# Work Plan

Stubblefield Site Assessment
595 Offner Road
Walla Walla, Washington

*for*
**Washington State Department of Ecology**

November 27, 2018

GeoEngineers
Earth Science + Technology

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523 East Second Avenue
Spokane, Washington 99202
509.363.3125

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# Stubblefield Site Assessment

## 595 Offner Road
## Walla Walla, Washington

**File No. 0504-139-00**

**November 27, 2018**

Prepared for:

Washington State Department of Ecology
Eastern Regional Office
4601 North Monroe Street
Spokane, Washington 99205

Attention: Katie Larimer

Prepared by:


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

Jedidiah R. Sugalski, PE
Project Manager

Bruce D. Williams
Principal


JRS:BDW:tjh:mce

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## 1.0 INTRODUCTION

This Work Plan presents the proposed scope of work to conduct a soil and groundwater assessment at the Stubblefield Salvage Yard site (herein designated the site) located at 595 Offner Road, Walla Walla, Washington (see Vicinity Map, Figure 1). The site is approximately 11 acres of vacant land. Key features are depicted in Site Plan and Proposed Explorations, Figure 2. This Work Plan has been prepared by GeoEngineers for the State of Washington Department of Ecology (Ecology) under the Department of Enterprises Services' Master Contract No. 05014, Ecology Contract No. C1900046, work request number WR 1900 TCP.

Ecology is looking to characterize the remaining contamination at the site by performing a Remedial Investigation and Feasibility Study (RI/FS). Groundwater and soil at the site were discovered to be contaminated in exceedance of state and federal standards from historic activities at the site. The U.S. Environmental Protection Agency (EPA) conducted an environmental investigation that resulted in two Removal Actions at the site; however, contamination remained on site following the Removal Actions with contaminant levels exceeding cleanup levels. The extent of the remaining contamination in soil and groundwater is unknown. In addition, the EPA removal actions focused on the process area and shop building at the site, but other areas of concern have been identified.

For the purposes of this investigation the site has been divided into four areas based on the nature of historical use at the site (Figure 2):

- Area A – Main Salvage Operation. Environmental concerns in this area include hydraulic fluid spills, uncovered automotive batteries and soil staining.
- Area B – Waste Burning. Environmental concerns include combustion of automotive parts and miscellaneous debris.
- Area C – Miscellaneous Storage. Environmental concerns include storage of used automotive batteries on bare soil, and 55-gallon drums with unknown contents. Soil staining was observed and combustion of automotive engines and other parts reportedly occurred.
- Area D included a foreclosed private residence, which was demolished sometime in 2018 (after Ecology prepared the Scope of Work). A well associated with the residence remains in the southeast portion of the site.

The scope of this Work Plan is limited to the RI portion of the project and includes excavating test pits, advancing direct push soil borings, installing three groundwater monitoring wells and collecting and analyzing groundwater and soil samples. The body of this Work Plan is the Sampling and Analysis Plan (SAP). The Quality Assurance Project Plan (QAPP) and the Health and Safety Plan (HASP) are presented as Appendices A and B of this Work Plan, respectively. Included in this Work Plan are general guidelines with the following sections:

- "Site Description and Background – Section 2.0"
- "Previous Investigations – Section 3.0"
- "Scope and Tasks – Section 4.0"

- "Assessment Procedures – Section 5.0"
- "Data Validation and Usability – Section 6.0"

## 2.0 SITE DESCRIPTION AND BACKGROUND

The site is located at 595 Offner Road in Walla Walla and is adjacent to and south of Mill Creek. The site is owned by Konen Properties, LLC of Milton-Freewater, Oregon. The site is approximately 11 acres of vacant land and is generally level or slightly sloped towards Mill Creek. The site represents the eastern portion of a former 40-acre site that operated as a fat-rendering plant from 1945 until 1950, when it was converted into a salvage yard facility that operated for about 60 years. When operating, the facility received metal wastes including vehicles, drums, appliances, transformers, structural metal, agricultural materials, batteries, spent aluminum casings and household waste. These materials were processed in a variety of ways and were either disposed or recycled.

Numerous inspections, assessments, investigations and removal actions have occurred at the site between 1999 and 2013, which are documented in the Scope of Work (Ecology 2017) and the Final Removal Action Report for the Stubblefield Salvage Yard Site (Ecology and Environment, Inc. 2014). During site inspections, the following conditions were observed: improper handling of used oil, batteries, incinerator ash, automotive fluids, spilled hydraulic fluids and other areas indicative of oil spills, numerous drums (some bulging), storage tanks, crushed or damaged batteries, and unpermitted burning of waste. Site assessment and investigation activities indicated several contaminants of concern (COC), including lead, arsenic, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and total petroleum hydrocarbons (TPH), were present in soil and/or groundwater at concentrations exceeding EPA residential screening levels (RSL) and/or Model Toxics Control Act (MTCA) cleanup criteria.

The EPA initiated time-critical removal actions in October 2009 to mitigate uncontrolled drums, excavate targeted stained soil, and remove asbestos-containing material. In April 2012, the EPA removed 61 drums of hazardous waste. In May 2013, EPA conducted a removal action to excavate contaminated soil in the Process Area and the Upland Area. About 12,996 tons of soil was excavated from the site and transported to a non-hazardous waste disposal facility. An additional 711 tons of soil was excavated and transported to a hazardous waste disposal facility. Both excavated areas were backfilled with imported soil.

Four groundwater monitoring wells were installed at the site in March 2010 and abandoned in June 2013 during the removal action. Groundwater was present about 8 feet below ground surface (bgs) in the northern portion of the site and about 17 feet in the southern portion. Shallow soil conditions generally consist of fine silt, although deeper soil (10 to 15 feet bgs) and shallow soil in some areas includes coarse sand and gravel, and in some instances, large cobbles.

The EPA removal actions targeted the areas that were significantly contaminated. However, other areas of the site have documented contamination and some areas have not yet been assessed. Furthermore, following the removal action in 2013, several confirmation samples collected at the perimeter of the excavation contained COCs at concentrations exceeding MTCA cleanup criteria. This work plan was developed to address data gaps and support development of a RI/FS to support Ecology in developing a Cleanup Action Plan (CAP) for the site.

## 3.0 PREVIOUS SITE INVESTIGATIONS

Our review of available records indicated the previous investigations have been conducted at the site:

- In 1999 and 2002, Ecology Inspections conducted by Ecology documented improper handling of used oil, spent batteries, incinerator ash and automotive fluids (EPA 2009).
- In 2005, a Phase I Environmental Assessment for the Myra Road Extension was conducted by HDR Engineering, Inc. (HDR) for Walla Walla County Department of Public Works, which also documented the potential sources including automotive batteries, fluid spills, and full tanks and drums. HDR recommended the collection of soil and groundwater samples as a Phase II Assessment (HDR 2005).
- In 2006, a Phase II Environmental Assessment was conducted by HDR. This study focused on the right-of-way property being considered for the Myra Road Extension. Soil and groundwater samples were collected from borings installed in the right of way, where Myra Road Currently passes. Barium and lead were detected in the groundwater in exceedance of the federal maximum concentration limits (MCLs) (HDR 2006).
- In 2006, A dangerous waste compliance inspection documented batteries on the ground, a hydraulic fluid spill and over twenty-five 55-gallon drums of used oil stored at the site. Bulging drums and soil staining at some of the drum locations were observed (EPA 2009).
- In 2007, an inspection by Ecology documented the presence of used oil, heavy oils, hydraulic fluids, and damaged batteries on the ground. No samples were collected but, conditions at the site prompted concerns of PAH and SVOC contamination (EPA 2009).
- In 2008, the site entered into Ecology's Voluntary Cleanup Program (EPA 2009).
- In 2009, the site was referred by Ecology to the EPA requesting "immediate intervention and action" (EPA 2009).
- In October 2009, the EPA conducted two time-critical removal actions to remove waste and bulging drums from the property.
- From 2009 through 2012, the EPA conducted a Removal Site Evaluation that consisted of seven field events. The evaluation investigated soil and groundwater in the Process Area for metals, PCB and pesticide, TPH, SVOCs, and volatile organic compounds (VOCs) contamination. The Process area was identified as a major source area for contamination (E&E 2012 and 2014).
- In 2013, the EPA published an Engineering Evaluation/Cost Analysis for remedial and removal alternatives to address surface and subsurface soil contamination in the Process Area to protect human and ecological receptors. Alternatives included institutional controls, containment, treatment, or excavation. Excavation and off-site disposal were recommended for the Process Area (E&E 2013).

Although previous site assessment activities have been conducted at the site, additional assessment currently is warranted because several data gaps were noted during previous assessments.

- The Environmental Assessments conducted by HDR focused on the right-of-way for Myra Road Extension but not other parts of the former property. Myra Road was extended, and now bisects the site.

- The Removal Site Evaluation by the EPA worked on establishing the vertical extent of the contamination at the Process Area (north central area of the site). The lateral extent of the contamination over the entire site area was not fully characterized; however, other areas of concern have been identified (EPA 2014). The additional areas of concern include the four areas, A through D previously identified.

Results of prior subsurface assessment and sampling activities are generally shown in Figure 2.

## 4.0 SCOPE AND TASKS

Based on previous investigations, review of environmental documents, and discussions with Ecology additional assessment is necessary to better define the extent of contamination at the site. Our general approach will consist of concurrently advancing test pits and direct-push soil borings and collecting soil samples for field screening and laboratory chemical analysis. We will then drill and install three monitoring wells, collecting soil samples during drilling and groundwater samples after well development for chemical analysis. The goal of these activities is to define the nature and extent of contamination in soil and groundwater to develop a RI/FS for the site.

### 4.1. Prepare Work Plan

This Work Plan was developed to guide field activities and assessment procedures. This Work Plan includes a QAPP (Appendix A) and HASP (Appendix B). The body of this Work Plan is the SAP.

### 4.2. Site Assessment and Laboratory Analyses

1. Coordinate underground utility locating using the One-call system. Per state regulations, we will mark the proposed boring locations prior to initiating the locate request.
2. Coordinate subcontractors (drillers, excavator operator, analytical laboratory and waste disposal contractors) and provide project management services.
3. Conduct field assessment activities including:
    a. Area A – Advance 17 test pits in Area A to approximately 15 feet bgs or until groundwater is encountered, whichever is shallower. Samples will be collected from 8 and 15 feet bgs in the previously excavated area, from 3 and 6 feet bgs around the edge of the previous excavation, and at 2 and 5 feet bgs in the rest of Area A. Samples from Area A will be analyzed for:
        i. VOCs using Environmental Protection Agency (EPA) Method 8260B
        ii. SVOCs using EPA Method 8270D-SIM
        iii. PCBs using EPA Method 8082A
        iv. Priority metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium and zinc ) using EPA Methods 6000/7000
        v. Gasoline-range hydrocarbons (GRPH) using Northwest Method NWTPH-Gx
        vi. Diesel- and oil-range hydrocarbons (DRPH, ORPH) using Northwest Method NWTPH-Dx
        vii. Pesticides using EPA Method 8081B
    b. Area B – Advance eight direct push borings to 4 feet bgs. Samples will be collected at about 2 and 4 feet bgs. Samples from Area B will be analyzed for:

i. VOCs using EPA Method 8260C
ii. PCBs using EPA Method 8082A
iii. Priority metals using EPA Methods 6000/7000
iv. GRPH using Northwest Method NWTPH-Gx
v. DRPH and ORPH using Northwest Method NWTPH-Dx
vi. PAHs using EPA 8270D-SIM

c. Area C – Advance 18 direct push borings to 4 feet bgs. Samples will be collected at about 2 and 4 feet bgs. Three test pits will be excavated - two to depths of 5 feet bgs with samples collected at approximately 2 and 5 feet bgs and one to a depth of 15 feet bgs with samples collected at approximately 8 and 15 feet bgs. Samples from Area C will be analyzed for:

i. VOCs using Method 8260C
ii. PCBs using Method 8082A
iii. Priority metals using EPA Methods 6000/7000
iv. GRPH using Northwest Method NWTPH-Gx
v. DRPH and ORPH using Northwest Method NWTPH-Dx
vi. PAHs using EPA 8270D-SIM

d. Area D– Advance two direct push borings to 4 feet bgs. Samples will be collected at about 2 feet and 4 feet bgs. Samples from Area D will be analyzed for:

i. Priority metals using EPA Methods 6000/7000
ii. GRPH using Northwest Method NWTPH-Gx
iii. DRPH and ORPH using Northwest Method NWTPH-Dx
iv. PAHs using EPA 8270D-SIM

e. Install three soil borings to be converted to monitoring wells using hollow stem auger (HSA) drilling methods to 30 feet bgs. Collect soil samples for field screening, visual observation and XRF analysis. Soil samples from the three 30 feet bgs borings will be analyzed for:

i. VOCs using EPA Method 8260C
ii. SVOCs using EPA Method 8270D-SIM
iii. PCBs using EPA Method 8082A
iv. Priority metals using EPA Methods 6000/7000
v. GRPH using Northwest Method NWTPH-Gx
vi. DRPH and ORPH using Northwest Method NWTPH-Dx
vii. Pesticides using EPA Method 8081B
viii. PAHs using EPA 8270D-SIM

f. A qualified field engineer or geologist will observe and document subsurface soil conditions. Recovered soil in the excavator buckets or samplers will be field screened for petroleum contamination. Field screening will consist of visual observation, water sheen testing and headspace vapor measurements using a photoionization detector (PID).

g. Submit soil samples for analysis on a standard turnaround time. Soil samples will be preferentially selected based on: (1) field screening indications of contamination; (2) depth requested by Ecology based on previous investigations; or (3) the sample collected at the soil/groundwater interface or the deepest sample, if groundwater is not encountered.

   Soil samples will be submitted to Pace Analytical Services, Inc (PACE) of Minneapolis, Minnesota.

h. Install and develop three monitoring wells in the 30-foot-deep soil borings. The wells will be stickup type with protective bollards and screened with 15 feet of screen with the midpoint of the screened interval located approximately where shallow groundwater is initially encountered during drilling. Each monitoring well will be developed until water runs clear before sampling and the purge water will be drummed and stored on-site pending disposal.

i. Abandon direct push borings by backfilling with bentonite. Soil recovered from the borings will be drummed and stored onsite pending disposal.

j. Collect and submit a groundwater sample from the three monitoring wells for analysis on a standard turnaround time. If accessible, a groundwater sample will be collected from the existing well located in the southeast portion of the site near the former residence. Samples will be submitted to PACE for the following analysis:

   i. VOCs using EPA Method 8260C

   ii. SVOCs using EPA Method 8270D-SIM

   iii. PCBs using EPA Method 8082A

   iv. GRPH using Northwest Method NWTPH-Gx

   v. DRPH and ORPH using Northwest Method NWTPH-Dx

k. Conduct a survey of the top of casing of each well using a licensed surveyor. Well locations will be surveyed and referenced to North American Datum of 1983, High Accuracy Reference Network (NAD83 HARN) and top of casing elevations will be referenced to North American Vertical Datum of 1988 (NAVD88). Depth to groundwater will be measured and used to calculate groundwater elevations and estimate groundwater flow direction.

l. Drum and label investigation-derived waste (IDW). A qualified contractor will be retained to profile and transport the IDW for disposal at a permitted facility. We assume IDW will be non-hazardous.

### 4.3. Reporting

An assessment report will summarize field activities and chemical analysis results. Boring logs will be provided for each boring and actual drilling locations will be marked in plan view.

## 5.0 ASSESSMENT PROCEDURES

This section contains standard procedures for field data collection anticipated during the remedial investigation including the following:

- Collecting soil samples from test pits and soil borings;
- Field screening methods;
- Well installation surveying and sampling;
- Decontamination procedures;
- IDW;
- Sample location control;
- Field measurement and observation documentation;
- Data management and documentation; and
- Sample identification.

### 5.1. Collecting Soil Samples from Test Pits and Soil Borings

Proposed direct push boring and test pit locations are shown on Figure 2. The following sections provide assessment procedures for each exploration type.

#### 5.1.1. Test Pits

Test pits will be excavated to approximately 6 to 15 feet bgs using a backhoe capable of a maximum excavation depth of 15 feet. Test pits will be excavated by an environmental contractor with Hazardous Waste Operations and Emergency Response (HAZWOPER) training and supervised by an appropriately trained GeoEngineers geologist or engineer.

Soil samples will be collected in pattern described above in Section 4.2 for Area A or when field screening indicates the presence of contamination. Upon completion of the exploration, material removed from the excavation will be placed into the test pit at the approximate depth from which it was removed, unless soil is visibly contaminated or field screening results indicate contamination likely is present. If visibly contaminated soil is observed or field screening indicates likely contamination, that soil will be placed on plastic sheeting and covered and secured to minimize the potential for release of contaminants. If contaminated soil is not suspected, the soil will be placed in approximately 1-foot lifts into the test pit excavation and compacted with the excavator bucket. No surface treatment is anticipated upon completion of backfilling the explorations. Soil encountered will be classified in general accordance with ASTM International (ASTM) D2488, the Standard Practice for Classification of Soils, Visual-Manual Procedure.

Soil samples will be field-screened for the presence of contamination using the procedures described in Section 5.2 to identify soil samples for chemical analysis. Field screening using x-ray fluorescence (XRF) equipment will also be conducted to evaluate metal contamination. Based on field indicators, the soil exhibiting the greatest level of contamination will be submitted for laboratory analysis. Additional soil samples indicating the presence of contamination may be collected, submitted to the laboratory and held for potential analysis (opportunity samples).

Soil selected for each sample will be removed from the excavator bucket using a decontaminated soil knife or new, clean nitrile gloves, and transferred into a laboratory-prepared container, labeled with a waterproof pen, and placed on “blue ice” or double-bagged wet ice in a cooler. Soil samples obtained from the test pits will be collected from near the middle of the excavator bucket (soil not touching the bucket). Samples will be documented on a chain-of-custody form including sample name, sample collection date and time, sample type, sample depth and requested analytical methods. Soil samples for VOC analyses will be collected consistent with EPA Method 5035A and preserved in accordance with Ecology Memorandum 5, document number 04-09-087 (Ecology 2004).

Sampling equipment will be decontaminated between each sampling attempt as described in Section 5.5. Sample coolers will be delivered to the analytical laboratory under standard chain-of-custody procedures described in the QAPP. Samples will be handled and analyzed in accordance with the project QAPP (Appendix A).

#### 5.1.2. Direct-Push Methods

Direct push soil borings will be advanced to approximately 4 feet bgs at the locations indicated on Figure 2. Soil borings will be advanced using direct-push drilling techniques using 4-foot-long, 1-inch-diameter acrylic sleeves. Drilling will be conducted by a State of Washington licensed driller and supervised by an appropriately trained GeoEngineers field representative.

Each boring will be continuously monitored by a GeoEngineers field representative to observe and 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 D 2488, the Standard Practice for Classification of Soils, Visual-Manual Procedure.

Soil samples from each sampling interval will be field-screened for the presence of contamination using the procedures described in Section 5.2 to assist selecting a sample for chemical analysis. Field screening using XRF equipment will also be conducted to evaluate metal contamination. Based on field indicators, two samples from each boring will be submitted for laboratory analysis. Additional samples might be submitted based on field screening results and as approved by Ecology.

Soil selected for analysis will be removed from acrylic sleeve using clean nitrile gloves, transferred into a laboratory-prepared container, labeled using a waterproof pen and placed on “blue ice” or wet ice in a clean plastic lined cooler. Each sample will be documented on a boring log and chain-of-custody including sample name, sample collection date and time, sample type, sample depth, requested analytical methods and sampler name. Soil samples for VOC analyses will be collected consistent with EPA Method 5035A and preserved in accordance with Ecology Memorandum 5, document number 04-09-087 (Ecology 2004).

Excess soil from samples and other soil removed during the drilling process will be placed in drums, which will be labeled and secured.

Sampling equipment will be decontaminated between each sampling attempt as described in Section 5.5. The sample coolers will be delivered to the analytical laboratory under standard chain-of-custody procedures described in the QAPP.

### 5.1.3. HSA Drilling Methods

Three soil borings will be advanced to approximately 30 feet bgs at the locations indicated on Site Plan and Proposed Exploration Locations, Figure 2. Soil borings will be advanced using HSA techniques and split spoons for sampling. Drilling will be conducted by a State of Washington licensed driller and supervised by an appropriately trained GeoEngineers field representative.

Each boring will be monitored by a GeoEngineers field representative to observe and 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 D 2488, the Standard Practice for Classification of Soils, Visual-Manual Procedure.

Soil samples from each sampling interval will be field-screened for the presence of contamination using the procedures described in Section 5.2 to assist selecting a sample for chemical analysis. Field screening using XRF equipment will also be conducted to evaluate metal contamination. Based on field indicators, at least one soil sample from each boring will be submitted for laboratory analysis. Additional samples might be submitted based on field screening results and as approved by Ecology.

