction and observation wells and during the startup operations of the SVE system. Summa canister sample containers equipped with a calibrated 8-hour flow valve will be placed in the area around the SVE extraction wells inside the KEC facility. During well installation one lab supplied Summa canister will be used during each day of well installation. The canister will be placed near the well locations. During the initial startup of the SVE system,

two lab supplied Summa canisters will be used during each day of operation for the first week of operation. After startup of the system, the ambient air will be sampled in two lab supplied Summa canisters over an eight hour period monthly during the first year of operation. The sample locations during startup and the first year of operations are noted on Figure 3.

9.2.5 Vacuum Monitoring

There are currently five observation wells (SVE-OBS-SHAL-01, SVE-OBS-SHAL-02, SVE-OBS-SHAL-03, SVE-OBS-SHAL-04, and SVE-OBS-SHAL-05) that were installed to monitor the vacuum response of the SVE system during the pilot study. Additional observation wells will be installed in the contaminant plume to monitor the SVE system's effectiveness and radius of influence. These new wells will be constructed to evaluate the vacuum response imposed by the SVE system.

The sampling procedure for the observation wells will be as follows:

- Connect vacuum gauge to well connection; and
- Record the vacuum reading on the gauge.

9.2.6 Field Decisions, Problems, Contingencies

Other than special safety considerations and implications, the field sampling operations planned for this project do not require special training or skills other than that already possessed by the EMS technicians and sampling personnel. Certain situations may be encountered in the field requiring an immediate decision to be made to achieve the objectives of the sampling program or accomplish a particular task in a modified manner. The sampling crew(s) will have cellular phones at all times to enable communication with project management and support personnel. The EMS Project Manager will have the authority to make field decisions regarding appropriate corrective actions in the sampling program in order to accomplish the sampling tasks and objectives. Communication with others in various roles and/or authority may be necessary including health and safety personnel, regulatory personnel, and property management personnel. Radios, cellular phones, or other appropriate means of communication will be in place prior to the start of the project to ensure the lines of communication are established and the appropriate individuals are aware of the site operations and schedules. A project contact list will be maintained in SVE system enclosure to allow rapid access to potentially pertinent telephone numbers. The EMS Project Manager will document in the field notes all situations that require

modification, and he will notify affected parties as soon as necessary or practical based on the situation.

10.0 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Sample handling and custody standard operating procedures are contained in SESD FBQSTP - Sample and Evidence Management and are summarized herein. A copy of the Sample and Evidence Management of the SESD FBQSTP is included for reference in Appendix B.

A specific labeling scheme has been developed for the samples to be collected during this project. Examples of the labeling scheme to be used for each media in this project are presented below:

Observation Wells

SVE-OBS-01-01 where:

SVE-OBS = Observation Well Sample

01 = Well Number

01 = Sample Number

Ambient Air Samples

SVE-AREA-01-01 where:

SVE-AREA = Ambient Air Sample

01 = Area Number (location described in field notes)

01 = Sample Number

Soil Samples

SVE-SS-01-01 where:

SVE-SS = Soil Sample

01 = Area Number (location described in field notes)

01 = Sample Number

Current Groundwater Monitoring Wells

KEP-GW-001-001 where:

KEPGW = Groundwater Sample

01 = Well Number

01 = Sampling Event Number

SVE Pilot Extraction Well

SVE-EXT-DEEP-01 where:

SVE- EXT-DEEP = Pilot Study Extraction Well Groundwater Sample

01 = Sample Number

Sample labels will be attached to each sample container to provide additional sample information not implied in the sample numbering system. This information will include:

- Project Name;
- Date and Time of sample collection;
- Collector's initials;
- Sample Type (grab or composite);
- Preservative (type or N/A); and
- Analysis Requested (EPA method number or name as appropriate).

All sample containers in this project will be supplied by the respective laboratory on an as-needed basis and will be pre-preserved if chemical preservation is required. Soil samples will be collected in a single, 4-ounce clear, wide-mouth jar sealed with a Teflon-lined lid for VOCs. Each sample jar should be filled and lightly packed with the soil material. Groundwater samples collected for VOC analysis will be collected in 40-millilter clear vials. Ambient air samples will be collected using Summa canisters fitted with a calibrated 8-hour flow valve

Upon collection of each sample, the sample label will be completed noting the date and time of sample collection. The sample container(s) will be wiped clean of surface debris or moisture and will be placed in an appropriately-sized zip-lock type plastic bag. The sample will be placed immediately in a cooler of double-bagged wet ice to negate leakage of melted ice into the cooler. Once the samples are collected and placed in the cooler, they will be prepared for temporary storage or shipment and the Chain-of-Custody paperwork will be completed.

Each cooler packaged with samples for shipment will contain the Chain-of-Custody in a separate zip-lock bag taped to the cooler lid for shipment. A copy of the Chain-of-Custody form will remain with the central files for the project.

Each cooler will be sealed using at least one (1) Custody Seal to ensure the cooler is not opened until it reaches the laboratory.

11.0 ANALYTICAL METHODS REQUIREMENTS

Environmental samples collected in this project for laboratory analysis will be analyzed according to EPA approved methodology for the chosen parameters. Protocol for analysis will follow the EPA methodology using the testing procedures for soil and groundwater as appropriate. Laboratory analytical services will be provided by a contract laboratory. The laboratory quality control personnel will be responsible for identifying and following appropriate procedures when failures occur and corrective action is required to complete the analysis. Documentation of QA/QC or operational failures will be maintained by the laboratory describing the nature of the failure and procedures used to implement the corrective action. Failures that impact the analytical results will be described and included in a narrative report submitted with each analysis. The laboratory will be responsible for disposal of sample contents in an appropriate manner after a designated period of storage (at least 30 days) after the sample results have been reviewed by the EMS Project Manager for adequacy.

Turnaround times specified for each analysis will be requested on the Laboratory Work Order/Sample Kit Request form and the corresponding Chain-of-Custody form. Standard turnaround times for each method (10 working days upon receipt by the laboratory) are anticipated for the SVE project with the exception of the ambient air samples. The turnaround times for the ambient air samples will be expedited (24 hours upon receipt by the laboratory) to confirm that worker safety is not compromised. These times represent when the final analytical report for the analysis has been prepared and checked by the laboratory. The report may be made available in electronic (.pdf file) form or may be faxed by the times specified. Hard copies of the reports may follow in standard mail or overnight carrier.

No non-standard methods of sample analysis are anticipated to be used in this project.

12.0 QUALITY CONTROL REQUIREMENTS

Each sampling and measurement technique employed in this project incorporates quality control procedures either by using standard and accepted procedures or by using additional sampling techniques to confirm the quality of the data is acceptable to make project decisions and achieve the project objectives. Routine measurements employed in the project are listed below with the quality control criteria listed following each method.

12.1 Measuring Depth to Groundwater and Monitoring Well Depths

- Place a notch on the north side of the well casing and use it as the measuring point; and
- Use an electronic measuring device graduated in 0.01-inch increments;

12.2 Collect Groundwater Samples

- Collect blind duplicate samples at a frequency of 10 % of the total samples collected;
- Collect equipment blank samples at a frequency of 10 % of the total samples collected;
- Collect one field blank per day of sampling. Use water (demonstrated to be free of the contaminates of concern);
- Trip Blanks at a frequency of one per cooler for samples collected for volatiles analysis; and
- Collect split/duplicate samples at a frequency of 10% of the total samples collected for MDEQ analysis (or as requested).

The contract lab will also implement quality control checks throughout the analysis process. This is routinely accomplished by analyzing a percentage (typically 20%) of the samples in a sampling event for matrix spike analysis, matrix spike duplicate analysis, surrogate compound analysis, laboratory duplicate samples, and laboratory blank samples and/or control samples as appropriate for the particular analysis. The quality control samples and frequencies are specified by the EPA method utilized. Each laboratory report will be accompanied by the results of the laboratory QC analysis report and a narrative of the results of the internal QC checks. Any results that fall outside the range of acceptability will be flagged with the appropriate designator to display the cause of the data qualifier.

12.3 Control Limits

The goal of the project laboratory analytical results is to ensure that the results obtained are accurate, comparable to regulatory limits, and provide an acceptable level of precision to enable decisions to be made regarding the future development of the property and ensure the health and welfare of the public and site workers is protected. The use of field prepared quality control samples and laboratory quality control samples will assist in determining the usefulness of the data to achieve the site objectives. Data falling outside the limits of reasonable confidence produces ambiguity and uncertainty in the decision making process. Therefore, the control limits set for the data in this project are set to high levels to ensure the data is of sufficient quality and usefulness. The following control limits are the goal of this project:

Completeness – the completeness or number of sampling locations that are deemed usable compared to the number of total samples planned to be collected limit is 95%.

Precision – the precision or "repeatability" of the data will be calculated using blind field duplicates submitted to the laboratory using a sequential, but fictitious sample station numbering scheme. This will enable the laboratory to produce results that are theoretically identical if the same conditions and controls are applied throughout the sampling and analysis process. Due to the inherent, although small variations in sampling protocol and other factors, the results of original and duplicate samples are rarely exact. The control limits set for this project dictate that the range of variance between the concentrations reported in the original and duplicate samples not exceed 30% for a single compound.

Representativeness – the sampling methods employed should yield accurate results and the results should not be influenced by the method of sampling and/or the techniques for cleaning the sampling equipment. This QC parameter will be measured by analysis of equipment blanks submitted to the laboratory for analysis in the same manner and by the same protocol as actual environmental samples. These samples are designed to ensure that the equipment cleaning and decontamination procedures in place were adequate to remove the contaminants from the sampling instruments prior to sampling the next location. The control limits set on this QC parameter will be that any equipment blank shall not contain more than 5% of the contaminants detected in the sample collected immediately before the decontamination process. The goal of the sample representativeness factor will be that no more than 5% of any one contaminant will be detected in the equipment blank sample compared to the results of the sample collected immediately before it.

Laboratory QC Parameters – laboratory blanks, duplicates, spike, and surrogates will be accomplished as required in the specified analytical methods and laboratory QC procedures in the sample batches submitted by this project. Laboratory QC procedures employed ensure the instrument and sample integrity is acceptable with the limits of error to be expected in the analysis of the various parameters. The laboratory QC personnel will review the data from the various QC parameters and flag any data that falls outside the acceptable level of confidence for that parameter. Flagged data may result from the parameter detected in a laboratory blank, samples that require dilution due to excessive contaminant concentration, detection of matrix spike compounds at lower recoverable concentrations than the method allows, and other internal QC causes.

