Revised Interim Action Sampling and Analysis Plan and Health and Safety Plan

Colville Post and Pole
Stevens County, Washington

for

Washington State Department of Ecology

January 16, 2015

GeoEngineers
Earth Science + Technology

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523 East Second Avenue
Spokane, Washington 99202
509.363.3125

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File No. 0504-098-00

January 16, 2015

Prepared for:

Washington State Department of Ecology
Toxics Cleanup Program – Eastern Region Office
4601 North Monroe Street
Spokane, Washington 99205

Attention: Jeremy Schmidt, PE

Prepared by:

GeoEngineers, Inc.
523 East Second Avenue
Spokane, Washington 99202
509.363.3125

Scott H. Lathen, PE
Environmental Engineer

John R. Haney, PE
Senior Environmental Engineer

Bruce D. Williams
Managing Principal

SHL:JRH:BDW:tjh

GeoEngineers

LIST OF FIGURES

APPENDICES

ACRONYMS

ACGIH – American Conference of Governmental Industrial Hygienists
ASTM – ASTM International
bgs – below ground surface
CFR – code of federal regulations
COC – chain of custody
COPC – contaminants of potential concern
cPAH – carcinogenic polycyclic aromatic hydrocarbons
CPPI – Colville Post and Poles, Inc.
CPR – cardiopulmonary resuscitation
dBA – decibels
DOSH – Division of Occupational Health and Safety
DOT – Department of Transportation
DRPH – diesel-range petroleum hydrocarbons
Ecology – Washington State Department of Ecology
EDD – electronic data deliverable
EIM – Environmental Information Management
EPA – U.S. Environmental Protection Agency
GeoEngineers – GeoEngineers, Inc.
GPS – global positioning system
HASP – Health and Safety Plan
HAZMAT – hazardous materials
HAZWOPER – Hazardous Waste Operations and Emergency Response Standard
HPLC – high performance liquid chromatography
HSM – GeoEngineers Health and Safety Manager
IAWP – Interim Action Work Plan
IDL – instrument detection limit
IDLH – immediately dangerous to life or health
IDW – investigation derived waste
LCS – laboratory control spikes
LCSD – laboratory control spike duplicates
MDL – method detection limit
mg/m^3 – milligrams per cubic meter
MS – matrix spike
MSD – matrix spike duplicate
MSDS – material safety data sheet
NIOSH – National Institute for Occupational Health and Safety
NRR – noise reduction rating
ORP – oxidation reduction potential
OSHA – Occupational Safety and Health Administration
PAH – polycylclic aromatic hydrocarbons
PCP – pentachlorophenol
PE – professional engineer
PEL – permissible exposure limits
PID – photo-ionization detector

ACRONYMS (CONTINUED)

PM – project manager
PPE – personal protective equipment
ppm – parts per million
PQL – practical quantitation limit
PVC – polyvinyl chloride
QA – Quality Assurance
QAPP – Quality Assurance Project Plan
QC – quality control
RPD – relative percent difference
SAP – Sampling and Analysis Plan
SOP – standard operating procedures
SSO – Site Safety Officer
SVOC – semi-volatile organic compounds
TLV – threshold limit value
TRL – target reporting limits
TWA – time-weighted average
USTs – underground storage tanks
VOC – volatile organic compound
WAC – Washington Administrative Code

1.0 INTRODUCTION

This Revised Interim Action Sampling and Analysis Plan (SAP) presents the proposed scope-of-work to conduct soil and groundwater sampling at the former Colville Post and Poles, Inc. (CPPI) Site (herein designated as the Site) located at 396 Highway 395 North near Colville in Stevens County, Washington, approximately as shown in the attached Vicinity Map, Figure 1. Historical Site features are shown in the attached Historical Site Features and Assessment Areas, Figure 2. The Site is managed by the Washington State Department of Ecology (Ecology). This SAP describes soil and groundwater sampling locations, analyses and procedures associated with the scope of work described in the Interim Action Work Plan (IAWP) (GeoEngineers, 2014). A limited soil and groundwater assessment in the northern portion of the Site, where the bulk of operations historically occurred and limited prior assessment data are available, is included in the IAWP. The assessment will include advancing an estimated 28 direct-push soil borings, collecting soil samples from each boring and collecting grab groundwater samples from select borings.

The Site description and background are included in the IAWP. This SAP includes the project Quality Assurance Project Plan (QAPP), presented as Appendix A, and the site Health and Safety Plan (HASP), included in Appendix B. The following sections are included in this SAP:

- "Scope and Tasks - Section 2.0"
- "Sampling Procedures – Section 3.0"
- "Data Validation and Usability – Section 4.0"
- "References – Section 5.0"
- "Appendices"

2.0 SCOPE AND TASKS

The scope items listed below are not a comprehensive list of the tasks that will be performed to conduct the Interim Action (GeoEngineers, 2014). The listed scope items address only the tasks associated with the soil and groundwater sampling assessment elements of the Interim Action, which includes the following activities:

- Coordinate a utility locate using the one-call system and a private utility locator.
- Subcontract a qualified driller to advance an estimated 28 direct-push soil borings at the approximate locations depicted on Proposed Direct-Push Boring Locations, Figure 3. The borings will be advanced to about 1 to 2 feet below the top of the underlying clay layer. We expect to encounter clay at depths ranging between 12 to 24 feet below ground surface (bgs). The soil recovered from the borings will be logged and field screened, and select sub-samples will be obtained for potential chemical analysis at an Ecology-accredited analytical laboratory. For cost estimating purposes, we assume two soil samples per boring will be analyzed for diesel-range petroleum hydrocarbons (DRPH) using Northwest Method NWTPH-Dx and semi-volatile organic compounds (SVOCs) including pentachlorophenol (PCP) using Environmental Protection Agency (EPA) Method 8270C.
- Collect groundwater grab samples from an estimated eight direct-push boring locations for screening and potential analysis. We estimate groundwater samples will be collected for screening and chemical

analysis from the eight soil borings indicated on Figure 3. Groundwater samples will be analyzed for DRPH and SVOCs/PCP using the methods listed above. Soil and groundwater samples will be submitted for chemical analysis on a standard turn-around time.

- Drum, label, profile and coordinate disposal of investigation-derived waste (IDW). A qualified contractor will be subcontracted to provide IDW disposal services.
- Include the results of the soil and groundwater assessment, completed per this SAP, in a draft and final Interim Action Report, to be prepared in accordance with Washington Administrative Code (WAC) 173-340-430. The report will include the results from Site assessment activities and other interim actions as described in the IAWP. The report will be submitted to Ecology for review and comment before being finalized.

3.0 SAMPLING PROCEDURES

This section contains standard procedures for field data collection that are anticipated during the Interim Action including the following:

- Collecting Soil Samples from Soil Borings;
- Field Screening Methods;
- Groundwater Sampling;
- Decontamination Procedures;
- Handling of IDW; and
- Sample Location Control.

3.1. Collecting Soil Samples from Soil Borings

An estimated 28 direct-push soil borings will be advanced in the northern portion of the Site where historical wood treating processes likely caused soil and groundwater contamination. The borings will be advanced by a State of Washington licensed driller with HAZWOPER training. Direct-push drilling will be observed and documented by an appropriately trained GeoEngineers geologist or engineer.

Continuous soil samples will be collected from the borings using 4- or 5-foot acrylic slip-sleeve samplers. The GeoEngineers field representative will observe each boring, classify the soil encountered, and prepare a detailed log of each boring. Soil encountered in the borings will be classified in the field in general accordance with ASTM International (ASTM) D 2488, the Standard Practice for Classification of Soils, Visual-Manual Procedure.

Soil sub-samples from each soil boring will be field-screened for the presence of petroleum-related compounds using the procedures described below, to determine which portion to sample for chemical analysis. We estimate two soil samples from each boring (about 56 total) will be retained for laboratory analysis; the remaining soil samples will be submitted to the laboratory and held for potential analysis (opportunity samples).

Soil selected for each sample will be removed from the slip-sleeve sampler using a decontaminated soil knife or new, clean nitrile gloves, and transferred into a laboratory-prepared container, labeled with a water proof pen, and placed on “blue ice” or double bagged wet ice in a clean plastic lined cooler.

Each sample will be documented on a boring log and chain-of-custody (COC) form including sample name, sample collection date and time, sample type, sample depth, requested analytical methods and sampler name.

Sampling equipment will be decontaminated between each sampling attempt as described in “Section 3.4.” The sample coolers will be delivered to the analytical laboratory under standard COC procedures described in the QAPP.

Direct-push boring locations will be abandoned per applicable regulations. The method selected to abandon the borings will be approved by Ecology before implementation.

3.2. Field Screening Methods

GeoEngineers’ field representative will perform field screening tests on soil samples collected from the direct-push borings and record the observations on the field boring log and in the field report. Field screening results will be used to aid in the selection of soil samples for chemical analysis. The sample from each boring showing the highest likelihood of petroleum contamination based on field screening will be selected for laboratory analysis. The remaining samples will be submitted to the laboratory and held pending the results of the samples submitted for analysis.

Screening methods will include: (1) visual examination; (2) water sheen screening; and (3) headspace vapor screening using a photoionization detector (PID). Visual screening consists of inspecting the soil for discoloration indicative of the presence of petroleum-impacted material in the sample. The field screening methods identified will adhere to the guidance provided by Ecology (Ecology, 2011).

Water sheen screening involves placing soil in water and observing the water surface for signs of sheen. Sheen classifications are as follows:

- **No Sheen (NS)** No visible sheen on the water surface;
- **Slight Sheen (SS)** Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly. Natural organic matter in the soil might produce a slight sheen;
- **Moderate Sheen (MS)** Light to heavy sheen; might have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on water surface; and
- **Heavy Sheen (HS)** Heavy sheen with color/iridescence; spread is rapid; entire water surface might be covered with sheen.

Headspace vapor screening involves inserting a soil sample into a sealed plastic bag and measuring the airspace volatile organic compound (VOC) vapor concentrations in parts per million (ppm) with a PID. Once a soil sample is placed in a sealed plastic bag with air space, the bag is shaken to expose the soil to the air trapped in the bag. The probe of the PID, calibrated to isobutylene following the manufacturer’s instructions, is inserted into a small opening in the bag seal and the measurement is collected. The PID typically is designed to quantify VOC vapor concentrations in the range between 1 ppm and 2,000 ppm with an accuracy of 10 percent of the reading and between 2,000 ppm and 10,000 ppm with an accuracy of 20 percent of the reading.

Field screening results are site specific. The results vary with temperature, soil type, contaminant type and soil moisture content.