Soil selected for analysis will be removed from the split spoon using clean nitrile gloves, transferred into a laboratory-prepared container, labeled using a waterproof pen and placed on "blue ice" or wet ice in a clean plastic lined cooler. Each sample will be documented on a boring log and chain-of-custody including sample name, sample collection date and time, sample type, sample depth, requested analytical methods and sampler name. Soil samples for VOC analyses will be collected consistent with EPA Method 5035A and preserved in accordance with Ecology Memorandum 5, document number 04-09-087 (Ecology 2004).

Excess soil from samples and other soil removed during the drilling process will be placed in drums, which will be labeled and secured.

Sampling equipment will be decontaminated between each sampling attempt as described in Section 5.5. The sample coolers will be delivered to the analytical laboratory under standard chain-of-custody procedures described in the QAPP.

## 5.2. Field Screening Methods

A GeoEngineers field representative will perform field screening tests on soil samples and record observations on the field exploration log and in the field notebook. Field screening results will be used to aid in the selection of soil samples for chemical analysis. The sample from each exploration showing the highest likelihood of contamination based on field screening will be selected for laboratory analysis. The remaining samples might 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 PID. Visual screening consists of inspecting the soil for discoloration indicative of the presence of impacted material in the sample.

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 VOC vapor concentrations in parts per million (ppm) with a PID. When a soil sample is placed in a sealed plastic bag with air space, the bag is warmed and 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 0.1 ppm and 1,999 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 using XRF analyzer will be performed according to the manufacturer's instructions, which includes:

- Choosing a convenient work surface. The surface should be free of material containing elements that may be detected by the analyzer.
- Removing debris (non-native materials and wood) and gravel from the sample.
- Placing a soil sample into a plastic bag and flattening the bag of soil to form a continuous uniform layer of at least 1 centimeter (0.4 inch) thick. The nose of the XRF should be against the bag. Be careful of bags with manufacturers printing or labeling surfaces. This printing often contains detectable elements, most notable titanium (Ti), and should be avoided when possible.
- Positioning the instrument against the surface of the bagged sample and initiate a reading by squeezing the shutter release and firmly pressing the instrument flat against the sample. The trigger and the proximity sensor must both be engaged before the shutter will open and the measurement initiated. WARNING! Do not hold bagged samples while testing.
- Recording the metals results on a prepared field form. Soil type, moisture content, temperature and approximate grain size, also will be recorded.

Field screening results are site-specific. The results vary with temperature, soil type, type of contaminant, and soil moisture content. Water sheen testing equipment will be decontaminated before field screening each sample using a Liquinox® soap solution with a water rinse. Used testing equipment and/or decontamination water will be stored on-site in a labeled Washington State Department of Transportation (DOT)-approved drum pending disposal with IDW.

### 5.3. Well Installation, Development, Surveying and Sampling

We plan to install monitoring wells in three of the soil borings. Groundwater monitoring wells will be constructed in accordance with WAC 173-160, Section 400, resource protection well construction standards. Groundwater monitoring well installation records will be submitted in accordance with these standards. GeoEngineers' field representative will observe and document the monitoring well installation, including maintaining a detailed log of the well construction materials, depths of materials, and depths of each well. Well construction details will be recorded on a monitoring well construction log.

Monitoring well borings will be advanced in three locations using HSA drilling techniques at locations agreed upon with Ecology. The borings will be advanced to approximately 30 feet bgs. Each monitoring well will be constructed using 2-inch-diameter, schedule 40 poly-vinyl chloride (PVC) well casing and well screens. The wells will have about a 15-foot screened interval with the midpoint of the screened interval located approximately where shallow groundwater was encountered. Based on prior site data, shallow groundwater appears to be unconfined and aquitards were not observed; therefore, static groundwater levels should be located approximately at depths where groundwater was first encountered. Prior groundwater data collected at the site and nearby sites indicated groundwater elevations can vary 5 feet seasonally. Considering wells will be installed in late autumn, when groundwater elevations likely are lower than the annual average, well screens should be located to best ensure groundwater always intercepts the screened interval. Screen intervals can be adjusted as needed, based upon estimated groundwater depths in the field at the time of drilling. It will be the goal of monitoring well installation to have at least 5 feet of wetted screen interval and approximately 5 feet of well screen above the groundwater level encountered during drilling to account for seasonal groundwater fluctuations.

Each groundwater monitoring well will be completed with a bentonite seal and a stickup monument. A lockable cap will be installed at the top of the PVC well casing. A concrete surface-seal will be placed around the monument at the ground surface to divert surface water away from the groundwater monitoring well location.

The groundwater monitoring wells will be developed to remove water introduced into the well during drilling (if any), stabilize the filter pack and formation materials surrounding the well screen, and restore the hydraulic connection between the well screen and the surrounding soil. The depth to water in the monitoring well will be measured prior to development. The total depth of the well also will be measured and recorded. The monitoring wells will be developed by pumping, surging, bailing or a combination of these methods after construction. Development of each well will continue until the water is as free of sediment as practicable with respect to the composition of the subsurface materials within the screened interval. The removal rate and amount of groundwater removed will be recorded during well development procedures. Water generated during development will be drummed, labeled, and stored in a safe location on site until chemical analytical results are obtained. After development, wells will be allowed to equilibrate a minimum of 72 hours prior to sampling.

The horizontal locations and elevations of the monitoring wells will be surveyed by a licensed surveyor. Groundwater monitoring well locations will be referenced to NAD83 HARN and top of casing elevations will be referenced to NAVD88. A survey reference mark will be established on the north side of each monitoring well casing as a reference for measuring groundwater elevations.

### 5.4. Groundwater Sampling

Groundwater samples will be collected no sooner than 72 hours after development of new wells. Depth to groundwater relative to the top of the monitoring well casing will be measured in all site wells to the nearest 0.01 foot using an electronic water level indicator and recorded in the field notes prior to sampling.

The electronic water level indicator will be decontaminated with Liquinox® solution wash and a distilled water rinse prior to use in each well. Following depth to groundwater measurements in site wells, groundwater sample will be collected from each groundwater monitoring well consistent with the EPA's low-flow groundwater sampling procedure (EPA 2017, and Puls and Barcelona 1996). Dedicated tubing and a peristaltic pump or bladder pump will be used for groundwater purging and sampling. During purging activities, water quality parameters, including pH, temperature, conductivity, dissolved oxygen (DO), oxidation/reduction potential (ORP) and turbidity, will be measured using a multi-parameter meter equipped with a flow-through cell. Groundwater samples will be collected after: (1) water quality parameters stabilize; or (2) a maximum purge time of 30 minutes is achieved. During purging and sampling, drawdown will be monitored and limited to less than 0.3 feet, if possible. The purge rate shall generally be limited to less than 0.5 liters per minute. Water quality parameter stabilization criteria will include the following:

- Turbidity: ±10 percent for values greater than 5 nephelometric turbidity units (NTU);
- Conductivity: ±3 percent;
- pH: ±0.1 unit;
- Temperature: ±3 percent;
- DO: ± 10 percent; and
- ORP: ±10 percent or 10 millivolts (mV) if under 100 mV.

Samples will not be collected from a groundwater monitoring well if it has measurable free product. Field water quality measurements and depth-to-water measurements will be recorded on a Well Purging-Field Water Quality Measurement Form. Groundwater samples will be transferred in the field to laboratory-prepared sample containers and kept cool during transport to the testing laboratory. Chain-of-custody procedures will be observed from the time of sample collection to delivery to the testing laboratory consistent with the QAPP. Samples will be handled and analyzed in accordance with the project QAPP (Appendix A).

### 5.5. Decontamination Procedures

The objective of the decontamination procedures described herein is to minimize the potential for cross-contamination between sample locations.

A designated decontamination area will be established for decontamination of drilling equipment and reusable sampling equipment. Equipment will be cleaned by physical removal of large particles and then rinsing with a detergent solution and then potable water. Rinse water from sampling equipment will be collected and placed into a 55-gallon drum. The sampling equipment will be decontaminated in accordance with the following procedures before each sampling attempt or measurement.

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. Wash with non-phosphate detergent solution (Liquinox® and potable tap water).
3. Rinse with distilled water.

### 5.6. Handling of IDW

IDW (decontamination water) will be placed in DOT-approved 55-gallon drums. Weather and quantity permitting, the IDW could be temporarily placed into a large shallow container and allowed to evaporate. Each drum will be labeled with the project name, exploration number, general contents and date. Drummed IDW will be stored on-site pending analysis and disposal.

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

### 5.7. Sample Location Control

Horizontal sample control will be maintained throughout the project. Horizontal control to locate test pits and direct push soil borings in the field will be established using an iPad with global positioning system (GPS) software accurate to approximately 10 lateral feet.

### 5.8. Sampling and Analytical Methods

Groundwater and soil field sampling methods, including quality control and maintenance of field instrumentation, will generally adhere to the requirements of the QAPP. Analytical method requirements also will adhere to the QAPP. The analytical lab provided the reporting limits and they were compared to MTCA Method A cleanup levels to ensure that data generated will be sufficient for assessment purposes.

### 5.9. 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.

### 5.10. Field Measurements and Observation Documentation

Field measurements and observations will be recorded in a project field notebook. 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 logbook:

- 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 site;
- Relevant comments regarding field activities; and
- Signatures of responsible personnel.

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

### 5.11. 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 Portable Document Format (PDF). 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.

### 5.12. Sample Identification

Sample identification is important to provide concise data management and to quickly determine sample location and date when comparing multiple samples.

Soil sample will be identified sequentially as DP for direct push borings and TP for test pits. Soil samples for the site shall adhere to the following general format:

**Location ID(Depth)**

For example, a soil sample collected at direct push boring DP-1 at a depth interval of 5 to 6 feet shall be labeled as DP-1(5-6), and a soil sample collected at test pit location TP-1 at a depth of 5 feet shall be labeled as TP-1(5).

If alternate locations for direct-push boring are sampled due to of refusal, the associated location ID shall be reused.

Groundwater samples shall have the following general format:

**Well ID:Date**

For example, a groundwater sampled collected from monitoring well location MW-1 on May 25, 2018, shall be labeled as MW-1:052518.

## 6.0 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.

## 7.0 REFERENCES


E & E (Ecology and Environment, Inc.), September 2012, *Removal Site Evaluation Report for Stubblefield Salvage Yard*, prepared for the United States Environmental Protection Agency, Seattle, Washington, under Contract No. EP-S7-06-02, TDD No. 11-06-0008.

E&E. April 2013, *Engineering Evaluation / Cost Analysis for Stubblefield Salvage Yard Site*, prepared for the United States Environmental Protection Agency, Seattle, Washington, under Contract No. EP-S7-06-02, TDD No. 12-09-0003.

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EPA. September 2009, Action Memorandum Subject Time-Critical Removal Action at the Stubblefield Salvage Site, On-Scene Coordinator, Emergency Response Unit United States Environmental Protection Agency to Linda Anderson Carnahan, Acting Director Office of Environmental Cleanup United States Environmental Protection Agency, September 4, 2009.

HDR (HDR Engineering, Inc.), February 2006, *Phase II Environmental Site Assessment for Stubblefield Salvage Yard Myra Road Extension Project*, prepared for Walla Walla County Department of Public Works.

HDR. August 2005, Phase I Environmental Site Assessment of Myra Road Extension Project Salvage Yard, prepared for Walla Walla County Department of Public Works.

Puls, R.W. and M.J. Barcelona. 1996. Low-flow (minimal drawdown) ground-water sampling procedures: EPA Ground Water Issue. p.1-9.

U.S. Environmental Protection Agency (EPA). 1998. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)," Revision 5.

U.S. Environmental Protection Agency (EPA). 2017. Region 1, Low stress (low-flow) purging and sampling procedure for the collection of ground water samples from monitoring wells. EQASOP-GW4, Revision No. 4.

Washington State Department of Ecology. 2004. "Collecting and Preparing Soil Samples for VOC Analysis."

Washington State Department of Ecology. August 2018. "*Work Request: Stubblefield Assessment Project".* Work Request No. WR 1900 TCP. Under contract No. 05014.

FIGURES

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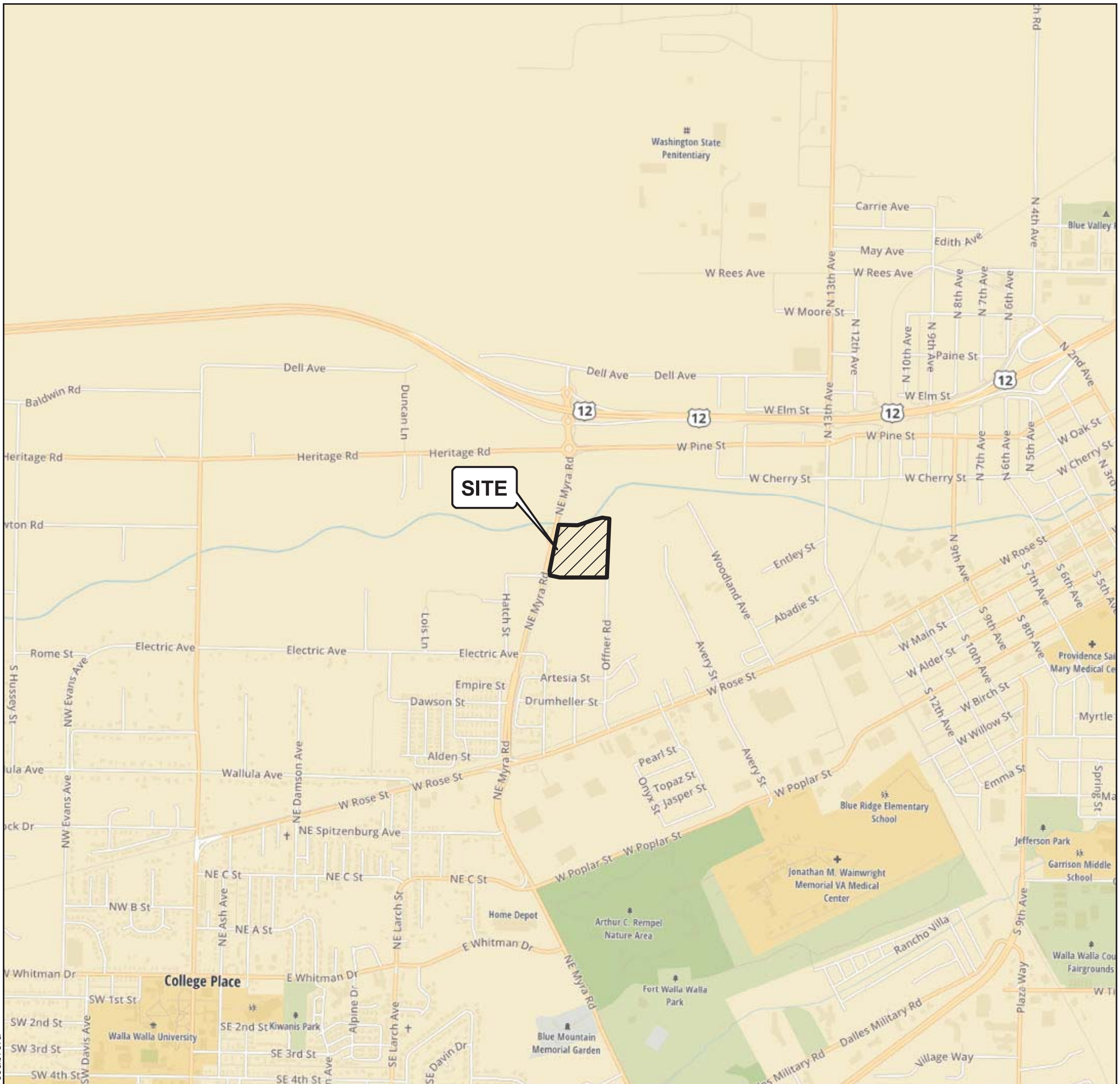


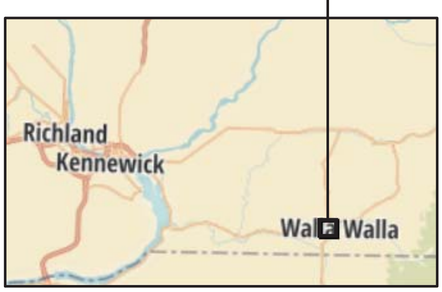


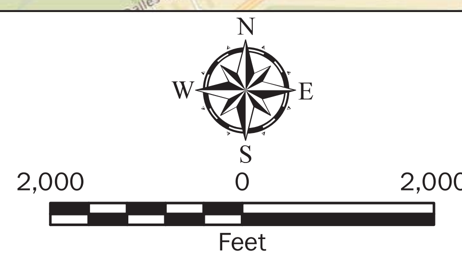


## Vicinity Map

Stubblefield Salvage Yard
Walla Walla, Washington

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**Figure 1**

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 Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 UTM Zone 11N

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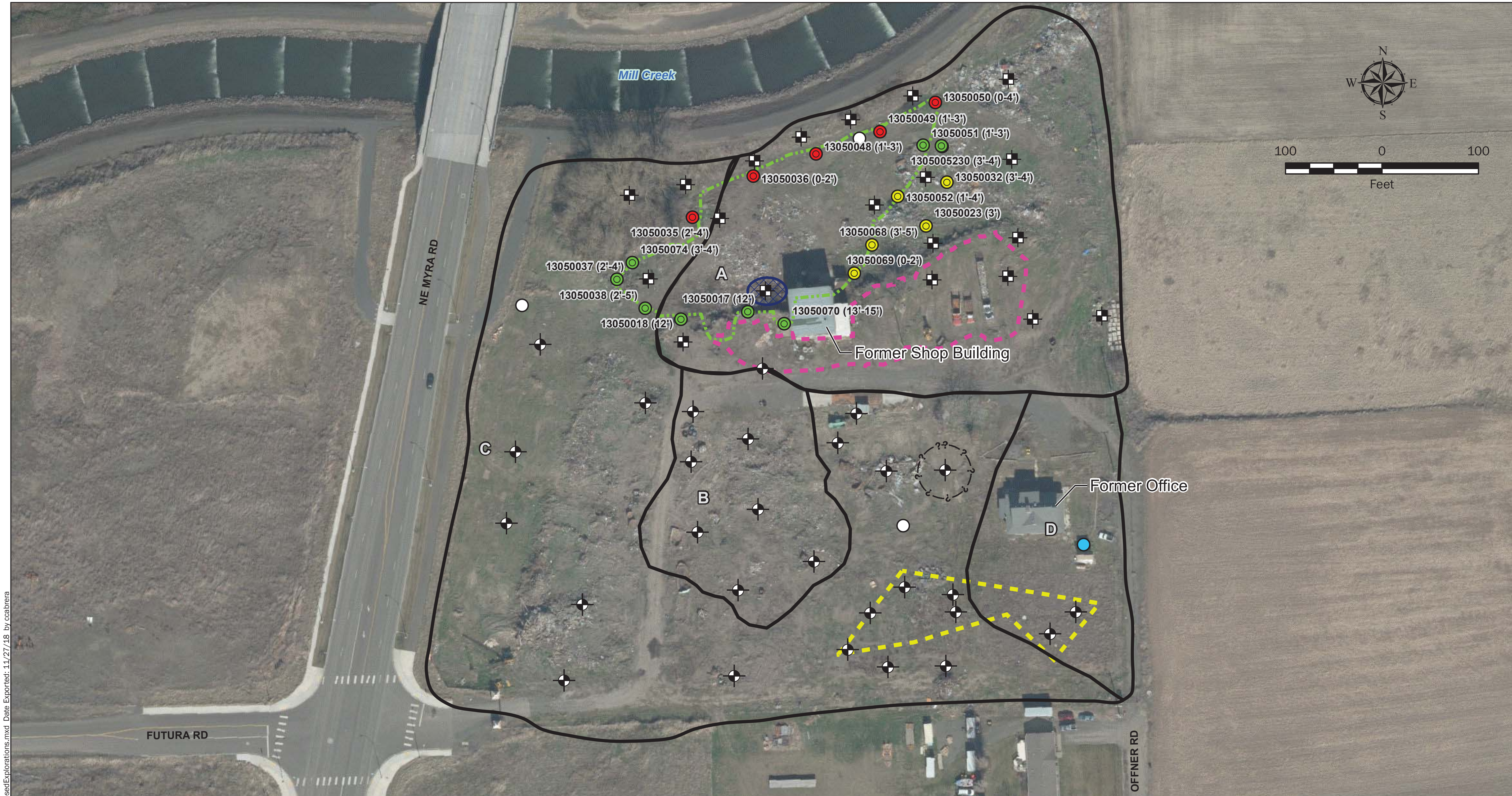


Notes:

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 Source: Street data and 2012 Ortho from Walla Walla County GIS. Site features digitized from ecology and environment EPA report.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

**Legend**

- Existing Well Approximate Location
- Proposed Well Approximate Location
- Proposed Test Pit Approximate Location
- Proposed Direct Push Boring Approximate Location

Historic EPA Sample Number, Depth and Approximate Location

- Less than EPA RSC Residential
- Greater than EPA RSL Residential, but less than EPA RSL Industrial
- Greater than EPA RSL Industrial

- Operable Approximate Area
- Drum Field Contamination Approximate Area
- Residual Petroleum Contamination in Groundwater Approximate Area
- Battery Storage Approximate Area
- 2013 Processing Excavation Approximate Area
- 2013 Upland Excavation Approximate Area

**Site Plan and Proposed Exploration Locations**

Stubblefield Salvage Yard
Walla Walla, Washington

GeoEngineers

Figure 2

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APPENDICES

# APPENDIX A
## Quality Assurance Project Plan

## APPENDIX A
## QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) was developed for investigation activities at the Stubblefield Salvage Yard Site, Walla Walla, Washington and 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 has been developed based on guidelines specified in Chapter 173-340-820 of the 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 (PARCC) of data generated meet the specified data quality objectives to the extent possible.