If control limits set forth in this section are violated in any one area, an analysis of the cause of the violation will be initiated and corrective measures will be taken. The corrective measures may include modification of equipment cleaning procedures, submitting additional duplicate or blank samples, screening for high concentrations of parameters prior to submission to the laboratory, re-evaluation of the sampling methodology, or re-sampling in areas where unacceptable data results were obtained. The decision of corrective measures to be employed will rest with the EMS project manager and will be determined using the cause for the unacceptable results and the best course of action to correct the results and bring them into compliance with the project QC goals.

13.0 INSTRUMENT/EQUIPMENT TESTING INSPECTION AND MAINTENANCE REQUIREMENTS

All equipment, instruments, and testing equipment required in the execution of this project require some maintenance and testing procedures to ensure the proper function and working order of the equipment in accordance with the manufacturer's instructions. The field equipment used in this project will be checked for operational and calibration compliance before mobilized into the field. The EMS Field Supervisor will ensure that all field equipment assigned to this project is in proper working order and has passed his inspection documenting it so. The EMS Field Supervisor will ensure that all equipment contains fresh or recharged batteries if required and all testing has been accomplished in accordance with manufacturer's instructions prior to approval for its use in this project. The EMS Field Supervisor will be responsible for collecting appropriate field duplicate samples in accordance with this Final Design and QAPP.

14.0 INSTRUMENT CALIBRATION AND FREQUENCY

Instruments to be used in this SVE project include field instruments such as the:

- Photoionization Detector (PID);
- Electronic Water Level Indicators;
- Water Quality Multi-Parameter Meter; and
- Turbidity Meter.

Each of these instruments contains manufacturer's procedures for testing, maintenance, and inspection, and all but the electronic water level indicators require calibration prior to use. The manufacturer's instructions will accompany each instrument to the project site. Each instrument will be supplied with fresh or recharged batteries as appropriate immediately prior to its use in the field. Those instruments requiring calibration checks contain a Calibration Log in the instrument case that is completed each time the instrument is used initially or calibrated in the field after a pre-determined number of samples have been checked (assumed to be once per day).

Instruments will be calibrated prior to use, and those that fail the calibration checks per manufacturer's instructions will not be placed into service until the condition causing the excursion is corrected. Instruments determined to be out of calibration will be tagged with "Lock out – Tag out" tags until the repair has been made. It will be the EMS Field Supervisor's responsibility or his designee to ensure each field instrument is within tolerance limits of calibration and to ensure backup instruments are available or made available in a timely fashion.

In the case of laboratory instruments, the laboratory QA/QC Manager will be responsible for ensuring the laboratory analytical instruments are operational within calibration limits and comply with manufacturer's instructions regarding calibration and operational checks. Any instrumentation found outside the limits of calibration will require the samples to be sent to another suitable laboratory (at the laboratory's expense) if holding times may be exceeded and suitable repairs cannot be made.

15.0 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

The supplies and consumable items required to execute the project will be obtained prior to the initial operation of the SVE system. These materials and consumables include the necessary health and safety items to execute the project, laboratory sampling containers, and other miscellaneous items. Materials will be purchased new from commercially available suppliers. The materials will be accepted only if the original containers have not been compromised, dented, or otherwise made unusable. Any defective materials or consumables will be noted in the field notes and will be returned to the manufacturer for replacement. The field supervisor will be responsible to accept and approve the materials and consumables ordered for this project.

16.0 NON-DIRECT MEASUREMENTS

No non-direct measurements are anticipated in this project. All data produced during this project will comprise direct measurement of properties or parameters associated with the contaminants of concern.

17.0 DATA MANAGEMENT

All field records and laboratory analytical data will be maintained and managed in accordance with procedures described in Sample and Evidence Management section of the SESD FBQSTP.

Field management of records will proceed as follows:

- During field and sampling activities, field notes will be completed and maintained by the Field Supervisor and assisting technician(s);

- Field notes will document the start and completion of daily field activities, any deviations from the Final Design and QAPP protocols/activities based upon field judgments, instrument calibration, field screening results, records of any field QA/QC anomalies or observations. Entries into the field notes will also include documentation of sample equipment decontamination events and sampling events; and

- Supplemental records including soil boring logs, soil sediment logs, groundwater sampling logs, and copies of chain-of-custody forms will be maintained within a file system developed to maintain these specific records. Copies of all supplemental records will be reviewed by the Project Manager for completeness.

Laboratory-related records will be managed and maintained as follows:

- The analyzing laboratory will prepare and maintain records and analytical data reports in accordance with the procedures specified within their laboratory-specific Quality Assurance Manual; and

- Hard copy analytical data packages will be delivered to the Project Manager within 60 days of completion of each phase of sampling. The laboratory will provide data in both hardcopy and electronic formats. The Project Manager will maintain laboratory and field data at the EMS Hattiesburg, Mississippi office through the extent of the project. Files will be available for review by project personnel, and representatives of the MDEQ and client.

Upon completion of field activities and analytical data validation, the project final report will be prepared by the EMS Project Manager. The report will contain descriptions of all field activities, data validation reports, results of data evaluations, copies of field records, copies of analytical data packages, and supporting figures and data summary tables.

Procedures for storing, archiving, and retrieving project documents, records, and reports are detailed in Section 7.5 of this document.

18.0 ASSESSMENTS AND RESPONSE ACTIONS

The assessment and response actions described within this section pertain to the evaluation of field and laboratory operations performed during the course of the project to ensure that the Final Design and QAPP requirements are met. As such, an EMS principal who has not contributed to the product preparation except to provide guidance to the EMS Project Manager will be designated to conduct a peer review of the document. Peer reviewers must be kept informed by the Project Manager of progress and key decisions made on products and deliverables that they are designated to review. At the absolute minimum, they will receive copies of all products and draft deliverables leading up to the final deliverable.

The Project Manager initiates the peer review step of the QA/QC process by providing copies to the predetermined peer reviewer. Written products are evaluated in accordance with the following criterion:

- Are the purpose and need for the project or deliverable clearly and thoroughly addressed?
- Is the report organized clearly and logically for the intended audience?
- Are the technical arguments, results, and conclusions sound and supported by adequate data, references, and professional judgment?
- Are the Data Quality Objectives (DQOs) specified in the Final Design and QAPP met?
- Are data presented in tables or figures in a way that is both correct and meaningful? (Data and calculations will be spot-checked.)
- If recommendations are offered, are they reasonable and useful?
- Does the conclusion accurately and logically summarize ideas developed in the main part of the report?
- If the report is one of a number of similar reports, is the format consistent with the other reports, and are approved procedures and language used?

The peer reviewer will discuss and resolve with the Project Manager any comments included on these checklists. The Project Manager will ensure that the reviewer's comments are adequately addressed and/or incorporated. A final review will be performed by a principal of EMS or by another senior professional of comparable expertise before release of the product. Factors evaluated include the following:

- Is the deliverable consistent with the scope of work and the contract?
- Are any constraints or limitations of the work clearly stated?
- Can the product be expected to satisfy the needs of the customer and of the audiences (e.g., regulators, supervisors, staff, public) that the customer is trying to reach?

19.0 REPORTS TO MANAGEMENT

During the SVE project semi-annual reports will be submitted to MDEQ. Upon receipt of all analytical data and upon completion of the data evaluation and validation process, a final project report will be prepared by the EMS Project Manager. The report will include summaries of all project activities, analytical data packages, data validation reports, and data evaluations. Final Design and QAPP addendum reports may be necessary if modifications to the analytical program are warranted.

20.0 DATA VALIDATION AND USABILITY

Review of completed laboratory reports will be conducted by the laboratory QA Manager prior to submission to EMS. The EMS Project QA Officer will validate the analytical data as applicable to and in accordance with protocols set forth in EPA analytical method requirements and EMS criteria.

Review of the laboratory data by the QA Manager will be performed to assure that all applicable laboratory procedures have been conducted in accordance with EPA approved methodologies and the laboratory SOP and Quality Assurance Plan. Limitations in the data set identified by the laboratory QA Manager will be communicated and documented in the Case Narrative supplied with the analytical data package.

A summary of data qualifiers used by the contract laboratory to "flag" identified QC problems is presented below:

Data Qualifier	**Definition of Data Qualifier**
J	Estimated value, below minimum quantification limit but detected between IDL and RL.
B	Present in sample, but also present in field blank.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte may not be verified. This flag may be used to designate samples with high or low surrogate recovery.
U	Note detected above laboratory reporting limit.

Data Qualifier	Definition of Data Qualifier
E	The concentration for this analyte is above the calibration range of the instrument. Results are from a secondary dilution.

Data verification will include, but not be limited to, a review of the following items:

- Field QC samples (field and rinsate blanks and field duplicates);
- Laboratory method blanks;
- LCS/LCSD results;
- MS/MSD data;
- Surrogate recoveries;
- Reporting limits;
- Holding time compliance;
- Data package completeness;
- Sample receipt information; and
- Chain-of-custody documentation.

Based upon a review of the data, the quality (usability) of the data will be determined and communicated to the Project Manager.

Field data packages will be reviewed by the Project QA Officer and Project Manager for completeness and accuracy. The validation of the field data package will consist of the following:

- A review of field data contained in note books, Soil Boring Logs, Soil/Sediment Logs, Water Sampling Logs, and Monitoring well Construction Logs for completeness;
- A verification that equipment blanks, field blanks, field replicates, and trip blanks were properly prepared, identified, and analyzed;

- A check on field analyses for equipment calibration and instrument condition; and
- A review of chain-of-custody records for proper completion, signatures, and dates. These records will be reviewed in conjunction with the sample receipt forms completed by the laboratory to assure adequate sample transfer procedures.

The objective of this project is to reduce COC concentrations in the soil of the targeted area. Analytical data generated under EPA methodologies will be considered definitive and quantitative based upon completion of the validation processes.

Errors or omissions in the data and anomalies noted during review of the data will be documented. Data determined to be qualified during validation will be utilized in the final project report based upon the following criteria:

Data Qualifier	**Definition of Qualifier**	**Criteria for Data Usability**
U	Analyte not detected above the laboratory Reporting Limit	Data Qualitative and Usable for intended purposes.
J	Estimated value either below the laboratory Reporting Limit or Estimated due to data quality issue (surrogate recoveries, minor holding time exceedance, etc.).	Data to be used as valid for risk evaluation.
B	Analyte present in sample, but also present in associated Method or Field Blank.	Data to be used as valid for risk evaluation if the sample concentration is significantly (4X) greater than concentration in Blank.