3.3. Groundwater Sampling

Grab groundwater samples will be collected from an estimated eight of the direct-push boring locations. Drill casing or temporary PVC casing and screen will be left in place in the selected borings for a minimum of 1 hour prior to collecting a groundwater sample. Depth to groundwater will be measured using an electronic water level indicator through the temporary sampling point and groundwater will be purged using a peristaltic pump until field water quality parameters stabilize before obtaining the groundwater sample for screening and analysis. Dedicated polyethylene tubing and a portable peristaltic pump will be used for groundwater purging and sampling. During purging activities, field water quality parameters (including pH, temperature, conductivity, dissolved oxygen, oxidation reduction potential [ORP] and turbidity) will be measured using a multi-parameter meter equipped with a flow-through cell. During purging and sampling, drawdown will not be allowed to exceed 0.3 feet, if possible, and the purge rate will not be allowed to exceed 400 milliliters per minute.

Samples will not be collected from the sampling points if the groundwater to be sampled contains measureable free product (floating petroleum hydrocarbons). Field water quality measurements and depth-to-water measurements will be recorded on a Well Purging-Field Water Quality Measurement Form. The groundwater samples will be transferred in the field to laboratory-prepared sample containers and kept cool during transport to the testing laboratory. COC procedures will be observed from the time of sample collection to delivery to the testing laboratory consistent with the QAPP.

3.4. Decontamination Procedures

The objective of the decontamination procedures described herein is to minimize the potential for cross-contamination between sample locations. Non-dedicated soil and groundwater sampling equipment will be decontaminated in accordance with the following procedures before each sampling attempt or measurement:

1. Brush equipment with a nylon brush to remove large particulate matter.
2. Rinse with potable tap water.
3. Wash with non-phosphate detergent solution (Liquinox® and potable tap water).
4. Rinse with potable tap water.
5. Rinse with distilled water.

3.5. Handling of IDW

IDW, which consists of mainly drill cuttings and decontamination/purge water, typically will be placed in Department of Transportation (DOT)-approved 55-gallon drums. Each drum will be labeled with the project name, exploration number, general contents and date. The drummed IDW will be stored on Site at a location coordinated with Ecology pending analysis and disposal.

Disposable items, such as sample tubing, disposable bailers, bailer line, gloves and protective overalls, paper towels, etc., will be placed in plastic bags after use and deposited in trash receptacles for disposal.

3.6. Sample Location Control

Horizontal sample control will be maintained throughout the project. Horizontal control to locate soil borings in the field will be established using an iPad with global positioning system (GPS) software accurate to approximately 15 lateral feet.

3.7. Sampling and Analytical Methods

Groundwater and soil field sampling methods, including quality control (QC) and maintenance of field instrumentation, will adhere to the requirements of the QAPP. Analytical method requirements also will adhere to the QAPP. During laboratory procurement and coordination, analytical method reporting limits for each proposed analysis will be compared to the reporting limits listed in the QAPP to ensure that data generated will be sufficient for assessment purposes.

3.8. Sample Handling and Custody Requirements

Samples will be handled in accordance with the QAPP. A complete discussion of the sample identification and custody procedures is provided in the QAPP.

3.9. Field Measurements and Observations Documentation

Field measurements and observations will be recorded in the project field notes. Daily logs will be dated, and pages will be consecutively numbered. Entries will be recorded directly and legibly in the daily log and signed and dated by the person conducting the work. If changes are made, the changes will not obscure the previous entry, and the changes will be signed and dated. At a minimum, the following data will be recorded in the log book:

- Purpose of activity;
- Location of activity;
- Description of sampling reference point(s);
- Date and time of activity;
- Sample number identification;
- Soil sample top and bottom depth (bgs);
- Sample number and volume;
- Sample transporting procedures;
- Field measurements and screening observations;
- Calibration records for field instruments;
- Visitors to the Site;
- Relevant comments regarding field activities; and
- Signatures of responsible personnel.

Sufficient information will be recorded in the log book so that field activities can be reconstructed without reliance on personnel memory.

3.10. Data Management and Documentation

Data logs and data report packages will be located in the project file system in GeoEngineers' Spokane, Washington office. Data reports will be available in both hard copy and electronic formats. Laboratory data reports will include internal laboratory quality control checks and sample results. Data logs and packages that are anticipated to be generated during the investigation include laboratory data report packages, boring logs, field sampling data sheets and chain-of-custody forms.

Analytical data will be supplied to GeoEngineers in both electronic data deliverable (EDD) format and hard copy format. The hard copy will serve as the official record of laboratory results. The EDDs will contain only data reported in the hard copy reports (e.g. only reportable results).

Upon receipt of the analytical data, the EDD will be uploaded to a project database and reduced into summary tables for each group of analytes and media. Upon completion of the summary tables, the accuracy of the data reduction will be verified using the hard copy of the data received from the laboratory. Any exceptions will be noted and corrections will be made. The EDD data will be submitted to Ecology's Environmental Information Management (EIM) system.

4.0 DATA VALIDATION AND USABILITY

Upon receipt of the sample data from the laboratory, the data will be validated and evaluated for usability in accordance with the QAPP.

5.0 REFERENCES

GeoEngineers, Inc. "Interim Action Work Plan." July 24, 2014.

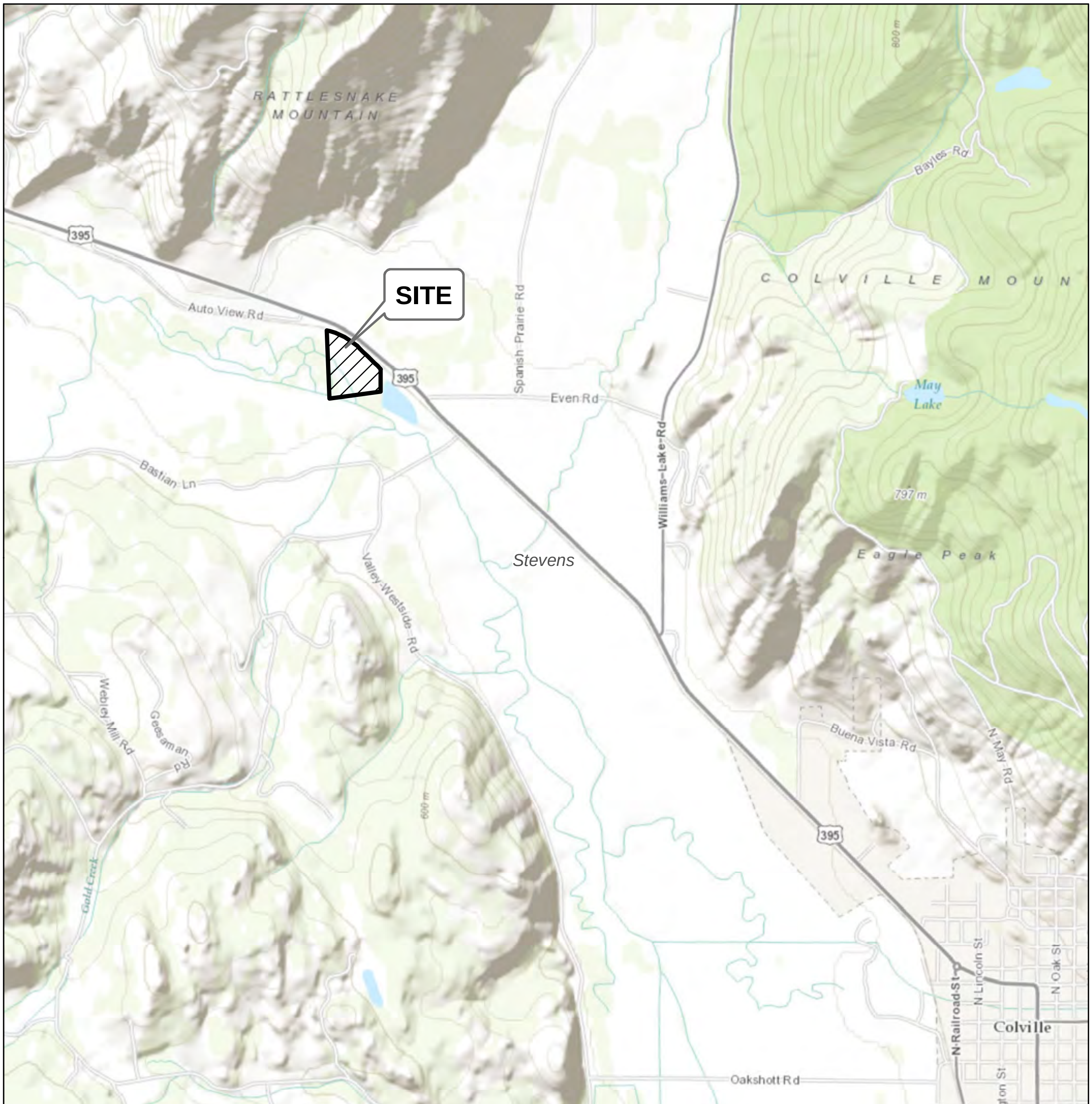
U.S. Environmental Protection Agency. 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review. 540/R-99/008.

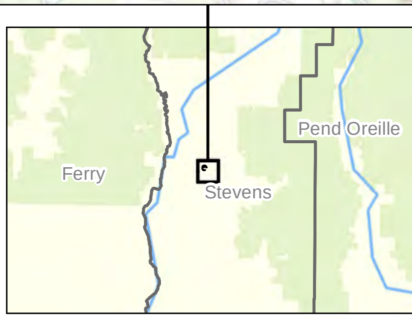
U.S. Environmental Protection Agency. 2004a. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. 540/R-04/004.

U.S. Environmental Protection Agency. 2004b. EPA Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. EPA 04-03-030.

Washington State Department of Ecology (Ecology). "Guidance for Remediation of Petroleum Contaminated Sites." Publication 10-09-057, September 2011.

FIGURES





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Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Sources: ESRI Data & Maps, Street Maps 2008.
Base map from ESRI Data Online.
Projection: NAD 1983, UTM Zone 11 North.

Vicinity Map

Colville Post and Pole
Colville, Washington

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Figure 1

Office: PORT Path: P:\0\0504098_GIS\GIS\MXD\050409800_F1_VM.mxd Map Revised: 30 January 2014 ccabrera

Map Revised: 18 July 2014 maugust

Path: \\pdx\projects\0\0504098_GIS\GIS\MXD\050409800_F3_HistoricalSitePlan.mxd

Office: PORT

Data Source: 2004 Aerial base from Goole Earth Pro.
Site and wetland boundary figures provided by EPA and Washington Department of Ecology.