## PROJECT ORGANIZATION AND RESPONSIBILITY

Descriptions of the responsibilities, lines of authority and communication for the key positions to 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. Jedidiah Sugalski, Professional Engineer (PE) is the PM for activities at the site. The Principal-in-Charge is responsible for fulfilling contractual and administrative control of the project. Bruce Williams is the Principal-in-Charge.

### Field Coordinator

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

- Provides technical direction to the field staff;
- Develops schedules and allocates resources for field tasks;
- Coordinates data collection activities to be consistent with information requirements;
- Supervises the compilation of field data and laboratory analytical results;
- Assures that data are correctly and completely reported;
- Implements and oversees field sampling in accordance with project plans;
- Supervises field personnel;

- Coordinates work with on-site subcontractors;
- Schedules sample shipment with the analytical laboratory;
- Monitors that appropriate sampling, testing and measurement procedures are followed;
- Coordinates the transfer of field data, sample tracking forms, and logbooks to the PM for data reduction and validation; and
- Participates in QA corrective actions as required.

The Field Coordinator for exploration activities at the site is Alicia Candelaria or suitably-qualified equivalent.

### QA Leader

The GeoEngineers project QA Leader is under the direction of Jedidiah Sugalski 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. Denell Warren is the QA Leader. The QA Leader has the following responsibilities:

- Serves as the official contact for laboratory data QA concerns;
- Responds to laboratory data, QA needs, resolves issues, and answers requests for guidance and assistance;
- Reviews the implementation of the QAPP and the adequacy of the data generated from a quality perspective;
- Maintains the authority to implement corrective actions as necessary;
- Reviews and approves the laboratory QA Plan;
- Evaluates the laboratory's final QA report for any condition that adversely impacts data generation;
- Ensures that appropriate sampling, testing, and analysis procedures are followed and that correct QC checks are implemented; and
- Monitors subcontractor compliance with data quality requirements.

### Laboratory Management

The subcontracted laboratories conducting sample analyses for this project are required to obtain approval from the QA Leader before the initiation of sample analysis to assure that the laboratory QA plan complies with the project QA objectives. The Laboratory's QA Coordinator administers the Laboratory QA 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; and

- Participate in QA audits and compliance inspections.

The chemical analytical laboratory QA Coordinator will be Jennifer Gross of Pace Analytical located in Minneapolis, Minnesota.

### Health and Safety

A site-specific Health and Safety Plan (HASP) will be used for field activities and is presented as Appendix B of this Work Plan. 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 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 PARCC, 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 (MQO) associated with these data quality factors are summarized in Tables A-1 and A-2 for soil and groundwater respectively.

### Analytes and Matrices of Concern

Samples of soil and groundwater will be collected during the assessment. Tables A-3 and A-4 summarize the analyses to be performed at the site for soil and water, 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). Results for analytes will be reported as numerical concentrations 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 PQL for site contaminants of potential concern (COPCs) are presented in Tables A-1 and A-2 for soil and groundwater respectively. These reporting limits were obtained from an Ecology-certified laboratory (PACE). The analytical methods and processes selected will provide PQLs less than the TRLs under ideal conditions. However, the reporting limits in Tables A-1 and A-2 are considered targets because several factors may influence final detection limits. First, moisture and other physical conditions of soil affect detection limits. Second, analytical procedures may 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 laboratory duplicates. 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 and EPA 2004a) that address criteria exceedances and courses of action. Relative percent difference goals for this effort are 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 which 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 and 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 the Work Plan and this QAPP.
- Comparing analytical results of field duplicates to determine the variations in the analytical results.
- 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 Tables A-3 and 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 procedures are outlined in "Section 5.0" of this Work Plan.

### Sampling Equipment Decontamination

Sampling equipment decontamination procedures are described in "Section 5.5" of the Work Plan.

### Sample Containers and Labeling

The Field Coordinator will establish field protocol to manage field sample collection, handling and documentation. Samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sample containers and preservatives are listed in Tables A-3 and 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 logbooks. The Field Coordinator will monitor consistency between the Work Plan, sample containers/labels, field logbooks and the chain-of-custody.

### 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-3 for soil and Table A-4 for water samples.

### Sample Shipment

The samples will be transported and shipped to the analytical laboratory in the coolers. Samples will be transported by a commercial express mailing service on an overnight basis. The Field Coordinator will monitor 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.

### chain-of-custody 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 chain-of-custody form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the chain-of-custody 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.
- Names of sampling personnel and transfer of custody acknowledgment spaces.
- Shipping information including shipping container number.

The original chain-of-custody 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 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).
- 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.
- Calibration readings for any equipment used and equipment model and serial number.

The handling, use and maintenance of field logbooks 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 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.

### 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 electronic data deliverable (EDD) will be established by GeoEngineers with the contract laboratory. Final results will be sent to the PM.

The laboratory will assure that the full heights of all peaks appear on the chromatograms and that the same horizontal time scale is used to allow for comparisons to other chromatograms.

## 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.

Due to the natural high variability of soil particulates and distribution, duplicate soil samples will not be collected. One duplicate groundwater sample will be collected.

### Trip Blanks

Trip blanks accompany soil sample containers used for VOC analyses during shipment and sampling periods. Trip blanks will be analyzed on a one per cooler basis.

### 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 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 semi-volatile 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 QA Leader and PM.

### 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 chain-of-custody 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 logbooks 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.

### 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
- 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.

## REFERENCES

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.

# Table A-1

## Soil Measurement Quality Objective and Target Reporting Limits

### Stubblefield Salvage Yard

### 595 Offner Road, Walla Walla, Washington

| Analyte | Method | MDL (mg/kg) | PQL (mg/kg) | LCS/LCSD Lower | LCS/LCSD Upper | LCS/LCSD RPD | MS/MSD Lower | MS/MSD Upper | MS/MSD RPD | DUP RPD | MCTA Clean Up Level (mg/kg)[1,2,3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **VOCs[1] (µg/kg)** | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 0.000278 | 0.004 | 75 | 125 | 20 | 47 | 150 | 30 | 30 | |
| 1,1,1-Trichloroethane | EPA 8260B | 0.000371 | 0.004 | 75 | 125 | 20 | 34 | 150 | 30 | 30 | 2.00 |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 0.000254 | 0.004 | 67 | 125 | 20 | 32 | 148 | 30 | 30 | |
| 1,1,2-Trichloroethane | EPA 8260B | 0.000475 | 0.004 | 75 | 125 | 20 | 55 | 150 | 30 | 30 | |
| 1,1,2-Trichlorotrifluoroethane | EPA 8260B | 0.001 | 0.004 | 70 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,1-Dichloroethane | EPA 8260B | 0.000427 | 0.004 | 70 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,1-Dichloroethene | EPA 8260B | 0.000322 | 0.004 | 67 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,1-Dichloropropene | EPA 8260B | 0.000366 | 0.004 | 68 | 125 | 20 | 31 | 150 | 30 | 30 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 0.000289 | 0.004 | 75 | 125 | 20 | 30 | 149 | 30 | 30 | |
| 1,2,3-Trichloropropane | EPA 8260B | 0.000781 | 0.004 | 75 | 125 | 20 | 52 | 150 | 30 | 30 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 0.000365 | 0.004 | 75 | 125 | 20 | 30 | 144 | 30 | 30 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 0.000419 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 0.00113 | 0.010 | 68 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 0.000226 | 0.004 | 75 | 125 | 20 | 46 | 148 | 30 | 30 | 0.005 |
| 1,2-Dichlorobenzene | EPA 8260B | 0.000408 | 0.004 | 75 | 125 | 20 | 30 | 147 | 30 | 30 | |
| 1,2-Dichloroethane | EPA 8260B | 0.00025 | 0.004 | 74 | 125 | 20 | 40 | 150 | 30 | 30 | |
| 1,2-Dichloroethene (Total) | EPA 8260B | 0.000461 | 0.008 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| 1,2-Dichloropropane | EPA 8260B | 0.000244 | 0.004 | 75 | 125 | 20 | 49 | 150 | 30 | 30 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 0.000385 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,3-Dichlorobenzene | EPA 8260B | 0.000395 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,3-Dichloropropane | EPA 8260B | 0.000368 | 0.004 | 75 | 125 | 20 | 55 | 146 | 30 | 30 | |
| 1,4-Dichlorobenzene | EPA 8260B | 0.000414 | 0.004 | 75 | 125 | 20 | 30 | 149 | 30 | 30 | |
| 2,2-Dichloropropane | EPA 8260B | 0.000356 | 0.010 | 75 | 125 | 20 | 31 | 150 | 30 | 30 | |
| 2-Butanone (MEK) | EPA 8260B | 0.00218 | 0.020 | 56 | 134 | 20 | 30 | 150 | 30 | 30 | |
| 2-Chlorotoluene | EPA 8260B | 0.000406 | 0.004 | 75 | 125 | 20 | 34 | 150 | 30 | 30 | |
| 4-Chlorotoluene | EPA 8260B | 0.000412 | 0.004 | 75 | 125 | 20 | 32 | 147 | 30 | 30 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 0.00139 | 0.020 | 71 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Acetone | EPA 8260B | 0.0091 | 0.020 | 30 | 150 | 20 | 30 | 150 | 30 | 30 | |
| Allyl chloride | EPA 8260B | 0.00096 | 0.010 | 65 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzene | EPA 8260B | 0.000334 | 0.004 | 69 | 125 | 20 | 39 | 150 | 30 | 30 | 0.03 |
| Bromobenzene | EPA 8260B | 0.000342 | 0.004 | 75 | 125 | 20 | 35 | 145 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (mg/kg) | PQL (mg/kg) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | MCTA Clean Up Level (mg/kg)[1,2,3] |
| Bromochloromethane | EPA 8260B | 0.00082 | 0.004 | 75 | 125 | 20 | 41 | 150 | 30 | 30 | |
| Bromodichloromethane | EPA 8260B | 0.000339 | 0.004 | 75 | 125 | 20 | 41 | 150 | 30 | 30 | |
| Bromoform | EPA 8260B | 0.000352 | 0.020 | 75 | 125 | 20 | 34 | 150 | 30 | 30 | |
| Bromomethane | EPA 8260B | 0.000284 | 0.020 | 67 | 131 | 20 | 45 | 150 | 30 | 30 | |
| Carbon tetrachloride | EPA 8260B | 0.000327 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Chlorobenzene | EPA 8260B | 0.000386 | 0.004 | 75 | 125 | 20 | 56 | 143 | 30 | 30 | |
| Chloroethane | EPA 8260B | 0.000287 | 0.010 | 63 | 125 | 20 | 42 | 150 | 30 | 30 | |
| Chloroform | EPA 8260B | 0.000884 | 0.004 | 75 | 125 | 20 | 37 | 150 | 30 | 30 | |
| Chloromethane | EPA 8260B | 0.000494 | 0.010 | 30 | 150 | 20 | 31 | 150 | 30 | 30 | |
| cis-1,2-Dichloroethene | EPA 8260B | 0.000461 | 0.004 | 72 | 125 | 20 | 44 | 150 | 30 | 30 | |
| cis-1,3-Dichloropropene | EPA 8260B | 0.000294 | 0.004 | 73 | 125 | 20 | 49 | 133 | 30 | 30 | |
| Dibromochloromethane | EPA 8260B | 0.000265 | 0.004 | 75 | 125 | 20 | 46 | 150 | 30 | 30 | |
| Dibromomethane | EPA 8260B | 0.00031 | 0.004 | 75 | 125 | 20 | 59 | 138 | 30 | 30 | |
| Dichlorodifluoromethane | EPA 8260B | 0.000444 | 0.010 | 55 | 134 | 20 | 30 | 150 | 30 | 30 | |
| Dichlorofluoromethane | EPA 8260B | 0.000326 | 0.004 | 75 | 125 | 20 | 54 | 150 | 30 | 30 | |
| Diethyl ether (Ethyl ether) | EPA 8260B | 0.000563 | 0.010 | 68 | 125 | 20 | 37 | 150 | 30 | 30 | |
| Ethylbenzene | EPA 8260B | 0.000302 | 0.004 | 75 | 125 | 20 | 46 | 148 | 30 | 30 | 6.00 |
| Hexachloro-1,3-butadiene | EPA 8260B | 0.000353 | 0.010 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Isopropylbenzene (Cumene) | EPA 8260B | 0.000304 | 0.004 | 75 | 125 | 20 | 36 | 148 | 30 | 30 | |
| Methyl-tert-butyl ether (MTBE) | EPA 8260B | 0.000304 | 0.004 | 70 | 125 | 20 | 46 | 150 | 30 | 30 | 0.10 |
| Methylene Chloride | EPA 8260B | 0.00367 | 0.020 | 58 | 134 | 20 | 32 | 150 | 30 | 30 | 0.02 |
| Naphthalene | EPA 8260B | 0.000373 | 0.010 | 66 | 125 | 20 | 30 | 125 | 30 | 30 | 5.00 |
| Styrene | EPA 8260B | 0.000291 | 0.004 | 75 | 125 | 20 | 43 | 136 | 30 | 30 | |
| Tetrachloroethene (PCE) | EPA 8260B | 0.000303 | 0.004 | 72 | 125 | 20 | 33 | 150 | 30 | 30 | 0.05 |
| Tetrahydrofuran | EPA 8260B | 0.00402 | 0.040 | 36 | 146 | 20 | 65 | 149 | 30 | 30 | |
| Toluene | EPA 8260B | 0.000932 | 0.004 | 75 | 125 | 20 | 41 | 150 | 30 | 30 | 7.00 |
| Trichloroethene (TCE) | EPA 8260B | 0.000347 | 0.004 | 75 | 125 | 20 | 41 | 150 | 30 | 30 | 0.03 |
| Trichlorofluoromethane | EPA 8260B | 0.000447 | 0.010 | 72 | 127 | 20 | 33 | 150 | 30 | 30 | |
| Vinyl chloride | EPA 8260B | 0.000294 | 0.004 | 67 | 127 | 20 | 36 | 150 | 30 | 30 | |
| Xylene (Total) | EPA 8260B | 0.000636 | 0.012 | 75 | 125 | 20 | 38 | 150 | 30 | 30 | 9.00 |
| m-Xylene (coelute)p-Xylene | EPA 8260B | 0.000636 | 0.008 | 75 | 125 | 20 | 37 | 150 | 30 | 30 | |
| n-Butylbenzene | EPA 8260B | 0.000282 | 0.004 | 74 | 125 | 20 | 30 | 150 | 30 | 30 | |
| n-Propylbenzene | EPA 8260B | 0.000343 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| o-Xylene | EPA 8260B | 0.000463 | 0.004 | 75 | 125 | 20 | 37 | 145 | 30 | 30 | |
| p-Isopropyltoluene | EPA 8260B | 0.000349 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| sec-Butylbenzene | EPA 8260B | 0.000316 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| tert-Butylbenzene | EPA 8260B | 0.00035 | 0.004 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| trans-1,2-Dichloroethene | EPA 8260B | 0.000427 | 0.004 | 69 | 125 | 20 | 33 | 150 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **Method** | **MDL (mg/kg)** | **PQL (mg/kg)** | **Lower** | **Upper** | **RPD** | **Lower** | **Upper** | **RPD** | **RPD** | **MCTA Clean Up Level (mg/kg)[1,2,3]** |