Data Qualifier	Definition of Qualifier	Criteria for Data Usability
R	Sample result is considered unusable due to serious deficiencies in method performance (major holding time exceedance, LCS and MS data outside of control limits). The presence or absence of the analyte cannot be verified.	Data may be used with caution as qualitative.
E	The concentration for this analyte is above the calibration range of the instrument. Results are from a secondary dilution.	Data Qualitative and Usable for intended purposes.

The project includes a biased sampling design and is not statistically based. As such, analysis and inference becomes limited to simple descriptions of the data with no extrapolation to areas beyond the immediate study boundaries. Identified QA/QC problems or data gaps occurring from a lack of sufficient information may require additional investigative activities.

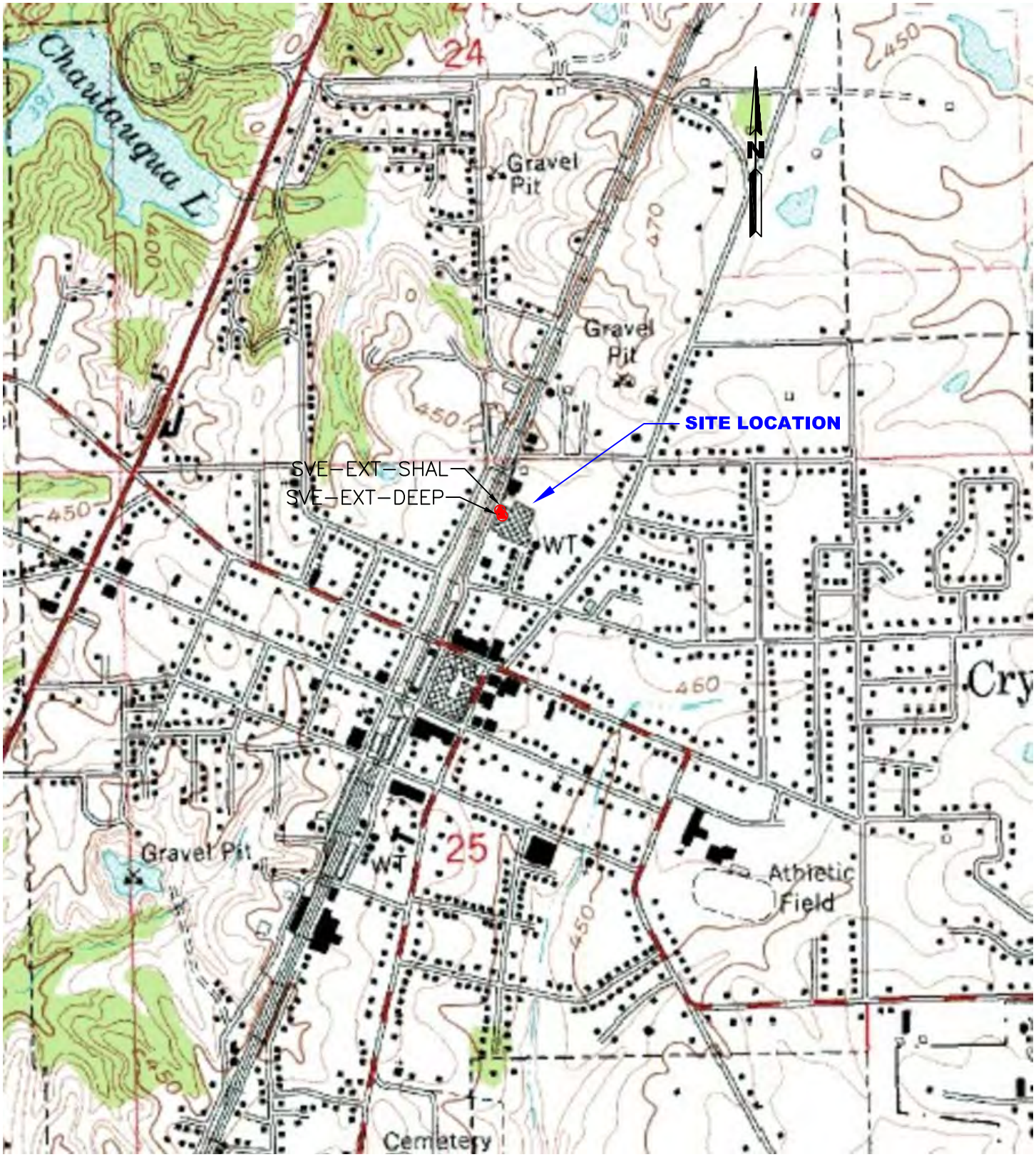
21.0 REFERENCES

EPA. Guidance for Quality Assurance Project Plans (EPA QA/G-5). 2002.

EPA. Region 4 Field Branches Quality System and Technical Procedures.

EPA. Test Methods for Evaluating Solid Wastes Physical/Chemical Methods (SW-846), Update IV. 2008.

FIGURES



SCALE 1 INCH = 1000 FEET

250 500 1000

0 250 500 1000 2000

NOTE: PROPERTY BOUNDARIES AND SCALE ARE APPROXIMATE.

REFERENCE: U.S.G.S. TOPOGRAPHIC MAP
1963 – CRYSTAL SPRINGS
7.5 MINUTE SERIES
COPIAH COUNTY, MS

SITE LOCATION MAP

SVE PILOT WELL INSTALLATION
KUHLMAN ELECTRIC BUILDING
CRYSTAL SPRINGS, MS

DATE: 08/2012	APPROVED: BY: _____ DATE: _____	DRAWN BY: D.E.P.
SCALE: 1"=1000'		PROJECT NO. KUH0-11-004

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

FIGURE 1

KUHLMAN ELECTRIC CORPORATION

SOURCE AREA

SVE-EXT-DEEP

MW-01 CLOSED

CSW TREATMENT FACILITY

TREATMENT BUILDINGS

MW-01 MW-02 MW-03 MW-04 MW-05 MW-06 MW-07 MW-08 MW-09 MW-10A MW-10B MW-10C MW-11A MW-11B MW-12 MW-13 MW-14A MW-14B MW-15A MW-15B MW-16 MW-17A MW-17B MW-18A MW-18B MW-19 MW-20A MW-20B MW-21A MW-21B MW-22 MW-23A MW-23B MW-24 MW-25 MW-26 MW-27 MW-28 MW-29 MW-30 MW-31 MW-32 MW-33 MW-34

CSW-WA1 CSW-WA2 CSW-WA3 CSW-WA4 CSW-WA7

CAMP STREET
ILLINOIS CENTRAL GULF RAILROAD
YOUNG STREET
FULGHAM AVENUE
GLEN STREET
LAMAR STREET
LEE CIRCLE
LEE AVENUE
PORTER ST
MCPHERSON STREET
DEANNE STREET
HUNTER STREET
GIBSON STREET
PEARL STREET
PRICE STREET
WEST RAILROAD AVENUE NORTH
JACKSON STREET
WEST GEORGETOWN STREET
EAST GEORGETOWN STREET
RAYMOND STREET
WEST MARION AVENUE
EAST MARION AVENUE
ALLEY
FIRST STREET
INDEPENDENCE STREET
WEST CAYUGA STREET
EAST CAYUGA STREET
JANET STREET
LIBERTY STREET
COPLEY STREET
ROOSEVELT STREET
CHURCHILL STREET
HORNE STREET
BYRD STREET
BRENT STREET
TRASSER STREET
EAST RAILROAD AVENUE
BERNSTEIN DRIVE
KIRK STREET
SOUTH AVENUE
SOUTH JACKSON STREET
WEST RAILROAD AVENUE SOUTH
WASHINGTON STREET
SIBBIE STREET
OSBORNE
61

LEGEND

- MONITOR WELL LOCATION (① MW-00A ②)
- SVE GROUNDWATER SAMPLING LOCATIONS
- ① MONITOR WELL LOCATION
- ② MONITOR WELL NUMBER
- SOURCE AREA
- KEC PROPERTY LINE
- KEC BUILDING FOOTPRINT
- MUNICIPAL WATER WELL

NOTE: SURVEY DATA SUPPLIED BY ARCADIS

0 400’ 800’

