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**Sampling and Analysis Plan
for the
Baseline Ecological Risk Assessment**

**Big John Salvage – Hoults Road Superfund Site
Fairmont Township
Marion County, West Virginia**

Tetra Tech/Black & Veatch Project No. 47121.0107

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1.0 Introduction

This document continues the Ecological Risk Assessment (ERA) process for the Big John Salvage – Hoult Road Site in Marion County, West Virginia. In support of a Remedial Investigation/Feasibility Study (RI/FS) for the site, a screening-level ecological risk assessment and problem formulation [Steps 1 through 3 of the risk assessment process (U.S. Environmental Protection Agency (USEPA, 1997))] was completed July 13, 2006 (Black & Veatch, 2006a). The report recommended that further evaluation of the potential for ecological risks from site contaminants be conducted. On July 22, a technical memorandum was prepared to define the elements of the ecological field sampling plan needed to evaluate the receptors at risk (Black & Veatch, 2006b).

This document serves as the ecological field sampling and analysis plan (SAP) and is considered Step 4 of the ERA process that describes the study design and data quality objectives (DQOs) for investigative tasks needed to evaluate ecological risks (EPA 1997). This SAP describes the collection of samples for chemical and biological analysis that will be used to support risk assessment and the remedial investigation.

1.1 Site Background

Detailed descriptions of the site including site history, contamination levels, pathways, potential receptors, conceptual site model, previous investigations, and removal actions are provided in the RI/FS Work Plan and in the Screening Level Ecological Risk Assessment (SLERA) (Black & Veatch 2006a).

1.2 Problem Definition

Based on the SLERA, there is concern that contaminant releases from the Big John Salvage – Hoult Road site may pose a risk to ecological receptors on-site and in adjacent areas off the site including the Monongahela River and Sharon Steel Run. Current data are insufficient to evaluate the nature of these potential risks. The proposed activities in this SAP are expected to provide the data necessary to evaluate ecological risks. Following completion of the ERA, preliminary remedial goals will be established for the RI/FS. The ultimate decision will be whether remedial actions are needed to protect the environment.

1.3 Project Description and Schedule

This ecological SAP addresses the field work that will be performed to provide data for an ecological risk assessment and the remedial investigation for the site. Soil, sediment, pore water, surface water, and biological tissue samples will be collected and analyzed. In addition, soil and sediment toxicity tests will be conducted. The sampling is scheduled to be performed during the fall of 2006.

2.0 Data Needs and Objectives

This section describes the overall objectives and general activities needed to assess ecological risks at the Big John Salvage – Houlst Road Superfund Site. These activities are based on a review of the site data, field visits, the screening-level risk assessment, and the recommendations for ecological field sampling (Black & Veatch 2006a,b). Specific DQOs, field sampling methods, and data acquisition are described in Section 3.

2.1 Analytical Evaluations

2.1.1 Soil

The objectives for soil sampling are to: (1) gain an understanding of the extent of contamination and potential soil exposure concentrations in the less disturbed habitats of the site and adjacent to Sharon Steel Run; and (2) determine the concentration of chemicals of potential concern (COPCs) in co-located soil samples collected for toxicity testing.

Soil samples will be collected at eight locations in the forested areas north of Sharon Steel Run and in the emergent wetland areas adjacent to Sharon Steel Run. Soil samples will be analyzed for polycyclic aromatic hydrocarbons (PAHs) and target analyte list (TAL) metals.

2.1.2 Sediment

The objective for sediment sampling is to determine exposure concentrations in co-located sediment samples associated with the benthic invertebrate sediment toxicity tests (Section 2.2.3). Sediment samples will be collected from six stations in the Monongahela River and one from a reference site. The samples will be analyzed for semi-volatiles (PAHs) and TAL metals.

2.1.3 Porewater

The objective for porewater sampling is to determine: (1) if contaminated groundwater from the site may be discharging into the Monongahela River and/or Sharon Steel Run, and (2) if the interstitial porewater may result in adverse exposure concentrations to benthic invertebrates.

