Soil Sampling and Analysis Plan
Collinsville Soil Program
Collinsville, Oklahoma

Prepared for:
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<th>Definition</th>
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<td>ADR</td>
<td>automated data review</td>
</tr>
<tr>
<td>AR</td>
<td>analysis request</td>
</tr>
<tr>
<td>As</td>
<td>arsenic</td>
</tr>
<tr>
<td>bgs</td>
<td>below ground surface</td>
</tr>
<tr>
<td>CCV</td>
<td>continuing calibration verification</td>
</tr>
<tr>
<td>Cd</td>
<td>cadmium</td>
</tr>
<tr>
<td>CD</td>
<td>compact disc</td>
</tr>
<tr>
<td>COC</td>
<td>chain-of-custody</td>
</tr>
<tr>
<td>DQO</td>
<td>data quality objective</td>
</tr>
<tr>
<td>DSR</td>
<td>data summary report</td>
</tr>
<tr>
<td>EDD</td>
<td>electronic data deliverable</td>
</tr>
<tr>
<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>ER</td>
<td>equipment rinsate</td>
</tr>
<tr>
<td>FD</td>
<td>field duplicate</td>
</tr>
<tr>
<td>FQC</td>
<td>field quality control</td>
</tr>
<tr>
<td>FS</td>
<td>field split</td>
</tr>
<tr>
<td>ft</td>
<td>foot/feet</td>
</tr>
<tr>
<td>GPS</td>
<td>global positioning system</td>
</tr>
<tr>
<td>Handbook</td>
<td>Superfund Lead-Contaminated Residential Sites Handbook</td>
</tr>
<tr>
<td>ICAL</td>
<td>initial instrument calibration</td>
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<tr>
<td>ICP</td>
<td>inductively coupled plasma</td>
</tr>
<tr>
<td>IDW</td>
<td>investigation-derived waste</td>
</tr>
<tr>
<td>Microbac</td>
<td>Microbac Laboratories, Inc.</td>
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<tr>
<td>MS</td>
<td>matrix spike</td>
</tr>
<tr>
<td>MSD</td>
<td>matrix spike duplicate</td>
</tr>
<tr>
<td>ODEQ</td>
<td>Oklahoma Department of Environmental Quality</td>
</tr>
<tr>
<td>Pb</td>
<td>lead</td>
</tr>
<tr>
<td>PC</td>
<td>personal computer</td>
</tr>
<tr>
<td>PPIN</td>
<td>property parcel identification number</td>
</tr>
<tr>
<td>QA</td>
<td>quality assurance</td>
</tr>
<tr>
<td>QAPP</td>
<td>Quality Assurance Project Plan</td>
</tr>
<tr>
<td>QC</td>
<td>quality control</td>
</tr>
<tr>
<td>SAP</td>
<td>Soil Sampling and Analysis Plan</td>
</tr>
<tr>
<td>Shaw</td>
<td>Shaw Environmental, Inc.</td>
</tr>
<tr>
<td>SOP</td>
<td>standard operating procedure</td>
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<tr>
<td>sf</td>
<td>square foot/feet</td>
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</table>
1.0 Introduction

Collinsville, Oklahoma is located about one mile north of two former zinc smelters. One of these smelters was owned and operated by the Bartlesville Zinc Company (BZC) between 1911 and 1918. That site is known as the Collinsville Smelter site. Cyprus Amax Minerals Company (Cyprus Amax) has been working with the Oklahoma Department of Environmental Quality (ODEQ) to investigate and conduct any needed remediation (i.e., cleanup) at this site. Cyprus Amax will be continuing that work over the next few years.

Separately, ODEQ, in conjunction with the U.S. Environmental Protection Agency (EPA), has been investigating the Tulsa Fuel & Manufacturing Site, a separate former smelter site owned and operated by other companies. Cyprus Amax is not associated with the Tulsa Fuel & Manufacturing Site. Coincidentally, this other smelter was also located south of Collinsville and near the Collinsville Smelter site (EPA, 2003). The EPA has completed its investigation of the Tulsa Fuel & Manufacturing Site, and cleanup of the site is anticipated to occur over the next few years.

Because these historic smelters operated near Collinsville, both EPA and ODEQ believed that past operations could have resulted in the presence of metals within Collinsville soils at concentrations higher than what would be typically found in this area. Sources of potential smelter impacts within Collinsville include historic air emission deposition, and use of smelter materials as yard fill or for construction projects.

To determine whether Collinsville soils contain elevated concentrations of metals commonly associated with zinc smelting operations, the agencies’ investigation of the Tulsa Fuel & Manufacturing Site included soil sampling at approximately 200 residential properties. The sampling results indicate that soils at 10 of these properties contain concentrations of lead (Pb), arsenic (As), or cadmium (Cd) above the cleanup levels established by the agencies for residential properties within Collinsville. While these 10 properties may have been impacted by materials from the former smelter operations, there are several other potential sources of Pb, As, or Cd (lead paint, treated wood, herbicides) that could also result in elevated concentrations of these metals being detected in soil.

Based upon these previous sampling results and the presence of visible smelter debris at some areas within Collinsville, ODEQ and EPA have determined that a systemic, larger-scale soil program is necessary in the town of Collinsville. ODEQ has designated this comprehensive program the Collinsville Soil Program (CSP). ODEQ did not discern any pattern or trend where impacted properties may be located, and there is uncertainty as to where smelter wastes may...
have been historically used as fill in Collinsville. Therefore, the comprehensive program will give all property owners in Collinsville the opportunity to have their property sampled.

Although the companies that owned and operated the Tulsa Fuel & Manufacturing Site have chosen not to participate in the CSP, Cyprus Amax has agreed to implement the CSP.

This Soil Sampling and Analysis Plan (SAP) has been prepared as guidance for the execution of field sampling activities, laboratory analysis of soil samples for selected constituents, sample data collection activities, and data reporting for the CSP (Figure 1-1). A separate sampling and analysis plan will be developed for characterization of sediment and surface water quality within Collinsville. All field work will be performed in accordance with the health and safety procedures of Shaw Environmental, Inc. (Shaw) and a site-specific health and safety plan. This document presents the site sampling and analysis procedures. Data quality objectives (DQOs) and analytical procedures that will be applicable to the soil sampling activities are specified in the Quality Assurance Project Plan, Collinsville Soil Program, Collinsville, Oklahoma (QAPP) (Shaw, 2009). Shaw’s Standard Operating Procedures (SOPs) and field forms that will be used to support the sampling are provided in Appendix A and Appendix B, respectively.

Applicable guidance from the Superfund Lead-Contaminated Residential Sites Handbook (EPA, 2003) [the Handbook] was used in developing this SAP. The Handbook states that lead-contaminated sites may contain other metals of concern; therefore, the handbook is appropriate for use in the remediation of sites contaminated with such metals (EPA, 2003). The soil sampling procedures and associated quality assurance/quality control (QA/QC) measures incorporated into this SAP follow the portions of the guidance presented in the Handbook applicable to the CSP to ensure that the sampling approach meets regulatory guidelines and will serve to meet the sampling objectives by providing data of sufficient accuracy to compare against final remediation levels.
Figure 1-1
Collinsville Soil Program, Oklahoma Study Area
1.1 **Constituents of Concern and Cleanup Levels**

The primary objective of this SAP is to provide representative soil concentrations for the constituents of concern (As, Cd, and Pb) for comparison to cleanup levels, which ODEQ has also adopted for the CSP (the CSP Cleanup Levels) (Collinsville Soil Program Action Memorandum, ODEQ, 2009). The CSP Cleanup Levels are as follows:

<table>
<thead>
<tr>
<th>ODEQ CSP Cleanup Levels by Medium</th>
<th>Cleanup Criteria</th>
</tr>
</thead>
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<tr>
<td><strong>Soil, Residential (mg/kg)</strong></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>37</td>
</tr>
<tr>
<td>Cadmium</td>
<td>75</td>
</tr>
<tr>
<td>Lead</td>
<td>500</td>
</tr>
<tr>
<td><strong>Soil, Nonresidential (mg/kg)</strong></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>200</td>
</tr>
<tr>
<td>Cadmium</td>
<td>560</td>
</tr>
<tr>
<td>Lead</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Sediment (mg/kg)</strong></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>181</td>
</tr>
<tr>
<td>Cadmium</td>
<td>813</td>
</tr>
<tr>
<td>Lead</td>
<td>500</td>
</tr>
<tr>
<td><strong>Surface Water (μg/L)</strong></td>
<td></td>
</tr>
<tr>
<td>Cadmium</td>
<td>238</td>
</tr>
</tbody>
</table>
2.0 Sampling Approach

2.1 Property Sampling Preparation

After identification of the property to be sampled, and verification of a signed property access agreement, Shaw will obtain utility clearances and dig permits for each property location before sampling activities commence. The Shaw Field Site Manager, or designee, will contact the Oklahoma One-Call System (1-800-Call-Okie), or the appropriate underground utility owner, to ensure that the underground utilities located on the property are marked prior to sampling. The Shaw Field Site Manager confirms the availability of the property for sampling, makes the underground utility marking requests, tracks the marking requests to verify all the utilities are marked, and coordinates with the sampling teams on which properties are marked for sampling.

2.2 Composite Sample Collection

Composite samples will be taken for each depth interval (Section 2.4.1) and consist of five to nine equal-volume soil grab samples. The aliquots will be composited into one sample for analysis following Shaw’s SOP EI-FS011 (Appendix A). The composite samples will consist of discrete aliquots containing equal volumes of soil. The individual aliquot will be placed into a container, such as a plastic bowl or disposable zipper storage bag, and homogenized. After each discrete soil grab sample is collected and thoroughly mixed, an aliquot of the grab sample will be measured by volume and placed into a single clean container and thoroughly mixed. This procedure will help to ensure that the composite soil sample is representative of the area sampled. More detailed procedures for obtaining the aliquots and creating the composite sample are provided in Section 4.1.

2.3 Confirmation Sampling

Every 20th sequential composite sample will be collected as a confirmation sample. Confirmation sampling will consist of shifting the yard sampling grids approximately 10 feet (ft) (space permitting). This will facilitate collection of composite sample aliquots at different locations from those collected for the initial composite sample for the property evaluation. This confirmation sampling approach will be used to determine any significant variability in soil concentrations.

Confirmation sampling will not be performed for greenways and alleyways. Greenways refer to those limited occurrences where the alley, or similar access, is generally covered in grass instead of gravel. The limited boundaries of these areas do not allow sufficient space for the shifting of grids that is required for confirmation sampling.
2.4 Sample Locations and Depth Intervals

Sample locations will not be known until requests from individual property owners are received and processed. As a result, the SAP anticipates that the properties will include a variety of land use classifications. This section describes the two CSP property types (residential and commercial) that are likely to be encountered and discusses the sampling protocols associated with each property type. The sample plan for any properties that are identified as being outside of the property categories or types described herein, will be developed on a case-by-case basis. Aerial photographs and on-site reconnaissance will be used to select the property, or lot sub-areas, for composite sampling to ensure the most representative samples are collected.

2.4.1 Depth Intervals

Samples will be obtained from the same depth intervals below ground surface (bgs) shown in Table 2-1 at each sample location (whether it is an aliquot for a composite sample or a discrete sample).

### Table 2-1
Sample Depth Intervals
(Inches bgs)

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Commercial</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 3</td>
<td>0 to 6</td>
<td></td>
<td>These two depth intervals will be obtained at each sample location to determine if remediation is required.</td>
</tr>
<tr>
<td>6 to 12</td>
<td>6 to 12</td>
<td></td>
<td>If either of the uppermost intervals indicates that remediation is required, the metals concentrations in lower intervals will be analyzed to determine the depth of excavation (i.e. the depth necessary to achieve the remediation criteria that will be approved by ODEQ). These samples may be obtained when the uppermost intervals are sampled or in follow-up sampling.</td>
</tr>
<tr>
<td>12 to 18</td>
<td>12 to 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 to 24</td>
<td>18 to 24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.2 Composite Sampling Locations for Residential Properties

A residential property yard is defined as extending to the further of the property line, an adjoining street or alleyway centerline, or the top edge of the drainage ditch or creek. Generally, a street curb or, in the absence of curb, the edge of the pavement will define the edge of the street or alleyway. The yard definition will include utility easements and right-of-ways associated with the property that are not owned by the property owner, but are functional parts of the area, provided that separate sampling access for these areas is obtained.
Residential properties will be divided, at a minimum, into two separate yard areas (i.e., a front yard and back yard). The property may also have one or more side yards or a gravel/earthen driveway (depending on its size and actual layout). Areas at the side of the house will be defined as a separate side yard area if they are at least 15 ft wide from the drip line to the closest property boundary described previously. Examples to illustrate how the sampling approach will be applied to different front, back, and side-yard configurations are provided in the remainder of this section.