Projection: NAD 1983 UTM Zone 11N

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Historical Site Features and Assessment Areas

Colville Post and Pole
Colville, Washington

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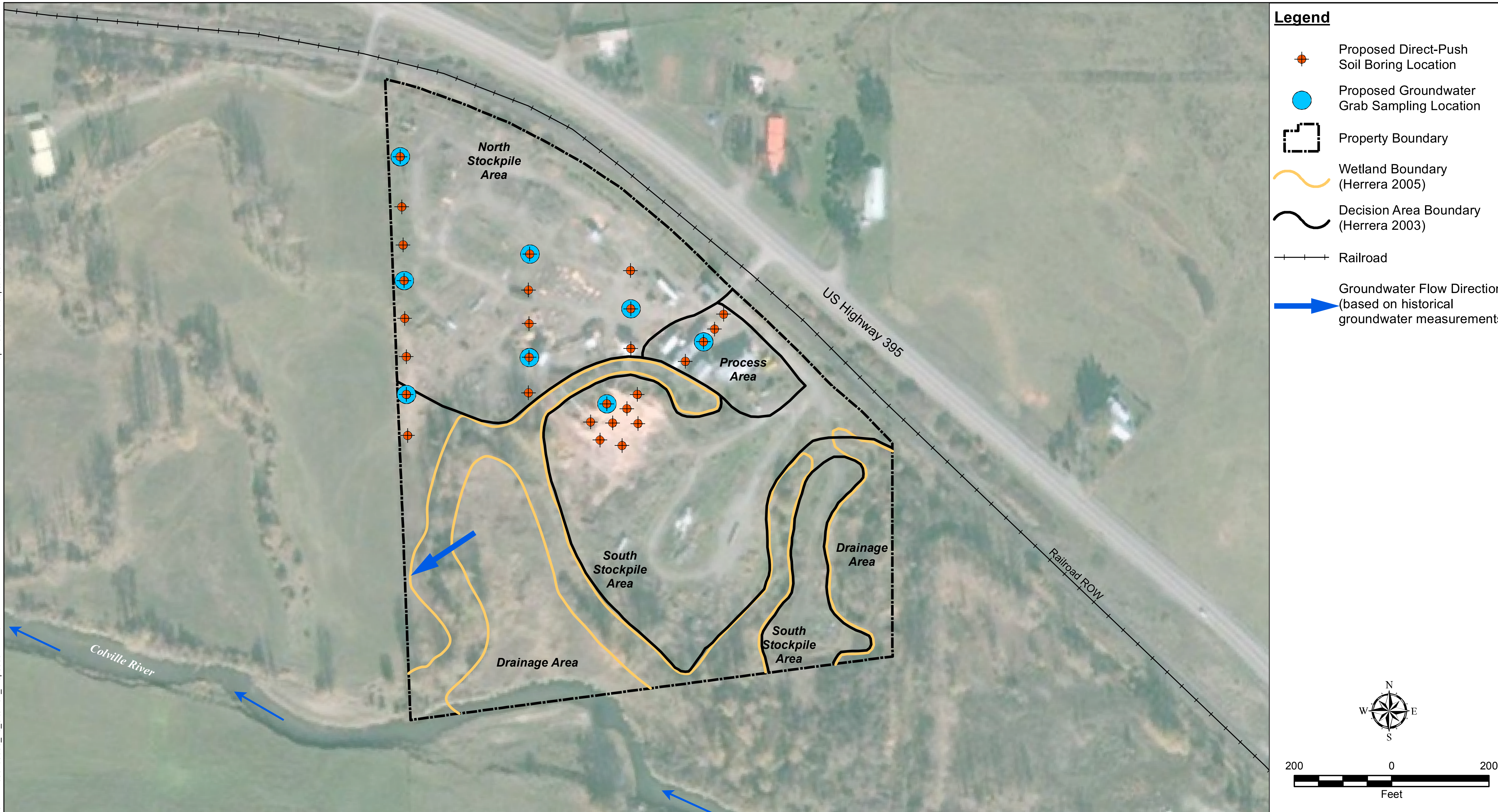
Figure 2



Data Source: 2011 Aerial base from ESRI ArcGIS Data Online.
Site and wetland boundary figures provided by EPA and Washington Department of Ecology.

Projection: NAD 1983 UTM Zone 11N

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Proposed Direct-Push Boring Locations

Colville Post and Pole
Colville, Washington

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Figure 3

Map Revised: 17 September 2014 ccabrera

Path: P:\0\0504098_GIS\GIS\MXD\050409800_F3_SitePlan_ProposedDP.mxd

Office: PORT

APPENDICES

APPENDIX A
Quality Assurance Project Plan

APPENDIX A
QUALITY ASSURANCE PROJECT PLAN

This QAPP was developed for interim action data gap investigation activities at the Colville Post and Pole Site (herein designated Site) located at 396 Highway 395 North near Colville in Stevens County, Washington.

Sampling procedures are outlined in the SAP. The QAPP serves as the primary guide for the integration of quality assurance (QA) and quality control (QC) functions into assessment activities. The QAPP presents the objectives, procedures, organization, functional activities, and specific QA and QC activities designed to achieve data quality goals established for the project. This QAPP is based on guidelines specified in Chapter 173-340-820 of the Washington Administrative Code (WAC) and the EPA Requirements for Quality Assurance Project Plans (EPA, 2004b).

Throughout the project, environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality, and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness and comparability of data generated meet the specified data quality objectives.

PROJECT ORGANIZATION AND RESPONSIBILITY

Descriptions of the responsibilities, lines of authority and communication for the key positions in the QA/QC are provided below. This organization facilitates the efficient production of project work, allows for an independent quality review, and permits resolution of QA issues before submittal.

Project Leadership and Management

The Project Manager's (PM) duties consist of providing concise technical work statements for project tasks, selecting project team members, determining subcontractor participation, establishing budgets and schedules, adhering to budgets and schedules, providing technical oversight and providing overall production and review of project deliverables. John Haney, Licensed Professional Engineer (PE) is the PM for activities at the Site. The Principal-in-Charge, Bruce Williams, is responsible to Ecology for fulfilling contractual and administrative control of the project.

Field Coordinator

The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include the following:

- Provide technical direction to the field staff.
- Develop schedules and allocate resources for field tasks.
- Coordinate data collection activities to be consistent with information requirements.
- Supervise the compilation of field data and laboratory analytical results.
- Assure that data are correctly and completely reported.
- Implement and oversee field sampling in accordance with project plans.

- Supervise field personnel.
- Coordinate work with on-site subcontractors.
- Schedule sample shipment with the analytical laboratory.
- Confirm that appropriate sampling, testing and measurement procedures are followed.
- Coordinate the transfer of field data, sample tracking forms, and log books to the PM for data reduction and validation.
- Participate in QA corrective actions as required.

The Field Coordinator for exploration activities at the Site is the assigned field engineer or geologist for each given field task.

QA Leader

The GeoEngineers project QA Leader is under the direction of John Haney and Bruce Williams, who are responsible for the project's overall QA. The Project QA Leader is responsible for coordinating QA/QC activities as they relate to the acquisition of field data. Mark Lybeer is the QA Leader. The QA Leader has the following responsibilities:

- Serve as the official contact for laboratory data QA concerns.
- Respond to laboratory data and QA needs, resolve issues, and answer requests for guidance and assistance if needed.
- Review the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintain the authority to implement corrective actions as necessary.
- Evaluate the laboratory's final QA report for any condition that adversely impacts data generation if data qualifiers are reported.

Laboratory Management

The Laboratory QA Coordinator administers the analytical laboratory's QA/QC Plan and is responsible for QC. Specific responsibilities of this position include:

- Ensure implementation of the QA Plan.
- Serve as the laboratory point of contact.
- Activate corrective action for out-of-control events.
- Issue the final QA/QC report.
- Administer QA sample analysis.
- Comply with the specifications established in the project plans as related to laboratory services.
- Participate in QA audits and compliance inspections.

The Laboratory QA Coordinator will be determined by the Ecology-accredited analytical laboratory selected for the project.

Health and Safety

A Site-specific HASP will be used for Site characterization field activities and is presented as Appendix B. The Field Coordinator will be responsible for implementing the HASP during sampling activities. The PM will discuss health and safety issues with the Field Coordinator on a routine basis during the completion of field activities.

The Field Coordinator will conduct a tailgate safety meeting each morning before beginning daily field activities. The Field Coordinator will terminate any project field work activities that do not comply with the HASP. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASP. GeoEngineers will review subcontractor HASPs before commencement of their work at the Site.

DATA QUALITY OBJECTIVES

The QA objective for technical data is to collect environmental monitoring data of known, acceptable and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for precision, accuracy, representativeness, completeness and comparability, and by testing data against these criteria.

The sampling design, field procedures, laboratory procedures and QC procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include quantitative factors (precision, bias, accuracy, completeness and reporting limits) and qualitative factors (representativeness and comparability). The measurement quality objectives associated with these data quality factors are summarized in Table A-1 and are discussed below.

Analytes and Matrices of Concern

Samples of soil and groundwater will be collected during the assessment. Tables A-2 and A-3 summarize the chemical analyses to be performed on Site soil and groundwater samples, respectively.

Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or IDL provide insight to site conditions, QA dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL). The contract laboratory will provide numerical results for all analytes and report them as detected above the PQL or undetected at the PQL.

Achieving a stated detection limit for a given analyte is helpful in providing statistically useful data. Intended data uses, such as comparison to numerical criteria or risk assessments, typically dictate specific project target reporting limits (TRLs) necessary to fulfill stated objectives. The PQLs for Site contaminants of potential concern (COPCs) are presented in Tables A-2 and A-3 for soil and groundwater, respectively. These reporting limits were obtained from an Ecology-accredited laboratory (TestAmerica, Laboratories, Inc., Spokane Valley, Washington). Other criteria include State of Washington (WAC 173-201) and federal Ambient Water Quality Criteria.

The analytical methods and processes selected will provide PQLs less than the TRLs under ideal conditions. However, the reporting limits in Tables A-2 through A-3 are considered targets because several factors may influence final detection limits including:

1. Moisture and other physical soil conditions affect detection limits.
2. Analytical procedures might require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value much higher than a specified TRL. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize site conditions.

Precision

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by:

$$RPD\,(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2}\ X\ 100,$$

Where

D_1 = Concentration of analyte in sample

D_2 = Concentration of analyte in duplicate sample

The calculation applies to split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates), and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review one or more pertinent documents (EPA, 1999; EPA, 2004a) that address criteria exceedances and courses of action. Relative percent difference goals for this effort are 30 percent in groundwater and 40 percent in soil for all analyses, unless the duplicate sample values are within 5 times the reporting limit.

Accuracy

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest.

Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as "system monitoring compound"), a matrix spike (MS) result, or from a standard reference material where:

$$Recovery\ (\%) = \frac{Sample\ Result}{Spike\ Amount}\ X\ 100$$

Persons performing the evaluation must review one or more pertinent documents (EPA, 1999; EPA, 2004a) that address criteria exceedances and courses of action. Accuracy criteria for surrogate spikes, MS, and laboratory control spikes (LCS) are found in Table A-1 of this QAPP.

Representativeness, Completeness and Comparability

Representativeness expresses the degree to which data accurately and precisely represent the actual site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within this Work Plan and QAPP;
- Comparing analytical results of field duplicates to determine the variations in the analytical results; and
- Invalidating non-representative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation and reporting activities.

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved, an evaluation will be made to determine if the data are adequate to meet study objectives.

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

Holding Times

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents have volatilized from the sample or degraded. Results for that analysis will be qualified as estimated to indicate that the reported results may be lower than actual site conditions. Holding times are presented in Table A-4.

Blanks

According to the *National Functional Guidelines for Organic Data Review* (EPA, 1999), "The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks and equipment blanks)." Trip blanks are placed with samples during shipment; method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* and professional judgment.

SAMPLE COLLECTION, HANDLING AND CUSTODY

Sampling Equipment Decontamination

Sampling equipment decontamination procedures are described in "Section 3.4" of the SAP.

Sample Containers and Labeling

The Field Coordinator will establish field protocol to manage field sample collection, handling and documentation. Soil and groundwater samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sample containers and preservatives are listed in Table A-4.

Sample containers will be labeled with the following information at the time of collection:

- Project name and number;
- Sample name, which will include a reference to depth if appropriate; and
- Date and time of collection.

The sample collection activities will be noted in the field log books. The Field Coordinator will monitor consistency between the Work Plan, sample containers/labels, field log books and the COC forms.

Sample Storage

Samples will be placed in a cooler with "blue ice" or double-bagged "wet ice" immediately after they are collected. The objective of the cold storage will be to attain a sample temperature of 4 degrees Celsius.

Holding times will be observed during sample storage. Holding times for the project analyses are summarized in Table A-4.

Sample Shipment

The samples will be transported and delivered to the analytical laboratory in the coolers. Field personnel will transport and hand-deliver samples that are being submitted to a local laboratory for analysis. Samples that are being submitted to an out-of-town laboratory for analysis will be transported by a commercial express mailing service on an overnight basis. The Field Coordinator will confirm that the shipping container (cooler) has been properly secured using clear plastic tape and custody seals.

Measures will be implemented to minimize the potential for sample breakage, which includes packaging materials and placing sample bottles in the cooler in a manner intended to minimize damage. Sample bottles will be appropriately wrapped with bubble wrap or other protective material before being place in coolers.

COC Records

Field personnel are responsible for the security of samples from the time the samples are taken until the samples have been received by the shipper or laboratory. A COC form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the COC form includes:

- Project name and number;
- Sample identification number;
- Date and time of sampling;
- Sample matrix (soil, water, etc.) and number of containers from each sampling point, including preservatives used;
- Depth of subsurface soil sample;
- Analyses to be performed; and
- Names of sampling personnel and transfer of custody acknowledgment spaces.

The original COC record will be signed by a member of the field team and bear a unique tracking number. Field personnel shall retain carbon copies and place the original and remaining copies in a plastic bag, placed within the cooler or taped to the inside lid of the cooler before sealing the container for shipment. This record will accompany the samples during transit by carrier to the laboratory.

Laboratory Custody Procedures

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation will include at a minimum, the analysts name or initial, time and date.

Field Documentation

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will maintain daily field logs while on-site. The field logs will be prepared on field report forms or in a bound logbook. Entries in the field logs and associated sample documentation forms will be typed in the field made in waterproof ink, and corrections will consist of line-out deletions that are initialed and dated. Individual logbooks will become part of the project files at the conclusion of the site characterization field explorations.

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description;
- Site or sampling area sketch showing sample location and measured distances;
- Sampler's name(s);
- Date and time of sample collection;
- Designation of sample as composite or discrete;
- Type of sample (soil or water);
- Type of sampling equipment used;
- Field instrument readings;
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, sample disturbance, etc.);
- Preliminary sample descriptions (e.g., lithologies, noticeable odors, colors, field-screening results);
- Sample preservation;
- Shipping arrangements (overnight air bill number); and
- Name of recipient laboratory.

In addition to the sampling information, the following specific information also will be recorded in the field log for each day of sampling:

- Team members and their responsibilities;
- Time of arrival/entry on site and time of site departure;
- Other personnel present at the site;
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel;
- Deviations from sampling plans, Site safety plans and QAPP procedures;
- Changes in personnel and responsibilities with reasons for the changes;
- Levels of safety protection; and
- Calibration readings for any equipment used and equipment model and serial number.

The handling, use and maintenance of field log books are the field coordinator’s responsibilities.

CALIBRATION PROCEDURES

Field Instrumentation

Equipment and instrumentation calibration facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use and environmental conditions. The basic calibration frequencies are described below.

The photoionization detector (PID) used for vapor measurements will be calibrated daily, if required (based on the model used), for site safety monitoring purposes in general accordance with the manufacturer's specifications. If daily calibration is not required for a specific PID model, calibration of the PID will be checked to make sure it is up to date. The calibration results will be recorded in the field logbook.

The water quality measuring system will be calibrated prior to each monitoring event in general accordance with the manufacturer's specifications. The calibration results will be recorded in the field report.

Laboratory Instrumentation

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory standard operating procedures. Calibration documentation will be retained at the laboratory and readily available for a period of 6 months.

DATA REPORTING AND LABORATORY DELIVERABLES

Laboratories will report data in formatted hardcopy and digital form. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample identification, the laboratory identification, reporting units, qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates and detection limit (PQL only). Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory EDD will be established by GeoEngineers, Inc., with the contract laboratory. Final results will be sent to the PM.

INTERNAL QC

Table A-5 summarizes the types and frequency of QC samples to be collected during the site characterization, including both field QC and Laboratory QC samples.

Field QC

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods and the influence of off-site factors on environmental samples. Off-site factors include airborne volatile organic compounds and potable water used in drilling activities.

Field Duplicates

In addition to replicate analyses performed in the laboratory, field duplicates also serve as measures for precision. Under ideal field conditions, field duplicates, are created when a volume of the sample matrix is thoroughly mixed, placed in separate containers and identified as different samples. This tests both the precision and consistency of laboratory analytical procedures and methods, and the consistency of the sampling techniques used by field personnel.

One field duplicate will be collected during each groundwater and soil sampling event. The duplicate sample will be analyzed for the COPCs specified for the given sample location or well.

Trip Blanks

Trip blanks accompany groundwater sample containers used for VOC analyses during shipment and sampling periods. One trip blank will be analyzed per sampling event.

Laboratory QC

Laboratory QC procedures will be evaluated through a formal data validation process. The analytical laboratory will follow standard method procedures that include specified QC monitoring requirements. These requirements will vary by method but generally include:

- Method blanks;
- Internal standards;
- Calibrations;
- MS/matrix spike duplicates (MSD);
- LCS/laboratory control spike duplicates (LCSD);
- Laboratory replicates or duplicates; and
- Surrogate spikes.

Laboratory Blanks

Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil like material having undergone a contaminant destruction process or high performance liquid chromatography (HPLC) water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatiles analysis since VOCs can be transported in the laboratory through the vapor phase. If a substance is found in the method blank, then one (or more) of the following occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered "real," and which ones are attributable to the analytical process. Furthermore, the guidelines (EPA, 2004b) state, ". . . there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example."

Calibrations

Several types of calibrations are used, depending on the method, to determine whether the methodology is 'in control' by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations and continuing calibration verification.

MS/MSD

MS/MSD samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH affects the results of semivolatile organic compounds (SVOCs). Or, the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data is reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix affects cannot be determined due to dilution and/or high levels of related substances in the sample. A MS is evaluated by spiking a known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount, and multiplying by 100.

The samples for the MS and MSD analyses should be collected from a boring or sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be achieved with low levels of contaminants. Additional sample volume will be collected for these analyses. This MS/MSD sample will be a composite to achieve a level of representativeness and reproducibility in the data.

LCS/LCSD

Also known as blanks spikes, LCSs are similar to MSs in that a known amount of one or more of the target analytes are spiked into a prepared media and a percent recovery of the spiked substances are calculated. The primary difference between a MS and LCS is that the LCS media is considered "clean" or contaminant free. For example, HPLC water is typically used for LCS water analyses. The purpose of an LCS is to help assess the overall accuracy and precision of the analytical process including sample preparation, instrument performance and analyst performance. LCS data must be reviewed in context with other controls to determine if out-of-control events occur.

Laboratory Replicates/Duplicates

Laboratories often utilize MS/MSDs, LCS/LCSDs, and/or replicates to assess precision. Replicates are a second analysis of a field collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process, but most commonly occur as a second analysis on the extracted media.

Surrogate Spikes

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to, but not one of, the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument, noting the surrogate recovery. Each surrogate used has an acceptable range of percent recovery. If a surrogate recovery is low, sample results may be biased low and depending on the recovery value, a possibility of false negatives may exist. Conversely, when recoveries are above the specified range of acceptance a possibility of false positives exist, although non-detected results are considered accurate.

DATA REDUCTION AND ASSESSMENT PROCEDURES

Data Reduction

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The laboratory personnel will reduce the analytical data for review by the PM and QA leader (if needed).

Field Measurement Evaluation

Field data will be reviewed at the end of each day by following the QC checks outlined below and procedures in the Work Plan. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information;
- Field instrumentation and calibration;
- Sample collection protocol;
- Sample containers, preservation and volume;
- Field QC samples collected at the frequency specified;
- Sample documentation and COC protocols; and
- Sample shipment.

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. The final report will contain what effects, if any, an incident has on data quality. Sample collection information will be reviewed for correctness before inclusion in a final report.

Field QC Evaluation

A field QC evaluation will be conducted by reviewing field log books and daily reports, discussing field activities with staff and reviewing field QC samples (trip blanks and field duplicates). Trip blanks will be evaluated using the same criteria as method blanks.

Precision for field duplicate soil samples will not be evaluated because even a well-mixed sample is not entirely homogenous due to sampling procedures, soil conditions and contaminant transport mechanisms.

Laboratory Data QC Evaluation

The laboratory data assessment will consist of a formal review of the following QC parameters:

- Holding times;
- Method blanks;
- MS/MSD;
- LCS/LCSD;
- Surrogate spikes; and
- Replicates.

In addition to these QC mechanisms, other documentation such as cooler receipt forms and case narratives will be reviewed to fully evaluate laboratory QA/QC.