| trans-1,3-Dichloropropene | EPA 8260B | 0.000294 | 0.004 | 75 | 125 | 20 | 54 | 142 | 30 | 30 | |
| **SVOCs (µg/kg)** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | EPA 8270D | 0.0641 | 0.330 | 46 | 125 | 20 | 30 | 127 | 30 | 30 | |
| 1,2-Dichlorobenzene | EPA 8270D | 0.0624 | 0.330 | 41 | 125 | 20 | 30 | 125 | 30 | 30 | |
| 1,2-Diphenylhydrazine | EPA 8270D | 0.0597 | 0.330 | 63 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 1,3-Dichlorobenzene | EPA 8270D | 0.0616 | 0.330 | 38 | 125 | 20 | 30 | 125 | 30 | 30 | |
| 1,4-Dichlorobenzene | EPA 8270D | 0.0602 | 0.330 | 39 | 125 | 20 | 30 | 125 | 30 | 30 | |
| 1-Methylnaphthalene | EPA 8270D | 0.0519 | 0.330 | 56 | 125 | 20 | 42 | 125 | 30 | 30 | |
| 2,4,5-Trichlorophenol | EPA 8270D | 0.0645 | 0.330 | 63 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 2,4,6-Trichlorophenol | EPA 8270D | 0.0469 | 0.330 | 61 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 2,4-Dichlorophenol | EPA 8270D | 0.0623 | 0.330 | 57 | 125 | 20 | 30 | 135 | 30 | 30 | |
| 2,4-Dimethylphenol | EPA 8270D | 0.124 | 0.330 | 51 | 125 | 20 | 30 | 148 | 30 | 30 | |
| 2.4-Dinitrophenol | EPA 8270D | 0.0743 | 0.330 | 30 | 132 | 20 | 30 | 125 | 30 | 30 | |
| 2,4-Dinitrotoluene | EPA 8270D | 0.0447 | 0.330 | 62 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 2.6-Dinitrotoluene | EPA 8270D | 0.0461 | 0.330 | 63 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 2-Chloronaphthalene | EPA 8270D | 0.0469 | 0.330 | 61 | 125 | 20 | 30 | 138 | 30 | 30 | |
| 2-Chlorophenol | EPA 8270D | 0.0657 | 0.330 | 46 | 125 | 20 | 30 | 130 | 30 | 30 | |
| 2-Methylnaphthalene | EPA 8270D | 0.0512 | 0.330 | 55 | 125 | 20 | 46 | 125 | 30 | 30 | |
| 2-Methylphenol(o-Cresol) | EPA 8270D | 0.0832 | 0.330 | 50 | 125 | 20 | 30 | 133 | 30 | 30 | |
| 2-Nitroaniline | EPA 8270D | 0.073 | 0.330 | 61 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 2-Nitrophenol | EPA 8270D | 0.0622 | 0.330 | 43 | 125 | 20 | 30 | 134 | 30 | 30 | |
| 3&4-Methylphenol | EPA 8270D | 0.0745 | 0.660 | 54 | 125 | 20 | 30 | 138 | 30 | 30 | |
| 3,3'-Dichlorobenzidine | EPA 8270D | 0.079 | 0.330 | 47 | 125 | 20 | 30 | 149 | 30 | 30 | |
| 3-Nitroaniline | EPA 8270D | 0.0809 | 0.330 | 57 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 4,6-Dinitro-2-methylphenol | EPA 8270D | 0.133 | 1.700 | 30 | 141 | 20 | 30 | 133 | 30 | 30 | |
| 4-Bromophenylphenyl ether | EPA 8270D | 0.0557 | 0.330 | 63 | 125 | 20 | 44 | 125 | 30 | 30 | |
| 4-Chloro-3-methylphenol | EPA 8270D | 0.0458 | 0.330 | 64 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 4-Chloroaniline | EPA 8270D | 0.0925 | 0.330 | 36 | 125 | 20 | 30 | 125 | 30 | 30 | |
| 4-Chlorophenylphenyl ether | EPA 8270D | 0.0452 | 0.330 | 64 | 125 | 20 | 44 | 125 | 30 | 30 | |
| 4-Nitroaniline | EPA 8270D | 0.0589 | 0.330 | 59 | 125 | 20 | 30 | 150 | 30 | 30 | |
| 4-Nitrophenol | EPA 8270D | 0.0954 | 0.330 | 54 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Acenaphthene | EPA 8270D | 0.0541 | 0.330 | 62 | 125 | 20 | 40 | 125 | 30 | 30 | |
| Acenaphthylene | EPA 8270D | 0.0453 | 0.330 | 61 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Anthracene | EPA 8270D | 0.0476 | 0.330 | 66 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(a)anthracene | EPA 8270D | 0.0384 | 0.330 | 69 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(a)pyrene | EPA 8270D | 0.0374 | 0.330 | 67 | 125 | 20 | 30 | 150 | 30 | 30 | 0.10 |
| Benzo(b)fluoranthene | EPA 8270D | 0.04 | 0.330 | 67 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(g,h,i)perylene | EPA 8270D | 0.0286 | 0.330 | 63 | 125 | 20 | 30 | 150 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (mg/kg) | PQL (mg/kg) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | MCTA Clean Up Level (mg/kg)[1,2,3] |
| Benzo(k)fluoranthene | EPA 8270D | 0.04 | 0.330 | 68 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Butylbenzylphthalate | EPA 8270D | 0.0732 | 0.330 | 69 | 129 | 20 | 30 | 150 | 30 | 30 | |
| Carbazole | EPA 8270D | 0.0444 | 0.330 | 66 | 125 | 20 | 41 | 125 | 30 | 30 | |
| Chrysene | EPA 8270D | 0.0332 | 0.330 | 68 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Di-n-butylphthalate | EPA 8270D | 0.0452 | 0.330 | 69 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Di-n-octylphthalate | EPA 8270D | 0.101 | 0.330 | 69 | 133 | 20 | 30 | 150 | 30 | 30 | |
| Dibenz(a,h)anthracene | EPA 8270D | 0.0341 | 0.330 | 64 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Dibenzofuran | EPA 8270D | 0.048 | 0.330 | 65 | 125 | 20 | 45 | 125 | 30 | 30 | |
| Diethylphthalate | EPA 8270D | 0.0392 | 0.330 | 67 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Dimethylphthalate | EPA 8270D | 0.0509 | 0.330 | 67 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Fluoranthene | EPA 8270D | 0.0353 | 0.330 | 66 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Fluorene | EPA 8270D | 0.0461 | 0.330 | 66 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Hexachloro-1,3-butadiene | EPA 8270D | 0.0762 | 0.330 | 40 | 125 | 20 | 30 | 128 | 30 | 30 | |
| Hexachlorobenzene | EPA 8270D | 0.0427 | 0.330 | 62 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Hexachloroethane | EPA 8270D | 0.0676 | 0.330 | 33 | 125 | 20 | 30 | 125 | 30 | 30 | |
| Indeno(1,2,3-cd)pyrene | EPA 8270D | 0.0385 | 0.330 | 64 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Isophorone | EPA 8270D | 0.0758 | 0.330 | 57 | 125 | 20 | 30 | 140 | 30 | 30 | |
| N-Nitroso-di-n-propylamine | EPA 8270D | 0.101 | 0.330 | 50 | 125 | 20 | 30 | 147 | 30 | 30 | |
| N-Nitrosodimethylamine | EPA 8270D | 0.0865 | 0.330 | 36 | 125 | 20 | 30 | 125 | 30 | 30 | |
| N-Nitrosodiphenylamine | EPA 8270D | 0.0406 | 0.330 | 65 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Naphthalene | EPA 8270D | 0.0629 | 0.330 | 48 | 125 | 20 | 44 | 125 | 30 | 30 | |
| Nitrobenzene | EPA 8270D | 0.0664 | 0.330 | 48 | 125 | 20 | 30 | 136 | 30 | 30 | |
| Pentachlorophenol | EPA 8270D | 0.0976 | 0.670 | 41 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Phenanthrene | EPA 8270D | 0.0453 | 0.330 | 66 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Phenol | EPA 8270D | 0.0639 | 0.330 | 46 | 125 | 20 | 30 | 129 | 30 | 30 | |
| Pyrene | EPA 8270D | 0.0348 | 0.330 | 69 | 125 | 20 | 30 | 150 | 30 | 30 | |
| bis(2-Chloroethoxy)methane | EPA 8270D | 0.0641 | 0.330 | 52 | 125 | 20 | 30 | 134 | 30 | 30 | |
| bis(2-Chloroethyl) ether | EPA 8270D | 0.0724 | 0.330 | 41 | 125 | 20 | 30 | 125 | 30 | 30 | |
| bis(2-Chloroisopropyl)ether | EPA 8270D | 0.0767 | 0.330 | 37 | 125 | 20 | 30 | 125 | 30 | 30 | |
| bis(2-Ethylhexyl)phthalate | EPA 8270D | 0.0845 | 0.330 | 69 | 131 | 20 | 30 | 150 | 30 | 30 | |
| **PAHs (µg/kg)** | | | | | | | | | | | |
| Acenaphthene | EPA 8270D-SIM | 0.000589 | 0.010 | 52 | 125 | 20 | 30 | 125 | 30 | 30 | |
| Acenaphthylene | EPA 8270D-SIM | 0.000651 | 0.010 | 50 | 125 | 20 | 30 | 133 | 30 | 30 | |
| Anthracene | EPA 8270D-SIM | 0.000527 | 0.010 | 65 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(a)anthracene | EPA 8270D-SIM | 0.00154 | 0.010 | 60 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(a)pyrene | EPA 8270D-SIM | 0.00105 | 0.010 | 69 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(b)fluoranthene | EPA 8270D-SIM | 0.000556 | 0.010 | 61 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(e)pyrene | EPA 8270D-SIM | 0.00102 | 0.010 | 71 | 125 | 20 | 30 | 150 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (mg/kg) | PQL (mg/kg) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | MCTA Clean Up Level (mg/kg)[1,2,3] |
| Benzo(g,h,i)perylene | EPA 8270D-SIM | 0.000945 | 0.010 | 60 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Benzo(k)fluoranthene | EPA 8270D-SIM | 0.00117 | 0.010 | 67 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Chrysene | EPA 8270D-SIM | 0.000302 | 0.010 | 67 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Dibenz(a,h)anthracene | EPA 8270D-SIM | 0.000459 | 0.010 | 63 | 125 | 20 | 30 | 131 | 30 | 30 | |
| Fluoranthene | EPA 8270D-SIM | 0.00031 | 0.010 | 75 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Fluorene | EPA 8270D-SIM | 0.000251 | 0.010 | 54 | 125 | 20 | 30 | 147 | 30 | 30 | |
| Indeno(1,2,3-cd)pyrene | EPA 8270D-SIM | 0.00104 | 0.010 | 63 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Naphthalene | EPA 8270D-SIM | 0.00102 | 0.010 | 49 | 125 | 20 | 30 | 131 | 30 | 30 | |
| Phenanthrene | EPA 8270D-SIM | 0.00142 | 0.010 | 65 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Pyrene | EPA 8270D-SIM | 0.000347 | 0.010 | 64 | 125 | 20 | 30 | 150 | 30 | 30 | |
| **PCBs (mg/kg)** | | | | | | | | | | | |
| PCB-1016 (Aroclor 1016) | EPA 8082A | 0.00801 | 0.033 | 66 | 125 | 20 | 30 | 150 | 30 | 30 | |
| PCB-1221 (Aroclor 1221) | EPA 8082A | 0.00855 | 0.033 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1232 (Aroclor 1232) | EPA 8082A | 0.0110 | 0.033 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1242 (Aroclor 1242) | EPA 8082A | 0.00961 | 0.033 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1248 (Aroclor 1248) | EPA 8082A | 0.00945 | 0.033 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1254 (Aroclor 1254) | EPA 8082A | 0.00878 | 0.033 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1260 (Aroclor 1260) | EPA 8082A | 0.00636 | 0.033 | 62 | 125 | 20 | 30 | 138 | 30 | 30 | |
| PCB-1262 (Aroclor 1262) | EPA 8082A | 0.0105 | 0.033 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1268 (Aroclor 1268) | EPA 8082A | 0.00641 | 0.033 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB, Total* | EPA 8082A | 0.00636 | 0.033 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1.00 |
| **TPH (mg/kg)** | | | | | | | | | | | |
| NwTPH-Gx | Ecology NWTPH-Gx | 0.656 | 5 | 54 | 125 | 20 | 70 | 130 | 30 | 30 | 30 with benzene or 100 with out benzene |
| Diesel Fuel Range | Ecology NWTPH-DX | 2.43 | 15 | 50 | 150 | 20 | 50 | 150 | 30 | 30 | 2000 |
| Motor Oil Range | Ecology NWTPH-DX | 4.34 | 10 | 50 | 150 | 20 | 50 | 150 | 30 | 30 | 2000 |
| **Pesticides (µg/kg)** | | | | | | | | | | | |
| 4,4'-DDD | EPA 8081B | 0.000303 | 0.003 | 62 | 127 | 20 | 56 | 125 | 20 | 20 | |
| 4,4'-DDE | EPA 8081B | 0.000248 | 0.003 | 66 | 125 | 20 | 32 | 150 | 20 | 20 | |
| 4,4'-DDT | EPA 8081B | 0.000419 | 0.003 | 67 | 128 | 20 | 60 | 132 | 20 | 20 | 3.00 |
| Aldrin | EPA 8081B | 0.000168 | 0.002 | 66 | 125 | 20 | 56 | 125 | 20 | 20 | |
| alpha-BHC | EPA 8081B | 0.000121 | 0.002 | 64 | 125 | 20 | 54 | 136 | 20 | 20 | |
| alpha-chlordane | EPA 8081B | 0.000135 | 0.002 | 68 | 125 | 20 | 54 | 133 | 20 | 20 | |
| beta-BHC | EPA 8081B | 0.000223 | 0.002 | 69 | 125 | 20 | 30 | 150 | 20 | 20 | |
| Chlordane, Technical | EPA 8081B | 0.00304 | 0.017 | 70 | 130 | 20 | 70 | 130 | 20 | 20 | |
| delta-BHC | EPA 8081B | 0.000138 | 0.002 | 42 | 133 | 20 | 45 | 145 | 20 | 20 | |
| Dieldrin | EPA 8081B | 0.000322 | 0.003 | 69 | 126 | 20 | 47 | 150 | 20 | 20 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **Method** | **MDL (mg/kg)** | **PQL (mg/kg)** | **Lower** | **Upper** | **RPD** | **Lower** | **Upper** | **RPD** | **RPD** | **MCTA Clean Up Level (mg/kg)[1,2,3]** |
| Endosulfan I | EPA 8081B | 0.00015 | 0.002 | 63 | 125 | 20 | 35 | 145 | 20 | 20 | |
| Endosulfan II | EPA 8081B | 0.000336 | 0.003 | 69 | 125 | 20 | 50 | 147 | 20 | 20 | |
| Endosulfan sulfate | EPA 8081B | 0.000343 | 0.003 | 56 | 137 | 20 | 54 | 132 | 20 | 20 | |
| Endrin | EPA 8081B | 0.000297 | 0.003 | 69 | 125 | 20 | 62 | 125 | 20 | 20 | |
| Endrin Aldehyde | EPA 8081B | 0.00104 | 0.003 | 65 | 125 | 20 | 33 | 150 | 20 | 20 | |
| Endrin Ketone | EPA 8081B | 0.000394 | 0.003 | 69 | 129 | 20 | 56 | 144 | 20 | 20 | |
| gamma-BHC (Lindane) | EPA 8081B | 0.000142 | 0.002 | 67 | 125 | 20 | 63 | 125 | 20 | 20 | |
| gamma-chlordane | EPA 8081B | 0.000384 | 0.002 | 63 | 125 | 20 | 45 | 132 | 20 | 20 | |
| Heptachlor | EPA 8081B | 0.00018 | 0.002 | 69 | 125 | 20 | 51 | 142 | 20 | 20 | |
| Heptachlor expoxide | EPA 8081B | 0.000157 | 0.002 | 68 | 125 | 20 | 50 | 142 | 20 | 20 | |
| Methoxychlor | EPA 8081B | 0.00251 | 0.017 | 65 | 134 | 20 | 58 | 139 | 20 | 20 | |
| Toxaphene | EPA 8081B | 0.00791 | 0.050 | 70 | 130 | 20 | 70 | 130 | 20 | 20 | |
| **Metals (mg/kg)** | | | | | | | | | | | |
| Aluminum | EPA 6020 | 3.38 | 10.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Antimony | EPA 6020 | 0.174 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Arsenic | EPA 6020 | 0.226 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | 2.00 |
| Barium | EPA 6020 | 0.114 | 0.30 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Beryllium | EPA 6020 | 0.0691 | 0.20 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Bismuth | EPA 6020 | 0.250 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Boron | EPA 6020 | 1.38 | 5.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Cadmium | EPA 6020 | 0.0324 | 0.08 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | 2.00 |
| Calcium | EPA 6020 | 19.9 | 40.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Chromium | EPA 6020 | 0.123 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Cobalt | EPA 6020 | 0.110 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Copper | EPA 6020 | 0.210 | 1.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Iron | EPA 6020 | 18.0 | 50.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Lead | EPA 6020 | 0.0350 | 0.10 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | 250 |
| Lithium | EPA 6020 | 0.129 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Magnesium | EPA 6020 | 4.59 | 10.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Manganese | EPA 6020 | 0.101 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Molybdenum | EPA 6020 | 0.149 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Mercury | EPA 7471 | 0.00804 | 0.02 | 80 | 120 | 20 | 80 | 120 | 20 | 20 | 2.00 |
| Nickel | EPA 6020 | 0.165 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Potassium | EPA 6020 | 17.9 | 50.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Selenium | EPA 6020 | 0.249 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Silica | EPA 6020 | 13.9 | 107 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Silicon | EPA 6020 | 6.48 | 50.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Silver | EPA 6020 | 0.175 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **Method** | **MDL (mg/kg)** | **PQL (mg/kg)** | **Lower** | **Upper** | **RPD** | **Lower** | **Upper** | **RPD** | **RPD** | **MCTA Clean Up Level (mg/kg)[1,2,3]** |
| Sodium | EPA 6020 | 17.0 | 50.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Strontium | EPA 6020 | 0.169 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Thallium | EPA 6020 | 0.0337 | 0.10 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Tin | EPA 6020 | 0.128 | 2.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Titanium | EPA 6020 | 0.349 | 1.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Vanadium | EPA 6020 | 0.430 | 1.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Uranium-238 | EPA 6020 | 0.250 | 0.50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Zinc | EPA 6020 | 1.30 | 5.00 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |

**Notes:**

[1]MTCA Method A cleanup levels of ethylenzene, toluene and xylenes are less than 1 percent of the gasoline mixture;
Otherwise, the cleanup level is 30 mg/kg.

[2]Cleanup level for total xylenes.

[3]Cleanup level refers to the sum of naphthalenes.

Practical quantitation limits (PQLs) based on information provided by PACE Analytical Laboratories.

mg/kg = milligrams per kilogram; NE = Not established; PCBs = Polychlorinated biphenyls; PAHs = Polycyclic aromatic hydrocarbons

EPA = Environmental Protection Agency

TPH = Total Petroleum Hydrocarbons

# Table A-2

## Groundwater Measurement Quality Objective and Target Reporting Limits

Stubblefield Salvage Yard

595 Offner Road, Walla Walla, Washington

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | MTCA Clean Up Level (mg/L)[1,2,3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (µg/L) | PQL (µg/L) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | |
| **VOCs[1]** | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | EPA 8260B | 0.143 | 1 | 75 | 125 | 20 | 69 | 130 | 30 | 30 | |
| 1,1,1-Trichloroethane | EPA 8260B | 0.151 | 1 | 75 | 125 | 20 | 72 | 133 | 30 | 30 | 200.00 |
| 1,1,2,2-Tetrachloroethane | EPA 8260B | 0.188 | 1 | 75 | 129 | 20 | 60 | 137 | 30 | 30 | |
| 1,1,2-Trichloroethane | EPA 8260B | 0.221 | 1 | 75 | 125 | 20 | 70 | 128 | 30 | 30 | |
| 1,1,2-Trichlorotrifluoroethane | EPA 8260B | 0.277 | 1 | 74 | 125 | 20 | 64 | 147 | 30 | 30 | |
| 1,1-Dichloroethane | EPA 8260B | 0.144 | 1 | 75 | 127 | 20 | 64 | 136 | 30 | 30 | |
| 1,1-Dichloroethene | EPA 8260B | 0.180 | 1 | 73 | 125 | 20 | 67 | 139 | 30 | 30 | |
| 1,1-Dichloropropene | EPA 8260B | 0.175 | 1 | 75 | 125 | 20 | 69 | 131 | 30 | 30 | |
| 1,2,3-Trichlorobenzene | EPA 8260B | 0.143 | 1 | 74 | 126 | 20 | 60 | 138 | 30 | 30 | |
| 1,2,3-Trichloropropane | EPA 8260B | 0.660 | 4 | 75 | 125 | 20 | 67 | 129 | 30 | 30 | |
| 1,2,4-Trichlorobenzene | EPA 8260B | 0.178 | 1 | 75 | 125 | 20 | 71 | 125 | 30 | 30 | |
| 1,2,4-Trimethylbenzene | EPA 8260B | 0.135 | 1 | 75 | 125 | 20 | 67 | 130 | 30 | 30 | |
| 1,2-Dibromo-3-chloropropane | EPA 8260B | 1.03 | 4 | 64 | 129 | 20 | 52 | 141 | 30 | 30 | |
| 1,2-Dibromoethane (EDB) | EPA 8260B | 0.235 | 1 | 75 | 125 | 20 | 66 | 130 | 30 | 30 | 0.01 |
| 1,2-Dichlorobenzene | EPA 8260B | 0.208 | 1 | 75 | 125 | 20 | 72 | 126 | 30 | 30 | |
| 1,2-Dichloroethane | EPA 8260B | 0.322 | 1 | 74 | 125 | 20 | 64 | 125 | 30 | 30 | 5.00 |
| 1,2-Dichloroethene (Total) | EPA 8260B | 0.615 | 4 | 75 | 125 | 20 | 65 | 128 | 30 | 30 | |
| 1,2-Dichloropropane | EPA 8260B | 0.179 | 1 | 75 | 125 | 20 | 63 | 139 | 30 | 30 | |
| 1,3,5-Trimethylbenzene | EPA 8260B | 0.160 | 1 | 75 | 125 | 20 | 70 | 128 | 30 | 30 | |
| 1,3-Dichlorobenzene | EPA 8260B | 0.129 | 1 | 75 | 125 | 20 | 70 | 131 | 30 | 30 | |
| 1,3-Dichloropropane | EPA 8260B | 0.103 | 1 | 75 | 125 | 20 | 74 | 125 | 30 | 30 | |
| 1,4-Dichlorobenzene | EPA 8260B | 0.397 | 4 | 70 | 125 | 20 | 58 | 137 | 30 | 30 | |
| 2,2-Dichloropropane | EPA 8260B | 2.42 | 5 | 57 | 130 | 20 | 45 | 132 | 30 | 30 | |
| 2-Butanone (MEK) | EPA 8260B | 0.204 | 1 | 75 | 125 | 20 | 66 | 134 | 30 | 30 | |
| 2-Chlorotoluene | EPA 8260B | 0.131 | 1 | 75 | 125 | 20 | 70 | 132 | 30 | 30 | |
| 4-Chlorotoluene | EPA 8260B | 0.549 | 5 | 69 | 137 | 20 | 54 | 143 | 30 | 30 | |
| 4-Methyl-2-pentanone (MIBK) | EPA 8260B | 8.84 | 20 | 32 | 150 | 20 | 51 | 150 | 30 | 30 | |
| Acetone | EPA 8260B | 1.01 | 4 | 64 | 135 | 20 | 52 | 150 | 30 | 30 | |
| Allyl chloride | EPA 8260B | 0.339 | 1 | 75 | 126 | 20 | 62 | 140 | 30 | 30 | |
| Benzene | EPA 8260B | 0.156 | 1 | 75 | 125 | 20 | 70 | 128 | 30 | 30 | 5.00 |
| Bromobenzene | EPA 8260B | 0.378 | 1 | 75 | 126 | 20 | 65 | 131 | 30 | 30 | |
| Bromochloromethane | EPA 8260B | 0.201 | 1 | 75 | 125 | 20 | 74 | 127 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | MTCA Clean Up Level |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (µg/L) | PQL (µg/L) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | (mg/L)[1,2,3] |
| Bromodichloromethane | EPA 8260B | 1.04 | 4 | 67 | 125 | 20 | 59 | 125 | 30 | 30 | |
| Bromoform | EPA 8260B | 1.54 | 4 | 30 | 150 | 20 | 30 | 149 | 30 | 30 | |
| Bromomethane | EPA 8260B | 0.199 | 1 | 75 | 125 | 20 | 67 | 134 | 30 | 30 | |
| Carbon tetrachloride | EPA 8260B | 0.137 | 1 | 75 | 125 | 20 | 72 | 131 | 30 | 30 | |
| Chlorobenzene | EPA 8260B | 0.439 | 1 | 64 | 142 | 20 | 55 | 150 | 30 | 30 | |
| Chloroethane | EPA 8260B | 0.460 | 1 | 75 | 125 | 20 | 67 | 125 | 30 | 30 | |
| Chloroform | EPA 8260B | 1.08 | 4 | 40 | 150 | 20 | 43 | 148 | 30 | 30 | |
| Chloromethane | EPA 8260B | 0.202 | 1 | 75 | 125 | 20 | 62 | 132 | 30 | 30 | |
| cis-1,2-Dichloroethene | EPA 8260B | 0.117 | 4 | 75 | 125 | 20 | 63 | 129 | 30 | 30 | |
| cis-1,3-Dichloropropene | EPA 8260B | 0.134 | 1 | 75 | 125 | 20 | 67 | 127 | 30 | 30 | |
| Dibromochloromethane | EPA 8260B | 0.499 | 4 | 75 | 125 | 20 | 68 | 132 | 30 | 30 | |
| Dibromomethane | EPA 8260B | 0.314 | 1 | 61 | 132 | 20 | 59 | 144 | 30 | 30 | |
| Dichlorodifluoromethane | EPA 8260B | 0.384 | 1 | 75 | 129 | 20 | 63 | 144 | 30 | 30 | |
| Dichlorofluoromethane | EPA 8260B | 1.31 | 4 | 74 | 125 | 20 | 52 | 139 | 30 | 30 | |
| Diethyl ether (Ethyl ether) | EPA 8260B | 0.135 | 1 | 75 | 125 | 20 | 75 | 131 | 30 | 30 | |
| Ethylbenzene | EPA 8260B | 0.479 | 1 | 75 | 125 | 20 | 58 | 146 | 30 | 30 | 700.00 |
| Hexachloro-1,3-butadiene | EPA 8260B | 0.171 | 1 | 75 | 125 | 20 | 71 | 132 | 30 | 30 | |
| Isopropylbenzene (Cumene) | EPA 8260B | 0.401 | 1 | 73 | 129 | 20 | 65 | 130 | 30 | 30 | 20.00 |
| Methyl-tert-butyl ether (MTBE) | EPA 8260B | 1.16 | 4 | 72 | 125 | 20 | 66 | 125 | 30 | 30 | |
| Methylene Chloride | EPA 8260B | 0.422 | 4 | 65 | 126 | 20 | 48 | 134 | 30 | 30 | 5.00 |
| Naphthalene | EPA 8260B | 0.145 | 1 | 75 | 125 | 20 | 65 | 134 | 30 | 30 | |
| Styrene | EPA 8260B | 0.158 | 1 | 75 | 125 | 20 | 69 | 135 | 30 | 30 | |
| Tetrachloroethene (PCE) | EPA 8260B | 4.31 | 10 | 30 | 150 | 20 | 48 | 150 | 30 | 30 | 5.00 |
| Tetrahydrofuran | EPA 8260B | 0.171 | 1 | 74 | 125 | 20 | 68 | 132 | 30 | 30 | 1000.00 |
| Toluene | EPA 8260B | 0.182 | 0.4 | 75 | 125 | 20 | 64 | 136 | 30 | 30 | 5.00 |
| Trichloroethene (TCE) | EPA 8260B | 0.129 | 1 | 71 | 131 | 20 | 65 | 146 | 30 | 30 | |
| Trichlorofluoromethane | EPA 8260B | 0.0961 | 0.2 | 65 | 137 | 20 | 51 | 150 | 30 | 30 | |
| Vinyl chloride | EPA 8260B | 0.243 | 3 | 75 | 125 | 20 | 69 | 135 | 30 | 30 | 0.20 |
| Xylene (Total) | EPA 8260B | 0.243 | 2 | 75 | 127 | 20 | 65 | 141 | 30 | 30 | 1000.00 |
| m-Xylene (coelute)p-Xylene | EPA 8260B | 0.133 | 1 | 75 | 125 | 20 | 57 | 141 | 30 | 30 | |
| n-Butylbenzene | EPA 8260B | 0.149 | 1 | 75 | 125 | 20 | 70 | 131 | 30 | 30 | |
| n-Propylbenzene | EPA 8260B | 0.167 | 1 | 75 | 125 | 20 | 65 | 133 | 30 | 30 | |
| o-Xylene | EPA 8260B | 0.139 | 1 | 75 | 125 | 20 | 66 | 136 | 30 | 30 | |
| p-Isopropyltoluene | EPA 8260B | 0.124 | 1 | 75 | 125 | 20 | 69 | 134 | 30 | 30 | |
| sec-Butylbenzene | EPA 8260B | 0.147 | 1 | 75 | 125 | 20 | 71 | 130 | 30 | 30 | |
| tert-Butylbenzene | EPA 8260B | 0.210 | 1 | 70 | 126 | 20 | 61 | 134 | 30 | 30 | |
| trans-1,2-Dichloroethene | EPA 8260B | 0.137 | 4 | 75 | 125 | 20 | 66 | 125 | 30 | 30 | |
| trans-1,3-Dichloropropene | EPA 8260B | 0.137 | 1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | MTCA Clean Up Level |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (µg/L) | PQL (µg/L) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | (mg/L)[1,2,3] |
| **SVOCs** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | EPA 8270D | 0.800 | 10 | 54 | 125 | 20 | 46 | 125 | 30 | 30 | |
| 1,2-Dichlorobenzene | EPA 8270D | 0.962 | 10 | 35 | 125 | 20 | 43 | 125 | 30 | 30 | |
| 1,2-Diphenylhydrazine | EPA 8270D | 1.75 | 10 | 68 | 125 | 20 | 51 | 125 | 30 | 30 | |
| 1,3-Dichlorobenzene | EPA 8270D | 0.694 | 10 | 30 | 125 | 20 | 41 | 125 | 30 | 30 | |
| 1,4-Dichlorobenzene | EPA 8270D | 0.974 | 10 | 33 | 125 | 20 | 42 | 125 | 30 | 30 | |
| 1-Methylnaphthalene | EPA 8270D | 1.10 | 10 | 67 | 125 | 20 | 61 | 125 | 30 | 30 | |
| 2,4,5-Trichlorophenol | EPA 8270D | 1.21 | 10 | 74 | 125 | 20 | 66 | 125 | 30 | 30 | |
| 2,4,6-Trichlorophenol | EPA 8270D | 1.43 | 10 | 74 | 125 | 20 | 67 | 125 | 30 | 30 | |
| 2,4-Dichlorophenol | EPA 8270D | 1.29 | 10 | 68 | 125 | 20 | 63 | 125 | 30 | 30 | |
| 2,4-Dimethylphenol | EPA 8270D | 2.13 | 50 | 33 | 125 | 20 | 30 | 141 | 30 | 30 | |
| 2.4-Dinitrophenol | EPA 8270D | 2.39 | 10 | 30 | 127 | 20 | 30 | 146 | 30 | 30 | |
| 2,4-Dinitrotoluene | EPA 8270D | 1.10 | 10 | 75 | 125 | 20 | 68 | 125 | 30 | 30 | |
| 2.6-Dinitrotoluene | EPA 8270D | 1.22 | 10 | 75 | 125 | 20 | 68 | 125 | 30 | 30 | |
| 2-Chloronaphthalene | EPA 8270D | 0.981 | 10 | 70 | 125 | 20 | 64 | 125 | 30 | 30 | |
| 2-Chlorophenol | EPA 8270D | 1.35 | 10 | 61 | 125 | 20 | 57 | 125 | 30 | 30 | |
| 2-Methylnaphthalene | EPA 8270D | 1.13 | 10 | 67 | 125 | 20 | 59 | 125 | 30 | 30 | |
| 2-Methylphenol(o-Cresol) | EPA 8270D | 1.57 | 10 | 63 | 125 | 20 | 57 | 125 | 30 | 30 | |
| 2-Nitroaniline | EPA 8270D | 1.66 | 10 | 73 | 125 | 20 | 60 | 125 | 30 | 30 | |
| 2-Nitrophenol | EPA 8270D | 1.54 | 10 | 64 | 125 | 20 | 58 | 125 | 30 | 30 | |
| 3&4-Methylphenol | EPA 8270D | 1.81 | 20 | 67 | 125 | 20 | 54 | 125 | 30 | 30 | |
| 3,3'-Dichlorobenzidine | EPA 8270D | 2.10 | 50 | 60 | 125 | 20 | 30 | 125 | 30 | 30 | |
| 3-Nitroaniline | EPA 8270D | 3.01 | 10 | 73 | 125 | 20 | 30 | 149 | 30 | 30 | |
| 4,6-Dinitro-2-methylphenol | EPA 8270D | 2.91 | 10 | 42 | 127 | 20 | 30 | 137 | 30 | 30 | |
| 4-Bromophenylphenyl ether | EPA 8270D | 1.36 | 10 | 75 | 125 | 20 | 55 | 125 | 30 | 30 | |
| 4-Chloro-3-methylphenol | EPA 8270D | 1.29 | 10 | 75 | 125 | 20 | 72 | 125 | 30 | 30 | |
| 4-Chloroaniline | EPA 8270D | 1.83 | 50 | 60 | 125 | 20 | 30 | 125 | 30 | 30 | |
| 4-Chlorophenylphenyl ether | EPA 8270D | 0.972 | 10 | 74 | 125 | 20 | 53 | 125 | 30 | 30 | |
| 4-Nitroaniline | EPA 8270D | 1.76 | 10 | 69 | 125 | 20 | 30 | 147 | 30 | 30 | |
| 4-Nitrophenol | EPA 8270D | 4.10 | 10 | 62 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Acenaphthene | EPA 8270D | 1.47 | 10 | 74 | 125 | 20 | 60 | 125 | 30 | 30 | |
| Acenaphthylene | EPA 8270D | 1.43 | 10 | 72 | 125 | 20 | 63 | 125 | 30 | 30 | |
| Anthracene | EPA 8270D | 1.55 | 10 | 75 | 125 | 20 | 61 | 125 | 30 | 30 | |
| Benzo(a)anthracene | EPA 8270D | 0.974 | 10 | 75 | 125 | 20 | 55 | 125 | 30 | 30 | |
| Benzo(a)pyrene | EPA 8270D | 0.863 | 10 | 75 | 125 | 20 | 49 | 125 | 30 | 30 | 0.10 |
| Benzo(b)fluoranthene | EPA 8270D | 0.988 | 10 | 75 | 125 | 20 | 49 | 126 | 30 | 30 | |
| Benzo(g,h,i)perylene | EPA 8270D | 1.14 | 10 | 73 | 125 | 20 | 35 | 131 | 30 | 30 | |
| Benzo(k)fluoranthene | EPA 8270D | 1.47 | 10 | 75 | 125 | 20 | 49 | 126 | 30 | 30 | |
| Butylbenzylphthalate | EPA 8270D | 1.65 | 10 | 69 | 127 | 20 | 57 | 125 | 30 | 30 | |
| Carbazole | EPA 8270D | 1.47 | 10 | 75 | 125 | 20 | 68 | 125 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | MTCA Clean Up Level |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (µg/L) | PQL (µg/L) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | (mg/L)[1,2,3] |
| Chrysene | EPA 8270D | 0.988 | 10 | 75 | 125 | 20 | 54 | 125 | 30 | 30 | |
| Di-n-butylphthalate | EPA 8270D | 3.11 | 10 | 75 | 125 | 20 | 60 | 125 | 30 | 30 | |
| Di-n-octylphthalate | EPA 8270D | 1.97 | 10 | 69 | 131 | 20 | 59 | 125 | 30 | 30 | |
| Dibenz(a,h)anthracene | EPA 8270D | 1.22 | 10 | 74 | 125 | 20 | 47 | 125 | 30 | 30 | |
| Dibenzofuran | EPA 8270D | 1.42 | 10 | 75 | 125 | 20 | 62 | 125 | 30 | 30 | |
| Diethylphthalate | EPA 8270D | 1.66 | 10 | 75 | 125 | 20 | 72 | 125 | 30 | 30 | |
| Dimethylphthalate | EPA 8270D | 1.48 | 10 | 75 | 125 | 20 | 73 | 125 | 30 | 30 | |
| Fluoranthene | EPA 8270D | 1.81 | 10 | 75 | 125 | 20 | 58 | 125 | 30 | 30 | |
| Fluorene | EPA 8270D | 1.48 | 10 | 75 | 125 | 20 | 65 | 125 | 30 | 30 | |
| Hexachloro-1,3-butadiene | EPA 8270D | 0.679 | 10 | 37 | 125 | 20 | 35 | 125 | 30 | 30 | |
| Hexachlorobenzene | EPA 8270D | 1.25 | 10 | 74 | 125 | 20 | 54 | 125 | 30 | 30 | |
| Hexachloroethane | EPA 8270D | 1.23 | 10 | 30 | 125 | 20 | 36 | 125 | 30 | 30 | |
| Indeno(1,2,3-cd)pyrene | EPA 8270D | 1.09 | 10 | 74 | 125 | 20 | 47 | 125 | 30 | 30 | |
| Isophorone | EPA 8270D | 1.58 | 10 | 72 | 125 | 20 | 69 | 125 | 30 | 30 | |
| N-Nitroso-di-n-propylamine | EPA 8270D | 1.46 | 10 | 65 | 125 | 20 | 68 | 125 | 30 | 30 | |
| N-Nitrosodimethylamine | EPA 8270D | 1.09 | 10 | 52 | 125 | 20 | 54 | 125 | 30 | 30 | |
| N-Nitrosodiphenylamine | EPA 8270D | 1.76 | 10 | 75 | 125 | 20 | 32 | 125 | 30 | 30 | |
| Naphthalene | EPA 8270D | 1.11 | 10 | 58 | 125 | 20 | 56 | 125 | 30 | 30 | 5.00 |
| Nitrobenzene | EPA 8270D | 1.63 | 10 | 64 | 125 | 20 | 61 | 125 | 30 | 30 | |
| Pentachlorophenol | EPA 8270D | 2.95 | 20 | 52 | 125 | 20 | 30 | 150 | 30 | 30 | |
| Phenanthrene | EPA 8270D | 1.46 | 10 | 75 | 125 | 20 | 62 | 125 | 30 | 30 | |
| Phenol | EPA 8270D | 1.26 | 10 | 59 | 125 | 20 | 50 | 125 | 30 | 30 | |
| Pyrene | EPA 8270D | 0.961 | 10 | 75 | 125 | 20 | 57 | 125 | 30 | 30 | |
| bis(2-Chloroethoxy)methane | EPA 8270D | 1.41 | 10 | 67 | 125 | 20 | 66 | 125 | 30 | 30 | |
| bis(2-Chloroethyl) ether | EPA 8270D | 1.50 | 10 | 55 | 125 | 20 | 53 | 125 | 30 | 30 | |
| bis(2-Chloroisopropyl)ether | EPA 8270D | 1.95 | 10 | 52 | 125 | 20 | 51 | 125 | 30 | 30 | |
| bis(2-Ethylhexyl)phthalate | EPA 8270D | 4.30 | 10 | 72 | 129 | 20 | 57 | 126 | 30 | 30 | |
| **PAHs** | | | | | | | | | | | |
| Acenaphthene | EPA 8270D-SIM | 0.00320 | 0.04 | 50 | 125 | 20 | 53 | 125 | 30 | 30 | |
| Acenaphthylene | EPA 8270D-SIM | 0.00463 | 0.04 | 47 | 125 | 20 | 48 | 125 | 30 | 30 | |
| Anthracene | EPA 8270D-SIM | 0.00617 | 0.04 | 65 | 125 | 20 | 66 | 125 | 30 | 30 | |
| Benzo(a)anthracene | EPA 8270D-SIM | 0.00391 | 0.04 | 60 | 125 | 20 | 57 | 125 | 30 | 30 | |
| Benzo(a)pyrene | EPA 8270D-SIM | 0.00401 | 0.04 | 67 | 125 | 20 | 62 | 125 | 30 | 30 | |
| Benzo(b)fluoranthene | EPA 8270D-SIM | 0.0127 | 0.04 | 64 | 125 | 20 | 50 | 125 | 30 | 30 | |
| Benzo(e)pyrene | EPA 8270D-SIM | 0.00441 | 0.04 | 69 | 125 | 20 | 72 | 125 | 30 | 30 | |
| Benzo(g,h,i)perylene | EPA 8270D-SIM | 0.00982 | 0.04 | 53 | 125 | 20 | 34 | 125 | 30 | 30 | |
| Benzo(k)fluoranthene | EPA 8270D-SIM | 0.0104 | 0.04 | 61 | 125 | 20 | 50 | 125 | 30 | 30 | |
| Chrysene | EPA 8270D-SIM | 0.00918 | 0.04 | 68 | 125 | 20 | 65 | 125 | 30 | 30 | |
| Dibenz(a,h)anthracene | EPA 8270D-SIM | 0.00918 | 0.04 | 45 | 125 | 20 | 31 | 127 | 30 | 30 | |
| Fluoranthene | EPA 8270D-SIM | 0.0183 | 0.04 | 73 | 125 | 20 | 70 | 125 | 30 | 30 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | MTCA Clean Up Level |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **Method** | **MDL (µg/L)** | **PQL (µg/L)** | **Lower** | **Upper** | **RPD** | **Lower** | **Upper** | **RPD** | **RPD** | **(mg/L)[1,2,3]** |
| Fluorene | EPA 8270D-SIM | 0.00594 | 0.04 | 53 | 125 | 20 | 53 | 125 | 30 | 30 | |
| Indeno(1,2,3-cd)pyrene | EPA 8270D-SIM | 0.0133 | 0.04 | 62 | 125 | 20 | 45 | 125 | 30 | 30 | |
| Naphthalene | EPA 8270D-SIM | 0.00680 | 0.04 | 46 | 125 | 20 | 34 | 125 | 30 | 30 | 5.00 |
| Phenanthrene | EPA 8270D-SIM | 0.0105 | 0.04 | 66 | 125 | 20 | 61 | 125 | 30 | 30 | |
| Pyrene | EPA 8270D-SIM | 0.0147 | 0.04 | 65 | 125 | 20 | 60 | 125 | 30 | 30 | |
| **PCBs** | | | | | | | | | | | |
| PCB-1016 (Aroclor 1016) | EPA 8082A | 0.0476 | 0.1 | 47 | 125 | 20 | 30 | 150 | 30 | 30 | |
| PCB-1221 (Aroclor 1221) | EPA 8082A | 0.0427 | 0.1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1232 (Aroclor 1232) | EPA 8082A | 0.0356 | 0.1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1242 (Aroclor 1242) | EPA 8082A | 0.0474 | 0.1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1248 (Aroclor 1248) | EPA 8082A | 0.0437 | 0.1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1254 (Aroclor 1254) | EPA 8082A | 0.0458 | 0.1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1260 (Aroclor 1260) | EPA 8082A | 0.0449 | 0.1 | 54 | 125 | 20 | 45 | 125 | 30 | 30 | |
| PCB-1262 (Aroclor 1262) | EPA 8082A | 0.0306 | 0.1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB-1268 (Aroclor 1268) | EPA 8082A | 0.0330 | 0.1 | 70 | 130 | 20 | 70 | 130 | 30 | 30 | |
| PCB, Total* | EPA 8082A | 0.0306 | 0.1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0.10 |
| **TPH** | | | | | | | | | | | |
| NwTPH-Gx | Ecology NWTPH-Gx | 19.6 | 100 | 41 | 137 | 20 | 30 | 145 | 30 | 30 | 800 with benzene or 1000 without benzene |
| Diesel Fuel Range | Ecology NWTPH-DX | 2.43 | 15 | 50 | 150 | 20 | 50 | 150 | 30 | 30 | 500.00 |
| Motor Oil Range | Ecology NWTPH-DX | 4.34 | 10 | 50 | 150 | 20 | 50 | 150 | 30 | 30 | 500.00 |
| **Pesticides** | | | | | | | | | | | |
| 4,4'-DDD | EPA 8081B | 0.0123 | 0.10 | 67 | 125 | 20 | 70 | 130 | 20 | 20 | |
| 4,4'-DDE | EPA 8081B | 0.0117 | 0.10 | 68 | 125 | 20 | 70 | 130 | 20 | 20 | |
| 4,4'-DDT | EPA 8081B | 0.0262 | 0.10 | 66 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Aldrin | EPA 8081B | 0.00994 | 0.05 | 46 | 125 | 20 | 70 | 130 | 20 | 20 | |
| alpha-BHC | EPA 8081B | 0.00460 | 0.05 | 66 | 125 | 20 | 70 | 130 | 20 | 20 | |
| alpha-chlordane | EPA 8081B | 0.00527 | 0.05 | 72 | 125 | 20 | 70 | 130 | 20 | 20 | |
| beta-BHC | EPA 8081B | 0.00856 | 0.05 | 72 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Chlordane, Technical | EPA 8081B | 0.156 | 0.50 | 70 | 130 | 20 | 70 | 130 | 20 | 20 | |
| delta-BHC | EPA 8081B | 0.00556 | 0.05 | 37 | 141 | 20 | 70 | 130 | 20 | 20 | |
| Dieldrin | EPA 8081B | 0.00858 | 0.10 | 71 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Endosulfan I | EPA 8081B | 0.00567 | 0.05 | 69 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Endosulfan II | EPA 8081B | 0.00937 | 0.10 | 73 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Endosulfan sulfate | EPA 8081B | 0.0106 | 0.10 | 63 | 127 | 20 | 70 | 130 | 20 | 20 | |
| Endrin | EPA 8081B | 0.0111 | 0.10 | 72 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Endrin Aldehyde | EPA 8081B | 0.0119 | 0.10 | 70 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Endrin Ketone | EPA 8081B | 0.0129 | 0.10 | 72 | 127 | 20 | 70 | 130 | 20 | 20 | |
| gamma-BHC (Lindane) | EPA 8081B | 0.00468 | 0.05 | 69 | 125 | 20 | 70 | 130 | 20 | 20 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | MTCA Clean Up Level |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (µg/L) | PQL (µg/L) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | (mg/L)[1,2,3] |
| gamma-chlordane | EPA 8081B | 0.00634 | 0.05 | 64 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Heptachlor | EPA 8081B | 0.0106 | 0.05 | 54 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Heptachlor expoxide | EPA 8081B | 0.00467 | 0.05 | 72 | 125 | 20 | 70 | 130 | 20 | 20 | |
| Methoxychlor | EPA 8081B | 0.144 | 0.50 | 67 | 127 | 20 | 70 | 130 | 20 | 20 | |
| Toxaphene | EPA 8081B | 0.215 | 1.5 | 70 | 130 | 20 | 70 | 130 | 20 | 20 | |
| **Metals (mg/kg)** | | | | | | | | | | | |
| Aluminum | EPA 6020 | 2.27 | 10 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Antimony | EPA 6021 | 0.1170 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Arsenic | EPA 6022 | 0.211 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | 5.00 |
| Barium | EPA 6023 | 0.142 | 0.3 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Beryllium | EPA 6024 | 0.0635 | 0.2 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Bismuth | EPA 6025 | 0.0676 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Boron | EPA 6026 | 1.54 | 5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Cadmium | EPA 6027 | 0.0279 | 0.08 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | 5.00 |
| Calcium | EPA 6028 | 11.4 | 40 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Chromium | EPA 6029 | 0.128 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | 50.00 |
| Cobalt | EPA 6030 | 0.151 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Copper | EPA 6031 | 0.203 | 1 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Iron | EPA 6032 | 6.75 | 50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Lead | EPA 6033 | 0.0280 | 0.1 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | 15.00 |
| Lithium | EPA 6034 | 0.166 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Magnesium | EPA 6035 | 3.00 | 10 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Manganese | EPA 6036 | 0.0985 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Mercury | EPA 7470A | 0.0777 | 0.2 | 80 | 120 | 20 | 80 | 120 | 20 | 20 | 2.00 |
| Molybdenum | EPA 6037 | 0.0805 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Nickel | EPA 6038 | 0.124 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Palladium | EPA 6039 | 0.0767 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Platinum | EPA 6040 | 0.250 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Potassium | EPA 6041 | 12.5 | 50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Selenium | EPA 6042 | 0.167 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Silica | EPA 6043 | 36.4 | 107 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Silicon | EPA 6044 | 17.0 | 50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Silver | EPA 6045 | 0.169 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Sodium | EPA 6046 | 14.0 | 50 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Strontium | EPA 6047 | 0.0749 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Thallium | EPA 6048 | 0.0280 | 0.1 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Tin | EPA 6049 | 0.113 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Titanium | EPA 6050 | 0.300 | 1 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Vanadium | EPA 6051 | 0.267 | 1 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Zinc | EPA 6052 | 0.818 | 5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |

| | | | | LCS/LCSD | | | MS/MSD | | | DUP | MTCA Clean Up Level |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Method | MDL (µg/L) | PQL (µg/L) | Lower | Upper | RPD | Lower | Upper | RPD | RPD | (mg/L)[1,2,3] |
| Uranium-238 | EPA 6053 | 0.0329 | 0.5 | 80 | 120 | 20 | 75 | 125 | 20 | 20 | |
| Hardness | EPA 6054 | 40.8 | 141 | | | | | | | | |

Notes:

[1]MTCA Method A cleanup level for gasoline-range hydrocarbons is 100 mg/kg if benzene is not detected and the total concentration of ethylenzene, toluene and xylenes are less than 1 percent of the gasoline mixture; otherwise the cleanup level is 30 mg/kg.

[2]Cleanup level for total xylenes.

[3]Cleanup level refers to the sum of naphthalenes.

Practical quantitation limits (PQLs) based on information provided by PACE Analytical Laboratories.

mg/kg = milligrams per kilogram; NE = Not established; PCBs = Polychlorinated biphenyls; PAHs = Polycyclic aromatic hydrocarbons

EPA = Environmental Protection Agency

TPH = Total Petroleum Hydrocarbons

# Table A-3

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

### Stubblefield Salvage Yard

### 595 Offner Road, Walla Walla, Washington

| Analysis | Matrix | Method | Minimum Sample Size | Sample Containers | Sample Preservation | Holding Times |
|---|---|---|---|---|---|---|
| VOCs | Soil | EPA 8260B | 30 g | 2 pre-weighed 40 ml voa vials preserved with MeOH; 4 oz jar (for dry-weight correction) | MeOH; <Cool 6°C | 14 days from collection to analysis |
| SVOCs | Soil | EPA 8011 | 30 g | 4 or 8 oz glass wide-mouth with Teflon-lined lid | Cool <6ºC | 14 days from collection to analysis |
| Metals (priority) | Soil | EPA 6020/Mercury 7471 | 20 g | 4 or 8 oz glass wide-mouth with Teflon-lined lid | NA | 180 days from collection to analysis |
| GRPH | Soil | Ecology NWTPH-Gx | 30 g | 2 pre-weighed 40 ml voa vials preserved with MeOH; 4 oz jar (for dry-weight correction) | MeOH; Cool <6°C | 14 days from collection to analysis |
| DRPH/ORPH | Soil | Ecology NWTPH-Dx | 30 g | 4 or 8 oz glass wide-mouth with Teflon-lined lid | Cool <6°C | 14 days from collection to analysis |
| PCBs | Soil | EPA 8082A | 15 g | 4 or 8 oz glass wide-mouth with Teflon-lined lid | Cool <6ºC | 1 year |
| PAHs | Soil | EPA 8270D-SIM | 50 g | 4 or 8 oz glass wide-mouth jar with Teflon-lined lid | Cool <6°C | 14 days from collection to analysis |
| Pesticides | Soil | EPA 8081B | 30 g | 4 or 8 oz glass wide-mouth jar with Teflon-lined lid | Cool <6°C | 14 days from collection to analysis |

**Notes:**

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

VOA = volatile organic analysis; MeOH = Methanol;

g = gram; C = Celsius

GRPH = Gasoline-Range Petroleum Hydrocarbons; DRPH = Diesel-Range Petroleum Hydrocarbons

EDC = Dichloroethane, 1-2; EDB = Dibromoethane, 1-2

PCBs = Polychlorinated Biphenyls; PAHs = Polycyclic aromatic hydrocarbons

# Table A-4

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

**Stubblefield Salvage Yard**

**595 Offner Road, Walla Walla, Washington**

| Analysis | Matrix | Method | Minimum Sample Size | Sample Containers | Sample Preservation | Holding Times |
|---|---|---|---|---|---|---|
| VOCs | Water | EPA 8260C | 120ml | 3-40ml VOA | HCL pH<2, Cool <6°C | 14 days from collection to analysis |
| SVOCs | Water | EPA 88270D | 1L | 1L Amber Glass with Teflon lined cap | $Na_2S_2O_3$; Cool <6°C | 7 days from collection to analysis |
| PCBs | Water | EPA 8082A | 1L | 1L Amber Glass with Teflon lined cap | $Na_2S_2O_3$; Cool <6°C | 1 Year from collection to analysis |
| GRPH | Water | Ecology NWTPH-Gx | 80ml | 3-40ml VOA | HCL pH<2, Cool <6°C | 14 days from collection to analysis |
| DRPH/ORPH | Water | Ecology NWTPH-Dx | 1L | 1L Amber Glass with Teflon lined cap | $Na_2S_2O_3$; Cool <6°C | 7 days from collection to analysis |

**Notes:**

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

VOA = volatile organic analysis; MeOH = Methanol;

g = gram; C = Celsius

GRPH = Gasoline-Range Petroleum Hydrocarbons; DRPH = Diesel-Range Petroleum Hydrocarbons

EDC = Dichloroethane, 1-2; EDB = Dibromoethane, 1-2

PCBs = Polychlorinated Biphenyls; PAHs = Polycyclic aromatic hydrocarbons

# Table A-5

## Quality Control Samples Type and Frequency

### Stubblefield Salvage Yard

### 595 Offner Road, Walla Walla, Washington

| Parameter | Field QC | | Laboratory QC | | | |
|---|---|---|---|---|---|---|
| | Field Duplicate | Trip Blanks | Method Blanks | LCS | MS / MSD | Lab Duplicates |
| VOCs | 1 per groundwater event | 1 per soil event and 1 per water event | 1/batch | 1/batch | 1/batch | 1/batch |
| SVOCs | 1 per groundwater event | None | 1/batch | 1/batch | 1/batch | 1/batch |
| Metals | None | None | 1/batch | 1/batch | 1/batch | 1/batch |
| PCBs | 1 per groundwater event | None | 1/batch | 1/batch | 1/batch | 1/batch |
| PAHs | None | None | 1/batch | 1/batch | 1/batch | 1/batch |
| GRPH | 1 per groundwater event | 1 per soil event and 1 per water event | 1/batch | 1/batch | 1/batch | 1/batch |
| DRPH/ORPH | 1 per groundwater event | None | 1/batch | 1/batch | 1/batch | 1/batch |
| Pesticides | None | None | 1/batch | 1/batch | 1/batch | 1/batch |

**Notes:**

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

GRPH = Gasoline-Range Petroleum Hydrocarbons, DRPH = Diesel-Range Petroleum Hydrocarbons, ORPH = Oil-Range Petroleum Hydrocarbons

EDC = Dichloroethane, 1-2; EDB = Dibromoethane, 1-2

PCBs, = Polychlorinated Biphenyls, PAHs = Polycyclic Aromatic Hydrocarbons

BTEXN = Benzene, toluene, ethylbenze, xylenes, naphthalene; MTBE = Methyl tert-butyl ether

LCS = Laboratory control sample; MS = Matrix spike sample; MSD = Matrix spike duplicate sample

# APPENDIX B
## Health and Safety Plan

## APPENDIX B
## SITE HEALTH AND SAFETY PLAN
## 595 OFFNER ROAD–STUBBLEFIELD SALVAGE YARD
## FILE NO. 0504-139-00

**This Health and Safety Plan (HASP) is to be used in conjunction with the GeoEngineers, Inc. (GeoEngineers) Safety Programs.** Together, the written safety programs and this HASP constitute the site safety plan for this site. This plan is to be used by GeoEngineers personnel on this site and must be available on 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 need to be approved by the GeoEngineers Health and Safety Program Manager. All plans are to be used in conjunction with current standards and policies outlined in the GeoEngineers Health and Safety Programs.

*Liability Clause: If requested by subcontractors, this site HASP may be provided for informational purposes only. In this case, Form 1 shall be signed by the subcontractor. Please be advised that this site-specific HASP is intended for use by GeoEngineers employees only. Nothing herein shall be construed as granting rights to GeoEngineers' subcontractors or any other contractors working on this site to use or legally rely on this HASP. GeoEngineers specifically disclaims any responsibility for the health and safety of any person not employed by the company.*

### GENERAL PROJECT INFORMATION

| | |
|---|---|
| **Project Name:** | 595 Offner Road – Stubblefield Salvage Yard |
| **Project Number:** | 0504-139-00 |
| **Type of Project:** | Site Assessment |
| **Start/Completion:** | November 2018 / December 2018 |
| **Subcontractors:** | Cascade Drilling, Spokane Environnemental Solutions (SES), Pace Analytical |

| Chain of Command | Title | Name | Telephone Numbers |
|---|---|---|---|
| 1 | **Project Manager** | JR Sugalski | 509.991.4471 |
| 2 | **Site Safety Officer (SSO)** | JR Sugalski | 509.991.4471 |
| 3 | **Health and Safety Program Manager** | Mary Lou Sullivan | 253.722.2425 |
| 4 | **Field Personnel** | Alicia Candelaria | 505.288.0807 |
| 5 | **Client Assigned Site Supervisor** | JR Sugalski | 509.991.4471 |
| 6 | **Subcontractor(s)** | Pace<br>SES<br>Cascade Drilling | 612.607.6390<br>509.279.5559<br>425.466.8588 |
| 7 | **Current Owner** | Charlie Konen | 541.938.6856 |

## Functional Responsibility

### Health and Safety Program Manager (HSM), Mary Lou Sullivan

GeoEngineers' HSM is responsible for implementing and promoting employee participation in the program. The HSM issues directives, advisories and information regarding health and safety to the technical staff. Additionally, the HSM has the authority to audit on-site compliance with HASPs, suspend work or modify work practices for safety reasons, and dismiss from the site any GeoEngineers or subcontractor employees whose conduct on the site endangers the health and safety of themselves or others.

### Project Manager (PM)

A PM is assigned to manage the activities of various projects and is responsible to the principal-in-charge of the project. The PM is responsible for assessing the hazards present at a job site and incorporating the appropriate safety measures for field staff protection into the field briefing and/or Site Safety Plan. He or she is also responsible for assuring that appropriate HASPs complying with this manual are developed. The PM will provide a summary of chemical analysis to personnel completing the HASP. PMs shall also see that their project budgets consider health and safety costs. The PM shall keep the HSM informed of the project's health- and safety-related matters as necessary. The PM shall designate the project Site Safety Officer (SSO) and help the SSO implement the specifications of the HASP. The PM is responsible for communicating information in site safety plans and checklists to appropriate field personnel. Additionally, the PM and SSO shall hold a site safety briefing before any field activities begin. The PM is responsible for transmitting health and safety information to the SSO when appropriate.

### Site Safety Officer/HAZWOPER

The SSO will have the on-site responsibility and authority to modify and stop work, or remove personnel from the site if working conditions change that may affect on-site and off-site health and safety. The SSO will be the main contact for any on-site emergency situation. The SSO is First Aid and CPR qualified and has current Hazardous Waste Operations and Emergency Response (HAZWOPER) training. The SSO is responsible for implementing and enforcing the project safety program and safe work practices during site activities. The SSO shall conduct daily safety meetings, perform air monitoring as required, conduct site safety inspections as required, coordinate emergency medical care, and ensure personnel are wearing the appropriate personal protective equipment (PPE). The SSO shall have advanced fieldwork experience and shall be familiar with health and safety requirements specific to the project. The SSO has the authority to suspend site activities if unsafe conditions are reported or observed.

Duties of the SSO include the following:

- Implementing the HASP in the field and monitoring compliance with its guidelines by staff.
- Being sure that all GeoEngineers field personnel have met the training and medical examination requirements. Advising other contractor employees of these requirements.
- Maintaining adequate and functioning safety supplies and equipment at the site.
- Setting up work zones, markers, signs and security systems, if necessary.
- Performing or supervising air quality measurements. Communicating information on these measurements to GeoEngineers field staff and subcontractor personnel.

- Communicating health and safety requirements and site hazards to field personnel, subcontractors and contractor employees, and site visitors.
- Directing personnel to wear PPE and guiding compliance with all health and safety practices in the field.
- Consulting with the PM regarding new or unanticipated site conditions, including emergency response activities. If monitoring detects concentrations of potentially hazardous substances at or above the established exposure limits, notify/consult with the PM. Consult with the PM and the HSM regarding new or unanticipated site conditions, including emergency response activities. If field monitoring indicates concentrations of potentially hazardous substances at or above the established exposure limits, the HSM must be notified and corrective action taken.
- Documenting all site accidents, illnesses and unsafe activities or conditions, and reporting them to the PM and the HSM.
- Directing decontamination operations of equipment and personnel.

#### Field Employees

All employees working on site that have the potential of coming in contact with hazardous substances or physical hazards are responsible for participating in the health and safety program and complying with the site-specific health and safety plans. These employees are required to:

- Participate and be familiar with the health and safety program as described in this manual.
- Notify the SSO that when there is need to stop work to address an unsafe situation.
- Comply with the HASP and acknowledge understanding of the plan.
- Report to the SSO, PM or HSM any unsafe conditions and all facts pertaining to incidents or accidents that could result in physical injury or exposure to hazardous materials.
- Participate in health and safety training, including initial 40-hour Occupational Safety and Health Administration (OSHA) course, annual 8-hour HAZWOPER refresher, and First Aid/cardiopulmonary resuscitation (CPR) training.
- Participate in the medical surveillance program if applicable.
- Schedule and take a respirator fit test annually.
- Any field employee working on site may stop work if the employee believes the work is unsafe.

#### Contractors Under GeoEngineers Supervision

Contractors working on the site under GeoEngineers supervision or direct control that have the potential of coming in contact with hazardous substances or physical hazards shall have their own health and safety program that is in line with the site-specific health and safety plan.

## List of Field Personnel and Training

| Name of Employee on Site | Level of HAZWOPER Training (24-/40-hr) | Date of 8-Hr Refresher Training | First Aid/ CPR | Date of Respirator Fit Test |
|---|---|---|---|---|
| Alicia Candelaria | 40-hr (Supervisor) | 09/18/2018 | 5/20/2017 | |
| Justin Rice | 40-hr | 4/4/2018 | 6/6/2018 | 3/12/2012 |
| Justin Orr | 40-hr | 1/5/2018 | 1/5/2017 | |

## Site Description and History

The site is a former salvage yard that is now primarily bare soil. The site is generally bordered by Mill Creek to the north, Offner Road and rural agricultural property to the east, rural/agricultural property to the south, and Myra Road to the west.

The site is a former salvage yard that was discovered to contain both soil and groundwater contamination due to historic uses at the site. The U.S. Environmental Protection Agency (EPA) conducted a soil and groundwater investigation as well as two removal actions at the site. Contaminates of possible concern include petroleum products, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), poly aromatic hydrocarbons (PAHs), pesticides, and metals.

## Site Map

HAZWOPER work zones are depicted below in Figure B-1. The Exclusion Zone contains most of the 11-acre property. The Contaminant Reduction Zone is located where the old haul road turns to head north on to the property. The Support Zone is located on the paved sections of the old haul road that heads east off of Myra Road on the southern end of the property.

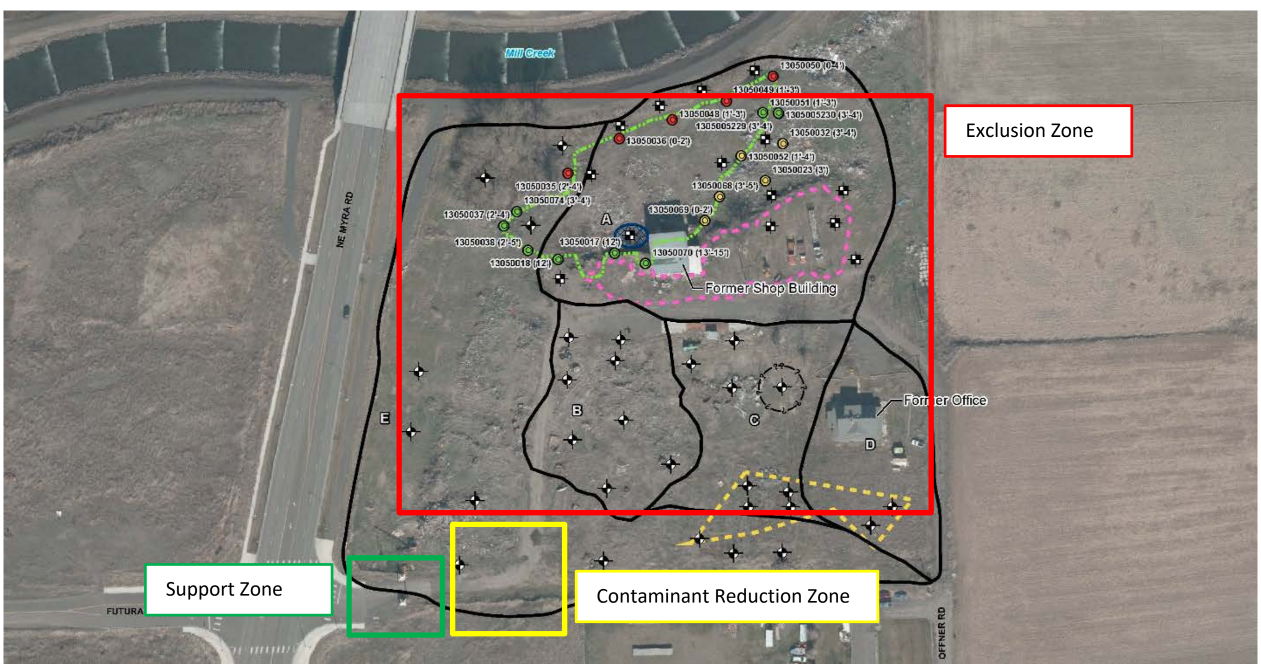



**Figure B-1. HAZWOPER Work Zones**

## WORK PLAN

The purpose of the work plan is to define the scope of fieldwork. The work plan should include:

### Phase II Environmental Site Assessment and Reporting

- Planning and Utility Locates
- Excavate test pits to depths of about 6 to 15 feet below ground surface (bgs) using an appropriately sized excavator, operated by a trained professional. Soil conditions will be documented in field test pit logs and soil will be field screened using a photoionization detector (PID), water sheen tests and by visual observation. Two soil samples from each test pit will be collected. Soil samples will be placed into laboratory-prepared bottles and jars and submitted to a qualified analytical laboratory for potential chemical analysis.
- Advance direct push soil borings to approximately 4 feet bgs. Soil conditions will be documented using field boring logs and field screened as described above. Two samples will be collected per direct push boring representing soil from the upper and lower halves.
- Advance three monitoring well borings using HSA drilling methods to 30 feet bgs. Soil conditions will be documented using field boring logs and field screened as described above. Two samples will be collected per hand auger boring representing soil from the upper and lower halves.
- Soil excavated from test pits will be placed back into the excavations, except if visibly contaminated soil is observed. If contaminated soil is observed or suspected, that soil will be placed on plastic sheeting and covered. Soil removed from direct-push borings and HSA drilling will be placed in drums, which will be labeled and secured.
- Sampling equipment will be decontaminated between explorations and decontamination fluids will be placed into metal drums for temporary storage and subsequent disposal.
- Approximately two soil samples from each test pit and boring location will be submitted to a qualified laboratory for chemical analysis. Soil samples will be analyzed for a subset of the following list based on historical activities:
    - VOCs using Environmental Protection Agency (EPA) Method 8260C
    - SVOCs using EPA SW-846 Method 8270D-SIM
    - PCBs using EPA SW-846 Method 8082A
    - Metals (priority) using EPA Methods 6000/7000
    - Gasoline range hydrocarbons (GRPH) using Northwest Method NWTPH-Gx
    - Diesel and oil range hydrocarbons using Northwest Method NWTPH-Dx
    - Pesticides using EPA Method 8018B
    - PAHs using EPA 8270D-SIM
- Install and develop three monitoring wells in the 30-foot borings.
- Collect a groundwater sample from each monitoring well. Groundwater samples will be analyzed for the following:
    - VOCs using Environmental Protection Agency (EPA) Method 8260C

  - SVOCs using EPA SW-846 Method 8270D-SIM
  - PCBs using EPA SW-846 Method 8082A
  - Gasoline range hydrocarbons (GRPH) using Northwest Method NWTPH-Gx
  - Diesel and oil range hydrocarbons using Northwest Method NWTPH-Dx
- Survey the locations of all explorations using GPS methods and supplemented by field measurements using permanent benchmarks.