**Front, Back, and Side-Yard**

Residential properties that have a front, back, and side yard (if the size of the side yard is 15 ft wide or greater) area will have a minimum of one composite sample taken from each of these yard areas. If a yard area (back, front, or side) is larger than 3,600 square feet (sf) but less than one acre, that yard area will be divided into equal sub-areas with each sub-area being no larger than 3,600 sf. Yard areas larger than one acre are discussed in Section 2.4.5. A composite sample for each depth interval will then be taken from each sub-area.

Each composite sample will consist of a sub-sample (or aliquot) for each 400 sf of yard or sub-yard area with a minimum of five total aliquots per composite sample. The aliquot locations will be located visually to result in an approximate equal spacing within the sample area as indicated on Figure 2-1; however, the aliquot locations will be adjusted as necessary to avoid those areas identified in Section 2.4.7.
Figure 2-1
Residential Properties with a Front Yard, Back Yard, and a Large Side Yard

Each Composite Sample will have
One Aliquot per 400 ft² with a Minimum of Five

In this example there would be 3 composite samples for each depth interval
(no separate yard area is > 3,600 ft²)

Front, Back, and Small Side-Yard
If the residential property has a small side yard less than 15 ft wide, one of the aliquots of either the front or back yards may be collected in the side yard as part of the total aliquots for the front or back yard area. Figure 2-2, illustrates one possible arrangement of sample aliquots.

Figure 2-2
Residential Properties with a Front Yard, Back Yard, and a Small Side Yard

Each Composite Sample will have
One Aliquot per 400 ft² with a Minimum of Five

In this example there would be 2 composite samples for each depth interval
(no separate yard area is > 3,600 ft²)
**Front and Back Yard Only**

If there is a very small or no side yard, the aliquots for the composite samples will be collected from the front and back yard areas only. The aliquot locations will be located visually to result in an approximate equal spacing within the sample area as indicated on **Figure 2-3**.

![Figure 2-3 Residential Properties with a Front Yard, Back Yard, and No Side Yard](image)

**Gravel/Earthen Driveways**

Residential gravel or earthen driveways will be sampled as a separate composite area. One composite sample for each depth interval will be collected for every 3,600 sf of the gravel/earthen driveway, comprised of aliquots that will represent no more than 400 sf of area with a minimum of 5 aliquots per composite sample. The aliquots will be located in an approximate “W” zigzag pattern with equal spacing down the length of the gravel/earthen driveway. Paved driveways will not be sampled. See **Section 2.4.7** for cautions on sampling driveways where petroleum staining is visible.

**2.4.3 Composite Soil Sampling Locations for Commercial Properties**

A commercial property sample area is defined as extending to the further of the property line, an adjoining street or alleyway, or the top edge of the drainage ditch or creek. Generally, a street curb, or in the absence of curb, the edge of the pavement will define the edge of the street or alleyway. The commercial sample area definition will include utility easements and right-of-ways associated with the property that are not owned by the property owner, but are functional parts of the area, provided that separate sampling access for these areas can be obtained.
Commercial properties that are less than or equal to 5,000 sf will be sampled as one sample area with one composite sample taken for the property. Five equally spaced aliquots (adjusted to avoid the areas identified in Section 2.4.7) will be taken for the composite. An example is presented on Figure 2-4.

![Figure 2-4](image)

In this example there would be 1 composite sample for each depth interval.

Commercial properties with a total sample area greater than 5,000 sf, but less than one acre, will be divided into approximate equal sub-areas with no single sub-area larger than 5,000 sf. One five-point composite will be taken from each sub-area for each depth interval. The five sub-sample aliquots are equally spaced within a given sub-area, as indicated on Figure 2-5; however, the aliquot locations will be adjusted as necessary to avoid those areas identified in Section 2.4.7. Commercial areas larger than one acre are discussed in Section 2.4.7.
2.4.4 Alleyways

Unpaved alleyways adjoining residential and commercial property will be sampled as outlined within this section. The approach to sampling will depend on whether access has to be obtained from individual property owners or a single governmental entity. Depending on the access scenario, the sample locations for the alleyway will be determined as follows:

- **Alleyway is sampled on an individual property basis:** The length and width of the alleyway adjoining the property being sampled will be measured to determine the alleyway use area. If access has been granted by both adjacent property owners, the full width of the alleyway will be used; otherwise, the width will be determined to the middle of the alleyway. One composite sample for each depth interval, to be the same as the type property being sampled, will be collected for every 3,600 sf (residential) or 5,000 sf (commercial) of the alley. These composite samples will be comprised of aliquots that will represent no more than 400 sf of an area with a minimum of 5 aliquots. A typical example for an alley adjoining a residential parcel will be smaller than 1,000 sf; in that example one composite sample per depth interval comprised of 5 aliquots each would be collected. The aliquots will be located in an approximate “W” zigzag pattern with equal spacing down the length of the alley.

- **Alleyway is sampled on a block basis:** The full length and width of the alleyway for the block (i.e., from street to street) will be measured to determine the use area. One composite sample for each depth interval, will be collected for every 3,600 sf (residential) or 5,000 sf (commercial) of the alley area, comprised of aliquots that will...
represent no more than 400 sf of area with a minimum of 5 aliquots per composite sample. The aliquots will be located in an approximate “W” zigzag pattern with equal spacing down the length of the alley.

2.4.5 Large Residential and Commercial Areas

If an individual yard area (i.e., back, front, or side) is larger than one acre, that yard area will be divided into sub-areas (grids) that are approximately equal in size but no larger than 3,600 sf. for residential or 5,000 sq. ft for commercial properties. Residential properties will have the larger number of 12 or 25 percent of the grids selected for sampling; commercial properties will have the larger of 8 or 25 percent of the grids selected for sampling. The grids for both residential and commercial properties will be selected for sampling using a random start systematic approach as follows:

- The first grid will be selected randomly.
- Then sampling will proceed by stepping out to every other grid from the first grid with the grids in alternating rows being shifted one grid.

The above grid selection process is shown in Figure 2-6.
A composite sample will then be obtained from each of the selected grids for each depth interval following the procedures specified in Section 4.1. If the concentration of As, Cd or Pb in a composite sample from a given grid is above the applicable CSP Cleanup Level for that property’s land use, then each of the four adjacent grids will also be sampled.

The data obtained from the sampled grids will be used to predict the probability of any given un-sampled grid having an average metals concentration that would exceed the CSP Cleanup Level as follows:

- The data from the sampled grids will be modeled using geospatial statistics using the geoR (Ribeiro and Diggle, 2001) package of the statistical computation and graphics software environment R (R Development Core Team, 2008).

- The statistical model will then be used to determine the probability that the average concentrations of As, Pb, or Cd within each of the un-sampled grids would exceed the CSP Cleanup Level.

- If the probability is estimated to be greater than 5% that the CSP Cleanup Levels would be exceeded in a given un-sampled grid, a composite sample from that grid will be obtained and analyzed.
• This process will continue until each grid has either been sampled or determined to have a 5% or less probability of an exceedance.

All grids within the large lot that are identified by the sampling and analysis as having concentrations of As, Pb, or Cd above the applicable CSP Cleanup Levels will be cleaned up.

2.4.6 Parks, Playgrounds, Schools, and Ball Fields
Large areas such as parks, greenways, playgrounds, schools and school sites, and ball fields will be sampled as described in Section 2.4.5 for large residential properties. Areas less than one acre will be divided into equal sub-areas with each sub-area being no larger than 3,600 sf, with all sub-areas being sampled.

2.4.7 Other Requirements for Sampling Locations
The purpose of the sampling is to determine the concentrations of metals in soil areas that could potentially be related to smelter air emissions or the use of smelter materials for fill or landscaping activities. Therefore, sample locations (whether for a composite aliquot or a discrete sample) will be selected to avoid the potential impact from other sources of metals including: lead-based paints, lead-contaminated vehicle fluids, or prior emissions from leaded gasoline. The following guidelines will be used to implement these criteria:

• Sample locations will be selected no closer than five ft from existing structures (and at least three ft from the drip zone) to minimize any potential influence of lead-based paint.

• Sample locations will be selected no closer than 10 ft from existing roads and paved parking lots to minimize potential influence of lead from fuels, oils, and vehicle emissions. In addition, sample locations will be a minimum of three ft from driveways.

• Soil samples will not be collected in areas visually observed to be impacted by oil or other petroleum products.

• Soil samples will not be collected under or within paved or impervious areas or stationary structures (inaccessible areas).

• Soil sampling locations will be no closer than three ft from in-yard garbage/compost piles, vehicles in repair or abandoned, or other “junked” items.

• Soil samples will not be collected from within drainage ditches and creeks.

2.4.8 Discrete Samples
In addition to the composite samples, individual discrete samples will be taken from bare soil play areas (e.g., under swing sets). A discrete sample will also be obtained from an area where the property owner or tenant believes that smelter materials may have been used as fill or
landscape material if that area is a localized small (typically 100 sf) area that is unique relative to the remainder of the yard area. Samples will be obtained from the same two depth intervals bgs at each sample location as for composite samples. When a sample from either of the two upper intervals exceeds the remediation levels, additional discrete samples will be collected to establish the vertical, as well as horizontal extent, of affected soil.

If the composite area surrounding the discrete sample also exceeds the remediation levels, delineating the discrete sample may not be required. However, if the discrete sample exceeding the remediation level is deeper than the composite sample exceeding the remediation level; it may be desirable to delineate a smaller area within the composite area.

If vertical delineation is required at a discrete sample location exceeding the remediation level, such delineation will consist of collecting samples from additional depth intervals as necessary to achieve the remediation criteria that will be approved by ODEQ. For the purposes of vertical delineation, each discrete sample will be regarded as representing no more than 400 sf of area, matching the area represented by each sub-sample (aliquot) of a composite sample. If the horizontally delineated area exceeds 400 sf, then additional vertical delineation samples will be required for each additional 400 sf. If horizontal delineation around a discrete sample location is required, additional discrete sample locations will be taken in a grid pattern around the discrete sample location. The maximum grid spacing between these horizontal delineation sample locations will be 20 ft. Structural boundaries such as pavement, buildings, or property lines will be excluded from this grid pattern.

2.4.9 Property Inspection

Prior to initiating sampling at a property, the field sampling team will perform a visual inspection of the property with the property owner to identify those specific locations where the owner knows or suspects the placement of smelter debris as fill material. The results of the property inspection will be documented on the Property Inspection Checklist (Appendix B). If smelter material is observed, discrete soil samples will be collected from these visually identified areas in accordance with Section 2.4.8. Any soil samples collected will be analyzed for comparison with the applicable CSP Cleanup Level for the land use type (residential or commercial).
3.0 **Analytical Methods and Field Quality Control Sampling**

This section describes the analytical methods, sample containers, preservatives, holding time requirements, and field QC samples.

### 3.1 Analytical Methods

All samples will be analyzed for As, Cd, or Pb using analytical methods specified in the QAPP. The samples will be shipped to Microbac Laboratories, Inc. (Microbac) in Marietta, Ohio for preparation and analysis unless Microbac becomes unavailable for any reason. Microbac has been licensed by ODEQ.

### 3.2 Sample Containers, Preservatives, and Holding Times

Samples must be placed in sample containers certified by the manufacturer to be pre-cleaned and are compatible with the matrix and intended analysis and properly prepared and preserved to maintain sample integrity. The sample containers, preservatives, and holding time requirements are identified in Table 3-1.