GRAPHIC SCALE

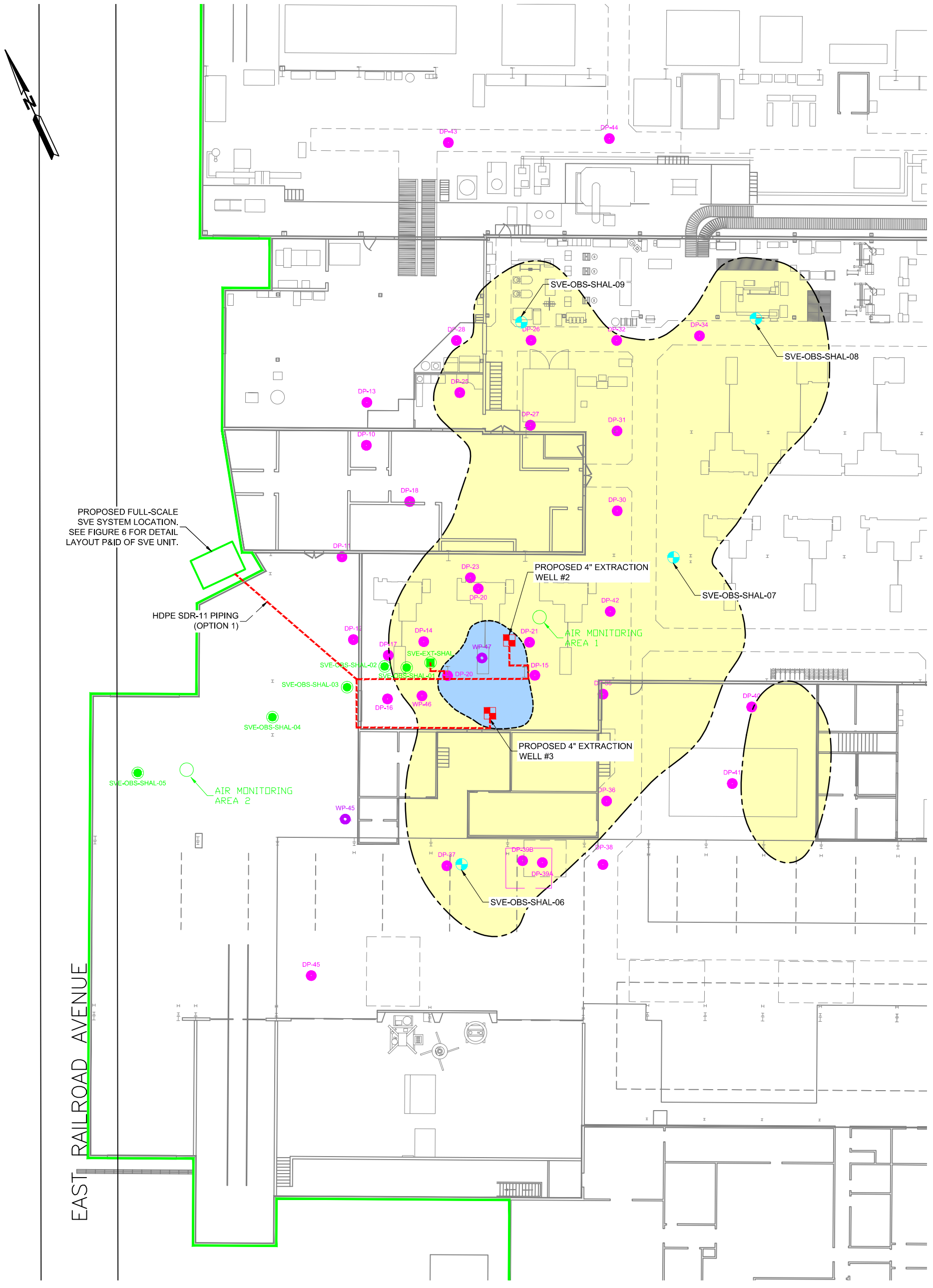
NEW MONITORING WELL LOCATION - MONITORING WELL LAYOUT

KUHLMAN ELECTRIC CORPORATION
KEC FACILITY
CRYSTAL SPRINGS, MISSISSIPPI

DATE:	APPROVED:	DRAWN BY:
08/29/13	BY:	P.D.M.
SCALE:	DATE:	CAD NO.
AS SHOWN		KUH0-13-014

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

FIGURE 2



LEGEND

- SOURCE AREA
- KEC BUILDING FOOTPRINT
- PROPOSED SVE PIPING
- SVE PILOT EXTRACTION WELL (SHALLOW) (4" PVC)
- SVE PILOT OBSERVATION WELLS (SHALLOW) (1" PVC)
- PROPOSED EXTRACTION WELLS (4" STAINLESS)
- PROPOSED OBSERVATION WELLS (1" PVC)
- WATERLOO PROFILER SAMPLE LOCATIONS (MARTIN AND SLAGLE 2005-2006)
- DIRECT PUSH SAMPLE LOCATIONS (MARTIN AND SLAGLE 2006-2008)
- AMBIENT AIR SAMPLE LOCATIONS
- 1,1-DICHLOROETHENE IN SOIL EXCEEDING UNRESTRICTED TIER 1 TRG (0.0772 mg/kg)
- 1,4-DIOXANE IN SOIL EXCEEDING UNRESTRICTED TIER 1 TRG (58.1 mg/kg)

SCALE 1 INCH = 25 FEET

5 10 25

0 5 10 15 20 25 50

NOTES:
1) DATA IS BASED ON EXTENT AS DEFINED IN CORRECTIVE ACTION PLAN, ARCADIS, MARCH 2009.

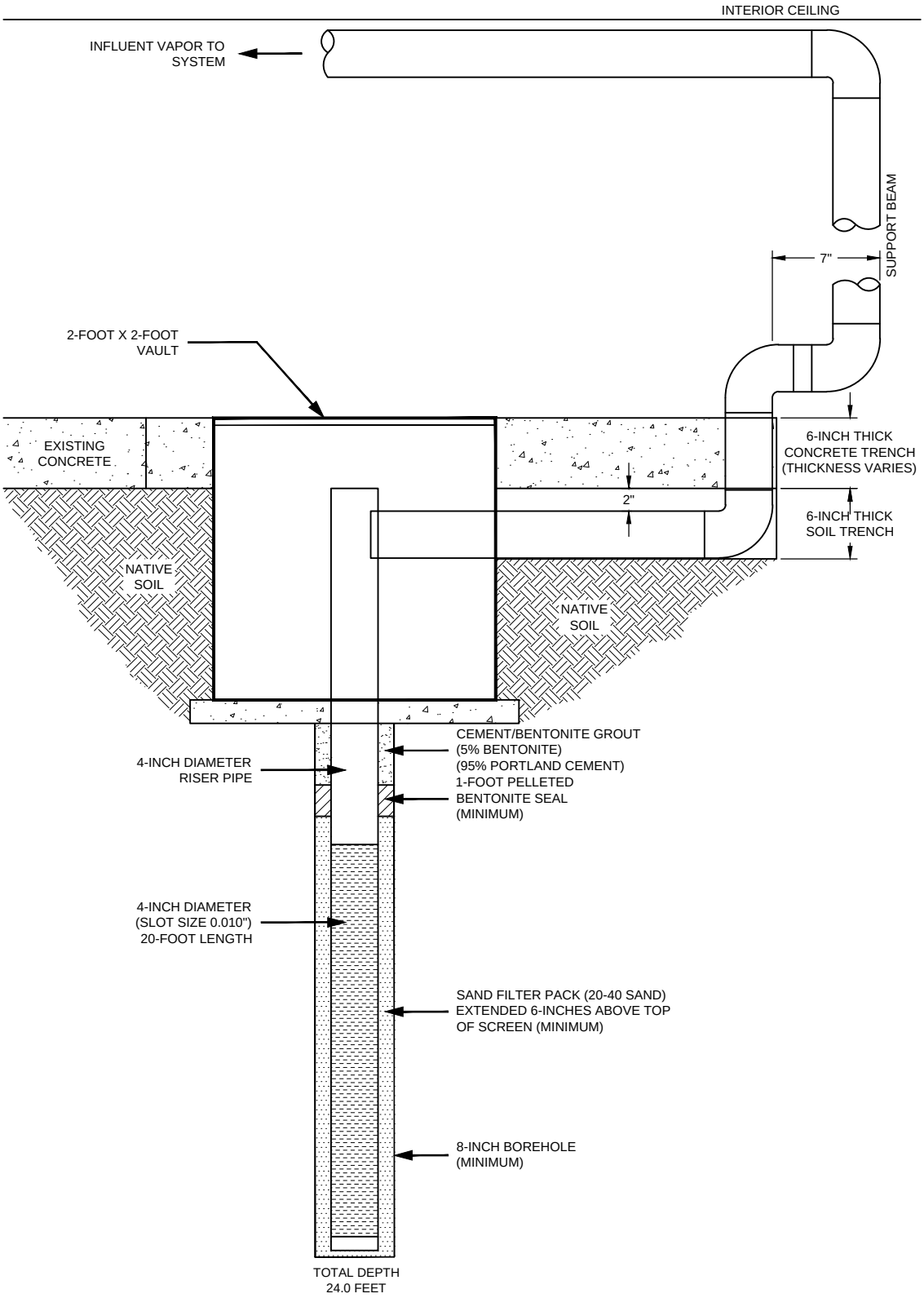
PROPOSED FULL SCALE SVE SYSTEM LAYOUT

KUHLMAN ELECTRIC CORPORATION
KEC FACILITY
CRYSTAL SPRINGS, MISSISSIPPI

DATE: 08/29/13	APPROVED: BY: _____ DATE: _____	DRAWN BY: P.D.M.
SCALE: AS SHOWN		CAD NO. KUH0-13-014

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

FIGURE 3



WELL	RISER CONSTRUCTION	SCREEN CONSTRUCTION
SVE EXTSHAL	PVC	PVC SLOTTED
SVE#2	STAINLESS	STAINLESS WIRE WRAPPED
SVE#3	STAINLESS	STAINLESS WIRE WRAPPED

TYPICAL 4-INCH DIAMETER EXTRACTION WELL DETAIL

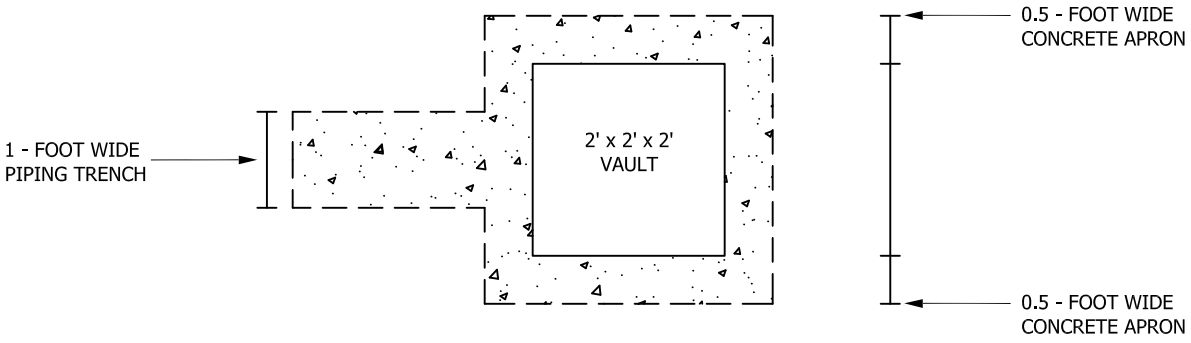
KUHLMAN ELECTRIC CORPORATION
KEC FACILITY
CRYSTAL SPRINGS, MISSISSIPPI

DATE:	APPROVED:	DRAWN BY:
08/27/13	BY: _____	P.D.M.
SCALE:	DATE: _____	CAD NO.
N.T.S.		KUH0-13-014

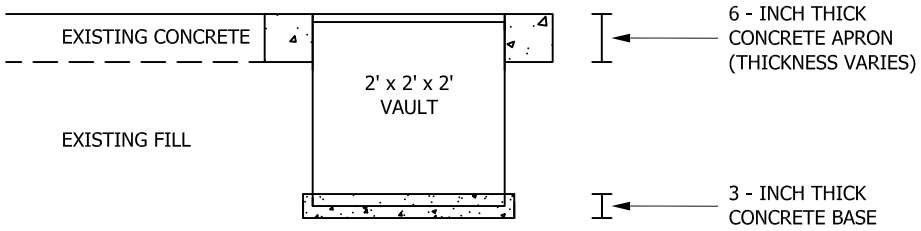
ENVIRONMENTAL MANAGEMENT SERVICES, INC.