Porewater samples will be collected at eight locations with a “peeper” device to obtain samples in interstitial porewater along likely groundwater discharge zones into the Monongahela and Sharon Steel Run. Porewater will be analyzed for semi-volatiles and TAL metals.

2.1.4 Surface Water

The objectives for surface water sampling are to determine the exposure concentrations of COPCs in co-located water samples collected for the fish and aquatic invertebrate toxicity tests (Sections 2.2.4 and 2.2.5). Surface water samples will be analyzed for total and dissolved TAL metals and the semi-volatile organic compounds.

2.1.5 Plant Tissue

The objective of collecting and analyzing plant tissues is to determine the direct exposure concentration of mercury in the plant and indirect exposures to consumers of the plant. Twelve samples of plants will be collected in at six locations across a range of known mercury contamination levels. Separate samples of shoots and roots will be collected. Roots should be rinsed to remove all soil. Discreet samples of shoots and roots may need to be composited at each location to achieve the necessary sample volume. All plant samples will be analyzed for mercury.

2.1.6 Earthworm Tissue

The objective of collecting and analyzing earthworm tissues is to determine the direct exposure concentration in the organisms and for determining the indirect exposures to consumers of earthworms in the food chain models. Whole-body earthworm samples will be collected from six locations in across a range of known PAH, mercury, and lead contamination levels. Earthworms will be analyzed for PAHs, lead, and mercury.

2.1.7 Aquatic Invertebrate Tissue

The objective of collecting and analyzing aquatic invertebrate tissue is to determine the exposure concentration to consumers of the invertebrates. Samples of benthic invertebrate tissue will be collected from the Monongahela River at six locations across a range of known lead concentration levels. Invertebrates from each location will be composited to form a single sample and will be analyzed for lead.

- Individual edible sized fish > 6 inches in length and comprised of bass; and
- Compositied small prey-sized fish (less than 6 inches in length) comprised of shiners, sunfish, and minnows.

The boat shocker will be used to collect the fish. All collected fish will be sorted by the two size classes, identified by species, and their lengths (in millimeters) will be recorded. The fish samples will be rinsed with de-ionized water and wrapped in aluminum foil. At the lab, a biologist will examine the large fish to note any evidence of tumor formation on both external and internal organs (upon filleting). The required analyses for fish tissue are shown in Table 3-2. Analytical DQOs, project reporting limits, and container types, are provided in Table 3-5.

3.7 Aquatic Macroinvertebrate Survey

An aquatic macroinvertebrate community bioassessment will be conducted in the Monongahela River. Six stations, corresponding with the sediment sample locations in Figure 3-3, and a reference station, located at the upstream of the Fairmont Coke site will be evaluated according to the West Virginia Division of Environmental Protection SOPs (Smithson 1997) and the stream monitoring manual Craddock (2006). This method uses the semi-quantitative invertebrate data but may not be very representative of large river systems such as the Monongahela River with respect to reference streams. Basically, the procedure utilizes a kick net and/or a D-frame dip net to sample within the representative habitat(s) at each station to obtain at least 100 organisms. The organisms will then be transferred to a container preserved with 95% ethanol. A qualified biologist will provide taxonomic identification to the genus level or the nearest practical taxon. A Benthic Macroinvertebrate Field Data Sheet will also be filled out at each location according to the above referenced protocols.

Upon receipt of the macroinvertebrate data, the following metrics are proposed to evaluate the communities at each station:

- Taxa Richness - total number of different macroinvertebrate families collected.
- EPT - number of Ephemeropteran (mayfly), Plecopteran (stonefly), and Tricopteran (caddisfly) families collected.
- HBI - Hilsenhoff Biotic Integrity - an index indicating relative pollution tolerance of macrobenthos collected.

- % Dominant Family - percent of total number of organisms which are of the numerically dominant family.
- CLI - Community Loss Index - measures loss of taxa between the reference site and sample site; the value increases as degree of dissimilarity with reference increases.
- EPT/Chir - ratio of number of EPT taxa to number of Chironomidae.
- Scraper/Filter-Collectors - ratio of scrapers to filtering collector organisms.

3.8 Other Field Data

Sample collection data, including sample station, sample identification number, collection date and time, and other pertinent information about samples and their collection will be recorded in bound notebooks.