<table>
<thead>
<tr>
<th>Analysis Type</th>
<th>Sample Matrix</th>
<th>Suggested Sample Container(s)/Volume Requirements</th>
<th>Recommended Preservation Technique</th>
<th>Maximum Recommended Holding Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (As, Cd, Pb)</td>
<td>Soil</td>
<td>1 – 4-ounce WM glass</td>
<td>NA</td>
<td>6 Months</td>
</tr>
<tr>
<td></td>
<td>Sediment</td>
<td>1 – 4-ounce WM glass</td>
<td>NA</td>
<td>6 Months</td>
</tr>
<tr>
<td></td>
<td>Water</td>
<td>1 – 1-liter HDPE</td>
<td>HNO₃ to pH &lt; 2</td>
<td>6 Months</td>
</tr>
</tbody>
</table>

**Table 3-1**

**Sample Containers, Preservatives, and Holding Time Requirements**

| As - arsenic            | HDPE - high-density polyethylene              | Pb - lead                             |
| Cd - cadmium            | HNO₃ - nitric acid                            | WM - wide mouth                       |
| NA - not applicable     |                                               |                                    |

### 3.3 Field Control Samples

Field QC is applied using a graded approach and depends on decisions required for individual tasks. Decisions must be based on procedures that are established to meet the objectives of the investigation defined within this SAP. Specific field QC procedures including: appropriate sample custody, documentation, and document control procedures are described in the QAPP.
Quantitative measures of field QC are produced by analysis of shifted grid or sub-area composite confirmation samples taken on a specified frequency. Confirmation, duplicate, and split samples collected for soils are only approximate measures of field QC due to the heterogeneity of the soil medium. Specific procedures and collection frequencies for field QC samples are provided in the QAPP.
4.0 Field Sampling

This section discusses the field sampling methods, sample handling protocols, and documentation requirements that will be required to complete the objectives of this investigation.

4.1 Soil Sampling Method

Soil samples will be collected using a stainless-steel hand auger, core sampler, or hand trowel per Shaw’s SOPs EI-FS100, EI-FS101, or EI-FS103 (Appendix A) for each specified depth interval. The soil samples will be collected as follows:

1. Sample grids or sub-areas (for composite sampling) will be laid out for each property by the sample team (Section 2.0). The sub-areas will be paced off and noted on a site plan that will be referred to in the field notes. A single point will be located at the approximate center of each sub-area for collecting the location coordinates using the Global Positioning System (GPS) instrument and the data recorded in the logbook and the electronic sample forms on portable tablets. GPS coordinate measurements will be captured to the extent possible using a handheld GPS unit with submeter accuracy. Section 4.7 describes the procedures for using the GPS instrument to locate each composite sample grid or sub-area. The discrete sample locations comprising each composite sub-area will be marked using surveyors flags and noted on the site plan as part of the sample documentation process.

2. All sampling equipment will be cleaned following the cleaning procedures outlined in Section 4.2 and before each composite sample is collected.

3. Where surface materials (such as mulch, gravel) have been placed on top of the soil, they will be removed from the boring location and placed next to the area to be sampled. Once the samples have been collected and the excess sample materials returned to the holes, the surface materials will be replaced in a manner as close to the original appearance as practicable.

4. At each sampling point, each sample hole will be excavated with a stainless steel auger, core sampler, or hand trowel to collect each discrete grab sample. Sample location holes will be excavated to the specified depth intervals for each composite sample (e.g., 0- to 3-inches and 6- to 12-inches bgs, etc.). Extreme care will be exercised during excavation of sample holes to prevent any material from falling into the hole from upper intervals and potentially cross-contaminating the sample.

5. Sampling equipment that comes in contact with the sample will be decontaminated between each sample depth interval but not between each aliquot location for that depth interval.

6. The individual soil aliquots will be placed in separate containers, such as plastic bowls or zipper storage bags, and homogenized before combining into the composite sample.
7. Composite samples will be placed in an appropriately cleaned container provided by the analytical laboratory and appropriately labeled in accordance with Section 4.5. Each sample will have a unique identification number that will be marked on the sample container and noted in the field notes, daily field sample log, and chain-of-custody (COC) form.

8. Each sample will be sent to the project analytical laboratory following the sample handling, storage, and shipping procedures outlined in Section 4.6. All samples will be analyzed for total As, Cd, and Pb. Sample analysis will be consistent with the methods identified in Section 3.1.

9. Excess sample material and material removed when excavating the hole will be returned to the holes, leaving the sampling location as close to pre-sampling conditions as possible (i.e., including replacing any surface materials that have been removed). Sand may be added to the hole, as necessary, to bring the hole back to ground surface level.

4.2 Decontamination
All sampling equipment that will come in contact with samples and is not designated to be disposable will be cleaned prior to sampling. The standard cleaning protocol for the CSP will include:

- Removing any excess dust or dirt from the equipment with paper towels and/or wire brushes and tap water if needed.
- Washing the equipment with a water solution containing a detergent, such as Alconox® or similar laboratory-grade detergent.
- Rinsing the equipment with tap water.
- Rinsing the equipment with distilled/deionized water.
- Wrapping the sampling equipment in plastic wrap or other non cross-contaminating material until the equipment is used.

Sampling equipment will be used immediately following cleaning procedures or wrapped for later use. Equipment will be cleaned between each composite sample and at the start of each day’s sampling event.

4.3 Wastewater Drum Samples
Field equipment decontamination fluids, such as investigation-derived waste (IDW) water, will be collected and stored in a 55-gallon drum or other appropriate container. If required, this wastewater will be sampled for a wastewater profile analysis to determine the disposal method for the wastewater. The wastewater samples from the holding container will be analyzed for the same parameters as the soil samples (As, Cd, and Pb). Drum sampling procedures are described
in Shaw’s SOP EI-FS116 (*Appendix A*). Disposal of the IDW water will be dependent on the detected concentrations of the contaminants in the IDW water samples.

### 4.4 Sample Documentation

All documentation related to sampling must be retained in electronic forms on a portable tablet personal computer (PC), field logbooks, sample custody forms, and other field information records according to procedures for documentation of sampling activities developed for the CSP geodatabase. Complete and accurate information is necessary for meeting the DQOs and the objectives of this SAP, which have been implemented to investigate potentially contaminated properties within the investigation area. Procedures for sample documentation are provided in the QAPP.

### 4.5 Sample Labels, Chain of Custody, Packaging, and Shipping

Procedures for sample labeling, COC, sample packaging, and shipping are provided in the QAPP.

### 4.6 Electronic Sample Forms

Sample information will be recorded in the field on project-specific electronic sample collection forms using portable tablet PCs, using the ShawMobile™ application developed for field data collection. As properties are approved for sampling, property-specific electronic sample collection forms will be uploaded to each sample team leader’s tablet PC. These electronic sample collection forms are designed with data fields that prompt field sample personnel to capture relevant sample data and information for each sample collected specific to meet the objectives of the investigation. The electronic forms will contain aerial photographs of each property sampled and will allow sample personnel to draw in sample locations and other pertinent information about the property.

These electronic sample collection forms ensure that all necessary information is captured, documented in project-designed data fields, and provided for systematic QC review of the sample information. The electronic forms will be completed by the sample team as the samples are collected and will be downloaded to the geodatabase server with each day’s recorded sample documentation. The downloaded sample information will become part of the sample record contained in the geodatabase. The sample information (records) will provide the necessary information for documenting sample collection, tracking the samples through analysis, and allowing the data to be reported through multiple applications.

### 4.7 Site Photographs

Digital photography will be performed for each composite sample location, the photographs linked to GPS units, and downloaded to the geodatabase to locate the photographs for geographic information system applications. Additional photographs will be taken of any features
significant to the sampling activities, as well as, any unusual soil samples observed at the properties. The digital photos will be downloaded from the camera storage media and onto a computer for electronic filing as soon as possible. When the pictures are downloaded to the designated computer, the picture file name may be renamed to be more descriptive of the photograph's content. An effort will be made to organize the photographs into meaningful sub-directories (i.e., by property area or activity) and will keep the sequential number of the photograph as part of the filename. Digital photos will be routinely stored on compact discs (CDs), or other similar media, and archived in the CSP project files.

For each photo taken, the following items will be noted on the electronic Photographic Field Log:

- Type of camera (digital or film)
- Name and address of property (or the parcel number)
- General direction faced
- A brief, but accurate description of what the photograph shows (typically the yard area name; e.g., F01.)
- Sequential number of the photograph taken (and the roll number if applicable)
- Reference point or reference scale (if appropriate)
- Photo location on the site aerial photo map/sketch
5.0 **Analytical Quality Control Procedures**

All samples identified for analysis at all depth intervals will be analyzed for As, Cd, and Pb.

Quality assurance project management and laboratory procedures, including data validation and usability, are specified within the QAPP.
6.0 **Data Management**

Data management will include maintaining the data collected in an electronic form that will meet the application needs foreseen for this data, as well as the appropriate checks to database accuracy. This process is separated between Data Management, Data Validation, and Data Evaluation.

6.1 **Data Management**

6.1.1 **Data Acquisition and Management Process**

The data reduction, review, validation, reporting, and record keeping procedures described in this section will ensure that complete documentation is maintained, transcription and data reduction errors are minimized, the quality of the data is reviewed and documented, and the reported results are properly qualified.

The CSP project will follow a systematic process for acquiring and managing data. The data flow from the laboratory and the field to the project team and data users shall be sufficiently documented to ensure the data are properly tracked, reviewed, and validated for use. At the core of this process is the CSP project geodatabase. The geodatabase will be used to store, transfer, and report all field sampling and analytical data. The geodatabase will be used to plan, collect, and track samples, then report the data. The primary elements of the data acquisition and management process include:

- Project planning
- Field sampling
- Laboratory analysis and reporting
- Data loading and data entry
- Data review and validation
- Data reporting

**Project Setup**

Specific events must occur at the initiation of a project to facilitate the timely and accurate flow of data. This information is entered into the geodatabase at the outset of the project and remains constant throughout the course of the project unless there are changes that necessitate modifying or updating this information. The project setup serves as the foundation of the project with respect to QA/QC, analytical requirements, and the analytical program. This information includes:
• Project summary (i.e., project name, type, number, manager, etc.) that will appear on analysis request/chain-of-custody (AR/COC) forms (addressed in the QAPP)

• Tasks (i.e., name, description, start and end dates, etc.) for sampling areas

• Parameters, groupings, and default units

• Other valid values (i.e., qualifiers, containers, preservatives, laboratories, etc.)

The project setup task is critical to the success of the project. The valid values will be established for the CSP project in the geodatabase.

**Sample Planning**

Sample planning will occur as early in the project as practicable for each property to be sampled. The sample planning task will involve entering the identified property information into the geodatabase. The specific information about the individual samples to be collected includes the identification and location of the approved property to be sampled; matrix, sample depths, sampling method; number of containers, type and volume; preservatives, analytical method requirements; and special handling, such as expedited turnaround. These data will be thoroughly reviewed for accuracy and compliance with the written plans (e.g., SAP, etc.). The geodatabase serves as a dynamic electronic sample plan for the project to be used in the field sample planning. The preplanning data are transferred electronically from the geodatabase and uploaded to portable tablet PCs for use of electronic sample forms in the field.

**6.1.2 Sample Nomenclature**

A sample coding system will be used to identify each sample collected during the sampling program for the properties. This sample coding system will provide a tracking procedure to allow retrieval of information concerning a particular sample and ensure that each sample and its location are uniquely identified.

To facilitate the use of the CSP project geodatabase, and to maintain data consistency for the project, a sample nomenclature scheme has been developed consisting of several database fields that are used to identify a sample. Each of these data fields is described in further detail in the sections that follow:

• **Location Code** - Each location must be uniquely identified. This field refers to the unique location from which a sample is collected. The Property Parcel Identification Number (PPIN) will be used to designate the particular property location along with the lot number. The PPIN will be appended with the sub-area location within the property. PPIN = 5512; front yard = F01 (Location Code = 5512-F01).

• **Sample Number** - Each sample collected must be uniquely identified. This field refers to the unique sample number assigned to each sample. The sample number will
be a combination of the PPIN-property sub-area- and a unique sequential numbering scheme. PPIN = 5512-F01 plus sequential sample number = 5512-F01-C0001.

- **Sample Type** - Each sample will have a designated sample type that corresponds to a particular type of sample and sample depth. The sample types are identified in Table 6-1.

**Location Codes**

Each location must be uniquely identified. As stated above, the PPIN, and the location (sub-area) within the property will be used to establish the distinctive location for each sample. In order to query the database for all of the samples from a particular location, a specific, consistent location code must be used each time the location is sampled.