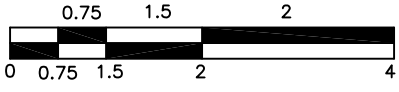
FIGURE 4

TOP ELEVATION



SIDE ELEVATION





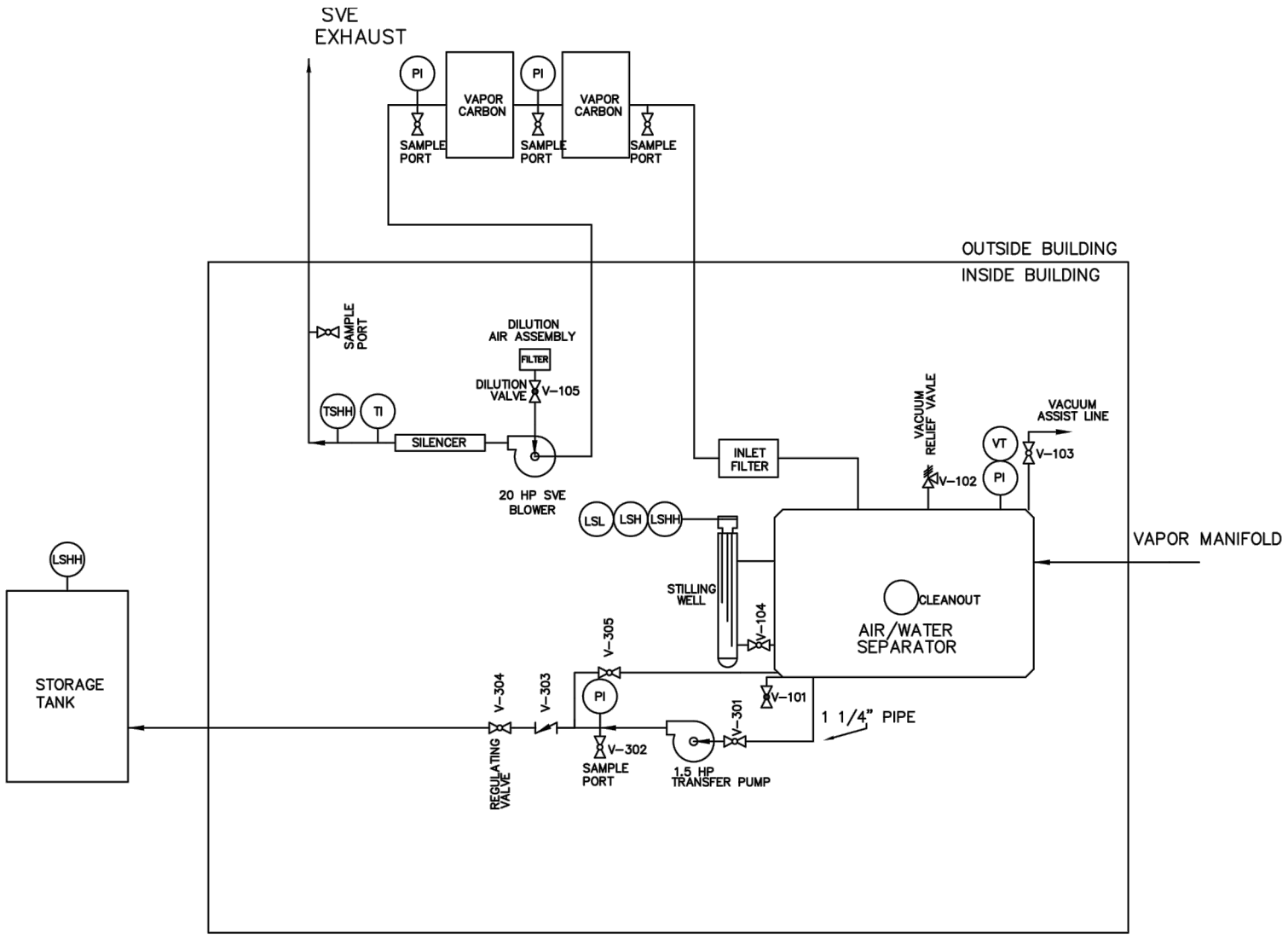
TYPICAL WELL VAULT DETAIL

KUHLMAN ELECTRIC COMPANY
KEC FACILITY
CRYSTAL SPRINGS, MISSISSIPPI

DATE: 08/23/2013	APPROVED: BY: _____ DATE: _____	DRAWN BY: WJV
SCALE: AS SHOWN		CAD NO. KUH0-12-014

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

FIGURE 5



V	VACUUM	I	INDICATOR
P	PRESSURE	FQI	FLOW QTY IND. (TOTALIZER)
S	SWITCH	FRI	FLOW RATE INDICATOR
L	LIQUID LEVEL OR LOW T	T	TEMPERATURE

REFERENCE:

MK ENVIRONMENTAL INC.

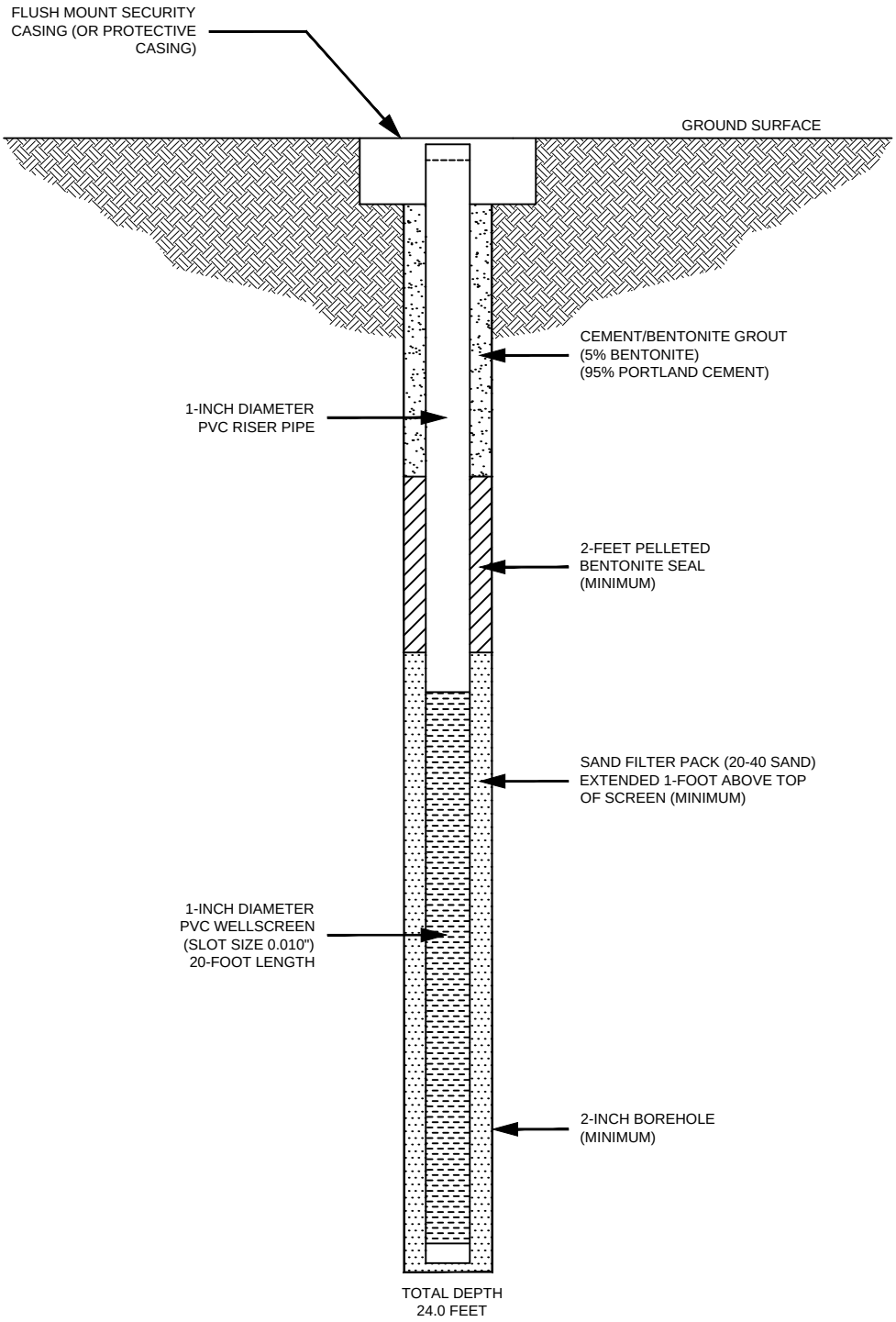
SVE UNIT PROCESS

KUHLMAN ELECTRIC CORPORATION
KEC FACILITY
CRYSTAL SPRINGS, MISSISSIPPI

DATE: 08/27/13	APPROVED: BY: _____ DATE: _____	DRAWN BY: P.D.M.
SCALE: N.T.S.		CAD NO. KUH0-13-014

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

FIGURE 6



TYPICAL 1-INCH DIAMETER OBSERVATION WELL DETAIL

KUHLMAN ELECTRIC CORPORATION
KEC FACILITY
CRYSTAL SPRINGS, MISSISSIPPI

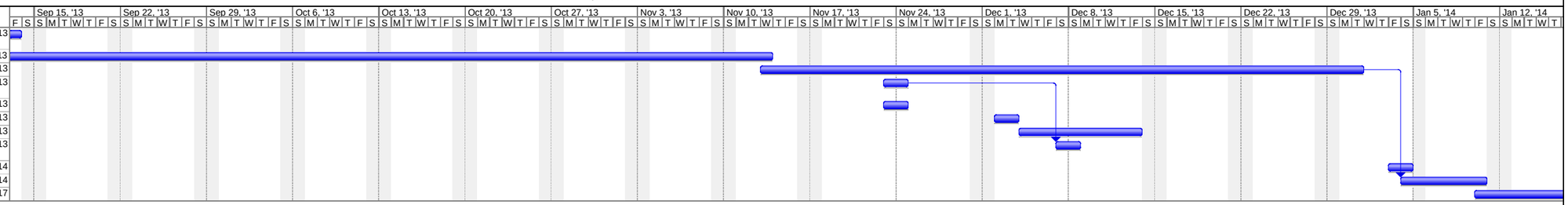
DATE: 08/27/13	APPROVED: BY: _____ DATE: _____	DRAWN BY: P.D.M.
SCALE: N.T.S.		CAD NO. KUH0-13-014

ENVIRONMENTAL MANAGEMENT SERVICES, INC.