At all aquatic stations, measurements of field parameters of temperature, pH, specific conductance, and dissolved oxygen will be collected for all surface water and pore water samples at the time of collection.

At all terrestrial sites, general observations of the habitat at each sampling station should be recorded, including estimates of cover and dominant vegetation types, notes of any animal tracks, scat, or other evidence of wildlife use.

The locations of all samples will be determined at the time of sample collection using a GPS unit with real-time differential correction and sub-meter accuracy. GPS also may be used to locate other points of interest noted during the field investigation. Locational information will be recorded in bound field notebooks and GPS data stored in the unit will be available for download. Location data will be recorded in West Virginia State Plane (feet) or UTM Zone 19 (meters).

Each sample site will be photographed using a film or digital camera at the time of sample collection. Frame numbers will be recorded in bound field notebooks. Photos should be framed so that the sample site is clearly shown in its geographic context.

2.1.8 Fish Tissue

The objectives of collecting and analyzing fish tissue are to: (1) determine the direct exposure concentration to the fish; (2) observe for evidence of external and internal organ tumor formation; (3) determine the indirect exposure concentrations of COPCs to consumers of fish; and (4) provide additional data to support the human health risk assessment. Two size classes of fish will be collected from four locations along the east bank of the Monongahela River.

Small fish (< 6 inches length) will be composited at each station and analyzed for mercury.

Larger (> 6 in length) bottom fish (bullheads [*Ictalurus spp.*] or white sucker [*Catostomus commersoni*]) as well as top fish [bass (*Micropeterus spp.*)] will be filleted and analyzed for mercury and PAHs. Tentatively identified compounds will also be recorded to provide potential evidence of PAH metabolites. Gross observations of the external and internal organs of these larger fish will be conducted for any evidence if tumors or other tissue abnormalities.

metals, SVOCs, PCBs

2.2 Toxicity Tests

This section describes the toxicity tests that will be conducted on a series of test organisms from the various media collected from the site. Details of field procedures for collecting media samples for the toxicity tests are discussed in Section 3.0

2.2.1 Earthworm Bioaccumulation and Toxicity in Surface Soil

The objective of the earthworm reproductive toxicity test is to determine if contaminated surface soils are toxic to soil invertebrates. The results of the associated bioaccumulation test will also be used as a line of evidence to estimate earthworm body burden for use in the evaluation of small mammal and avian receptors that consume soil invertebrates.

Chronic earthworm toxicity and bioaccumulation tests will be conducted using one receptor species along a COPC concentration gradient from six on-site soil stations in the open field habitat locations, and one off-site reference control sample. The test protocol will be the 42-day toxicity test using *Eisenia fetida* as the test organism as described in procedure E1676-04 of *Standard Guide for Conducting Laboratory Soil Toxicity or Bioaccumulation Tests with the Lumbricid Earthworm Eisenia fetida and the Enchytraeid*

Potworm Enchytraeus albidus (ASTM, 2004). The endpoint is where reproduction is statistically different from the control.

2.2.2 Plant Germination Toxicity in Surface Soil

The objective of this germination test is to determine if contaminated surface soils are toxic to plants. The tests will be conducted along a COPC concentration gradient from six soil locations from the open field habitat at the site and one off-site reference station. The test protocol will be the 42-day toxicity test using perennial ryegrass (*Lolium perenne*) according to ASTM E1963-02 - *Standard Procedures for Conducting Terrestrial Plant Toxicity Tests* (ASTM, 2002). The endpoint is where the percent reduction in seed germination in site soils is statistically different from the control.

2.2.3 Benthic Invertebrate Toxicity in Sediment

The objective of the benthic invertebrate toxicity test is to determine if contaminated surface sediments may be toxic to a sensitive test organism. A chronic benthic invertebrate toxicity test using the amphipod *Hyaella azteca* will be evaluated across a range of COPC concentrations in sediment from six locations in the Monongahela River near the site, and from one reference location. The 42-day chronic test to *H. azteca* with survival, growth, and reproduction as endpoints will be used (EPA Test Method 100.4; EPA, 2000).