**Sample Numbers**

The sample numbering system to be used in the field has been developed to uniquely identify each sample collected. All samples will receive a unique sequential number, including the QA/QC samples, except for matrix spike/matrix spike duplicate (MS/MSD) samples. The MS/MSD samples retain the original parent sample number and are given a distinct sample purpose that is appended to the number.

The field sample coordinator, or other project personnel, can use the unique sample numbers to query sample information in the database to sort, track, and guide the sampling activities until each sample task is completed. If planned samples are not collected or unplanned samples are collected, the field sample coordinator can make adjustments to the sample information and document the final sample list for each sampling task. The unique sample number will be a combination of the PPIN and a sequential sample type number that will be specific to the property and the type sample collected. Examples of the sample number are as follows:

- 4695-C0001 – Soil composite sample collected at PPIN 4695
- 4695-G0001 – Soil grab sample collected at PPIN 4695
- 1491-SD001 – Sediment sample collected at PPIN 1491
- 1491-W001 – Water sample collected at PPIN 1491

The sample number will be used sequentially for all the same sample types collected at a property. The individual database fields for depth and sample type (described below) will be used to query and sort the depth types or depth intervals for the individual samples.

**Sample Type**

An alpha character designation will be applied for each sample type. Sample types for this project are as shown in Table 6-1.
Table 6-1
Sample Type Nomenclature

<table>
<thead>
<tr>
<th>Sample Types</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSC</td>
<td>Surface Soil Composite (0&quot; to 3&quot; bgs) (residential)</td>
</tr>
<tr>
<td>SSC</td>
<td>Surface Soil Composite (0&quot; to 6&quot; bgs) (commercial)</td>
</tr>
<tr>
<td>NSC</td>
<td>Near Surface Soil Composite (6&quot; to 12&quot; bgs)</td>
</tr>
<tr>
<td>DSC</td>
<td>Deep Subsurface Soil Composite (greater than 12&quot; bgs)</td>
</tr>
<tr>
<td>SSG</td>
<td>Surface Soil Grab (0&quot; to 6&quot; bgs or 0&quot; to 3&quot; bgs)</td>
</tr>
<tr>
<td>NSG</td>
<td>Near Subsurface Soil Grab (6&quot; to 12&quot; bgs)</td>
</tr>
<tr>
<td>DSG</td>
<td>Deep Subsurface Soil Grab (greater than 12&quot; bgs)</td>
</tr>
<tr>
<td>SW</td>
<td>Surface Water Sample</td>
</tr>
<tr>
<td>SD</td>
<td>Sediment Sample</td>
</tr>
<tr>
<td>WW</td>
<td>Wastewater Sample</td>
</tr>
<tr>
<td>WQ</td>
<td>Field QC Water Sample (e.g., equipment rinsate)</td>
</tr>
<tr>
<td>UNK</td>
<td>Unknown/Other</td>
</tr>
</tbody>
</table>

\[bgs \text{ - below ground surface.}\]

**Sample Purpose**

Another database field that is part of the sample identification scheme is the sample purpose. An alpha character description for the purpose of each sample collected is shown on Table 6-2.
Table 6-2
Sample Purpose Nomenclature

<table>
<thead>
<tr>
<th>Sample Purpose</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REG</td>
<td>Regular Field Sample</td>
</tr>
<tr>
<td>ER</td>
<td>Equipment Rinsate</td>
</tr>
<tr>
<td>FB</td>
<td>Field Blank</td>
</tr>
<tr>
<td>FD</td>
<td>Field Duplicate</td>
</tr>
<tr>
<td>FS</td>
<td>Field Split</td>
</tr>
<tr>
<td>CF</td>
<td>Confirmation Sample</td>
</tr>
<tr>
<td>MS</td>
<td>Matrix Spike</td>
</tr>
<tr>
<td>MSD</td>
<td>Matrix Spike Duplicate</td>
</tr>
</tbody>
</table>

To ensure uniformity in sample name identification of all samples collected for this sampling task, the following combination of fields will be used:

- **PPIN** Property Parcel Identification Number
- **Alpha plus Number** Sample locations within a property (e.g., front, left, right, or back, or alley)
- **Alpha** Sample type, examples are:
  - SSC = Composite Soil (0 – 6” or 0 – 3”),
  - NSC = Near subsurface composite (6 – 12”),
  - DSG = Deep subsurface soil grab (12 – 18” or 18 – 24”).
- **PPIN plus Number** Sequential unique number for sample collection type, examples are: C0001 = composite soil, G0001 = grab soil, and W0001 = water sample
- **Alpha** Sample Purpose, examples are: REG = Regular field sample, FD = Field Duplicate

Equipment rinsate (ER) water sample identification will not include a PPIN as part of the sample location code, but will use a generic field quality control (FQC) location code. ER water samples will include a PPIN or other location code as part of the sample identification name. Examples are as follows:

- 1346-WQ-1346-W0001-ER = an ER sample for field QC
- FQC-WW-FQC-W0002-WW= an IDW sample for waste water disposal determination

6.1.3 Field Data Collection Activities

The geodatabase will be used to plan each day’s sampling activities. A daily work list will be produced from the geodatabase to direct each day’s sampling effort. Along with the work list, planned sample information from the geodatabase will be uploaded to the sample teams’ tablet.
PCs and will contain ShawMobile™ and project-designed electronic sample collection forms with property aerial photograph inserts. This information includes identification of properties approved to be sampled, the appropriate analytical parameters, sample container types and quantities, chemical preservation, and associated QA/QC samples. Sample bottle labels will be preprinted from the geodatabase to use as part of the sampling kit.

Completed electronic sample collection records are downloaded from the portable tablet PCs to the geodatabase at the end of each day’s sampling activity. They are reviewed, approved, and processed in the geodatabase to produce the AR/COC form that accompanies the samples to the laboratory. On the day the samples are shipped, copies of the AR/COC forms are scanned and emailed to the project chemist and database manager for review and tracking. During sampling activities, any variances (changes) to the plan are recorded on the tablet PC electronic forms, field log book, and recorded on a variance record form (Appendix B). Both the transferred data and manually entered data residing in the geodatabase constitute the complete record of field sampling information for each sample.

During field sampling activities, custody of the samples must be maintained from the time that the samples are collected until laboratory data are issued and samples are appropriately disposed. Initial information concerning collection of the samples will be recorded in a field logbook and on electronic sample forms residing on the portable tablet PCs that are downloaded directly to the geodatabase. Information regarding the COC, transfer, handling, and shipping of all samples will be recorded in the geodatabase. An AR/COC form will be printed from the geodatabase to accompany each set of samples from the field to the laboratory. The geodatabase will be used by the field sample coordinator, or other designees, to perform all pre- and post-sampling activities.

**Pre-Sample Collection Activities**

This project-specific SAP contains the following:

- Sample nomenclature
- Parameters to be tested
- Methods of analysis to be used
- QA/QC samples to be collected at each designated location

After properties are identified to be sampled and approved, sample details will be pre-planned using the geodatabase and will utilize preprinted bottle labels and electronic sample collection forms available for each sample. The field sample coordinator will review and verify all preplanned information for accuracy and compliance with the SAP and will notify the project chemist of any problems. Any paper copies of generated AR/COC forms and any sample documentation will be placed in site-specific files created expressly for the purpose of managing
documentation as samples are collected and provided to the project chemist the day the samples are shipped.

The field sample coordinator will provide all necessary sample bottles, preservatives, bottle labels, etc., to each sample team to accomplish the sample collection work list assigned by the site manager or geodatabase administrator.

The field sample coordinator is responsible for enforcing the frequency for field QA/QC samples collected by the sample teams established in the SAP such as ERs and field blanks by tracking samples collected and reviewing planned samples to be collected. The field QC-to-sample associations will be documented in the geodatabase at the time of sample login.

**Sample Collection Activities**

Each sample collected for chemical analysis or archived for possible future analysis will be placed in the appropriate container(s) and labeled at the time of sample collection with the following information:

- Shaw project number and name
- Sample number
- Date and time of collection
- Required analyses and methods
- Type of preservative, if applicable
- Volume of sample and container type

The above scenario assumes that all samples to be collected are predetermined. In the event that samples have not been preplanned or that the field scope of work does not explicitly define the locations and number of samples, field personnel will follow the sample nomenclature for labeling unplanned samples. All appropriate documents including field logbooks, field activity daily logs, and other sample documentation are to be completed.

**Post-Sample Collection Activities**

The field sample coordinator is responsible for verifying that appropriate sample information is submitted for each sample, that correct sample container(s) was used, that samples were correctly preserved or maintained at the appropriate temperature, and that the assigned QA/QC samples were collected.

The field sample coordinator will download samples into the geodatabase. Special attention will be given to the preplanned information such as sampling method, sample depth, etc., that is retrieved by the form. The field sample coordinator or geodatabase administrator will also track and enter the field QC sample-to-regular sample associations in the geodatabase. The accuracy of the information will be verified at the time of sample download to the geodatabase.
geodatabase manager or designee will ensure that these data are entered or imported into the geodatabase.

The field sample coordinator will generate the AR/COC form from the geodatabase for each sample shipment. The field sample coordinator is responsible for verifying the accuracy and completeness of the AR/COC forms for the sample shipment being made. A full QC check will be performed and documented on the AR/COC form for each shipment. The field sample coordinator is responsible for the contents of each cooler shipped and the accompanying documentation. On the day the samples are shipped, the generated AR/COC forms will be scanned and emailed to the project chemist and the associated laboratories for notification of sample shipment.

The field sample coordinator is responsible for documenting any variance or nonconformance to the SAP with respect to sample collection, preservation, packaging, documentation, and shipment through the use of the variance record form (Appendix B), non-conformance form (Shaw’s SOP EI-Q007, Appendix A), and/or any other means of documentation initiated by the project. The project chemist will be notified and consulted prior to the initiation of the documentation.

The field sample coordinator is responsible for preparing and submitting export files to the project geodatabase on a routine basis. This individual is also responsible for providing a backup to the geodatabase system in case of system malfunction or computer failure to prevent data loss. Import files will also be received and loaded by the field sample coordinator from the project geodatabase that contains preplanned sample data sets or supplemental information for upcoming sampling events.

6.1.4 Laboratory Analysis and Data Deliverables
The laboratory verifies receipt of the samples with the project chemist and field sample coordinator. Any sample integrity problems or discrepancies with the AR/COC forms are addressed at this time. If the issue requires that a location be re-sampled, the project chemist notifies the field sample coordinator and the technical manager of the problem so it can be resolved. Any problems encountered by the laboratory during the sample analysis program will immediately be brought to the attention of the project chemist.

The laboratory data packages are sent to the project chemist for review and inventory and to the project office for archival. At the same time, the project chemist receives the electronic data deliverable (EDD) from the laboratory, acknowledges receipt of the EDD, and reviews and processes the file utilizing the automated data review (ADR), and exports the EDD to the geodatabase manager for data loading. Upon successful upload of the EDD by the geodatabase manager, the project team is notified when the electronic portion of the deliverable is ready for
evaluation and reporting. The EDD is also received by the project office and stored for archival purposes.

All data generated for the CSP investigations will be provided in both hardcopy and electronic format that complies with the defined geodatabase EDD specifications. The laboratory will be required to confirm sample receipt and login information. For each sample group, the laboratory will return copies of the completed AR/COC forms and confirmation of the laboratory’s analytical login to the field sample coordinator and project chemist within 24 hours of sample receipt.

**Receipt for Sample Forms**

When the analytical laboratory receives the sample coolers, a receipt of sample form will be initiated. This form will document the sample condition upon receipt. All receipt nonconformance situations will be sent to the project chemist and field sample coordinator. A nonconformance report will be completed to record the nonconformance and correction action will be implemented to prevent reoccurrence (Shaw’s SOP EI-Q007, Appendix A).