FIGURE 7

Figure 8
Project Schedule

ID	Task Name	Duration	Start	Finish
1	Submittal of SVE Design to MDEQ	1 day	Fri 9/13/13	Fri 9/13/13
2	MDEQ Approval	44 days	Fri 9/13/13	Wed 11/13/13
3	Order SVE Unit	39 days	Wed 11/13/13	Tue 12/31/13
4	Drilling Extraction and Observation Wells	2 days	Sat 11/23/13	Sun 11/24/13
5	Piping Support Installation	2 days	Sat 11/23/13	Sun 11/24/13
6	Unit Site Preparation	2 days	Mon 12/2/13	Tue 12/3/13
7	Electrical/Communications Sup	10 days	Wed 12/4/13	Fri 12/13/13
8	Installation of SVE Piping and Extraction Well Vaults	2 days	Sat 12/7/13	Sun 12/8/13
9	Installation of SVE Unit	2 days	Fri 1/3/14	Sat 1/4/14
10	Startup and Testing	6 days	Sat 1/4/14	Fri 1/10/14
11	Operation and Maintenance	938 days	Fri 1/10/14	Tue 8/15/17

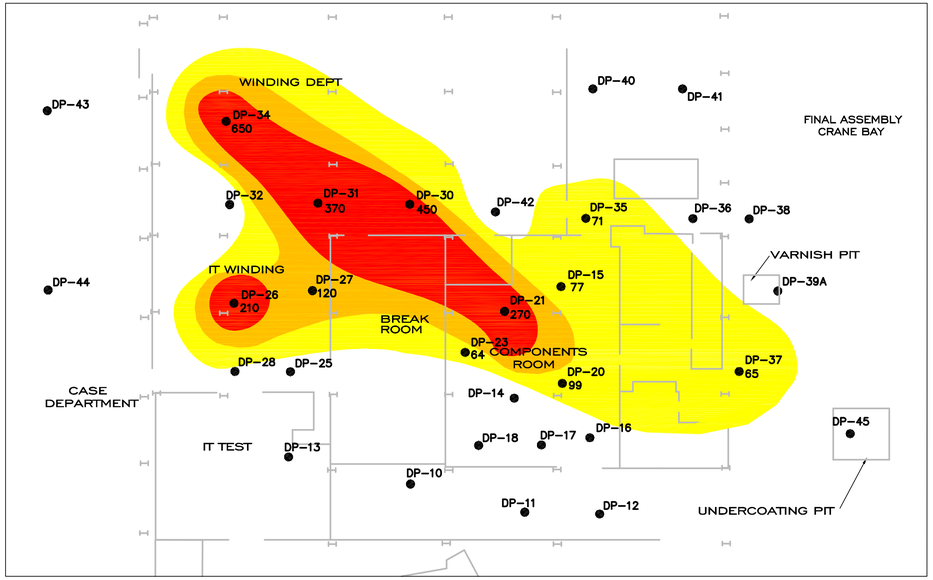


Project: SVE schedule
Date: Wed 9/4/13

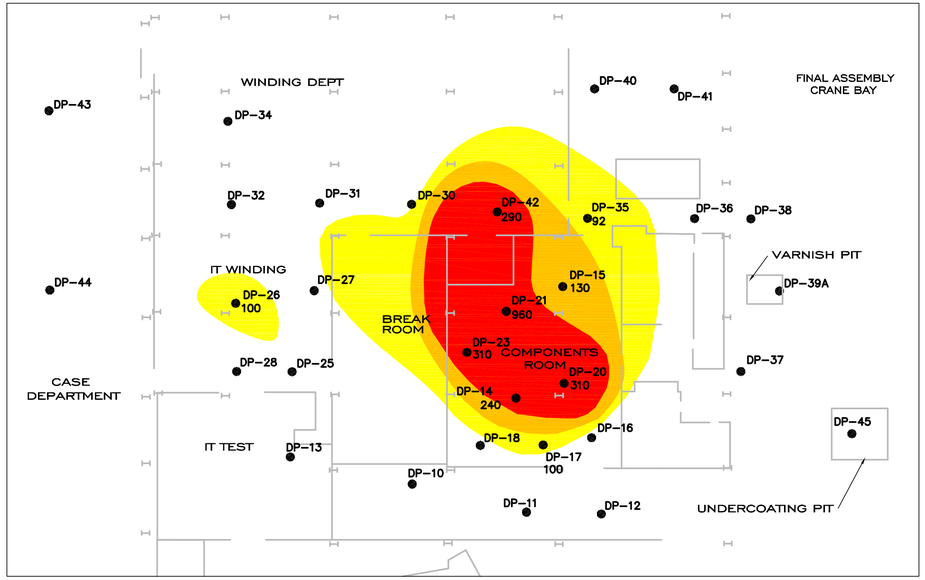
Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

APPENDICES

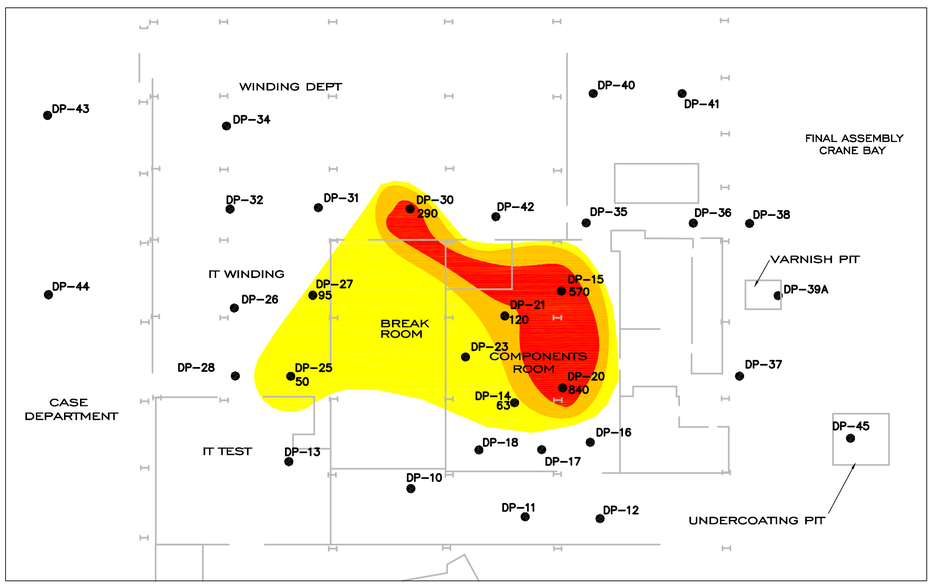
APPENDIX A



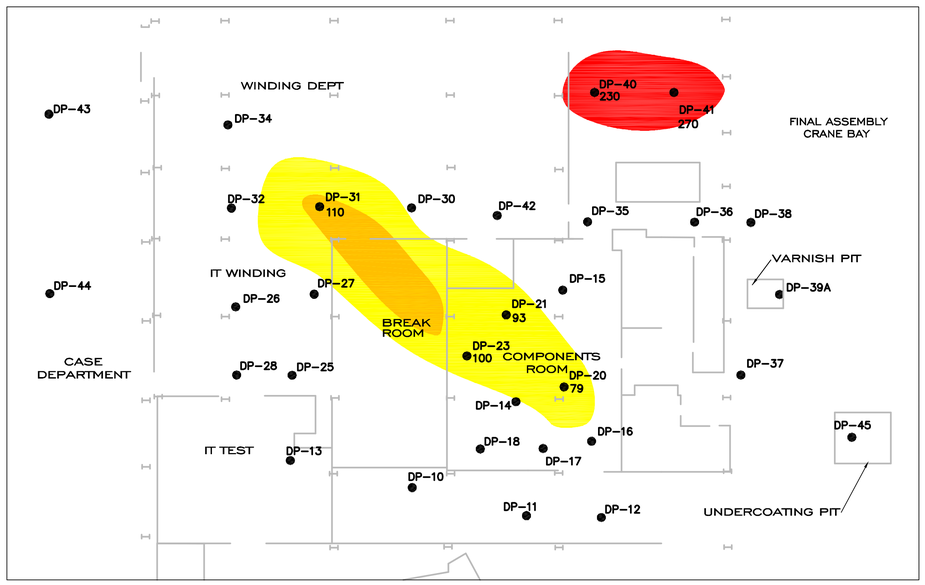
0'-5' DEPTH



10'-15' DEPTH



20'-25' DEPTH



30'-35' DEPTH

LEGEND

DIRECT PUSH SAMPLE LOCATION W/1,1-DCE CONCENTRATIONS (ug/kg)