2.2.4 Fish Toxicity in Surface Water

The objective of the fish toxicity test is to determine if the Monongahela River water adjacent to the site may be toxic. The acute 7-day fathead minnow (*Pimephales promelas*) test with survival as the endpoint will be conducted according to the protocol provided in OSWER Directive 9360.4-08, EPA/540/P-91/009 (EPA 1991). The river water will be collected just above contaminated areas of the sediment at six locations and at one reference site.

2.2.5 Aquatic Invertebrate Toxicity in Surface Water

The objective of this toxicity test will be to determine if water associated with contaminated areas of the Monongahela River may be toxic to sensitive aquatic invertebrates. A reproductive chronic toxicity test will be conducted using the water flea (*Daphnia magna*) across a range of COPC concentrations in surface water collected just above contaminated areas of the sediment at six locations in the Monongahela River (and

one control) near the site. The 21-day static-renewal *Daphnia* chronic toxicity test will be conducted as specified in *Ecological Effects Test Guidelines, OPPTS 850.1300, Daphnid Chronic Toxicity Tests*, EPA 712-C-96-120 (EPA 1996). The endpoint is daphnid reproduction.

2.3 Benthic Invertebrate Community Data

The purpose of collecting benthic invertebrate community data is to provide a baseline of benthic conditions in Sharon Steel Run (SSR) relative to a reference location upstream of the Fairmont Coke site. A semi-qualitative bioassessment protocol (described in Section 3.6) will be used to characterize the benthic community at three stations within SSR and the reference station. Several metrics will be used to interpret the invertebrate data that include species composition, taxa richness, and biotic integrity.

3.0 Field Sampling Activities

This section describes the field activities for this investigation. The following is a list of the field sampling-related tasks for this investigation:

- Site mobilization/demobilization;
- Procurement of equipment, supplies, and containers;
- GPS location of all sampling sites;
- Soil sampling and collection of soil for toxicity tests;
- Sediment sampling and collection of sediments for toxicity tests;
- Pore water sampling;
- Surface water sampling and collection for toxicity tests;
- Completion of field logbook documentation;
- Packaging and shipping of environmental samples;
- Equipment decontamination; and
- Management of sampling wastes.

TetraTech/Black & Veatch will conduct sampling and EPA or other regulatory personnel may provide oversight or assistance where needed. Samples will be analyzed at a qualified laboratory contracted through the EPA Contract Lab Program (CLP). To the extent necessary, contract labs may also be used.

3.1 Field Verification

The purpose of field verification is to determine field conditions prior to the start of field work in order to enable field activities to start on time and within schedule and budget and ensure that the DQOs for the site are met. Field verification occurs as Step 5 of the ERAGS 8-Step process to ensure that it is technically feasible to collect the proposed samples (EPA, 1997). This activity will include a site visit for the purposes of verification of sample access, staking out of sample locations, and confirming the abundance of earthworms and/or aquatic invertebrates for tissue analysis.

Step 5 also includes the confirmation of background sample locations (EPA, 1997). Appropriate background locations will be identified and co-located for both the toxicity bioassays and bioaccumulation tests.

During field verification activities, all sample stations will be located and staked by Black & Veatch field personnel using a Trimble Pro XRS Global Positioning System (GPS). This system uses satellite correction to enable sub-meter horizontal accuracy.

3.2 Soil Sampling

Soil samples will be collected for two purposes - to better understand the extent of contamination in the less disturbed habitats of the site and to perform toxicity tests. Eight soil samples will be collected to evaluate the extent of contamination and seven soil samples from the biometric stations will be collected for analysis; a total of 15 surface soil samples. The soil sampling stations are depicted in Figure 3-1. These soils will be collected from the 0-6 inch depth with a stainless steel hand soil auger or spoons. The sample material will be placed into a stainless steel bowl, debris and other non-representative material will be discarded, and the soil will be thoroughly mixed prior to filling the sample container(s).