**Delivery of Hard Copy Data**

The laboratory will deliver a definitive data package in hard copy format that allows for review or validation of the data by an independent organization. The report will have sequentially numbered pages and will contain a table of contents referencing individual sections in the data package, original AR/COC forms, a copy of all corrective action reports, and a case narrative documenting the resolution of all corrective actions and noncompliant events. All Level IV data packages will be assembled in the following sequence:

1. Cover page (with laboratory service identification number and Shaw project name and number)
2. Original AR/COC form
3. Sample receipt form (including cooler temperature)
4. Cross-reference table (laboratory sample number versus field sample number)
5. Case narrative
6. Summary data sheets
7. Raw data
8. Inorganic raw data sequence:
   - Sample results forms, including method blanks
   - QC summaries
– Initial instrument calibration (ICAL)
– Continuing calibration verification (CCV)
– Daily calibration checks, including all related CCVs
– Calibration blanks, including all related continuing calibration blanks
– Interference check standards (A & B for inductively coupled plasma [ICP] only)
– Sample raw data
– QC raw data
– Post digestion spike results
– Analytical spike results
– Method of standard additions
– ICP series dilutions
– Instrument run log
– Sample preparation log
– Standard preparation log

The laboratory is required to retain a full copy of the analytical and QC documentation. Such retained documentation will include all hard copies and other storage media (e.g., CD, mass storage devices, etc.). As needed, the analytical laboratory will make available all retained analytical data information.

**Delivery of Electronic Data**

The laboratory will also provide an EDD in the specified ADR comma delimited format. The CSP project geodatabase uses a standard file format for transmitting analytical data. The filename will match as closely as possible the Sample Delivery Group identifier assigned by the laboratory to identify a group of samples. Exceptions are to be discussed with Shaw prior to submission.

### 6.2 Data Validation

Analytical data will be validated to ensure that method, procedural, contractual compliance are achieved and analytical data quality requirements are met. The data will be validated in accordance with the logic identified in the QAPP.

All validated sample results are entered into the CSP project database either by manual data entry or automatic upload during the ADR process. The database has data fields for both the laboratory and the validation qualifiers, which allows both qualifiers to be retained. The database will also accommodate a reason code, which is descriptive information explaining the rationale for applying a particular validation qualifier. All manual data entry is subjected to a QC review to verify the completeness and accuracy of the data entry.
6.3 **Data Evaluation**

The valid analytical results for As, Cd, and Pb will be compared to the remediation level goals that will be established by ODEQ (Section 1.1). Once the validity and usability of the soil data has been determined, a series of standard and/or custom reports can be readily generated as required from the CSP project geodatabase for evaluation. Exportable electronic files in various formats can also be produced as necessary.
7.0 **Reporting**

Each property owner who participates in the soil sampling program will receive a property sampling report that provides the analytical results obtained.

Upon completion of the soil sampling program analytical results will be provided to ODEQ in a Data Summary Report (DSR). The DSR will contain sampling field maps, tables of field and analytical data, and a summary of data validation and data quality.
8.0 References

EPA, 2000, Technical Review Workgroup

EPA, 2003, *Superfund Lead-Contaminated Residential Sites*


Appendix A

Shaw E & I Standard Operating Procedures
STANDARD OPERATING PROCEDURE

Subject: Compositing

1. PURPOSE
This procedure is intended to provide guidelines for the compositing of samples collected in the course of environmental program activities. Composites represent the average distribution of properties and can be used to reduce analytical costs or represent well-defined decision boundaries.

2. SCOPE
This procedure applies to the compositing of solid and liquid samples where no project-specific process is in place. Field composite methods are not appropriate for Volatile Organic Compounds (VOC) analysis of solids. Composites for these methods must be laboratory derived using either individual grab extracts or other laboratory methods.

3. REFERENCES
- U.S. Environmental Protection Agency, 1987. Compendium of Superfund Field Operations Methods, EPA 540/P-87/001a, OSWER 9355.0-14, Washington, DC.
- Shaw E & I Standard Operating Procedure FS010, Sample Mixing/Homogenization.

4. DEFINITIONS
- Composite Sample—A sample that is comprised of roughly equal amounts of discrete grabs from a set of sample locations or time/flow increments known as a sample group.
- Sample Group—A predetermined number or time/area span of discrete samples, which is composited into one sample for analytical purposes.

5. RESPONSIBILITIES

5.1 Procedure Responsibility
The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this procedure. Questions, comments, or suggestions regarding this technical SOP should be sent to the Field Sampling Discipline Lead.

5.2 Project Responsibility
Shaw E & I employees performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. Shaw E & I employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager or designee is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e. checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

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6. **PROCEDURE**

The discrete samples that are used to prepare a composite sample must be of equal volume and must each be collected in an identical manner. Field documentation must clearly indicate the composite elements on either a map or a composite logsheet. There are several types of composite samples.

*Flow-proportioned composite*—Flow-proportioned composite samples are collected proportional to the flow rate during the sampling period by either a time-varying/constant-volume or time-constant/varying-volume method. Flow-proportioned composite samples are typically collected using automatic samplers paced by a flow meter. This sampling method is commonly used for wastewaters.

*Time composite*—A time composite sample is composed of a discrete number of grab samples collected at equal time intervals during the sampling period. Time composite sampling is often used to sample wastewater discharges or streams.

*Volume/mass composite*—A volume/mass composite is composed of a discrete number of grab samples collected at defined volume or mass intervals. Volume/mass composite sampling is often used to sample the output of a process system such as a Thermal Destruction Unit or pug mill.

*Area composite*—Area composite samples are samples collected from individual grab samples located on a regularly spaced grid or along a pile at defined locations and depths. Each of the grab samples must be collected in an identical fashion and must be of equal volume.

*Vertical or Depth composite*—Vertical composites are composed of individual grab samples collected across a vertical cross section. Like area composites, the grab samples must be collected in an identical fashion and must be of equal volume. Soils and sediments can be used to create vertical composites.

6.1 **Solid Composites**

- To ensure the integrity of the composite, all discrete grab samples must be collected in an identical manner.

- Composite samples can be created by combining discrete grab samples into the same mixing/holding container as they are collected or by combining and mixing equal aliquots of containerized and homogenized discrete grab samples.

- Remove coarse fragments and organic material from the mixing bowl. Homogenize the sample as specified in SOP FS010, Sample Mixing/Homogenization.

- Remove sample aliquots and place into the appropriate sample containers for shipment to the laboratory.

- Label the sample and document the sampling event according to the project procedures.

- Package/ship the composite sample as required.

6.2 **Liquid Composites**

- Liquid composite samples should be created by combining equal aliquots of discrete samples.

- Assemble the containers that will comprise a given composite.

- Swirl or stir the individual containers to homogenize the contents just prior to removing the measured aliquots.
• Using clean glass pipets, deliver equal volumes from each grab container to the composite sample container that is to be shipped to the lab. For example, if there are five grab samples, and the composite sample requires 100 mL for the parameter of interest, pipet 20 mL from each of the grab samples into the composite sample container.

• Alternatively, measured volumes can be determined via a graduated cylinder/beaker and combined. The measuring container should be decontaminated between composites.

• Cap/seal the composite container and swirl to agitate. Stirring should be avoided as it increases the risk of introducing contamination to the sample.

• Label the sample(s), document the event, and package/ship the sample(s) as required.

7. ATTACHMENTS

None.

8. FORMS

None.
STANDARD OPERATING PROCEDURE

Subject: Hand Auger Sampling

1. PURPOSE

The purpose of this document is to provide the methods and procedure for sampling of soils and other solids using hand auger techniques. Hand auger sampling can be used when matrices are composed of relatively soft and non-cemented formations, to reach depths of up to 5 feet below ground surface, dependent on site conditions. Samples for Volatile Organic Compound (VOC) analysis should not be collected via hand auger methods. However, a hand auger may be utilized to penetrate to and expose the undisturbed material at the desired depth for sampling by more applicable methods.

2. SCOPE

This procedure is applicable to all Shaw E & I projects where soil samples will be collected via hand auger methods and no project-specific procedure exists.

3. REFERENCES


4. DEFINITIONS

- **Hand Auger**—A sample collection device consisting of metal rods with a T-bar handle and a detachable metal head. The auger head is a hollow metal tube with two cutting edges at the bottom curved into each other to hold the material pushed up into the tube as the auger is forced deeper. All trace environmental samples should be collected using stainless steel auger heads. See ASTM D1452 for a description of various types of augers available for use.

- **Sand Auger**—A type of auger with the cutting edges bent toward and touching each other. The design allows for the trapping of loosened materials in the auger tube.

- **Mud Auger**—A type of auger head with the top several inches open at the sides to allow for reduction of suction during removal from wetted and highly plastic materials, such as mud and lagoon solids.

5. RESPONSIBILITIES

5.1 Procedure Responsibility

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this procedure. Questions, comments, or suggestions regarding this technical SOP should be sent to the Field Sampling Discipline Lead.
5.2 Project Responsibility

Shaw employees performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. Shaw employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for recording information in sufficient detail to provide objective documentation (checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. PROCEDURE

6.1 Equipment

The following equipment should be used when conducting hand auger sampling:

- Decontaminated commercial hand auger, stainless steel construction for trace environmental sampling (any of those mentioned in ASTM D1452 are acceptable). If samples will be collected at depth, the auger head will require decontamination prior to collection of the targeted-depth sample. Alternatively, one auger can be used to remove the material to the targeted depth, and the sample can be collected using a different, clean dedicated auger.

- Engineers rule or stiff measuring tape

- Stainless steel spoons or scoops—decontaminated or dedicated

- Decontaminated or dedicated stainless steel bowl

6.2 Sampling

The following procedure should be used for hand auger sampling:

1. Don a pair of clean gloves.

2. If desired, place plastic sheeting around the targeted location to keep sampled material in place. Use a knife to cut an access hole for the sample location.

3. Remove any surficial debris (e.g., vegetation, rocks, twigs) from the sample location and surrounding area.

4. Place the bucket of the hand auger on the ground with the teeth down, and, while holding the T-handle, rotate it in a clockwise direction while pushing straight downward until the bucket is full.

5. Extract the auger by pulling upward with a slight rocking or rotating motion (counter-clockwise) until the head is fully out of the hole.

6. Measure the depth of the sample bottom with the rule or tape and compare to the desired sampling depth.

7. Remove the soil with a spoon or scoop. If the material represents the desired sample, place it into the bowl. If it is not the material to be sampled, empty the auger bucket onto the ground or plastic and repeat steps 4 through 6 until the desired sample aliquot is collected, placing it into the sample bowl. Remember to either decontaminate the auger head or use a fresh one to collect the actual sample aliquot.
8. If collecting a sample for VOC analysis, expose the desired depth by following steps 4 through 6 and then collect the sample from undisturbed material, using a corer or syringe-type sampling device.

9. Homogenize the non-VOC sample and transfer the sample directly into the sample container(s). Cap the sample container(s), label, complete documentation, and place into the sample cooler.

10. Measure the depth from which the sample was taken and record it in the field logbook or sheet.

11. Repeat steps 4 through 10 for deeper samples from the same hole.

7. ATTACHMENTS

None.

8. FORMS

None.
STANDARD OPERATING PROCEDURE

Subject: Trowel/Spoon Surface Soil Sampling

1. PURPOSE

The purpose of this document is to provide the methods and procedure for sampling of surface soils using trowels or spoons. Trowels or spoons can be used when matrices are composed of relatively soft and non-cemented formations and to depths of up to 12 inches into the ground surface, dependent on site conditions. Samples for Volatile Organic Compound (VOC) analysis should not be collected via trowel or spoon method. However, a trowel or spoon may be utilized to penetrate to and expose the undisturbed material at the desired depth for sampling by more applicable methods.

2. SCOPE

This procedure is applicable to all Shaw E & I projects where surface soil samples will be collected via trowel or spoon methods.

3. REFERENCES


4. DEFINITIONS

- **Trowel**—A sample collection device with a curved and pointed metal blade attached to a handle. All trace environmental samples should be collected using stainless steel blades.

- **Spoon**—A sample collection device with a round metal blade attached to a handle.

- **Surface Soil**—Soil that is removed from the surface no greater than 6 inches below grade after removing vegetation, rocks, twigs, etc.

- **Weathered Soil**—The top ¼ to ¼ inch of soil impacted by heat from sun, rain, or foot traffic that could evaporate, dilute, or otherwise deposit contaminants from an adjacent location, thereby misrepresenting the actual soil characteristic.

5. RESPONSIBILITIES

5.1 Procedure Responsibility

The Field Sampling Discipline Lead is responsible for the maintenance, management, and revision of this procedure. Questions, comments, or suggestions regarding this technical SOP should be directed to the Field Sampling Discipline Lead.