DP-21
93

1,1-DICHLOROETHENE CONCENTRATION GRADIENTS

200 + µg/kg

100 - 200 µg/kg

0 - 100 µg/kg

KEY

FIGURE 12

SOURCE AREA
1,1-DCE PLUME IN SOIL

KUHLMAN ELECTRIC CORPORATION
CRYSTAL SPRINGS, MS

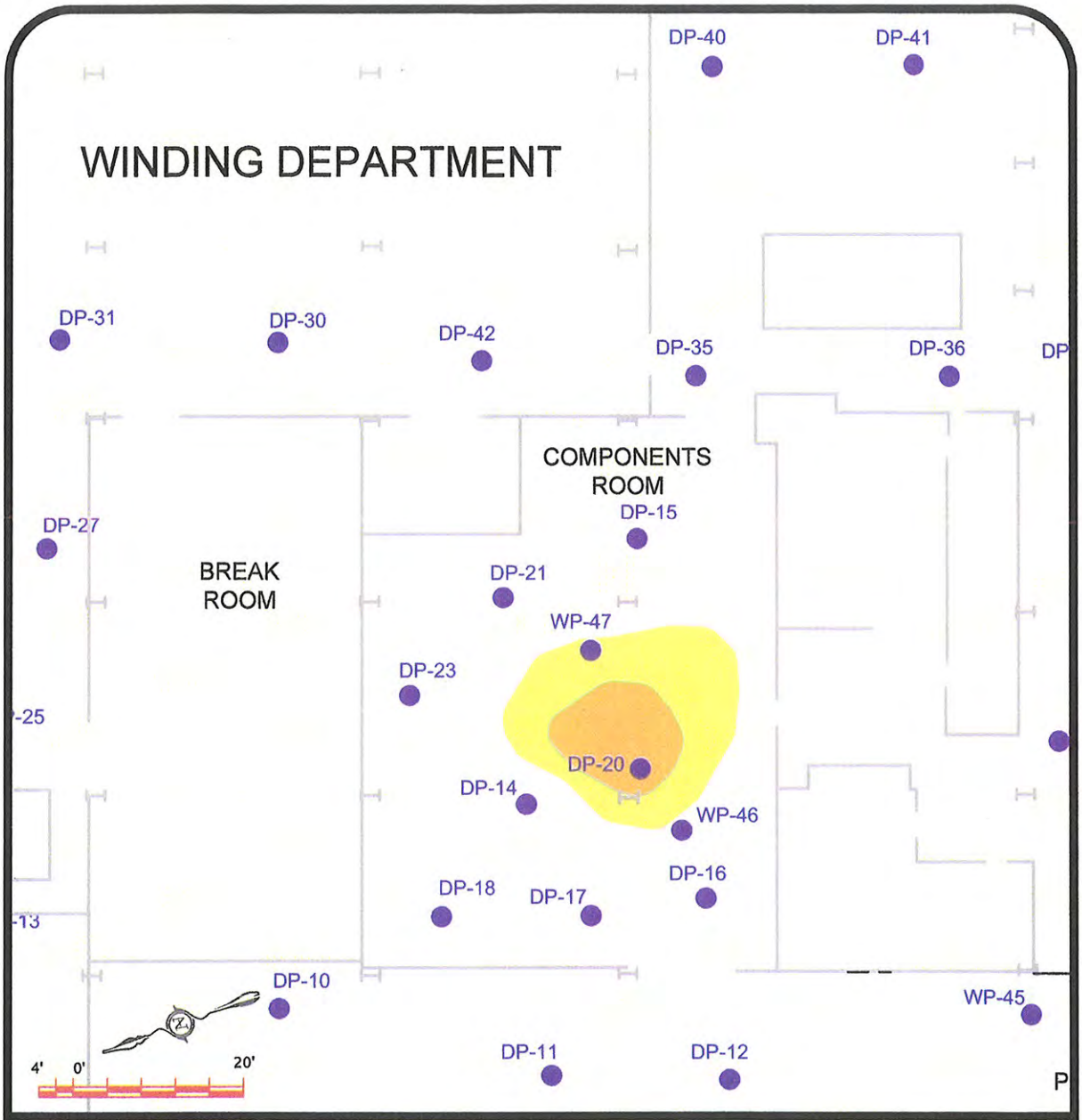
SCALE VARIES
DR: DGR
CHK: RLM
REV: 0
DATE: 4/19/09

1 2 3 4

PREPARED FOR:
BorgWarner Inc.

DRAWING NAME:
GROUNDWATER ASSESSMENT REPORT\F12.DWG

GeoEnvironmental Associates, LLC
MARTIN&SLAGLE
PO Box 1023
Black Mountain NC 28711
828.669.3929 828.669.5289



LEGEND

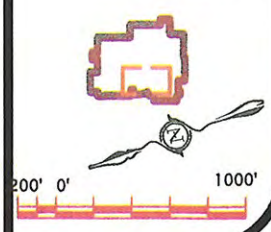
DP-00 DIRECT PUSH SAMPLE LOCATION

1,4-DIOXANE CONCENTRATION GRADIENTS

> 75,000 µg/kg

58,100 – 75,000 µg/kg

MAP KEY



MARTIN&SLAGLE
GeoEnvironmental Associates, LLC
PO Box 1023
Black Mountain NC 28711
828.669.3929 828.669.5289

PREPARED FOR:
BorgWarner Inc.

SOURCE AREA – 1,4 DIOXANE PLUME IN SOIL

CRYSTAL SPRINGS, MS

SCALE = 1":20'
REV: 0
DATE: 4/19/2009
DR: DGR
CHK: RLM

13

FIGURE

APPENDIX B

Region 4
U.S. Environmental Protection Agency
Science and Ecosystem Support Division
Athens, Georgia

OPERATING PROCEDURE

Title: **Sample and Evidence Management**

Effective Date: January 29, 2013 | **Number:** SESDPROC-005-R2

Authors

Name: Art Masters
Title: Environmental Scientist, Regional Expert
Signature: Date: 1/23/13

Approvals

Name: Danny France
Title: Chief, Enforcement and Investigations Branch
Signature: Date: 1/23/13

Name: John Deatrick
Title: Chief, Ecological Assessment Branch
Signature: Date: 1/23/13

Name: Bobby Lewis
Title: Field Quality Manager, Science and Ecosystem Support Division
Signature: Date: 1/25/13

Revision History

This table shows changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the SESD Document Control Coordinator.

History	Effective Date
SESDPROC-005-R2, *Sample and Evidence Management*, replaces SESDPROC-005-R1 **General:** Corrected any typographical, grammatical, and/or editorial errors. **General:** Replaced all references to FORMS with the generic term sample custody software program. The specific sections are listed below: Section 3.3 Section 3.4 Section 4.2 Section 5 **Title Page:** Changed the EIB Branch Chief from Antonio Quinones to Danny France. Changed the EAB Branch Chief from Bill Cosgrove to John Deatrick (Acting). Changed the Field Quality Manager from Laura Ackerman to Bobby Lewis. **Revision History:** In the last sentence, changed Field Quality Manager to Document Control Coordinator. **Section 1.2:** Added the following statement - Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use. **Section 1.3:** Changed requirement so that the DCC is responsible for ensuring the most recent version of the procedure is placed on the SESD LAN and for maintaining records of review conducted prior to its issuance. Deleted reference to the H: drive. Section 2.2 Changed requirement for comments on sample label to make comments optional. Section 2.2.2 Removed requirement for printed copies of photographs in the official file. Section 3.3 Removed different custody requirements for criminal investigations so that all projects are treated consistently. Section 3.4 Removed statement in the fourth paragraph regarding retention of paper air bills in the official project file to reduce unnecessary paperwork. The air bill number or shipment tracking number is recorded on the chain of custody.	January 29, 2013

SESDPROC-005-R1, *Sample and Evidence Management*, replaces SESDPROC-005-R0 **General** Updated referenced procedures to reflect most recent version. Replaced "shall" with "will". **Cover Page:** Changed title for Antonio Quinones from Environmental Investigation Branch to Enforcement and Investigations Branch. Changed Bill Cosgrove's title from Acting Chief to Chief. **Section 1.3** Updated information to reflect that procedure is located on the H: drive of the LAN. **Section 1.4** Added reference for the SESD Operating Procedure for Control of Records. Alphabetized and revised the referencing style for consistency. **Section 2.2.3** Added that Confidential Business Information will be handled in accordance with SESD Operating Procedure for Control of Records.	November 1, 2007
SESDPROC-005-R0, Sample and Evidence Management, Original Issue	February 05, 2007

TABLE OF CONTENTS

1 General Information

1.1 Purpose

This document describes general and specific procedures, methods and considerations to be used and observed by SESD field investigators when handling and managing samples and other types of evidence after their collection and during delivery to the laboratory.

1.2 Scope/Application

The procedures contained in this document are to be used by field investigators when handling and managing samples and other evidence collected to support SESD field investigations. On the occasion that SESD field investigators determine that any of the procedures described in this section are either inappropriate, inadequate or impractical and that another procedure must be used, the variant procedure will be documented in the field log book, along with a description of the circumstances requiring its use. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

1.3 Documentation/Verification

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities and have been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on the SESD Local Area Network (LAN). The Document Control Coordinator is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

1.4 References

SESD Operating Procedure for Control of Records, SESDPROC-002, Most Recent Version

SESD Operating Procedure for Packing, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209, Most Recent Version

USEPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), November 2001

USEPA Digital Camera Guidance for EPA Civil Inspections and Investigations, July 2006

2 Sample and Evidence Identification

2.1 Introduction

Sample identification, chain-of-custody records, receipt for sample records and other field records will be legibly recorded with waterproof, non-erasable ink, unless otherwise specified. If errors are made in any of these documents, corrections will be made by crossing a single line through the error and entering the correct information. All corrections must be initialed and dated. If possible, all corrections should be made by the individual making the error.

Following are definitions of terms used in this section:

Field Investigator
Any individual who performs or conducts field sampling, observation and/or measurement activities in support of field investigations

Project Leader
The individual with overall responsibility for conducting a specific field investigation in accordance with this procedure

Field Sample Custodian
Individual responsible for identifying the sample containers and maintaining custody of the samples and the Chain-of-Custody Record

Sample Team Leader
An individual designated by the project leader to be present during and responsible for all activities related to the collection of samples by a specific sampling team

Sampler
The individual responsible for the actual collection of a sample

Transferee
Any individual who receives custody of samples subsequent to release by the field sample custodian

Laboratory Sample Custodian
Individual responsible for accepting custody of samples from the field sample custodian or a transferee

One individual may fulfill more than one of the roles described above.

2.2 Sample and Evidence Identification Procedures

2.2.1 Sample Identification

The method of sample identification used depends on the type of sample collected. Field measurement samples are those collected for specific field analysis or measurement where the data are recorded directly in bound field logbooks or on the Chain-of-Custody Record. Examples of field measurements and analyses include XRF, pH, temperature, dissolved oxygen and conductivity. Samples collected for laboratory analysis will be identified by using a stick-on label or a tag which is attached to the sample container. In some cases such as biological samples, the label or tag may have to be affixed to a bag containing the sample. If a sample tag is used, the sample should be placed in a bag, then the sample and the tag will be placed in a second bag.

The following information will be included on the sample label or tag using waterproof, non-erasable ink:

- Project number;
- Field identification or sample station number;
- Date and time of sample collection;
- Designation of the sample as a grab or composite;
- Whether the sample is preserved or unpreserved;
- The general types of analyses to be performed.

Other information such as readily detectable or identifiable odor, color, or known toxic properties may be added as deemed necessary by the project leader or sample custodian.

2.2.2 Photograph, Digital Still Image and Video Identification

Photographs and Digital Still Images

When photographs or digital images are taken for purposes of documenting and supporting a field investigation, a record of each exposure or image will be kept in a bound field logbook. The following information will be recorded in the logbook:

- An accurate description of what the photograph or image shows, including orientation, if appropriate;

- The date and time that the photograph or image was taken;

- The name of the individual who took the photograph or digital image.

When photographs are taken with a film camera, the film should be developed with the negatives supplied uncut, if possible. The identifying information that was recorded in the field logbook will be entered on the back of the prints.

When digital images are obtained during a field investigation, an electronic copy of the unaltered investigation-related images will be placed in the official files. If deemed necessary due to project requirements, a printed copy of the original photographs may be placed in the official file. For enforcement cases, it is imperative that the individual who took the image be identified in the field logbook in the event their testimony is required.