Table A-1

Measurement Quality Objectives

Colville Post and Pole

Stevens County, Washington

		Surrogate Standards (SS) %R Limits [1,2,3]	Check Standard (LCS) %R Limits [2,3]		Matrix Spike (MS) %R Limits [3]		MSD Samples or Lab Duplicate (Dup) RPD Limits [4]		Field Duplicate Samples RPD Limits [4]
Laboratory Analysis	**Reference Method**	**Soil/Water**	**Soil**	**Water**	**Soil**	**Water**	**Soil**	**Water**	**Water**
Diesel-range Petroleum Hydrocarbons	NWTPH-Dx	50%-150% (soil) 50%-150% (water)	73%-133%	54.4%-136%	70.1-%-139%	54.5%-136%	≤25% (MSD) ≤40% (Dup)	≤32.5% (MSD) ≤25% (Dup)	≤20%
Semi-volatile Organic Compounds (SVOCs)	EPA 8270	30%-150%	40%-120%	40%-130%	30%-120%	35%-125%	≤20%	≤20%	≤20%

Notes:

[1]Individual surrogate recoveries are compound specific.

[2]Recovery Ranges are estimates. Actual ranges will be provided by the laboratory when contracted.

[3]Percent Recovery Limits are expressed as ranges based on laboratory control limits. Limits will vary for individual analytes.

[4]RPD control limits are only applicable if the concentration are greater than 5 times the method reporting limit (MRL). For results less than 5 times the MRL, the difference between the sample and duplicate must be less than 2X the MRL for soils and 1X the MRL for waters.

Method numbers refer to EPA SW-846 Analytical Methods or Washington State Department of Ecology (Ecology) recommended analytical methods.

%R = percent recovery; LCS = Laboratory Control Sample; MS/MSD = Matrix Spike/Matrix Spike Duplicate;

RPD = Relative Percent Difference; NA = Not Applicable

Table A-2

Methods of Analysis and Target Reporting Limits (Soil)

Colville Post and Pole
Stevens County, Washington

Analyte	Analytical Method	Practical Quantitation Limit[1] (mg/kg)	MTCA Method A Cleanup Level (mg/kg)
Total Petroleum Hydrocarbons			
TPH-Diesel Range	NWTPH-Dx	20	2,000
Semi - Volatile Organic Compounds			
Pentachlorophenol (PCP)	EPA 8270 SIM	0.050	NE
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)	EPA 8270 SIM	RL's vary (Benzo(a)pyrene RL = 0.01	0.1 [2]
Naphthalenes	EPA 8270 SIM	0.010	5 [3]

Notes:

[1]Practical quantitation limist (PQLs) based on information provided by TestAmerica Laboratories, Inc.

[2]Cleanup level based on the toxic equivalency of benzo(a)pyrene as established in MTCA 173-340-708.

[3]Cleanup level for total naphthalenes (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene).

mg/kg = milligrams per kilogram; NE = Not established

Table A-3

Methods of Analysis and Target Reporting Limits (Groundwater)

Colville Post and Pole

Stevens County, Washington

Analyte	Analytical Method	Practical Quantitation Limit[1] (μg/l)	MTCA Method A Cleanup Levels (μg/l)
Total Petroleum Hydrocarbons			
TPH-Dielsel Range	NWTPH-Dx	240	500
Semi-Volatile Organic Compounds			
Pentachlorophenol (PCP)	EPA 8270 SIM	1	NE
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)	EPA 8270 SIM	RL's vary (Benzo(a)pyrene RL = 0.1	0.1[2]
Naphthalenes	EPA 8270 SIM	0.1	160[3]

Notes:

[1]Practical quantitation limist (PQLs) based on information provided by TestAmerica Laboratories, Inc.

[2]Cleanup level based on the toxic equivalency of benzo(a)pyrene as established in MTCA 173-340-708.

[3]Cleanup level for total naphthalenes (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene).

μg/l = micrograms per liter; NE = not established

Table A-4

Test Methods, Sample Containers, Preservation and Holding Time[1]

Colville Post and Pole

Stevens County, Washington

Analysis	Method	Soil				Groundwater			
		Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times	Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times
Diesel-Range Hydrocarbons	NWTPH-Dx	30 g	4 or 8 oz glass wide-mouth with Teflon-lined lid	Cool 4°C	14 days	125 mL	125 ml amber glass	Cool 4 C, HCl to pH < 2	14 days
SVOCs	EPA 8270	30 g	4 or 8 oz glass wide-mouth with Teflon-lined lid	Cool 4°C	14 days	250 mL	2 - 250 mL amber glass	Cool 4 C	7 days

Notes:

[1]Holding Times are based on elapsed time from date of collection

HCl = Hydrochloric Acid; HNO_s = Nitric Acid; oz = ounce; mL = millilieter; L = liter; g = gram; NA = not applicable

Table A-5

Quality Control Samples Type and Frequency

Colville Post and Pole

Stevens County, Washington

Parameter	Field QC		Laboratory QC			
	Field Duplicates	Trip Blanks	Method Blanks	LCS	MS / MSD	Lab Duplicates
Diesel Range Hydrocarbons	1/20 groundwater samples	NA	1/batch	1/batch	1/batch	1/batch
SVOCs	1/20 groundwater samples	NA	1/batch	1/batch	1 set/batch	NA

Note:

An analytical lot or batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and MS/ MSD (or MS and lab duplicate).

No more than 20 field samples can be contained in one batch.

LCS = Laboratory control sample; MS = Matrix spike sample; MSD = Matrix spike duplicate sample; VOCs = volatile organic compounds; NA = Not applicable

APPENDIX B
Health and Safety Plan

APPENDIX B
HEALTH AND SAFETY PLAN
DEPARTMENT OF ECOLOGY: COLVILLE POST AND POLE

This HASP is to be used in conjunction with the GeoEngineers Safety Program Manual. Together, the written safety programs and this HASP constitute the Site safety plan for the Colville Post and Pole Site. This plan is to be used by GeoEngineers personnel on this Site and must be available at all times that project work is conducted on the Site. If the work entails potential exposures to other substances or unusual situations, additional safety and health information will be included and the plan will be approved by the GeoEngineers Health and Safety Manager. All plans are to be used in conjunction with current standards and policies outlined in the *GeoEngineers Health and Safety Program Manual*.

TABLE 1. GENERAL PROJECT INFORMATION

Project Name:	**Colville Post and Pole Site**
Project Number:	00504-098-00; Task 100
Type of Project:	Soil/Groundwater Assessment and Interim Waste Consolidation/Disposal
Project Address:	396 Highway 395 North, Stevens County, Washington
Start/Completion:	August 1, 2014 to June 30, 2015
Subcontractors:	Environmental West Drilling, Environmental Excavation Contractor, Private Utility Locator

Liability Clause - This Site Safety Plan is intended for use by GeoEngineers Employees only. It does not extend to the other contractors or subcontractors working on this Site. If requested by subcontractors, this Site safety plan may be used as a minimum guideline for those entities to develop safety plans or procedures for their own staff to work under. In this case, Form 3 shall be signed by the subcontractor.

All personnel participating in this project must receive initial health and safety orientation (Form 1). Thereafter, brief tailgate safety meetings will be held as deemed necessary by the Site Safety and Health Supervisor.

The orientation and the tailgate safety meetings shall include a discussion of emergency response, Site communications and Site hazards.

TABLE 2. ORGANIZATION CHART

Chain of Command	Title	Name	Telephone Numbers
1	Project Manager	John Haney	O: 509.209.2818 C: 509.768.5861
2	Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) Supervisor	John Haney	O: 509.209.2818 C: 509.768.5861

Chain of Command	Title	Name	Telephone Numbers
3	Field Engineer/Geologist	Katie Hall Josh Lee Chelsea Voss	O: 509.209.2839 C: 509.768.3579 O: 509.209.2832 C: 406.239.7810 O: 509.209.2837 C: 425.327.9591
4	Site Safety and Health Supervisor (Site Safety Officer; [SSO])	Katie Hall/Josh Lee/Chelsea Voss	See above
5	Client Assigned Site Supervisor	John Haney	O: 509.209.2818 C: 509.768.5861
6	Health and Safety Program Manager (HSM)	Wayne Adams	O: 425.861.6000 C: 253.350.4387

SITE SAFETY AND HEALTH SUPERVISOR

The Site Safety and Health Supervisor is the individual present at a hazardous waste site responsible to the employer and who has the authority and knowledge necessary to establish the site-specific health and safety plan and verify compliance with applicable safety and health requirements.

GeoEngineers employees often do not have stop work authority on projects controlled by other contractors; however, any GeoEngineers employee, regardless of job title, working in the field will be responsible for contacting the Project Manager if they observe practices on the job site that are serious safety violations that are not under their control. They will document the unsafe practices and will contact the site supervisor as identified by the client, if the client directly controls the site. If a site supervisor is not present, the GeoEngineers Project Manager, once notified, will contact the client. This action establishes GeoEngineers commitment to site health and safety on all job sites as our duty of care to the public, contractors and clients.