### List of Field Activities

Check the activities to be completed during the project:

☒ Job Hazard analyses (JHA) Form 3
☐ Site Reconnaissance
☒ Exploratory Borings
☐ Construction Monitoring
☒ Surveying
☒ Test Pit Exploration
☒ Soil Sample Collection
☒ Groundwater Sampling
☐ Groundwater Depth and Free Product Measurement
☐ Vapor Measurements
☐ Product Sample collection
☐ Soil Stockpile Testing
☐ Remedial Excavation
☐ Recovery of Free Product
☒ Monitoring Well Installation
☒ Monitoring Well Development
☐ UST Removal Monitoring
☐ Other:

## EMERGENCY INFORMATION

**Hospital Name and Address:** **Providence St. Mary Medical Center**
401 West Poplar Street
Walla Wall, Washington 99362

**Phone Numbers (Hospital ER):** **Phone**: 509.897.3320

**Distance**: 1.8 miles

**Route to Hospital**:

Head South of Offner Rd toward Artesia Ave (0.4 mi)

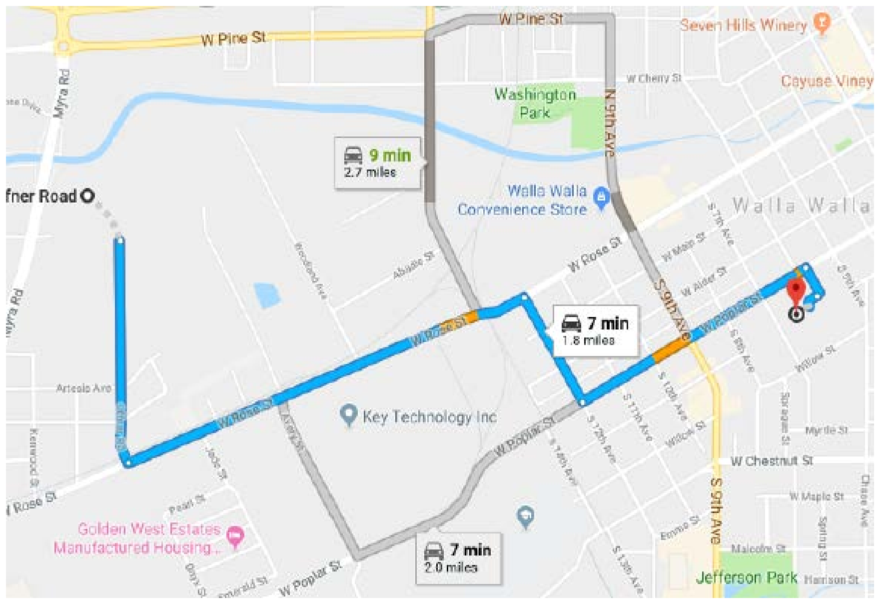
Turn Left onto W Rose St (0.7 mi)

Turn Right onto N 12th Ave (0.2 mi)

Turn Left on to W Poplar St. (0.4)

Destination is on the Right

**Map to Hospital**:




| | |
|---|---|
| **Ambulance:** | 9-1-1 |
| **Poison Control:** | 1-800-222-1222 |
| **Police:** | 9-1-1 |
| **Fire:** | 9-1-1 |
| **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

**Get help**

- Send another worker to phone 9-1-1 (if necessary)
- As soon as feasible, notify GeoEngineers' Project Manager

**Reduce risk to injured person**

- Turn off equipment

- Move person from injury location (if in life-threatening situation only)
- Keep person warm
- Perform CPR (if necessary)

**Transport injured person to medical treatment facility (if necessary)**

- By ambulance (if necessary) or GeoEngineers vehicle
- Stay with person at medical facility
- Keep GeoEngineers Project Manager apprised of situation and notify Human Resources Manager of situation

## HAZARD ANALYSIS

A hazard analysis has been completed as part of preparation of this HASP. The hazard analysis was performed considering the known and potential hazards at the site and surrounding areas, as wells as the planned work activities. The results of the hazard analysis are presented in this section. The hazard assessment will be evaluated each day before beginning work. Updates will be made as necessary and documented in the JHA Form 3 or daily field log.

The following are known applicable hazards.

### Physical Hazards

☒ Drill rigs and Concrete Coring, including working inside a warehouse

☒ Backhoe

☒ Trackhoe

☐ Crane

☐ Front End Loader

☒ Excavations/trenching (1:1 slopes for Type B soil) (1:1.5 slopes for Type C soil)

☐ Shored/braced excavation if greater than 4 feet of depth

☐ Overhead hazards/power lines

☒ Tripping/puncture hazards (debris on site, steep slopes or pits)

☐ Unusual traffic hazard – Street traffic

☒ Heat/Cold, Humidity

☒ Utilities/ utility locate

☒ Noise

☐ Other:

- Utility checklist will be completed as required for the location to prevent drilling or digging into utilities. Note: These procedures should be added to the standard GeoEngineers utility checklist identifying that GeoEngineers will complete the public utility locates.
- High-visibility vests will be worn by on-site personnel to ensure they can be seen by vehicle and equipment operators.
- Field personnel will be aware at all times of the location and motion of heavy equipment in the area of work to ensure a safe distance 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 that it is safe to do so through hand signal or other acceptable means.
- Heavy equipment and/or vehicles used on this site will not work within 20 feet of overhead utility lines 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. Note: If it is later determined that overhead lines are a hazard on this job site, a copy the overhead lines safety section from the HASP Supplemental document shall be attached.
- Personnel entry into unshored or unsloped excavations deeper than 4 feet is not allowed. Any trenching and shoring requirements will follow guidelines established in Washington Administrative Code (WAC) 296-155, the Washington State Construction Standards or OSHA 1926.651 Excavation Requirements. If a worker is required to enter an excavation deeper than 4 feet, a trench box or other acceptable shoring will be employed or the side walls of the excavation will be sloped according to the soil type and guidelines as outlined in Department of Occupational Safety and Health (DOSH) and OSHA regulations. If the shoring/sloping deviates from that outlined in the WAC, it will be designed and stamped by a Professional Engineer (PE). Prior to entry, personnel will conduct air monitoring as described later in this plan. All hazardous encumbrances and excavated material will be stockpiled at least 2 feet from the edge of a trench or open pit. If concentrations of volatile gases accumulate within an open trench or excavation, the means of entering shall adhere to confined space entry and air monitoring procedures outlined under the air monitoring recommendations in this Plan and/or the GeoEngineers Health and Safety Programs.
- Personnel will avoid tripping hazards, steep slopes, pits and other hazardous encumbrances. If it becomes necessary to work within 6 feet of the edge of a pit, slope or other potentially hazardous area, appropriate fall protection measures will be implemented by the Site Safety Officer in accordance with OSHA/DOSH regulations and the GeoEngineers Health and Safety Program.
- Cold stress control measures will be implemented according to the GeoEngineers Health and Safety Program to prevent frost nip (superficial freezing of the skin), frost bite (deep tissue freezing), or hypothermia (lowering of the core body temperature). Heated break areas and warm beverages shall be available during periods of cold weather.
- Heat stress control measures required for this site will be implemented according to GeoEngineers Health and Safety Program with water provided on site.

## Biological Hazards and Procedures

☐ Poison Ivy or other vegetation

☒ Insects or snakes — Bees, wasps, spiders and snakes

☐ Hypodermic needles or other infectious hazards

☒ Wildlife — Mill Creek to the north of the property

☐ Other:

## Ergonomic Hazard Mitigation Measures and Procedures

### Avoiding Lifting Injuries

Back injuries often result from lifting objects that are too heavy or from using the wrong lifting technique. Keep your back healthy and pain-free by following common sense safety precautions.

- Minimize reaching by keeping frequently used items within arm's reach, moving your whole body as close as possible to the object.
- Avoid overextending by standing up when retrieving objects on shelves.
- Keep your back in shape with regular stretching exercises.
- Get help from a coworker or use a hand truck if the load is too heavy or bulky to lift alone.

### Proper Lifting Techniques

- Face the load; don't twist your body. Stand in a wide stance with your feet close to the object.
- Bend at the knees, keeping your back straight. Wrap your arms around the object.
- Let your legs do the lifting.
- Hold the object close to your body as you stand up straight. To set the load down, bend at the knees, not from the waist.

## 1.1 Engineering Controls

☒ Trench shoring (1:1 slope for Type B Soils) (1:1.5 slope for Type C Soils)

☒ Location work spaces upwind/wind direction monitoring

☐ Other soil covers (as needed)

☐ Other (specify):

## Chemical Hazards

**CHEMICAL HAZARDS (POTENTIALLY PRESENT AT SITE)**

| Compound/ Description | Exposure Limits/IDLH | Exposure Routes | Toxic Characteristics |
|---|---|---|---|
| Gasoline Fuel—liquid with a characteristic odor | OSHA PEL 300 ppm<br>IDLH 20,000 ppm (LEL) | Ingestion, inhalation, skin absorption, skin and eye contact | Irritated eyes, skin, mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; and headache; dermatitis. |
| Benzene | PEL 5 ppm<br>IDLH 500 ppm | Inhalation, ingestion, skin absorption, and/or direct contact | Irritation of eyes, skin, nose, respiratory system, dizziness, headache, nausea, staggered gait, anorexia, exhaustion, dermatitis, bone marrow depression (leukemia). |
| Toluene | PEL 100 ppm<br>IDLH 500 ppm | Inhalation, absorption, ingestion, direct contact | Irritation to eyes, nose, exhaustion, confusion, dizziness, headaches, dilated pupils, euphoria, anxiety, teary eyes, muscle fatigue, insomnia, paresthesia, dermatitis, liver and kidney damage. |
| Ethyl benzene | PEL 100 ppm<br>IDLH 800 ppm | Inhalation, ingestion, direct contact | Irritation to eyes, skin, respiratory system, burning of skin, dermatitis. |
| Xylenes | PEL 100 ppm<br>IDLH 900 ppm | Inhalation, skin absorption, ingestion, direct contact | Irritation to eyes, skin, nose, throat, dizziness, excitement, drowsiness, incoordination, staggering gait, corneal vacuolization, anorexia, nausea, vomiting, abdominal pain, dermatitis. |
| Diesel | ACGIH PEL: TWA 100 $mg/m^3$<br>IDLH: Not established<br>TLV–TWA: 100 ppm (skin) | Central nervous system, liver, Respiratory system, blood | Leukemia, central nervous system excitation/depression, loss of consciousness, respiratory paralysis, death. Non-malignant blood disorders; eye, nose, and respiratory irritation. |
| Polychlorinated biphenyls (PCBs) | OSHA PEL 0.5 $mg/m^3$ skin<br>IDLH: Ca 5 $mg/m^3$<br>REL: Ca TWA 0.001 $mg/m^3$ | Ingestion, inhalation, skin absorption, skin and eye contact | Irritated eyes, skin, carcinogenic, reproductive/neurological/immune/endocrine system effects. |
| Polycyclic aromatic hydrocarbons PAHs (coal tar pitch) | OSHA PEL: 0.2 $mg/m^3$<br>IDLH: TWA 80 $mg/m^3$<br>REL: Ca TWA 0.1 $mg/m^3$ | Ingestion, inhalation, skin absorption, skin and eye contact | Irritated eyes and respiratory track, effects to kidneys and nervous system resulting in renal failure. |

| Compound/ Description | Exposure Limits/IDLH | Exposure Routes | Toxic Characteristics |
|---|---|---|---|
| Lead (and inorganic compounds as lead)<br>A heavy, ductile, soft, gray solid. | OSHA PEL: 0.5 $mg/m^3$ (TWA)<br>(skin)<br>IDLH: 100 $mg/m^3$ | Inhalation, ingestion, skin and/or eye contact | Lassitude (weakness, exhaustion), insomnia, facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, wrist and ankle paralysis, encephalopathy, kidney disease, irritated eyes, hypotension |

Notes:

If a State has established a PEL more restrictive than the OSHA limits, then the applicable State limit becomes the legal limit.

IDLH = immediately dangerous to life or health

LEL = lower explosive limit

PEL = permissible exposure limit

REL = recommended exposure limit

ACGIH = American Conference of Governmental Industrial Hygienists

$mg/m^3$ = milligrams per cubic meter

TWA = time-weighted average (over 8 hrs.)

TLV = threshold limit value (over 10 hrs.)

## Summary of Selected Chemical Hazards

### Gasoline

Gasoline is a known animal carcinogen, but unknown relevance to humans. Benzene, a gasoline component is a known human carcinogen. Exposure can produce a wide range of health effects depending on the amount and timing of exposure. Exposure may irritate the eyes, skin, respiratory tract and may also affect the central nervous system.

### Diesel Fuel

Diesel fuel is a known carcinogen in animals, but unknown relevance to humans. Exposure can produce a wide range of health effects depending on the amount and timing of exposure. Short-term exposure may irritate the eyes, skin, respiratory tract and may also affect the central nervous system.

### PCBs

PCBs are a known human carcinogen. Exposure can produce a wide range of health effects depending on the amount and timing of exposure. Short-term exposure may irritate the eyes, skin, respiratory tract, and may also affect the central nervous system. Exposure to PCBs can affect the reproductive/neurological/ immune/endocrine systems.

### PAHs

PAHs are a group of more than 100 chemicals. They are released from the burning of coal, oil, gasoline, trash, tobacco, and wood. PAHs are known to be carcinogenic. They can also affect the pulmonary system, gastrointestinal system and renal and dermatological systems. OSHA has not established a substance-specific standard for occupational exposure to PAHs. Exposures are regulated under the air standards for coal tar pitch volatiles and coke oven emission standards.

#### Lead

Lead is absorbed and stored in the bones, blood and tissue of the body. It doesn't bioaccumulate and is excreted by the body. Health effects from short term lead exposure include abdominal pain, constipation, tiredness, memory loss or weakness. Long-term exposure to lead causes symptoms similar to those described for short term exposure.

### Additional Hazards

Additional hazards that are specific to your site should be identified here or on the JHA Form 3.

Daily field logs should include evaluation of:

- *Physical Hazards* (excavations and shoring, equipment, traffic, tripping, heat stress, cold stress and others)
- *Biological Hazards* (snakes, spiders, bees/wasps, animals, discarded needles, poison ivy, pollen, and others present)
- *Ergonomic Hazards* (lifting heavy loads, tight work spaces, etc.)
- *Chemical Hazards* (odors, spills, free product, airborne particulates and others present)

## AIR MONITORING PLAN

An air monitoring plan has been prepared as part of development of this HASP. The air monitoring plan is based on the results of the chemical exposure assessment and the known and potential inhalation hazards on site. The air monitoring plan addresses steps necessary to limit worker exposure. Non-occupational exposures are not addressed in this plan.

Work upwind if possible.

**Check Instrumentation to be Used**

☐ Multi-Gas Detector (may include oxygen, carbon monoxide, hydrogen sulfide, lower explosive limit)

☐ Dust Monitor

☒ Other (i.e., detector tubes or badges) Please specify: Photoionization Detector (PID)

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

☐ Continuous during soil disturbance activities or handling samples

☐ 15 minutes

☐ 30 minutes

☒ Hourly

### Additional Personal Air Monitoring for Specific Chemical Exposure

#### Action Levels for Volatile Organic Chemicals

- The workspace will be monitored using a PID. These instruments must be properly maintained, calibrated and charged (refer to the instrument manuals for details). Zero this meter in the same relative humidity as the area in which it will be used and allow at least a 10-minute warm-up prior to zeroing. Do not zero in a contaminated area.

- An initial vapor measurement survey of the site should be conducted to detect "hot spots" if contaminated soil is exposed at the surface. Vapor measurement surveys of the workspace should be conducted at least hourly or more often if persistent petroleum-related odors are detected. Additionally, if vapor concentrations exceed 5 parts per million (ppm) above background continuously for a 5-minute period as measured in the breathing zone, upgrade to Level C PPE or move to a non-contaminated area.
- Standard industrial hygiene/safety procedure is to require that action be taken to reduce worker exposure to organic vapors when vapor concentrations exceed one-half the TLV. Because of the variety of chemicals, the PID will not indicate exposure to a specific PEL and is therefore not a preferred tool for determining worker exposure to chemicals. If odors are detected, then employees shall upgrade to respirators with Organic Vapor cartridges and will contact the Health and Safety Program Manager for other sampling options.

**AIR MONITORING ACTION LEVELS**

| Contaminant | Activity | Monitoring Device | Frequency of Monitoring Breathing Zone | Action Level | Action |
|---|---|---|---|---|---|
| Organic Vapors | Environmental Remedial Actions | PID | Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors | Background to 5 ppm in breathing zone | Use Level D or Modified Level D PPE |
| Organic Vapors | Environmental Remedial Actions | PID | Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors | 5 to 50 ppm in breathing zone | Upgrade to Level C PPE |
| Organic Vapors | Environmental Remedial Actions | PID | Start of shift; prior to excavation entry; every 30 to 60 minutes | > 50 ppm in breathing zone | Stop work and evacuate the area. Contact Health and Safety Program Manager for guidance. |
| Combustible Atmosphere | Environmental Remedial Actions | PID | Start of shift; prior to excavation entry; every 30 to 60 minutes | >10% LEL or >1,000 ppm | Depends on contaminant. The PEL is usually exceeded before the lower explosive limit (LEL). |
| Combustible Atmosphere | Environmental Remedial Actions | PID or 4-gas meter | Start of shift; prior to excavation entry; every 30 to 60 minutes | >10% LEL or >1,000 ppm | Stop work and evacuate the site. Contact Health and Safety Program Manager for guidance. |

| Contaminant | Activity | Monitoring Device | Frequency of Monitoring Breathing Zone | Action Level | Action |
|---|---|---|---|---|---|
| Oxygen Deficient/ Enriched Atmosphere | Environmental Remedial Actions<br>Confined Spaces | Oxygen meter or 4-gas meter | Start of shift; prior to excavation entry; every 30 to 60 minutes | <19.5<br>>23.5% | Continue work if inside range. If outside range, evacuate area and contact Health and Safety Program Manager. |

## SITE CONTROL PLAN

Work zones will be within 50 feet of the excavation and drilling equipment (backhoe/track hoe). Employees should work upwind of the machinery if possible. To the extent practicable, use the buddy system. Do not approach heavy equipment unless you are sure the operator sees you and has indicated it is safe to approach. All personnel from GeoEngineers and subcontractor(s) should be made aware of safety features during each morning's safety tailgate meeting (drill rig shutoff switch, location of fire extinguishers, cell phone numbers, etc.). For medical assistance, see above.