Video

When a video recording is used as evidence in an enforcement case, the following information should be recorded in a bound field logbook:

- The date and time that the video was recorded;

- A brief description of the subject of the video;

- The person recording the video.

An audio record may also be included in the video tape with the above logistical information, as well as a narrated description of the video record.

A label will be placed on the video media with the appropriate identifying information (i.e., project name, project number, date, location etc.). In the event testimony regarding a video recording is required for an enforcement case, one individual should be responsible for recording the video for each case. The original, unaltered recording will be placed in the official files.

2.2.3 Identification of Physical Evidence

Physical evidence, other than samples, will be identified, when possible, by recording the necessary information on the evidence. When samples are collected from vessels or containers which can be moved (drums for example), the vessel or container should be marked with the field identification or sample station number for future identification. The vessel or container may be labeled with an indelible marker (e.g., paint stick or spray paint). The vessel or container need not be marked if it already has a unique marking; however, these markings will be

recorded in the bound field logbooks. In addition, it is suggested that photographs of any physical evidence (markings, etc.) be taken and the necessary information recorded in the field logbook.

Occasionally, it is necessary to obtain copies of recorder and/or instrument charts from facility owned analytical equipment, flow recorders, etc., during field investigations and inspections. A unique identifier will be recorded on the document with that information as well as the following recorded in the logbook:

- Starting and ending time(s) and date(s) for the chart;

- An instantaneous measurement of the media being measured by the recorder will be taken and entered at the appropriate location on the chart along with the date and time of the measurement; and

- A description of the location being monitored and other information required to interpret the data such as type of flow device, chart units, factors, etc.

The field investigator will indicate who the chart (or copy of the chart) was received from and enter the date and time, as well as the field investigator's initials.

Documents such as technical reports, laboratory reports, etc., should be marked with the field investigator's signature, the date, the number of pages and from whom they were received. Documents that are claimed by a facility to be "confidential" and, therefore, potentially subject to the Confidential Business Information requirements, will be handled in accordance with SESD Operating Procedure for Control of Records (SESDPROC-002).

3 Chain-of-Custody Procedures

3.1 Introduction

Chain-of-custody procedures are comprised of the following elements: 1) maintaining custody of samples or other evidence, and 2) documentation of the chain-of-custody for evidence. To document chain-of-custody, an accurate record must be maintained to trace the possession of each sample, or other evidence, from the moment of collection to its introduction into evidence.

3.2 Sample Custody

A sample or other physical evidence is in custody if:

- It is in the actual possession of an investigator;
- It is in the view of an investigator, after being in their physical possession;
- It was in the physical possession of an investigator and then they secured it to prevent tampering; and/or
- It is placed in a designated secure area.

3.3 Documentation of Chain-of-Custody

The following are used to identify and demonstrate how sample integrity is maintained and custody is ensured.

Sample Identification
A stick-on sample label or a tag should be completed for each sample container using waterproof, non-erasable ink as specified in Section 2.2.1.

Sample Seals
If appropriate, samples should be sealed as soon as possible following collection using a custody seal with EPA identification. The sample custodian or project leader will write the date and their initials on the seal. The use of custody seals may be waived if field investigators keep the samples in their custody as defined in Section 3.2, from the time of collection until the samples are delivered to the laboratory analyzing the samples.

Field Sample Custodian
The field sample custodian is the person designated by the project leader to receive and manage custody of samples while in the field, including labeling and custody sealing.

Chain-of-Custody Record

The field Chain-Of-Custody record is used to document the custody of all samples or other physical evidence collected and maintained by investigators. All physical evidence or samples will be accompanied by a Chain-Of-Custody Record. This form may be generated by sample custody management software (Section 5) or it may be a pre-printed multi-sheet carbonless form for hand entry of required information. The Chain-Of-Custody Record documents transfer of custody of samples from the sample custodian to another person, to the laboratory or other organizational elements. The Chain-of-Custody Record will not be used to document the collection of split samples where there is a legal requirement to provide a receipt for samples (see Section 4, Receipt for Samples Form (CERCLA/RCRA/TSCA)). The Chain-Of-Custody Record also serves as a sample logging mechanism for the laboratory sample custodian. A separate Chain-of-Custody Record should be used for each final destination or laboratory used during the investigation.

All information necessary to fully and completely document the sample collection and required analyses must be recorded in the appropriate spaces to complete the field Chain-Of-Custody Record. The following requirements apply to Chain-Of-Custody records generated by either sample custody management software or by hand entry on pre-printed forms:

- All sampling team leaders must sign in the designated signature block.
- One sample should be entered on each line and not be split among multiple lines.
- If multiple sampling teams are collecting samples, the sampling team leader's name should be clearly indicated for each sample.
- The total number of sample containers for each sample must be listed in the appropriate column. Required analyses should be entered in the appropriate location on the Chain-of-Custody Record.
- The field sample custodian, project leader or other designee, and subsequent transferee(s) should document the transfer of the samples listed on the Chain-of-Custody Record. Both the person relinquishing the samples and the person receiving them must sign the form. The date and time that this occurs should be documented in the proper space on the Chain-of-Custody Record. The exception to this requirement would be when packaged samples are shipped with a common carrier. Even though the common carrier accepts the samples for shipment, they do not sign the Chain-of-Custody Record as having received the samples.
- The last person receiving the samples or evidence will be the laboratory sample custodian or their designee(s).

The Chain-of-Custody Record is a uniquely identified document. Once the Record is completed, it becomes an accountable document and must be maintained in the project file. The suitability of any other form for chain-of-custody should be evaluated based upon its inclusion of all of the above information in a legible format.

If chain-of-custody is required for documents received during investigations, the documents should be placed in large envelopes, and the contents should be noted on the envelope. The envelope will be sealed and an EPA custody seal placed on the envelope such that it cannot be opened without breaking the seal. A Chain-Of-Custody Record will be maintained for the envelope. Any time the EPA seal is broken, that fact will be noted on the Chain-Of-Custody Record and a new seal affixed, as previously described in this section.

Physical evidence such as video tapes or other small items will be placed in an evidence bag or envelope and an EPA custody seal should be affixed so that they cannot be opened without breaking the seal. A Chain-Of-Custody Record will be maintained for these items. Any time the EPA seal is broken, that fact will be noted on the Chain-of-Custody Record and a new seal affixed.

EPA custody seals can be used to maintain custody of other items when necessary by using similar procedures as those previously outlined in this section.

Samples should not be accepted from other sources unless the sample collection procedures used are known to be acceptable, can be documented and the sample chain-of-custody can be established. If such samples are accepted, a standard sample label containing all relevant information and the Chain-Of-Custody Record will be completed for each set of samples.

3.4 Transfer of Custody with Shipment

Transfer of custody is accomplished by the following:

- Samples will be properly packaged for shipment in accordance with the procedures outlined in SESD Operating Procedure for Packing, Marking, Labeling and Shipping of Environmental and Waste Samples (SESDPROC-209).

- All samples will be accompanied by the laboratory copy of the Chain-Of-Custody Record. If pre-printed forms are used, the white and pink sheets will be sent. If sample custody management software is used to generate the Chain-Of-Custody Record, the laboratory copy is identified with an “L” in the upper right corner. If multiple coolers are needed for shipment to a particular laboratory, the laboratory copy of the Chain-Of-Custody Record for the entire shipment is placed in a sealed plastic bag in one of the coolers. When shipping samples via common carrier, the "Relinquished By" box should be filled in; however, the "Received By" box should be left blank. The laboratory sample custodian is responsible for receiving custody of the samples and will fill in the "Received By" section of the Chain-of-

Custody Record. One copy of the Record will be provided to and retained by the project leader. After samples have been received and accepted by the laboratory, a copy of the Chain-of-Custody Record, with ASB sample identification numbers, will be transmitted to the project leader. This copy will become a part of the project file.

- If sent by mail, the package will be registered with return receipt requested. If sent by common carrier, an Air Bill should be used. The Air Bill number, shipment tracking number or registered mail serial number will be recorded in the remarks section of the Chain-Of-Custody Record.

4 Receipt for Samples Form (CERCLA/RCRA/TSCA)

4.1 Introduction

Section 3007 of the Resource Conservation and Recovery Act (RCRA) of 1976 and Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) of 1980 require that a "receipt" for all facility samples collected during inspections and investigations be given to the owner/operator of each facility before the field investigator departs the premises. The Toxic Substances Control Act (TSCA) contains similar provisions. The laws do not require that homeowners or other off-site property owners be given this form.

4.2 Receipt for Samples Form

If necessary, a Receipt for Samples form, using either the pre-printed form or one generated by sample custody management software, is to be used to satisfy the receipt for samples provisions of RCRA, CERCLA and TSCA. The form also documents that split samples were offered and either "Received" or "Declined" by the owner/operator of the facility or site being investigated (if a sample is split with a facility, state regulatory agency or other party representative, the recipient should be provided (if enough sample is available) with an equal weight or volume of sample). All information must be supplied in the indicated spaces to complete the Receipt for Samples form.

- The sampler(s) must sign the form in the indicated location

- Each sample collected from the facility or site must be documented in the sample record portion of the form. The sample station number, date and time of sample collection, composite or grab sample designation, whether or not split samples were collected (yes or no should be entered under the split sample column), a brief description of each sampling location and the total number of sample containers for each sample must be entered.

- The bottom of the form is used to document the site operator's acceptance or rejection of split samples. The project leader must sign and complete the information in the "Split Samples Transferred By" section (date and time must be entered). If split samples were not collected, the project leader should initial and place a single line through "Split Samples Transferred By" in this section. The operator of the site must indicate whether split samples were received or declined and sign the form. The operator must give their title, telephone number and the date and time they signed the form. If the operator refuses to sign the form, the sampler(s) should note this fact in the operator's signature block and initial this entry.

The Receipt for Samples form is an accountable document after it is completed. A copy of the form is to be given to the facility or site owner/operator. The original form must be maintained in the project files.

5 Sample Custody Management Software

The container labels and the Chain-of-Custody record should be generated using a sample custody management software to streamline the documentation required by SESD and/or the Contract Laboratory Program (CLP) for sample identification and chain-of-custody. When possible, the sample custody management software should be used during all field investigations. Once the appropriate information is entered into the computer, the software will generate stick-on labels for the sample containers and will generate sample receipt forms and chain-of-custody records for the appropriate laboratory. The advantages to this system include faster processing of samples and increased accuracy. Accuracy is increased because the information is entered only once, and consequently, consistent for the bottle labels, sample receipt forms and chain-of-custody records. .