TABLE 3. PERSONNEL TRAINING RECORDS

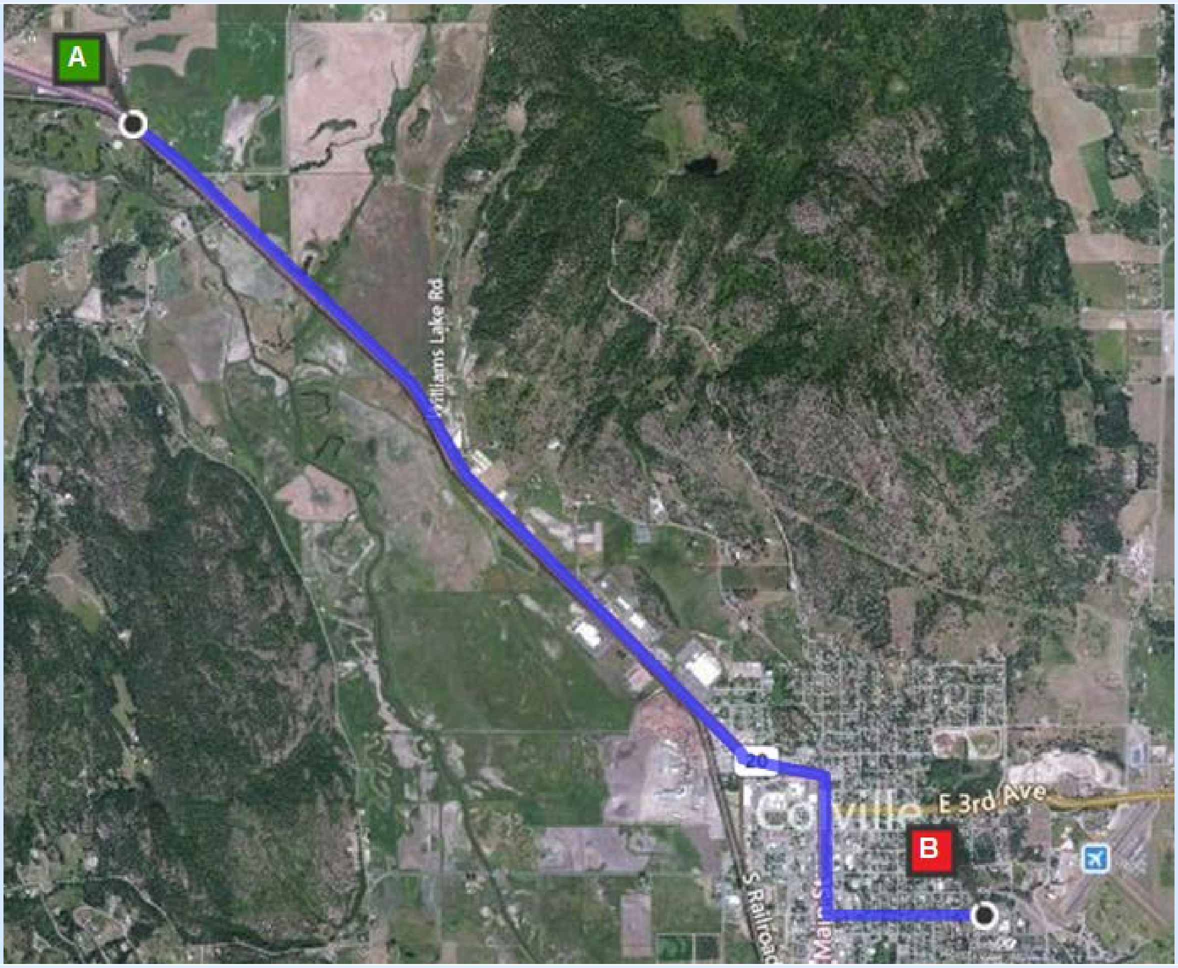
Name of Employee On Site	Level of HAZWOPER Training (24-/40-hr)	Date of 8-Hour Refresher Training	First Aid/ Cardiopulmonary Resuscitation (CPR)	Date of Respirator Fit Test
Josh Lee	40-hr	03/17/14	5/1/2013	
Katie Hall	40-hr	4/9/2014		3/12/2012
Chelsea Voss	40-hr	NA	6/18/2014	3/7/2014

TABLE 4. EMERGENCY INFORMATION – COLVILLE POST AND POLE SITE

Hospital Name and Address:	Providence Mt Carmel Hospital 982 East Columbia Avenue, Colville, Washington 99114
Phone Numbers (Hospital ER):	509.685.5100
Distance:	4.6 miles

Route to Hospital:

1. Head east on U.S. Highway 395.
2. Take 2nd exit at roundabout.
3. Turn Left at East Columbia Avenue.



Ambulance:	911
Poison Control:	800.222.1222
Police:	911
Fire:	911
Location of Nearest Telephone:	Cell phones are carried by field personnel.
Nearest Fire Extinguisher:	Located in the GeoEngineers vehicle on Site.
Nearest First-Aid Kit:	Located in the GeoEngineers vehicle on Site.

STANDARD EMERGENCY PROCEDURES

1. Get help
    a. Send another worker to phone 911 (if necessary)
    b. As soon as feasible, notify GeoEngineers' project manager
2. Reduce risk to injured person
    a. Turn off equipment
    b. Move person from injury location (if possible)
    c. Keep person warm
    d. Perform CPR (if necessary)
3. Transport injured person to medical treatment facility (if necessary)
    a. By ambulance (if necessary) or GeoEngineers vehicle
    b. Stay with person at medical facility
    c. Keep GeoEngineers' manager apprised of situation and notify human resources manager of situation

COMPREHENSIVE WORK PLAN

- Contact the one-call utility locate service and coordinate private locate.
- Collect soil and groundwater samples from direct-push soil borings. Samples will be submitted for polycyclic aromatic hydrocarbon (PAH), pentachlorophenol (PCP) and diesel-range petroleum hydrocarbons (DRPH).
- Observe and document contractor operation to locate, consolidate and dispose IDW.

TABLE 5. LIST OF FIELD ACTIVITIES

Check the Activities to be Completed during the Project	
X	Site reconnaissance
X	Exploratory borings
X	Construction monitoring
	Surveying
	Test pit exploration
	Monitor well installation
	Monitor well development
X	Soil sample collection
X	Field screening of soil samples
	Soil Vapor measurements
	Soil Vapor sampling

Check the Activities to be Completed during the Project	
X	Groundwater sampling
X	Groundwater depth
	Product sample measurement (if any)
	Soil stockpile testing
	Remedial excavation
	Underground storage tank (UST) removal monitoring
	Remediation system monitoring
	Recovery of free product

HAZARD ANALYSIS

Note: A hazard assessment will be completed at every site prior to beginning field activities. Updates will be included in the daily log. This list is a summary of hazards listed on the form.

TABLE 6. PHYSICAL HAZARDS

Physical Hazards	
X	Drill rigs
	Overhead hazards/power lines
X	Tripping/puncture hazards
X	Snow, rain, ice, freezing temperatures
X	Heat/Cold, Humidity
X	Utilities/ utility locate
X	Contaminated soil
X	Contaminated groundwater
X	Loud noise
X	Backhoe
X	Trackhoe
	Crane
X	Front End Loader
	Excavations/trenching (1:1 slopes for Type B soil)
	Shored/braced excavation if greater than 4 feet of depth

Procedures to Mitigate Physical Hazards

- Utility check list completed.
- Lifting hazards: Use proper techniques, mechanical devices where appropriate.

- Terrain obstacles: Work will be conducted generally in areas without restricted access. Heavy brush, shrubs and trees might limit access to some proposed boring locations.
- Personnel will wear high-visibility vests for increased visibility by vehicle and equipment operators.
- Field personnel will be aware constantly of the location and motion of heavy equipment. A safe distance will be maintained between personnel and the equipment. Personnel will be visible to the operator at all times and will remain out of the swing and/or direction of the equipment apparatus. Personnel will approach operating heavy equipment only when they are certain the operator has indicated it is safe to do so.
- Overhead Power Line Clearance Safety: Working equipment around overhead power lines requires distance and a spotter. Heavy equipment and/or vehicles used on this Site will not work within 20 feet of overhead utility lines, if present, without first ensuring that the lines are not energized. This distance may be reduced to 10 feet depending on the client and the use of a safety watch.
- Before a job begins, call the utility company and find out voltage in lines. Have the equipment de-energized if possible. Ensure that the equipment remains de-energized by using some type of lockout and tag procedure, and ensure that the electrician uses grounding lines when they are required.
- Don't operate equipment around overhead power lines unless you are authorized and trained to do so. If an object (scaffolds, crane, etc.) must be moved in the area of overhead power lines, appoint a competent worker whose sole responsibility is to observe the clearance between the power lines and the object. Warn others if the minimum distance is not maintained.
- Never touch an overhead line if it has been brought down by machinery or has fallen. Never assume lines are dead. When a machine is in contact with an overhead line, DO NOT allow anyone to come near or touch the machine. Stay away from the machine and summon outside assistance. Never touch a person who is in contact with a live power line.
- If you are in a vehicle that is in contact with an overhead power line, DON'T LEAVE THE VEHICLE. As long as you stay inside and avoid touching metal on the vehicle, you may avoid an electrical hazard. If you need to get out to summon help or because of fire, jump out without touching any wires or the machine, keep your feet together, and hop to safety.
- When mechanical equipment is being operated near overhead power lines, employees standing on the ground may not contact the equipment unless it is located so that the required clearance cannot be violated even at the maximum reach of the equipment.
- When working near overhead power lines, the use of nonconductive wooden or fiberglass ladders is recommended. Aluminum ladders and metal scaffolds or frames are efficient conductors of electricity.
- Avoid storing materials under or near overhead power lines.
- Personnel will avoid tripping hazards, steep slopes, pit and other hazardous encumbrances. If it becomes necessary to work within 6 feet of the edge of a pit, slope, pier or other potentially hazardous area, appropriate fall protection measures will be implemented by the Site Safety and Health Supervisor in accordance with Occupational Safety and Health Administration (OSHA)/Division of Occupational Safety and Health (DOSH) regulations and the GeoEngineers' *Safety Program manual*.
- Heat stress control measures must be implemented according to the GeoEngineers program, with water provided on Site. See "Additional Elements" later in this HASP.

- Excessive levels of noise (exceeding 85 decibels [dBA]) are anticipated. Personnel potentially exposed will wear ear plugs or muffs with a noise reduction rating (NRR) of at least 25 dBA whenever it becomes difficult to carry on a conversation 6 feet away from a co-worker or whenever noise levels become bothersome. (Increasing the distance from the source will decrease the noise level noticeably.)
- Work may be conducted in rain, freezing rain, snow, or icy conditions. Care will be taken to wear warm water proof clothing that limits exposure to cold.