### Traffic or Vehicle Access Control Plans

Explorations will be located within the fenced area of the site.

### Site Work Zones

An exclusion zone, contamination reduction zone, and support zone should be established around working areas. Personnel leaving the facility or on break should exit the exclusion zone through the contamination reduction zone. The contamination reduction zone, at a minimum, should consist of garbage bags into which used PPE should be disposed. Personnel should wash hands at the Facility before eating or leaving the facility.

Hot zone/exclusion zone: *Within 10 feet of borings or excavations*

**Method of Delineation/Excluding Non-Site Personnel**

☐ Fence

☐ Survey Tape

☒ Traffic Cones

☐ Other:

### Buddy System

Personnel on site should use the buddy system (pairs), particularly whenever communication is restricted. 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) and an agreed upon location for an emergency assembly area.

In instances where communication cannot be maintained, you should consider suspending work until it can be restored. If this is not an option, the following are some examples for communication:

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

### Emergency Action

In the event of an emergency, employees with convene in a designated area Identified on the JHA Form 3. Employees should communicate with others working on site and the PM to determine the Emergency Action Plan for each site. All personnel from GeoEngineers and subcontractor(s) should be made aware of the Emergency Action for the site at each morning's safety tailgate meeting (equipment shutoff switch, location of fire extinguishers, cell phone numbers, etc.). For medical assistance, see above.

### Decontamination Procedures

Decontamination, at a minimum, should include removing and disposing of PPE when exiting the exclusion zone; and washing your hands. Decontamination may also consist of removing outer protective gloves and washing soiled boots and gloves using bucket and brush provided on site in the contamination reduction zone. If needed, inner gloves will then be removed, and respirator, hands and face will be washed in either a portable wash station or a bathroom facility at the site. Employees will perform decontamination procedures and wash before eating, drinking or leaving the site.

### Waste Disposal or Storage

Used PPE is to be placed in a plastic bag for disposal.

**Excavated Soil and Development Water:**

☒ On site, pending analysis and further action for soil boring cuttings

☐ Secured (list method):

☒ Other (describe destination, responsible parties): Placed back into the excavation and tamped flat with excavation equipment.

## PERSONAL PROTECTIVE EQUIPMENT

After the initial and/or daily hazard assessment has been completed the appropriate PPE will be selected to ensure worker safety. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted before the start of site operations. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted before the start of site operations.

Site activities include handling and sampling solid subsurface material (material may potentially be saturated with contaminated materials). Site hazards include potential exposure to hazardous materials, and physical hazards such as trips/falls, heavy equipment, and contaminant exposure.

Air monitoring will be conducted to determine the level of respiratory protection.

- Half-face combination organic vapor/high efficiency particulate air (HEPA) or P100 cartridge respirators will be available on site to be used as necessary. P100 cartridges are to be used only if PID measurements are below the site action limit. P100 cartridges are used for protection against dust, metals and asbestos, while the combination organic vapor/HEPA cartridges are protective against both dust and vapor. Ensure that the PID or TLV will detect the chemicals of concern on site.
- Level D PPE, unless a higher level of protection is required, will be worn at all times on the site. Potentially exposed personnel will wash gloves, hands, face and other pertinent items to prevent hand-to-mouth contact. This will be done prior to hand-to-mouth activities including eating, smoking, etc.
- Adequate personnel and equipment decontamination will be used to decrease potential ingestion and inhalation.

**Check Applicable Personal Protection Gear to be Used:**

☒ Hardhat (if overhead hazards, or client requests)

☒ Steel-toed boots (if crushing hazards are a potential or if client requests)

☒ Safety glasses (if dust, particles, or other hazards are present or client requests)

☒ Reflective vest (if working near traffic or equipment)

☒ Hearing protection (if it is difficult to carry on a conversation 3 feet away)

☒ Rubber boots (if wet conditions)

**Gloves (Specify):**

☒ Nitrile

☐ Latex

☐ Liners

☒ Leather (For use during hand auger if needed)

☐ Other (specify)

**Protective Clothing:**

☐ Tyvek (if dry conditions are encountered, Tyvek is sufficient) (modified Level D or Level C)

☐ Saranex (personnel shall use Saranex if liquids are handled or splash may be an issue) (modified Level D or Level C)

☒ Cotton (Level D)

☒ Rain gear (as needed) (Level D)

☒ Layered warm clothing (as needed) (Level D)

**Inhalation Hazard Protection:**

☒ Level D (no respirator)

☐ Level C (respirators with organic vapor/HEPA P100 filters)

☐ Level B (Self Contained Breathing Apparatus— STOP, Consult the HSM)

### Personal Protective Clothing Inspections

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

If respirators are required, site personnel shall be trained before use on the proper use, maintenance and limitations of respirators. Additionally, they must be medically qualified to wear respiratory protection in accordance with 29 CFR 1910.134. Site personnel who 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 the action levels identified in the Air Monitoring Action Levels Table, are exceeded, site personnel should don respiratory protection appropriate for the known or suspected chemical of concern. For most sites, a half-face or full-face air purifying respirator with a National Institute for Occupational Safety and Health (NIOSH)-approved organic vapor/HEPA P100 combination cartridge (Level C), will be appropriate for the known or suspected chemicals of concern. Monitoring frequency should be continuous while using Level C respiratory protection. The SSO closely monitor personnel using respiratory protection, including observing for signs of fatigue or respiratory distress, the potential for cartridge breakthrough or increased resistance to inhalation, and the need for changes in the level of respiratory protection based on air monitoring. The frequency and duration of breaks should be increased for personnel working in respiratory protection. If at any time on-site air monitoring indicates Level B respiratory protection is warranted, personnel should leave the exclusion zone and consult with the HSM.

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 approved and NIOSH-certified. 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.

### Respirator Inspection and Cleaning

The Site Safety Officer shall periodically (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.

## ADDITIONAL ELEMENTS

### Cold Stress Prevention

Working in cold environments presents many hazards to site personnel and can result in frost nip (superficial freezing of the skin), frost bite (deep tissue freezing), or hypothermia (lowering of the core body temperature).

The combination of wind and cold temperatures increases the degree of cold stress experienced by site personnel. Site personnel shall be trained on the signs and symptoms of cold-related illnesses, how the human body adapts to cold environments, and how to prevent the onset of cold-related illnesses. Heated break areas and warm beverages shall be provided during periods of cold weather.

### Heat Stress Prevention

Keep workers hydrated in a hot outdoor environment requires more water be provided than at other times of the year. When employee exposure is at or above an applicable temperature listed in the Heat Stress table below, Project Managers will ensure that:

- A sufficient quantity of drinking water is always readily accessible to employees
- All employees have the opportunity to drink at least one quart of drinking water per hour

**HEAT STRESS**

| Type of Clothing | Outdoor Temperature Action Levels |
|---|---|
| Nonbreathing clothes including vapor barrier clothing or PPE such as chemical resistant suits | 52° |
| Double-layer woven clothes including coveralls, jackets and sweatshirts | 77° |
| All other clothing | 89° |

### 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.
- 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 PM, 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 (Form 4) for submittal to the PM, the HSPM and HR. The PM should ensure that follow-up action is taken to correct the situation that caused the accident or exposure.

## MISCELLANEOUS

### Personnel Medical Surveillance

GeoEngineers employees are not in a medical surveillance program because they do not fall into the category of “Employees Covered” in OSHA 1910.120(f)(2), which states that 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.
4. Members of HAZMAT teams.

### Spill Containment Plans (Drum and Container Handling)

Issues to be addressed in this section include:

- Site topography is generally flat
- Site drainage --Municipal drain
- There are no engineered site drains

### Sampling, Managing and Handling Drums and Containers

Drums and containers used during the cleanup shall meet the appropriate Department of Transportation (DOT), OSHA and U.S. Environmental Protection Agency (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 rupturing 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)

GeoEngineers employees shall not enter confined spaces to perform work unless they have been properly trained and with hands-on experience in the use of retrieval equipment. If a project requires confined space entry, please include a copy of the confined space permit and include the training documentation in this HASP.

Trenches greater than 4 feet in depth with the potential for buildup of a hazardous atmosphere are considered confined spaces.

### Sanitation

Sanitary facilities are not available on site. The closest facilities are located in the shops and hotels located a quarter mile north of the site off of Myra Road.

### Lighting

Work is anticipated to be performed during daylight hours. Work may extend slightly into the evening provided adequate lighting is used (e.g. portable flood lights).

## DOCUMENTATION TO BE COMPLETED FOR HAZWOPER PROJECTS

- Daily Field Log
- FORM 1—Health and Safety Pre-Entry Briefing and Acknowledgment of Site Health and Safety Plan for use by employees, subcontractors and visitors
- FORM 2—Safety Meeting Record
- FORM 3—JHA Form
- FORM 4—Accident/Exposure Report Form

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

- Updates on hazard assessments, field decisions, conversations with subcontractors, client or other parties, etc.;
- Air monitoring/calibration results, including: personnel, locations monitored, activity at the time of monitoring, etc.;
- Actions taken;

- Action level for upgrading PPE and rationale; and
- Meteorological conditions (temperature, wind direction, wind speed, humidity, rain, snow, etc.).

## APPROVALS

1. Plan Prepared

| | |
|---|---|
| Alicia Candelaria | November 27, 2018 |
| Signature | Date |

2. Plan Approval

| | |
|---|---|
| Jedidiah R. Sugalski, PE | November 27, 2018 |
| PM Signature | Date |

3. Health & Safety Officer

| | |
|---|---|
| Mary Lou Sullivan | November 27, 2018 |
| HSPM Signature | Date |

## FORM 1
## HEALTH AND SAFET PRE-ENTRY BRIEFING AND ACKNOWLEDGEMENT OF THE SITE HEALTH AND SAFETY PLAN FOR GEOENGINEERS' EMPLOYEES, SUBCONTRACTORS AND VISITORS
## 595 OFFNER ROAD, WALLA WALLA, WA –STUBBLEFIELD SALVAGE YARD
## FILE NO. 0504-139-00

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; and
- 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, brief tailgate safety meetings will be held as deemed necessary by the Site Safety Officer.
- The orientation and the tailgate safety meetings shall include a discussion of emergency response, site communications and site hazards.

(All of GeoEngineers' Site workers shall complete this form, which should remain attached to the HASP and be filed with other project documentation). Please be advised that this site-specific HASP is intended for use by GeoEngineers employees only. Nothing herein shall be construed as granting rights to GeoEngineers' subcontractors or any other contractors working on this site to use or legally rely on this HASP. GeoEngineers specifically disclaims any responsibility for the health and safety of any person not employed by the company.

I hereby verify that a copy of the current HASP has been provided by GeoEngineers, Inc., for my review and personal use. I have read the document completely and acknowledge an understanding of the safety procedures and protocol for my responsibilities on site. I agree to comply with all required, specified safety regulations and procedures.

| Print Name | Signature | Date |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**FORM 2**
**SAFETY MEETING RECORD**
**595 OFFNER ROAD, WALLA WALLA, WA –STUBBLEFIELD SALVAGE YARD**
**FILE NO. 0504-139-00**

Safety meetings should include a discussion of emergency response, site communications and site hazards.

- Use in conjunction with the HASP and Job Hazard Analyses (JHA) Form 3 to help identify hazards.

**Date**: ___________________________ **Site Safety Officer (SSO)**:_________________________________

**Topics**: _______________________________________________________________________________

**Attendees:**
**Print Name** **Signature:**

_____________________________________________________________________________________

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## FORM 3
## JOB HAZARD ANALYSES (JHA) FORM
## EXAMPLE
## 595 OFFNER ROAD, WALLA WALLA, WA –STUBBLEFIELD SALVAGE YARD
## FILE NO. 0504-139-00

This form can be used for analyses of daily hazards where there are multiple tasks and ongoing projects and for record keeping purposes. Make copies as needed.

| **Project:** Stubblefield Salvage Yard<br>**File No:** 0180-216-02 | **Date:** | **Site Location:**<br>595 Offner Road, Walla Walla, WA |
|---|---|---|

| **Development Team:** | **Position/Title:** | **Reviewed by:** | **Position/Title:** |
|---|---|---|---|
| | | | |
| | | | |

**Minimum Required Protective Equipment:** (see critical actions for task-specific requirements)

| **PPE** | **Equipment** | **Tools** | **Actions** |
|---|---|---|---|
| ☒ Hard Hat | ☐ Safety Beacons | ☒ Cell/Satellite Phone | ☒ Stay Visible |
| ☒ High Visibility Vest | ☐ Safety Cones | ☐ Digital Camera | ☒ Equipment Inspection |
| ☐ Safety Shoes/Waders | ☒ First Aid Kit | ☐ iPad | ☒ Work in Pairs |
| ☒ Gloves | ☒ Fire Extinguisher | ☐ | ☒ Safety Control/Traffic Plan |
| ☒ Safety Glasses | ☐ Eye Wash/ Drinking Water | ☐ | ☐ |

| **Job Steps** | **Potential Hazards** | **Critical Actions to Mitigate Hazards** |
|---|---|---|
| **Pre-Job Activities** | Example: Unfamiliar locations, congestion, unpaved roads, Mechanical Failure, Flat Tires Vehicle Fire, Exhaust Leaks, Vehicle Collision, Internal Projectiles | ■ Inspect the vehicle before departure:<br>▪ Check for tire cuts, fluid leaks, flat tires, body damage, windshield cracks, and other damage.<br>▪ Check lights, wipers, fluid levels, and seat belts.<br>■ Study the area maps, photos and use GPS and compass skills.<br>■ Identify the safest spot to park field vehicles. |
| **Familiarize crew with the task and location of site** | Crew does not notify site owner / manager.<br>Unaware of the job site hazards and steps to prevent injury.<br>Appropriate personnel protective equipment not worn.<br><br>Other Hazards | ■ Example: Conduct a tailgate safety meeting discussing the jobs, the hazards and actions that will be taken to prevent injury.<br>■ Discuss “Stop Work Authority” as it applies to each site member.<br>■ Discuss appropriate PPE including high visibility clothing such as reflective vest.<br>■ Notify attendant and/or site owner/manager of work activities and location.<br>■ Discuss appropriate PPE including high visibility clothing such as reflective vest.<br>■ Set up exclusion zone surrounding work area. |

| | | |
|---|---|---|
| **Driving to work site location (Highway Driving)** | Unfamiliar road, Mechanical Failure, Flat Tires, Vehicle Fire, Vehicle Collision.<br><br>Other Hazards | ■ Inspect the vehicle before departure:<br>▪ Check for tire cuts, fluid leaks, flat tires, body damage, windshield cracks, and other damage.<br>▪ Check lights, wipers, fluid levels, and seat belts.<br>■ Study the area maps, photos and use GPS and compass skills.<br>■ Use only vehicles appropriate for the work needs and the driving conditions expected.<br>■ Ensure the vehicle has a complete and current first aid kit and fire extinguisher.<br>■ Place heavy objects behind a secure safety cage if they must be carried in a passenger compartment.<br>■ Use parking brake, and don't leave vehicle unattended while it is running.<br>■ Ensure vehicle has fuel to get to and from your destinations.<br>■ Inform your Project Manager of your destination and estimated time of return.<br>■ Carry extra food, water, and clothing.<br>■ Drive defensively. |
| **Driving on Unimproved Roads**<br><br>**(Off-Highway Driving)** | Encountering Other Vehicles on Narrow<br><br>Unfamiliar Road,<br><br>Narrow, Rough Roads, Animal / Object Collision,<br><br>Running / Skidding Off Road, Icy / Muddy Roads<br><br>Flying Debris (Rocks, etc.), Poor Visibility<br><br>Backing, Run-Away Vehicle, Roadway Obstacles<br><br>Project Manager unaware of location. | ■ Stay on the main roadway. Pull over on firm ground and avoid soft shoulders, if a stop is necessary.<br>■ Drive on maintained trails when possible.<br>■ Drive with care in tall brush and grass. Watch for wildlife, fallen trees, rocks, and other obstacles.<br>■ Slow down, especially on corners. Maintain a safe speed at all times.<br>■ Follow from a safe distance.<br>■ Know when and how to use 4WD.<br>■ Use only vehicles appropriate to the road conditions. Learn these conditions before you go.<br>■ Pull over to allow larger vehicles (ie: trucks and trailers) to pass from either direction.<br>■ Don't travel the road at all if there is high potential for vehicle damage.<br>■ Park so that backing up will not be necessary.<br>■ Use a spotter or get out to check behind vehicle. |

| | | |
|---|---|---|
| | | ■ Use ground guide to walk the path on questionable roadways.<br>■ When removing debris from the roadway, use care, lift properly, and use proper equipment and PPE.<br>■ When descending a long grade, use lower gears to control speed rather than brakes.<br>■ Keep vehicle well ventilated by opening a window at least 6 inches, when idling or heating for a period.<br>■ Keep all windows clear of snow, ice, mud, and anything else obstructing the driver's view.<br>■ Keep vehicle windows clean, inside and out, and washer fluid full. Replace damaged or worn wipers. |
| **Traveling on Foot** | Falls, Foot Injuries, and Stress and Impact Injuries<br><br>Forest Fires<br><br>Lightning<br><br>Personal Safety | ■ Identify and use safe travel routes. Do not exceed physical abilities or equipment design.<br>■ Use pack equipment properly. Carry weight on hips, not back.<br>■ Warm up and stretch the appropriate muscle groups before and after hitting the trail.<br>■ Test and use secure footing. Move cautiously and deliberately. Never run.<br>■ In heavy undergrowth, particularly off-trail, slow down and watch carefully.<br>■ Carry tools on the downhill side.<br>■ Wear safety-toed boots with good, non-skid soles that are tall enough to support ankles.<br>■ Know basic first aid. Completion of a basic first aid course is required.<br>■ Use footwear appropriate to the terrain and load being carried.<br>■ Know how to fall. Roll, protect the head and neck, and do not extend arms to break the fall.<br>■ Wear fire retardant clothing<br>■ Refer to GeoEngineers Personal Safety Program - Never you're your personal safety. Leave the area and contact your Project Manager.<br>■ Travel on maintained trails when possible. |
| | Biological Hazards | ■ Discuss applicable hazard mitigation measures - Insects, Snakes, Wildlife, Vegetation |

| | | |
|---|---|---|
| **Slope Evaluation** | Slips, Trips and Falls | ■ Travel on maintained trails when possible.<br>■ Take extra precautions when encountering steep, loose, wet trail conditions.<br>■ Always carry tools on your downhill side.<br>■ Use a rope for stability if needed / tie off to trees / have throw rope with on-shore buddy.<br>■ Take slow deliberate steps as conditions dictate.<br>■ Use a flashlight after dark.<br>■ Travel after dark only in an emergency.<br>■ Wear appropriate footwear for conditions. |
| **Communication** | Additional Hazards, i.e., No communication in case of emergency | ■ Verify cell phone is working.<br>■ Maintain communication with Project Manager throughout job task.<br>■ Verify location and contact numbers for emergency medical assistance or 911. |
| | Additional Hazards, i.e., Emergency | ■ **Dial 911**<br>■ Hospital Route (Attached Fall Protection Plan) |

| **Required Control Measures:** (check the box when complete) |
|---|
| ☐ Perform a pre-work vehicle inspection (First Aid kit, fire extinguisher). |
| ☐ Drive defensively looking out for the other guy. |
| ☐ Conduct a pre-work safety meeting. |
| ☐ Use a Safety Watch to monitor equipment Minimum Approach Distance (MAD) and to keep personnel clear if needed. |
| ☐ Wear Personal Protective Equipment (PPE). |
| ☐ Ensure training is current (First Aid, defensive driving, etc.). |
| ☐ Conduct Task Safety Assessments throughout the job. |
| **Additional Comments:** |
| |

## DAILY HAZARD ASSESSMENT RECORD OF SAFETY MEETINGS

| Signature | Date | Signature | Date |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**Directions to Nearest Hospital**

## FORM 4
## ACCIDENT/EXPOSURE REPORT FORM
## 595 OFFNER ROAD, WALLA WALLA, WA –STUBBLEFIELD SALVAGE YARD
## FILE NO. 0504-139-00

To (Supervisor): ____________________ From (Employee): ____________________

Telephone (with area code): ____________________

Name of injured or ill employee: ____________________

Date of accident: Time of accident: Exact location of accident:

Narrative description of: **accident**/**exposure** (circle one):

Medical attention given on site:

Nature of illness or injury and part of body involved: Lost Time? Yes ☐ No ☐

**Probably Disability (check one):**

| Fatal | Lost work day with days away from work | Lost work day with days of restricted activity | No lost work day | First Aid only |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

Corrective action taken by reporting unit and corrective action that remains to be taken (by whom and when):

Employee Signature: Date:

Name of Supervisor:

GeoEngineers