5.2 Project Responsibility

Shaw employees performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. Shaw employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.
For those projects where the activities of this SOP are conducted, the Project Manager, or
designee, is responsible for ensuring that those activities are conducted in accordance with this
and other appropriate procedures. Project participants are responsible for documenting
information in sufficient detail to provide objective documentation (checkpoints, calculations,
reports, etc.) that the requirements of this SOP have been met. Such documentation shall be
retained as project records.

6. PROCEDURE

6.1 Equipment

- Decontaminated trowel or spoon, stainless steel construction for trace environmental
  sampling. If samples will be collected at depth (0-6 inches), the trowel or spoon will require
decontamination prior to collection of the targeted-depth sample. Alternatively, a different
  trowel or spoon can be used to remove the material to the targeted depth and the sample
  collected using a clean dedicated trowel or spoon.

- Engineer's rule or stiff measuring tape

- Decontaminated stainless steel mixing bowl

6.2 Sampling

1. Don a pair of clean gloves.

2. If desired, place plastic sheeting around the targeted location to keep sampled material in
   place. Use a knife to cut an access hole for the sample location.

3. Remove any surficial debris (e.g. vegetation, rocks, twigs) from the sample location and
   surrounding area until the soil is exposed. Once exposed, the soil surface is designated as
   "at grade," or 0 inches.

4. Use a trowel to scrape and remove the top 1/8 to 1/4 inch of weathered soil. (A spoon can be
   interchanged with trowel).

5. If collecting a sample that includes VOC analysis, collect the VOC sample aliquot first
   following more applicable methods.

6. With a new trowel, place the point of the blade on the ground. While holding the handle of
   the trowel, partially rotate the blade in a clockwise/counter-clockwise motion while pushing at
   a downward angle until the blade is inserted to the required depth or the blade is nearly
   covered. Be certain that the trowel is not inserted to a depth where the soil will touch the
   handle or other non-stainless steel portion of the trowel or the sampler's hand.

7. With a prying motion lift up the trowel with soil on the blade and place soil into the stainless
   steel mixing bowl.

8. Repeat steps 6 and 7 until the required depth of soil is placed into the mixing bowl.

9. Measure the depth of the sample location with a rule or tape to verify the sampling depth and
   record in the field logbook.

10. Homogenize the non-VOC sample and transfer the sample directly into the sample
    container(s). Cap the sample container(s), label the containers, complete the documentation,
    and place the containers into the sample cooler.
7. ATTACHMENTS
   None.

8. FORMS
   None.
STANDARD OPERATING PROCEDURE

Subject: Soil Sampling using a Soil Probe or Core-Type Sampler

1. PURPOSE

The purpose of this document is to provide the methods and procedure for sampling of soils and other solids using soil probes and core-type devices. These samplers can be used when matrices are composed of relatively soft and non-cemented formations. They are utilized to collect near-surface core samples and can also be placed into boreholes at specified depths. Soil probe/corer samplers provide an intact depth-specific sample for geotechnical, chemical, radiological, or biological analysis.

2. SCOPE

This procedure is applicable to all Shaw E & I projects where soil samples will be collected via hand-operated soil probe/corer methods and no project-specific procedure exists. This procedure is not applicable to drilling or direct push methods.

3. REFERENCES


4. DEFINITIONS

- Soil Corer—A sample collection device consisting of extension rods, a T-handle, and a sampling head. The sampling head is a thin-walled two-piece metal tube, split lengthwise, into which a metal or plastic sleeve is placed. The tube halves are held together with screw-locked ends, the bottom one having a point. The sleeve fills with material as the sampler is forced downward, allowing for an undisturbed core to be collected.

- Soil Probe—A core sample collection device consisting of a thin-walled metal tube with a cutting edge on the bottom. The tube is cut-away from its tip to approximately one-third of the way to its top to allow material to enter. The top of a soil probe is removable, and a plastic or metal sleeve is inserted through the top and is held in place by the reduced diameter of the tube at the top of the cutout. Soil probes can be attached to extension rods and T-handles or may be of one-length construction. Samples collected from a soil probe are almost always submitted to the laboratory intact.
5. RESPONSIBILITIES

5.1 Procedure Responsibility

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this procedure. Questions, comments, or suggestions regarding this technical SOP should be directed to the Field Sampling Discipline Lead.

5.2 Project Responsibility

Shaw employees performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. Shaw employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. PROCEDURE

The sampling procedure is as follows:

1. Assemble the sampler by inserting the appropriate sample tube and close the ends. If using extension rods, attach the sampler by its top to the bottom rod. Attach the T-handle either to the extension rod or directly to the sampler head.

2. If desired, place plastic sheeting around the targeted location to keep sampled material in place. Use a knife to cut an access hole for the sample location.

3. Don a pair of clean sample gloves.

4. Remove any surficial debris (e.g., vegetation, rocks, twigs) from the sample location and surrounding area.

5. If the sample will be collected from a depth beyond the surface, use a hand-auger to remove the overburden and expose the "target" sample depth. Measure the depth of the hole with a rule or stiff tape to confirm that the target depth has been reached.

6. If the sampling depth is below where the sampling device can be seen while sampling, measure the distance from the tip to top of the sampler and mark the extension rod at this distance plus the depth of the hole with tape as a reference.

7. Change sample gloves just prior to collecting the sample, especially if an auger was used to expose the target depth.

8. To collect the sample using a Soil Corer, place the point of the assembled corer directly on the ground or in the auger hole and, while holding it vertical, push straight down into the soil. Do not twist. A slide hammer may be required for hard or stiff materials.

9. A Soil Probe should be placed into the location and pushed downward with a twisting motion to allow the cutting edge to work. Do not drive or hammer the sampler as this will damage the cutting tip.
10. Continue to force the sampler downward until the top joint is touching the ground or the
    reference mark is even with the top of the auger hole. This will ensure that the entire sleeve
    is filled with material.

11. Extract the sampler by pulling upward with a slight rocking or twisting motion until the head is
    fully out of the hole.

12. Wipe the sampler head with a cloth or towel and remove it from the T-handle or extension
    rod.

13. Disassemble the sampler and remove the sleeve. Also perform any field screening desired
    (e.g., PID screen).

14. For a Soil Probe sample, the sleeve will most likely be submitted intact. Wipe the outside of
    the sleeve and use a knife to cut off any material sticking from the end so that the ends are
    even. Place Teflon™ tape over the ends and cap both ends. Be sure to label the top and
    bottom of the sample interval.

15. A Soil Corer sample may be submitted intact, especially for geotechnical parameters. If this
    is the case, wipe the outside of the sleeve and use a knife to cut off any material sticking from
    the end so that the ends are even. Place Teflon™ tape over the ends and cap, labeling the
    sleeve and marking the top and bottom of the sample interval.

16. If the Soil Corer sample will be aliquotted into other containers, use a knife to split the sleeve
    lengthwise and remove the top section to expose the sample.

17. If sampling for Volatile Organic Compounds (VOCs), collect sample aliquots from the intact
    core first using an EnCore™ or other syringe-type device.

18. Place the remaining material directly into sample jars or into a mixing bowl for
    homogenization and containerization. Cap the sample container(s), label it/them, complete
    the documentation, and place the sample container(s) into the sample cooler.

19. Decontaminate the sampler.

7. ATTACHMENTS

None.

8. FORMS

None.
STANDARD OPERATING PROCEDURE

Subject: Sampling of Drums and Other Containers

1. PURPOSE

   This procedure is intended to provide general guidance for sampling of drums and other small containers for all analyses including characterization or compatibility (HazCat) analysis. The procedure also presents container handling and safety requirements and reiterates Shaw policies with regards to safe container handling.

2. SCOPE

   This procedure is applicable to all Shaw E & I instances where drums or other containers of less than 120-gallon capacity require sampling for either specific analysis or characterization purposes. This procedure also presents important safety information and Shaw policies concerning the opening of drums/containers.

3. REFERENCES


4. DEFINITIONS

   - Drum—A container constructed of metal, plastic, glass, or fiber designed to hold material. The size of the container can be as small as an ampoule found on laboratories shelves to as large as 120-gallon capacity.
   - Drum Type A—A drum or other container in which the contents are reasonably known and for which a qualified chemist or other hazardous material-experienced individual has determined that no hazard from shock sensitivity, air reactivity, or hazardous reactions is probable. These drums may be opened by hand unless damaged or visibly bulging. Determination may be made based upon visual inspection of drum/container condition, legible labeling, site information/records, or process/use knowledge that is supported by other information. Examples include staged IDW, waste oils, and other unused/waste products that do not degrade into shock-sensitive compounds. Type A Drums must also be constructed of typical materials and not of nickel, stainless steel, aluminum, center bung, or other special designs usually used to hold highly reactive materials. All drums removed from legacy landfills or dump sites must be treated as Drum Type B containers and accessed remotely.
   - Drum Type B—A drum that poses a potential risk of injury to the sampler from shock sensitivity, air reactivity, flammability, toxicity, or rapid polymerization. Included in this

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category are drum/containers with visible crystals along the sides or tops, those constructed of non-typical materials or design (nickel, stainless steel, aluminum, or center bung), non-IDW drums that are bulging, containers with too much damage to allow for safe hand-opening, and all unknowns from sites where there is not assurance of non-hazardous content. In addition, it is Shaw policy that all drums removed from landfills or dump sites must be treated as Drum Type B containers and accessed remotely and in Level B PPE unless a clear determination can be made to handle them otherwise.

Equipment

- **Dosimeter**—A portable, transistorized survey meter that can be used for radiation monitoring purposes and/or contamination measurements. All drums in landfills, in dump sites, or from sites where a potential exists that radioactive materials may have been used must be screened with a dosimeter.

- **Drum Thief**—A thin-walled borosilicate glass tube used to collect liquid samples from drums and containers.

- **LEL (Lower Explosive Limit) Meter**—An air monitoring device that can test the surrounding air for sufficient oxygen content for life support and/or the presence of combustible gases or vapors which may pose a potential flammability hazard. The lower limit is defined as the minimum concentration of a particular combustible gas in the air that can be ignited. The upper explosive limit is defined as the maximum concentration that can be ignited.

- **Toxic Gas Meter**—A portable warning device used for detecting specific toxic gases found in the surrounding air (i.e., H₂S, HCl, Cl₂, HCN, and COCl₂).

- **PID (Photoionization Detector)**—A portable air-monitoring instrument used to detect organic vapors. The PID does not distinguish between different types of vapors or tell if more than one vapor is present.

Special Types of Containers

- **Laboratory Packs**—Such drums are commonly used for disposal of expired chemicals and process samples from laboratories, hospitals, and similar institutions. Bottles in the lab pack may contain incompatible materials and may not be packed in absorbent material. They may contain radioisotopes; shock-sensitive material; or highly volatile, highly corrosive, or very toxic exotic chemicals. Lab packs have been the primary ignition sources for fires at some hazardous waste sites.

- **Exotic Metal Drums**—Very expensive drums (aluminum, nickel, stainless steel, or other unusual metals) that usually contain an extremely dangerous material.

- **Polyethylene or PVC-lined Drums**—These drums often contain strong acids or bases. If the lining is punctured, the substance usually corrodes the steel, resulting in a significant leak or spill and possible explosive gas (hydrogen) generation.

- **Single-Walled Drums Used as a Pressure Vessel**—These drums have fittings for both product filling and placement of an inert gas, such as nitrogen. Such drums may contain reactive, flammable, or explosive substances.

5. **RESPONSIBILITIES**

5.1 **Procedure Responsibility**

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this procedure. Questions, comments, or suggestions regarding this technical SOP should be directed to the Field Sampling Discipline Lead.
5.2 Project Responsibility

Shaw employees performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. Shaw employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. PROCEDURE

Safety note: Drums and other containers can pose a potential threat to the employee’s health and the environment. It is extremely important that all safety precautions outlined in an approved project health and safety plan are understood and followed. At no time shall Shaw E & L employees open an unknown and potentially hazardous or Type B drum/container by hand. All monitoring devices shall be intrinsically safe and all tools shall be non-sparking. To protect against possible toxic gas/vapor exposure, all drums/containers should be accessed and sampled in Level B PPE unless the site responsible person (SSHO or chemist) deems otherwise based upon clear and unquestionable information. All unknowns where there is not assurance of the absence of toxic gas or vapors from cyanide, sulfide, or strongly corrosive acids must be opened and sampled using Level B PPE.

6.1 Evaluate and Log Drum/Container

- Verify that all screening instruments are operational and have been calibrated before proceeding.