TABLE 7. ENGINEERING CONTROLS

X	Trench shoring (1:1 slope for Type B Soils)
X	Locate work spaces upwind/wind direction monitoring
x	Other soil covers (as needed)
	Other (specify _______________

TABLE 8. SUMMARY OF CHEMICAL HAZARDS

Compound/ Description	Exposure Limits/Immediately Dangerous to Life or Health (IDLH)	Exposure Routes	Toxic Characteristics
Diesel Fuel	OSHA PEL (none) American conference of Governmental Industrial Hygienists (ACGIH) has adopted 100 milligrams per cubic meter (mg/m^3) for a time-weighted average (TWA) (as total hydrocarbons)	Ingestion, inhalation, skin absorption, skin and eye contact	Irritated eyes, skin, mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; and headache; dermatitis.
Pentachlorophenol (PCP)	IDLH limit of 2.5 mg/m^3 based on acute toxicity data in humans TWA is 0.5 mg/m^3 with a skin notation	Inhalation, ingestion, skin absorption, and/or direct contact	Carcinogenic; cough, dizziness, headache, drowsiness, difficulty breathing and sore throat. It is also hazardous by ingestion (soil particles, etc.) causing abdominal cramps, diarrhea, nausea, vomiting and weakness.
Naphthalene	See Specific Material Safety Data Sheets	Absorption, ingestion, skin and/or eye contact	Irritation to nose, throat, lungs and respiratory tract. CNS effects may include headache, dizziness, etc.
Polycyclic aromatic hydrocarbons (PAHs) as coal tar pitch volatiles	OSHA = TWA 0.5 mg/m3 NIOSH = 0. 001 ppm IDLH 5.0 ppm Threshold limit value-TWA = 0.5 ppm	Inhalation (dusts or mists), skin absorption, ingestion, skin and/or eye contact	Irritated eyes, chloracne, liver damage, reproductive effects, potential carcinogen

Compound/ Description	Exposure Limits/Immediately Dangerous to Life or Health (IDLH)	Exposure Routes	Toxic Characteristics
Arsenic	OSHA = TWA 0.01 mg/m³ NIOSH = C 0.002 mg/m³ IDLH = 5 mg/m³ TLV-TWA = 0.01 mg/m³	Inhalation, skin absorption, ingestion, skin and/or eye contact	Ulcerated nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, potential carcinogen
Cadmium as dust	OSHA = TWA 0.005 mg/m³ IDLH 9 mg/m³ TLV –TWA = 0.002 mg/m³	Respiratory system, kidneys, prostate, blood	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]
Mercury (and inorganic compounds as mercury)	TLV-TWA = 0.025 mg/m³ Ceiling 0.1 mg/m³ IDLH 10 mg/m³	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritated eyes and skin, coughing, chest pain, difficulty breathing, bronchitis, pneumonitis, tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion), stomatitis, salivation, gastrointestinal disturbance, anorexia, weight loss, proteinuria

Notes:

ppm	parts per million
mg/m³	milligrams per cubic meter
MSDS	material safety data sheet
OSHA	Occupational Safety and Health Administration
ACGIH	American Conference of Governmental Industrial Hygienists
NIOSH	National Institute for Occupational Safety and Health Recommended
TLV-TWA	Threshold limit value- time weighted average for no more than 8 hours (ACGIH)
IDLH	Immediately dangerous to life or health if exposed for more than 30 minutes (NIOSH)
PEL	permissible exposure limits
OSHA = TWA	Time weighted average for no more than 8 hours (OSHA)
NIOSH = TWA	TWA of no more than 10 hours (NIOSH)

Pentachlorophenol

Pentachlorophenol (penta or PCP) is a nonflammable crystalline solid that does not have an ionization potential and is therefore not detected by the PID. As a wood preservative, it is commonly applied as a 0.1 percent solution in mineral spirits, No. 2 fuel oil, or kerosene. It is absorbed through the skin, and irritating to eyes, nose and mucous membranes. PCP is a potential carcinogen or listed as an animal carcinogen. When inhaled, it can cause cough, dizziness, headache, drowsiness, difficulty breathing and sore throat. It is also hazardous by ingestion (soil particles, etc.) causing abdominal cramps, diarrhea, nausea, vomiting and weakness. Penta has low volatility (VP at 77°F is 0.0001 mmHg) like the others, but often the combination of chemical odors in oils or heavily contaminated soils can cause transient nausea and headache. Penta (liquid) has an IDLH limit of 2.5 mg/m³ based on acute toxicity data in humans. This may be a conservative value due to the lack of relevant acute toxicity data for workers exposed to concentrations above 2.4 mg/m^3. The OSHA PCP PEL TWA is 0.5 mg/m^3 with a skin notation.

Pentachlorophenol exists as colorless or white crystals (when pure) with a sharp, phenolic odor when hot, but very little odor at room temperature. The odor threshold for pentachlorophenol is approximately 12 ppm.

Mercury

Mercury is a neurotoxic substance that can produce a wide range of health effects depending on the amount and timing of exposure. Mercury is a liquid at room temperature but vaporizes readily; in vapor form it is readily absorbed through the lungs. Repeated exposures to low levels of mercury vapor over long periods have been associated with tremors, irritability, impulsiveness, drowsiness, impaired memory and sleep disturbances. These effects may occur at lower levels of exposure in children than adults.

When mercury attaches to an organic molecule, it may be absorbed into the body through the digestive tract. Methyl mercury, which is produced naturally by certain bacteria, is such a molecule. It can cross the placenta and enter the brain, causing severe brain damage in fetuses. High mercury levels in fish consumed by pregnant women have been linked to severe brain damage and cerebral palsy in newborns. For more information: http://www.ilpi.com/safety/mercury.html

Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)

Exposure to cPAHs can occur via inhalation of vapors, ingestion, and skin and eye contact. Skin contact can result in reddening or corrosion. Ingestion can cause nausea, vomiting, blood pressure fall, abdominal pain, convulsions and coma. Damage to the central nervous system can also occur. The U.S. Department of Health and Human Services has classified 15 PAHs compounds as having sufficient evidence for carcinogenicity, while the U.S. EPA has classified at least 5 of the identified PAHs as human carcinogens. There is no currently assigned PEL-TWA for cPAHs, but the closely related material coal tar is listed as coal tar pitch volatiles with a PEL-TWA of 0.2 mg/m^3.

PAHs and cPAHs as soil contaminants can be irritating to eyes and mucous membranes. PAHs are also formed during combustion and are linked to lung cancers with exposure to combustion byproducts. Lymphatic cancers are reported in the literature with PAHs in the presence of carbon black.

Sample handling, packaging and processing: skin contact with contaminated media and preservative acids. Wear modified Level D personal protection equipment (PPE).

Decontamination of equipment: Inhalation or eye contact or skin contact with airborne mists or vapors, or contaminated liquids. Wear safety glasses; decontaminate clothing and skin prior to eating, drinking or other hand to mouth contact.

Groundwater Sampling: Splash hazard associated with groundwater extraction and sample collection. Possible corrosion hazard associated with sample preservatives. Wear protective clothing and eye protection and chemical-resistant gloves are required when handling samples.

TABLE 9. BIOLOGICAL HAZARDS AND PROCEDURES

Y/N	Hazard	Procedures
Y	Poison Ivy or other vegetation	
Y	Insects or snakes	
	Others	

Site personnel shall avoid contact with or exposures to potential biological hazards encountered.

Additional Hazards (Update in Daily Log)

Include evaluation of:

- Physical Hazards (equipment, traffic, tripping, heat stress, cold stress and others)
- Chemical Hazards (odors, spills, free product, airborne particulates and others present)
- Biological Hazards (snakes, spiders, dogs, other animals, poison ivy and others present)

Air Monitoring Plan

Work upwind if at all possible.

Check Instrumentation to be Used

_______ TLV Monitor (flammability only, for methane and petroleum vapors)

___X___ PID

_______ Other (i.e., detector tubes): ____

Check Monitoring Frequency/Locations and Type (Specify: Work Space, Borehole, Breathing Zone)

_______ 15 minutes—Continuous during soil disturbance activities or handling samples

_______ 15 minutes

_______ 30 minutes

___X___ Hourly (in breathing zone during excavations, drilling, sampling)

SITE CONTROL PLAN

An up-to-date site control plan will be developed before field activities begin to minimize employee exposure to hazardous substances and including the following: a Site map is included with the SAP. The hospital route map is included with this HASP.

Traffic or Vehicle Access Control Plans

The gate to the Site will be kept closed to restrict public vehicular and pedestrian access to the Site.

Site Work Zones

Exclusion zones will be established within approximately 10 feet around each boring or well during drilling/sampling. Only persons with the appropriate training will enter this perimeter while work is being conducted there.

Buddy System

Personnel on-Site should use the buddy system (pairs), particularly whenever communication is restricted. If only one GeoEngineers employee is on-Site, a buddy system can be arranged with subcontractor/contractor personnel.

Site Communication Plan

Positive communications (within sight and hearing distance or via radio) should be maintained between pairs on-Site, with the pair remaining in proximity to assist each other in case of emergencies. The team should prearrange hand signals or other emergency signals for communication when voice communication becomes impaired (including cases of lack of radios or radio breakdown). In these instances, consider suspending work until communication can be restored; if not, the following are some examples for communication:

1. Hand gripping throat: Out of air, can't breathe.
2. Gripping partner's wrist or placing both hands around waist: Leave area immediately, no debate.
3. Hands on top of head: Need assistance.
4. Thumbs up: Okay, I'm all right; or, I understand.
5. Thumbs down: No, negative.
6. Extended fist: Stop.

Decontamination Procedures

Non-dedicated sampling equipment will be decontaminated with Liquinox™ soap and rinsed with distilled water prior to collecting any samples for analysis.

Personal decontamination consists of removing outer protective Tyvek clothing (if used), washing soiled boots, removing respirator (if used); hands and face will be washed in either a portable wash station or a bathroom facility in the support zone. Employees will perform decontamination procedures and wash prior to eating, drinking or leaving the Site. All disposable personal protective clothing (i.e., nitrile gloves) will be bagged with other miscellaneous waste and discarded in the appropriate refuse receptacle.

PERSONAL PROTECTIVE EQUIPMENT

PPE will consist of standard Level D equipment. Disposable PPE (gloves) will be placed into plastic trash bags and disposed as solid waste. Minimum level of protective equipment for the Site is Level D. After the initial and/or daily hazard assessment has been completed, select the appropriate PPE to preserve worker safety. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted prior to the start of Site operations.

Check Applicable Personal Protection Equipment to be Used	
X	Hardhat
X	Steel-toed boots
X	Safety glasses
X	Hearing protection
X	Rubber boots (if wet conditions)
Gloves (specify)	
X	Nitrile
	Latex
	Liners
	Leather
	Other (specify) ___________________________________
Protective clothing	
	Tyvek (if dry conditions are encountered, Tyvek is sufficient)
	Saranex (personnel shall use Saranex if liquids are handled or splash may be an issue)
X	Cotton
X	Rain gear (as needed)
X	Layered warm clothing (as needed)
Inhalation hazard protection	
X	Level D
	Level C (respirators with organic vapor filters/ P100 filters)

Limitations of Protective Clothing

PPE clothing ensembles designated for use during Site activities shall be selected to provide protection against known or anticipated hazards. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any PPE provide protection against all types of hazards. To obtain optimum performance from PPE, Site personnel shall be trained in the proper use and inspection of PPE. This training shall include the following:

- Inspect PPE before and during use for imperfect seams, non-uniform coatings, tears, poorly functioning closures, or other defects. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Inspect PPE during use for visible signs of chemical permeation such as swelling, discoloration, stiffness, brittleness, cracks, tears or other signs of punctures. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Disposable PPE should not be reused after breaks unless it has been properly decontaminated.