- If the sampling is being performed for purposes of compatibility or HazCat analysis, obtain a blank Drum/Container log or, if using a touch pad-based drum logging system, advance to a blank entry.

- If the drum/container is being sampled for other purposes, use the standard project sampling logging convention.

- Assign a number to the drum/container before beginning the visual evaluation. This will ensure that all drums/containers are accounted for.

- Complete the header and visual observation sections of the Drum/Container log. Be sure to note any markings, the manufacturer trade names, the drum condition, and NFPA information on the drum/container. Do not complete the Volume section until after the drum has been opened. Also, if on a staging area, notate the location of the drum/container on the log; draw a map if necessary.

- If using a dosimeter, perform the radiation survey on the drum first. If the activity is above the limits of the health and safety plan, do not continue unless your PPE is sufficient to proceed.

6.2 Open and/or Sample Drum/Container

- Type B drums that have been remotely opened via a backhoe-attached brass punch will most likely be staged for sampling. Drums/containers may sometimes be logged, opened remotely, and sampled as they are unearthed from landfills and dump sites and then placed into over-packs with or without their lids in place. Type A drums/containers can be opened using a bung wrench, non-sparking crow-bar-type implement, or even a brass punch and
hammer combination. Type B containers not opened via backhoe are usually opened using drum/container-attachable remote punch apparatus or, in the case of small containers, drill-based cap removal or drilling systems.

- If the drum/container is not in direct contact with the ground surface, make sure it is grounded before proceeding. Static electricity could potentially ignite any flammable contents.

- If the drum/container was previously opened, remove the lid of the over-pack container or other covering from the top of the drum.

- If opening the drum manually or with a single-container remote-opening system, proceed to open the drum/container.

- Use a PID (if weather permits), LEL meter, and/or toxic gas meter to collect air monitoring readings from the drum/container. Record the results on the Drum/Container Log.

- If the drum is empty (<2 inches of content for a 55-gallon drum), note it on the Drum/Container Log and proceed to the next drum/container.

- Insert the drum thief almost to the bottom of the drum or until a solid layer is encountered. About 1 foot of tubing should extend above the drum. Allow the waste in the drum to reach its natural level in the tube. Cap the top of the sampling tube using a thumb or forefinger. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container. Release thumb or forefinger from tube and allow the glass thief to drain completely into the sample container. Repeat as necessary until the required sample volume has been collected.

- Close the sample container cover tightly, wipe off with a paper towel, and place a label on the sample container. Replace the overpack lid or place a plastic cover over the drum/container.

- Place the used sampling tube, along with paper towels or waste rags (used to wipe up any spills), into an empty metal barrel marked “sampling waste” for subsequent disposal. Alternatively, break the drum thief in half inside the drum/container and leave it in the drum. Make sure the top of the thief does not extend above the drum cover or serious eye/hand injury may occur to others.

- Solids in drums are sampled by use of tongue depressors or disposable scoops. All reasonable efforts shall be made to obtain the sample to a depth of 12 inches or refusal. It is sometimes necessary to sample the material with the use of a trier. Nonexpendable sampling tools must be decontaminated between drums. Sometimes, the material must first be broken up with a non-sparking hammer or hammer and chisel, or, for rubber-like solids, a piece may need to be cut off with a knife.

- In some instances, a solid may form on top of a liquid. When the solid is broken up this may reveal the liquid layer. The solid and liquid should be collected.

- Every effort must be made to collect all phases of the drum contents. If a layer is not accessible or cannot be sampled it must be noted on the Drum/Container Log. Drums may contain air- or water-reactive solids that are covered with inert materials such as phosphorous under water or metallic sodium under light hydrocarbon fuels. Misclassification of such drums can and has resulted in serious repercussions during subsequent handling efforts.

- After sampling is complete, the container should be resealed to prevent the escape of vapors and possible reactions from rainwater, air, etc. The resealing method depends on the opening methods used and may include replacing the lid and retaining ring, placing the drum in an over-pack when it cannot be resealed by any other method, and/or placing polyethylene sheeting over the drum in a manner that prevents rainwater from entering the drum.
Samples should be documented, packaged, and shipped in accordance with the project plans and Shaw SOPs. Samples with known hazards evident from the field data must be shipped in accordance with Shaw Procedure No. EI-FS013. Remember to keep the total weight of samples, cooler, and ice below 60 pounds.

6.3 Drum/Container Log Completion—HazCat/Compatibility Projects

For projects where samples are being collected to characterize the container contents for segregation and/or disposal (HazCat or compatibility analysis), the field data gathered during the sampling activities is imperative to the process and must be recorded on a Drum/Container Sampling Log. The following information is needed for the form:

- Drum Number—Use either straight numeric or a site standard convention. Do not identify/number drums by items such as date or locations. This information should be cross-reference to drum numbers elsewhere.

- Project Number—Assigned by Shaw E & I to each project.

- Page x of y—If the drum log is accompanied by Material Safety Data Sheets (MSDSs) or other information, then the total number of pages is required. Commonly, will be page 1 of 1.

- Project Location—Generally the client company’s name and/or street address of the facility or site.

- Project Contact—The Shaw E & I employee responsible for overseeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results given for review (i.e., project chemist or site supervisor).

- Phone—Site phone or number of the supporting Shaw E & I office.

- Logger—Name of the individual responsible for filling in the sampling portion of the Drum Inventory Log.

- Sampler—Name of individual(s) responsible for obtaining the sample.

- Weather—Weather conditions during sampling (e.g., temperature and/or precipitation).

- Date—Date when sample is collected.

- Time—Time when sample is collected.

- Drum Type—Place an “x” in the box or boxes that best describe the drum type and materials of construction.

- Lid Type—Place an “x” in the box that describes the type of closure on the container.

- Drum Condition—Place an “x” in the box indicating the integrity of the drum. “Meets DOT specifications” means the drum can be shipped according to U.S. Department of Transportation (DOT) regulations.

- Drum Size—Place an “x” in the box indicating the volume of the drum when full. If the drum is over-packed, the inner drum volume should be indicated, not the size of the over-pack.

- Drum Contents—Place an “x” in the box indicating the volume of waste contained in the drum.

- Overpacked—Place an “x” in the “yes” box if the container was overpacked, along with an “x” in the box that states the type of overpack utilized.
- **Layers**—Designate the layer as top, middle, or bottom for a multi-layered sample. If only one layer exists, complete only the line associated with the top layer, "T."

- **Physical State**—Place an "x" in the box indicating the actual physical state of each layer.

- **Color**—Write in the standard color description for each layer of the sample. **The only acceptable color descriptions are as follows:**
  
<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>blue</td>
<td>white (wht)</td>
</tr>
<tr>
<td>red</td>
<td>cream (crm)</td>
</tr>
<tr>
<td>pink</td>
<td>orange (org)</td>
</tr>
<tr>
<td>colorless</td>
<td>yellow (yel)</td>
</tr>
<tr>
<td>purple</td>
<td>gray (gry)</td>
</tr>
<tr>
<td>tan</td>
<td>green (grn)</td>
</tr>
<tr>
<td>green-blue</td>
<td>brown (brn)</td>
</tr>
</tbody>
</table>

- **Clarity**—Add an "x" in the box indicating the clarity of each layer of the sample.

- **Layer Thickness**—Record the estimated thickness of each layer in inches.

- **pH**—Record the pH measurement in standard units (SU), 0 to 14, or designate "N/A" if no measurement was obtained. Measurements should be made by pH test strips.

- **PID**—Record the results for vapor analysis by photoionization detector (PID) or designate "N/A" if no measurement was obtained. The PID scale reads in ppm (0 to 2,000).

- **Dosimeter**—Record the results of the field radiation survey in this space or designate "N/A" if no measurement was obtained. The dosimeter's scale units are in millirems per hour (mrems/hr).

- **Other**—Use this space to record additional analysis that may take place or designate "N/A" if no other measurements were taken. The information should include the equipment used, the parameter being measured, and its concentration. Example: Drager tube - HCN - 5 ppm.

- **DOT Haz**—Hazard category from placards or stencils on drum. Example: Corrosive Liquid.

- **UN/NA**—Space for any UN or NA numbers that are stenciled or written on the drum. These numbers are always prefixed by either UN or NA.

- **MFG Name**—Record the name, address, and telephone number of the company producing or distributing the chemical/product. If the space provided is inadequate, indicate that the information continues on the back of the log, and use the back side as needed.

- **Chemical Name**—Record the chemical compound, key ingredient, trade name, and/or chemical name of the contents on the label or stenciled on the drum. Indicate whether the information was printed on a label or stenciled or handwritten on the drum. If the space provided is inadequate, indicate that the information continues on the back of the log, and use the back side as needed.

- **Additional Information**—This space is for additional information or comments for which no specific space is designated. Use it to provide unusual comments or indicate problems such as contents too hard to sample, drum color, or colored crystals formed on the drum. If the space provided is inadequate, indicate that the information continues on the back of the log.

The Drum/Container Log acts as its own Chain of Custody for projects where an on-site laboratory is being utilized. On these projects, the samples should be transferred along with the log, and the log should be signed and transferred to the on-site laboratory staff. This transfer is not necessary whenever the sampling personnel are also the on-site laboratory staff, as occurs on small projects.
For projects where the samples will be shipped to an off-site laboratory for HazCat, copies of the Drum/Container Logs must be included with the Chain of Custody documentation. The samples should be transferred via Shaw's standard Chain of Custody form.

7. ATTACHMENTS

None.

8. FORMS

- Drum Container Sampling Log
# Drum Container Sampling Log

(FS116.1.0)

<table>
<thead>
<tr>
<th>DRUM/CONTAINER</th>
<th>DRUM NO.</th>
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<td>SAMPLING LOG</td>
<td>PROJECT NO.</td>
</tr>
<tr>
<td></td>
<td>PAGE OF</td>
</tr>
</tbody>
</table>

**Project Location**

**Logger**

**Date**

**Project Contact**

**Sampler**

**Time**

**Phone**

**Weather**

**Drum Type**: Fiber ☐ Poly Lined ☐ Steel ☐ Poly ☐ Stainless Steel ☐ Nickel ☐

**Lid Type**: Ringtop ☐ Closed Top ☐

**Drum Condition**: Meet DOT Spec. ☐ Good ☐ Fair ☐ Poor ☐ Other ☐

**Drum Size**: 110 ☐ 85 ☐ 55 ☐ 42 ☐ 30 ☐ 16 ☐ 10 ☐ 5 ☐ Other ☐

**Drum Contents**: Volume ☐ Full ☐ 3/4 ☐ 1/2 ☐ 1/4 ☐ < 1/4 ☐ MT ☐

**Overpacked**: No ☐ Yes ☐

**Overpack Type**: Fiber ☐ Steel ☐ Poly ☐

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<thead>
<tr>
<th>Phys. State</th>
<th>Color</th>
<th>Clarity</th>
<th>Layer Thickness</th>
<th>Field Analysis</th>
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<tr>
<td>L</td>
<td>L</td>
<td>S</td>
<td>Use</td>
<td>pH Su PID ppm</td>
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<tr>
<td>Y</td>
<td>Q</td>
<td>O</td>
<td>STD</td>
<td>Dosimeter</td>
</tr>
<tr>
<td>E</td>
<td>U</td>
<td>L</td>
<td>Colors</td>
<td>Other</td>
</tr>
</tbody>
</table>

**Drum Labels / Markings**

**MFG Name**

**Chemical Name**

**Additional Information**

## LABORATORY COMPATIBILITY DATA

- Mark if physical state and color matches the above information. If not, stop analysis and notify Project Contact. Further work will not be paid for.

- **Radiation**: Pos ☐ Neg ☐
- **mRem / Hr**

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<th>React</th>
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<th>Hex Sol</th>
<th>Per</th>
<th>Oxid</th>
<th>CN</th>
<th>Sal</th>
<th>Beilstein</th>
<th>Flash Point</th>
<th>PCBs (25ppm)</th>
<th>Layer Class</th>
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<tbody>
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<td>S</td>
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<td>Std.</td>
<td>Units</td>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
</tr>
<tr>
<td>Y</td>
<td>Q</td>
<td>O</td>
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<td>Inches</td>
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<td>H or L</td>
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<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
<td>or</td>
</tr>
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</table>

**Comments**: __________________________________________________________________________________________

**PCB Conc.** ppm

**Flash Point**

**C/F**

**Compatibility Composite Bulk No.**

**Data Reviewer**

**Data Review Date**

**Field Reviewer**

**Field Review Date**

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<thead>
<tr>
<th>Transfer Number</th>
<th>Transfers Relinquished By</th>
<th>Transfers Accepted By</th>
<th>Date</th>
<th>Time</th>
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STANDARD OPERATING PROCEDURE

Subject: Nonconformance Reporting

1. PURPOSE
To establish the system for initiating, processing, and controlling nonconforming items, services, or activities to include disposition and corrective actions.