Respirator Selection, Use and Maintenance

GeoEngineers has developed a written respiratory protection program in compliance with OSHA requirements contained in 29 code of federal regulations (CFR) 1910.134. Site personnel shall be trained on the proper use, maintenance, and limitations of respirators. Site personnel that are required to wear respiratory protection shall be medically qualified to wear respiratory protection in accordance with 29 CFR 1910.134. Site personnel that will use a tight-fitting respirator must have passed a qualitative or quantitative fit test conducted in accordance with an OSHA-accepted fit test protocol. Fit testing must be repeated annually or whenever a new type of respirator is used. Respirators will be stored in a protective container.

Respirator Cartridges

If Site personnel are required to wear air-purifying respirators, the appropriate cartridges shall be selected to protect personnel from known or anticipated Site contaminants. The respirator/cartridge combination shall be certified and approved by NIOSH. A cartridge change-out schedule shall be developed based on known Site contaminants, anticipated contaminant concentrations, and data supplied by the cartridge manufacturer related to the absorption capacity of the cartridge for specific contaminants. Site personnel shall be made aware of the cartridge change-out schedule prior to the initiation of Site activities. Site personnel shall also be instructed to change respirator cartridges if they detect increased resistance during inhalation or detect vapor breakthrough by smell, taste, or feel although breakthrough is not an acceptable method of determining the change-out schedule. At a minimum, cartridges should be changed a minimum of once daily.

Respirator Inspection and Cleaning

The Site Safety and Health Supervisor shall periodically (i.e., weekly) inspect respirators at the project Site. Site personnel shall inspect respirators prior to each use in accordance with the manufacturer's instructions. In addition, Site personnel wearing a tight-fitting respirator shall perform a positive and negative pressure user seal check each time the respirator is donned to ensure proper fit and function. User seal checks shall be performed in accordance with the GeoEngineers respiratory protection program or the respirator manufacturer's instructions.

Facial Hair and Corrective Lenses

Site personnel with facial hair that interferes with the sealing surface of a respirator shall not be permitted to wear respiratory protection or work in areas where respiratory protection is required. Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the sealing surface of the respirator. Site personnel requiring corrective lenses will be provided with spectacle inserts designed for use with full-face respirators. Contact lenses should not be worn with respiratory protection.

ADDITIONAL ELEMENTS

Heat Stress Prevention

Site specific procedures for preventing heat stress include: provide shade, water and frequent breaks.

The State of Washington and the State of California have regulations that provide specific requirements for handling employee exposure to heat stress. GeoEngineers' program complies with both sets of requirements and will be implemented in all areas where heat stress is identified as a potential health issue.

The Washington State requirements for preventing heat stress apply to outdoor work environments from May 1 through September 30, only when employees are exposed to outdoor heat at or above an applicable temperature listed in Table 10. To determine which temperature applies to each worksite, select the temperature associated with the general type of clothing or PPE each employee is required to wear.

TABLE 10. OUTDOOR TEMPERATURE ACTION LEVELS

All other clothing	89°
Double-layer woven clothes including coveralls, jackets and sweatshirts	77°
Non-breathing clothes including vapor barrier clothing or PPE such as chemical resistant suits	52°

Keeping workers hydrated in a hot outdoor environment requires more water be provided than at other times of the year. GeoEngineers is prepared to supply at least one quart of drinking water per employee per hour. When employee exposure is at or above an applicable temperature listed in Table 10, Project Managers will ensure that:

- A sufficient quantity of drinking water is readily accessible to employees at all times; and
- All employees have the opportunity to drink at least one quart of drinking water per hour.

Emergency Response

Indicate what Site specific procedures you will implement.

- Personnel on-Site should use the "buddy system" (pairs).
- Visual contact should be maintained between "pairs" on-Site, with the team remaining in proximity to assist each other in case of emergencies.
- If any member of the field crew experiences any adverse exposure symptoms while on-Site, the entire field crew should immediately halt work and act according to the instructions provided by the SSO.
- Wind indicators visible to all on-Site personnel should be provided by the SSO to indicate possible routes for upwind escape. Alternatively, the SSO may ask on-Site personnel to observe the wind direction periodically during Site activities.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team, contact of the project manager, and reevaluation of the hazard and the level of protection required.
- If an accident occurs, the SSO and the injured person are to complete, within 24 hours, an Accident Report for submittal to the project manager, the HSM and human resources. The project manager should ensure that follow-up action is taken to correct the situation that caused the accident or exposure.

Contact with Subsurface Site Utilities

If buried utilities are contacted during subsurface exploration activities, stop work immediately and contact the project manager. After completing the one call utility locate, attach the list of identified utilities and contact numbers to this HASP. If a utility is encountered during subsurface exploration contact the utility company immediately.

A sampling and monitoring plan for Drums and Containers

N/A

Site control measures

Listed above in "Site Control Plan."

Spill containment plans (Drum and container handling)

Investigation derived waste will be drummed and stored in a location approved by the property owners pending chemical analytical results. Drums will be labeled with applicable information and secured.

Standard operating procedures for sampling, managing, and handling drums and containers

Drums and containers used during the cleanup shall meet the appropriate Department of Transportation (DOT), OSHA and EPA regulations for the waste that they contain. Site operations shall be organized to minimize the amount of drum or container movement. When practicable, drums and containers shall be inspected and their integrity shall be ensured before they are moved. Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled. Before drums or containers are moved, all employees involved in the transfer operation shall be warned of the potential hazards associated with the contents.

Drums or containers and suitable quantities of proper absorbent shall be kept available and used where spills, leaks or rupture may occur. Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred. Fire extinguishing equipment shall be on hand and ready for use to control incipient fires.

Entry Procedures for Tanks or Vaults (Confined Spaces)

Confined space entry is not anticipated for the current scope of work. If confined space entry is required, contact the project manager immediately.

Personnel Medical Surveillance

GeoEngineers' employees are not in a medical surveillance program as they do not fall into the category of "Employees Covered" in OSHA 1910.120(f)(2) which states a medical surveillance program is required for the following employees:

1. All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;
2. All employees who wear a respirator for 30 days or more a year or as required by state and federal regulations;

3. All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and
4. Members of hazardous materials (HAZMAT) teams.

Sanitation

Field staff and subcontractors must go off Site to access sanitation facilities.

Lighting

Fieldwork will be conducted during daylight hours.

Excavation, Trenching and Shoring

All employees working on project sites where there is an excavation greater than 4 feet in depth shall be trained in excavation safety and shall utilize safe procedures. OSHA designates a 5-foot-depth for instituting excavation safety procedures; however GeoEngineers will use the more conservative depth of 4 feet as specified by states such as Washington, Oregon and California. This program is for the protection of employees while working in excavations; however, employees should not enter excavations if there is an alternative.

GeoEngineers employees often do not have stop work authority on projects controlled by other contractors. However, any GeoEngineers employee, regardless of job title, working in the field will be responsible for contacting the Project Manager (PM) if they observe practices on the job site that are serious safety violations that are not under their control. They will document the unsafe practices and will contact the Site safety coordinator as identified by the client, if applicable. If a client representative is not on-site, the PM, once notified, will contact the client. This action establishes GeoEngineers' commitment to site health and safety on all job sites as our duty of care to the public, contractors and clients.

GeoEngineers is responsible for its subcontractors and will also be providing inspections and corrections of any work that subcontractors perform around excavations.

Other programs

None.

Documentation to Be Completed for HAZWOPER Projects

NOTE: The Field Log is to contain the following information:

- Updates on hazard assessments, field decisions, conversations with subs, client or other parties.
- Air monitoring/calibration results; personnel, locations monitored, activity at the time of monitoring (if performed).
- Actions taken.
- Action level for upgrading PPE and rationale.
- Meteorological conditions (temperature, wind direction, wind speed, humidity, rain, snow, etc.).

Required forms:

- Field Log.
- Health and Safety Plan acknowledgment by GeoEngineers' employees (Form 2).
- Contractors Health and Safety Plan Disclaimer (Form 3).
- Conditional forms available at GeoEngineers' office: Accident Report.

APPROVALS

1.	______________________	______________ Date
2. Plan Approval	______________________ PM Signature	______________ Date
3. Health & Safety Officer	Wayne Adams Health and Safety Program Manager	______________ Date

FORM 1
HEALTH AND SAFETY PRE-ENTRY BRIEFING
COLVILLE POST AND POLE

Inform employees, contractors, and subcontractors or their representatives about:

- The nature, level and degree of exposure to hazardous substances they're likely to encounter, all Site-related emergency response procedures, any identified potential fire, explosion, health, safety or other hazards.
- Conduct briefings for employees, contractors and subcontractors, or their representatives as follows:
  - A pre-entry briefing before any Site activity is started.
  - Additional briefings, as needed, to make sure that the Site-specific HASP is followed.
  - Make sure all employees working on the Site are: Informed of any risks identified and trained on how to protect themselves and other workers against the Site hazards and risks.
  - Update all information to reflect current sight activities and hazards.
  - All personnel participating in this project must receive initial health and safety orientation. Thereafter, daily brief tailgate safety meetings will be held or as deemed necessary by the Site Safety and Health Supervisor (such as a significant change in field conditions).
  - The orientation and the tailgate safety meetings shall include a discussion of emergency response, Site communications and Site hazards.

Date	Topics	Attendee	Company Name	Employee Initials

FORM 2
SITE SAFETY PLAN – GEOENGINEERS' EMPLOYEE ACKNOWLEDGMENT
COLVILLE POST AND POLE

(All GeoEngineers' Site workers complete this form, which should remain attached to the safety plan and filed with other project documentation).

I, ____, do hereby verify that a copy of the current Safety Plan has been provided by GeoEngineers, Inc., for my review and personal use. I have read the document completely and acknowledge a full understanding of the safety procedures and protocol for my responsibilities on Site. I agree to comply with all required, specified safety regulations and procedures. I understand that I will be informed immediately of any changes that would affect Site personnel safety.

Signed ______________________ Date ________________

Range of Dates From: ______________________ To: ______________________

Signed ______________________ Date ________________

Range of Dates From: ______________________ To: ______________________

Signed ______________________ Date ________________

Range of Dates From: ______________________ To: ______________________

Signed ______________________ Date ________________

FORM 3
SUBCONTRACTOR AND SITE VISITOR SITE SAFETY FORM
COLVILLE POST AND POLE

I, ____, verify that a copy of the current Site Safety Plan has been provided by GeoEngineers, Inc. to inform me of the hazardous substances on Site and to provide safety procedures and protocols that will be used by GeoEngineers' staff at the Site. By signing below, I agree that the safety of my employees is the responsibility of the undersigned company.

Signed ____________________ Date ____________________
Firm: ____

Signed ____________________ Date ____________________
Firm: ____

Signed ____________________ Date ____________________
Firm: ____

Signed ____________________ Date ____________________
Firm: ____

Signed ____________________ Date ____________________
Firm: ____

Signed ____________________ Date ____________________
Firm: ____

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