2. SCOPE
This procedure applies when nonconforming items, services, or activities are identified during the course of performing project work activities. Nonconformances may be identified during the execution, monitoring and control, or closure phases of a project or activity. The responsibilities and requirements provided in this SOP are applicable for project or programmatic activities.

3. REFERENCES
   - Shaw E & I Quality Management System Plan

4. DEFINITIONS
   - Disposition—An evaluation or arrangement provided to determine the fate or condition of use of an item, service, or activity.
   - Nonconformance—Non-fulfillment of a requirement. In addition, any item, service, or activity which deviates from drawings, specifications, or other project requirements and cannot be corrected readily within the scope of such requirements or otherwise requires a disposition. A nonconformance is not a deficiency whereby correction is part of the normal course of work outlined in project requirements (e.g., failing density tests that provide an indication of “in-process” work in a given point in time).
   - Corrective Action—Action(s) taken to correct a nonconforming condition and prevent future recurrence.

5. RESPONSIBILITIES

5.1 Responsible Manager
The Responsible Manager of the product or service shall ensure that corrective action is implemented and that a cause analysis for nonconformances is performed. In addition, the Responsible Manager(s) shall ensure the disposition of nonconforming items to include the segregation of nonconforming products, when practical, to prevent unauthorized use or delivery.

5.2 Project Quality Representative
The Project Quality Representative is responsible for maintaining a status of nonconformance reports at project or program locations. This includes reviewing nonconformances, logging and tracking nonconformance reports (NCRs), and verifying the satisfactory completion and closure of corrective actions. These activities may be performed by oversight or project personnel independent of the activity.

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5.3 All Personnel

Any individual assigned to a project who discovers a nonconforming product or service is responsible for initiating a nonconformance report describing the condition.

6. PROCEDURE

6.1 General

Identified nonconformances shall be handled in a controlled system as to ensure that the deviating condition is corrected as documented in the flowchart in Attachment 1.

In situations where the Quality Representative, Responsible Manager, or other staff determines that continued work would cause damage, jeopardize the safety of personnel, preclude subsequent inspections, or make corrective actions ineffective, work shall be stopped.

6.2 Identification and Reporting of Nonconformances

The identifying individual shall complete the description sections of the NCR form. The condition description will be clearly written after consultation with the responsible supervisor to ensure that the discrepancy is correctly described. Appropriate project criteria to include specifications, requirements, or codes violated must also be referenced to provide sufficient information to facilitate a proper and complete disposition. Sketches, photographs, reports, or other records may be included to supplement the NCR.

When this section of the NCR is completed, the report is sent to the Project Quality Representative for review. The Quality Representative shall review the NCR to ensure that it is complete and the reported condition(s) meets the criteria for a nonconformance. NCRs that are not complete or do not meet the criteria shall be reviewed with the originator to coordinate resolution. The NCR will be voided and filed if it is determined the criteria is not met. If the NCR is determined to be valid, the Quality Representative will assign a unique number or identifier and forward the NCR to the Responsible Manager for determining and documenting the appropriate corrective actions. A copy of the NCR shall be forwarded to the Director of Quality.

The Project Quality Representative shall maintain a status log of open and closed nonconformances. The log will also serve as the basis for numbering each discrepancy and tracking it through closure.

6.3 Disposition

The Responsible Manager shall evaluate the nonconforming characteristics of the item or service and determine the disposition. Disposition may include reject, use as is, and/or repair. The determination shall be documented on the NCR and a justification provided when the disposition is determined to be “repair” or “use as is.” The Quality Representative shall concur with the disposition.

Whenever practical, nonconforming items should be segregated from conforming items to prevent their inadvertent installation or use. When practical, identification tags or markings should be used to aid in this segregation.

When required by the contract or determined appropriate, the client shall be notified of the nonconformance by the Responsible Manager. The client must be promptly notified of technical errors in work previously completed and submitted to them.
6.4 Corrective Action

The Responsible Manager shall evaluate the nonconforming characteristics and determine the corrective actions for nonconforming items or services. The required section of the NCR shall be completed by the Responsible Manager who shall document the following:

- Corrective actions to be taken. Actions taken shall be appropriate for the nonconformance and shall be sufficient to preclude recurrence.
- Causes of the nonconformance and any preventive actions.
- Personnel responsible for implementing corrective actions.
- Date when necessary actions are to be completed.

The NCR shall be forwarded to the Quality Representative for review. If corrective actions are determined appropriate, then personnel responsible for implementation shall perform the corrective action in accordance with the scheduled due date. Extensions of time may be granted by the Project Quality Representative for extenuating circumstances.

After the completion of corrective actions, the Responsible Manager shall document the resolution on the NCR form, sign the form, and forward it to the Quality Representative. Any objective evidence of the corrective actions shall be included.

6.5 Verification and Closeout

Satisfactory resolution of nonconformances must be verified by the Quality Representative. The Quality Representative shall do the following to achieve resolution:

- Initiate an inspection and/or a review of objective evidence to verify satisfactory completion of the corrective action
- Sign off the NCR, if the work is satisfactory, and remove identification tags or markings as applicable

NCRs are not to be closed until the required corrective and preventative measures have been completed to the satisfaction of the Quality Representative, or long-term corrective measures have been established and implemented. Nonconformances will be monitored until the action is verified as complete and closed as documented on the NCR.

6.6 Records

The original, signed NCR form and associated documentation shall be retained in the project records.

7. ATTACHMENTS

- Attachment 1, Nonconformance Process Flowchart

8. FORMS

- Nonconformance Report

---

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## Nonconformance Report

<table>
<thead>
<tr>
<th>1) NCR Number</th>
<th>2) Project Name and Number</th>
<th>3) Date</th>
<th>Page 1 of</th>
</tr>
</thead>
</table>

4) Nonconformance Description And Violation Type: (Specification ___ Drawing ___ Code ___)

Identified by: ___________________________ Date________________

Reviewed By: ___________________________ Date________________

(Project Quality Representative)

5) Disposition of Nonconforming Condition (explain action to be taken to include 1) Reject 2) Use-As-Is, 3) Repair/Correct – any Use-As-Is or Repair/Correct determinations must be justified)

Evaluated by: ___________________________ Date________________

Responsible Manager:

6) Corrective Action(s) to be taken (include date when action(s) will be complete):

Corrective Action to be Performed by: ___________________________ Due Date________________

Responsible Manager: ___________________________ Date________________

Client Notification Required: ___ Yes ___ No Date Notified: ___________________________

7. Corrective Action Completion

Comments:

Responsible Manager: ___________________________ Date:________________

7) Corrective Action(s) Completion Verification and Date:

Comments:

Reviewed and Closed By: ___________________________ Date________________

(Project Quality Representative)
GERS Expense Report
Transmittal Page

TEA005151159

SUMMARY INFORMATION

Name: LARRY W DUTY
Employee ID: 441329
Expense dates: 07/08/09-07/13/09
Total Expenses: 113.70 USD
Card Amount: 2.12 USD
Cash Amount: 111.58 USD
Form ID: TEA005151159
Approver: John W Kraus
Report Name: Davis Dump Rd
Purpose: field sampling

DIRECTIONS FOR SUBMISSION

Mail the original receipts, and other appropriate documentation with this page.
Do NOT include unused (partially or wholly) airline tickets. Return ALL unused tickets to your travel agency.
Unless your manager has directed otherwise, place this transmittal and receipts into an envelope and address exactly as shown above.

REQUIRED RECEIPTS

<table>
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<tr>
<th>Rec. #</th>
<th>Date</th>
<th>Receipt Item</th>
<th>Amount</th>
<th>If not submitted - Explain</th>
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<td>07/08/09</td>
<td>Materials &amp; Supplies (X301)</td>
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<td>2)</td>
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<td>07/13/09</td>
<td>Postage / Courier (X701)</td>
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Appendix B

Collinsville Soil Program
Property Investigation Field Forms
## FIELD WORK VARIANCE

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<th>DATE:</th>
<th>VARIANCE NO.:</th>
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<table>
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<th>COST/SCHEDULE IMPACT:</th>
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<td>ORDER NO.</td>
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<th>CC:</th>
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<table>
<thead>
<tr>
<th>APPROVED BY:</th>
<th>DATE:</th>
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<tbody>
<tr>
<td>Shaw E &amp; I Site Manager,</td>
<td></td>
</tr>
<tr>
<td>APPROVED BY:</td>
<td>DATE:</td>
</tr>
<tr>
<td>Shaw E &amp; I CQCSM,</td>
<td></td>
</tr>
<tr>
<td>APPROVED BY:</td>
<td>DATE:</td>
</tr>
<tr>
<td>APPROVED BY:</td>
<td>DATE:</td>
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Privileged and Confidential, Attorney Client Communication
Prepared at the Direction of Legal Counsel
### FIELD WORK VARIANCE LOG

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Collinsville Soil Program  
Property Inspection Checklist

<table>
<thead>
<tr>
<th>Address</th>
<th>Date</th>
<th>Property Owner</th>
<th>Sample Team Member</th>
<th>Property Group Number</th>
<th>Sample Team Member</th>
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<table>
<thead>
<tr>
<th>EXIST</th>
<th>NA</th>
<th>CONDITION</th>
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</thead>
</table>

**YARD AREA**

1. **Lawn Area**
   - A. Location of Flower/Plant Boxes
   - B. Soil (grade) next to house
   - C. Shrubbery
   - D. Trees
   - E. Evidence of Flooding from nearby streams
   - F. Low areas near house (that could cause ponding of water)
   - G. Evidence of smelter residue in yard
   - H. Other: ______________________

2. **Utility**
   - A. Water Meter
   - B. Gas Meter
   - C. Sewer Lines
   - D. Other: ______________________

3. **Driveway**
   - A. Concrete
<table>
<thead>
<tr>
<th></th>
<th>EXIST</th>
<th>NA</th>
<th>CONDITION</th>
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</thead>
<tbody>
<tr>
<td><strong>4. Electrical Service</strong></td>
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<tr>
<td>A. Condition</td>
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<td>B. Other:</td>
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<tr>
<td><strong>EXTERIOR AREA</strong></td>
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<tr>
<td><strong>5. Brick Siding</strong></td>
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<tr>
<td>A. Brick</td>
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<tr>
<td>B. Stucco</td>
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<tr>
<td>C. Siding</td>
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<td>D. Windows</td>
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<td>E. Other:</td>
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<td><strong>6. Roofing</strong></td>
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<td>A. Condition</td>
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<tr>
<td>B. Chimney</td>
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<tr>
<td>C. Other:</td>
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<tr>
<td><strong>7. Gutters &amp; Leaders</strong></td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>A. Condition</td>
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<tr>
<td>B. Other:</td>
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<tr>
<td><strong>8. Streetwalk &amp; Walkways</strong></td>
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<tr>
<td>A. Concrete cracked, eroded</td>
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<tr>
<td>B. Tripping hazards</td>
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<tr>
<td>C. Tree roots cracking, lifting slab</td>
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<tr>
<td>D. Sections missing</td>
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<td></td>
<td>EXIST</td>
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<td>CONDITION</td>
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<tr>
<td>E. Other:</td>
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**9. Garage**

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<tbody>
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<td>A. Attached</td>
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<td>B. Detached</td>
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<td>C. Other:</td>
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**10. Swimming Pool (Above Ground)**

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<tbody>
<tr>
<td>A. Leakage</td>
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<td>B. Visible damage</td>
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<td>C. Other:</td>
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**11. Swimming Pool (Below Ground)**

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<tr>
<td>B. Visible damage</td>
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<td>C. Other:</td>
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**12. Storm Cellar**

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<td>A. Condition</td>
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<td>B. Other:</td>
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**PROPERTY AREAS**

**13. Other Areas (Other Buildings)**

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**COMMENTS:**

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