At each of the seven biometric sampling stations, soil will be collected from the top 6 inches using a hand soil auger and placed into a 3 or 5 gallon stainless steel bucket for mixing. After mixing, the soil will then be transferred to fill two 1-gallon plastic buckets with sealable lids for handling, labeling, and shipping (one plastic bucket for the earthworm test and one bucket for the plant germination test).

All soil samples will be analyzed for TAL metals, semi-volatile compounds (PAHs), and total organic carbon. Required analyses are shown in Table 3-1. Analytical DQOs, project reporting limits, and container types, are provided in Table 3-3.

3.3 Sediment Sampling

Sediment samples will be collected from six locations in the Monongahela River (Figure 3-2) and one reference location to be determined in the field. The selection of sampling equipment will depend on substrate conditions, water depth, and river. For sediments in shallow water where a person could wade or access by shallow-draft boat, sediments will be collected using a small hand-held van Veen, Ponar, or Eckman dredges. Stainless steel spoons will not be used, but scoops could be used if they are modified to minimize loss of fines as samples are brought to the surface. In all cases, sampling should be conducted in a manner to minimize the loss of fines.

To ensure sufficient sediments for the 42-day toxicity tests, a 1-gallon plastic bucket will need to be filled with sediment at each sampling location. In addition, a split sample of the sediment at each location will be sent to the laboratory for chemical analysis to determine sediment exposure concentrations.

Required sediment analyses are shown in Table 3-1. Analytical DQOs, project reporting limits, and container types, are provided in Table 3-3.

Field characterization of sediments will consist of examining the gross characteristics of the material and record properties such as:

- Physical description of sediments (color, layering, bedding, grain size, etc.)
- Texture, biological structures (e.g., shells, tubes, macrophytes)
- Presence of debris (e.g., wood chips, plant fibers, human artifacts)
- Presence of oily or bacterial sheen, odor (e.g., hydrogen sulfide)

Field personnel in charge of gathering the samples will be responsible for measuring water depth, estimating water velocity, and recording GPS locations of each sampling station.

3.4 Porewater Sampling

Sediment porewater samples will be collected eight locations as shown on Figure 3-3. These areas are where Site groundwater is suspected to discharge into the Monongahela River and Sharon Steel Run. Peeper devices will be used to obtain samples from the interstitial porewater. A peeper device usually has a dozen or more diffusion cells of approximately 10 mL that are covered with a membrane to allow diffusion of porewater into the chambers. The number of peepers needed at each sampling location depends on the volume of porewater needed for analyses. Extraction of porewater from the peeper cells usually requires syringes.

At each sampling location, the peepers will be buried into the sediments to a depth where the top of the peeper is within 5 to 10 cm of the sediment surface. The depth of the peeper will depend on the substrate type (e.g., gravel, fines, muck), stream velocity, and the potential for erosion. A second peeper will be placed adjacent to the other to serve as a field duplicate sample. Field personnel will record the field conditions and peeper depth into the logbook. Once placed, the peepers will need to equilibrate in the sediments for a minimum of 14 days. After the equilibrium period, the peepers will be retrieved and the porewater collected from the device according to the particular device's instructions and into the proper containers for analysis.

Required porewater analyses are shown in Table 3-1. Analytical DQOs, project reporting limits, and container types, are provided in Table 3-4.

3.5 Surface Water Sampling

Surface water will be collected from six site locations in the Monongahela River (Figure 3-4) and one reference location to be determined in the field. A boat will be required to access the stations. The intent is to collect water samples within six inches of the bottom sediments. Samples will be collected using a peristaltic pump and attaching a weight to the intake tubing and lowering it to the desired depth. The field team will need to be careful not to disturb the sediment bottom when collecting water samples so as to not increase suspended solids in the sample. Field parameter measurements will be made using portable multi-parameter meters.

From each station, approximately 12 liters (3 gallons) will need to be collected from each sampling location for the 7-day fathead minnow toxicity test, and 12 L (3 gallon) will be required from each location for the 21-day *Daphnia magna* test. The toxicity test water will be collected separately for each test in collapsible plastic cube containers.

In addition to the water collected for the toxicity tests, waters from each station will also need to be collected for contaminant analysis. The required analyses for surface water samples are shown in Table 3-1. Analytical DQOs, project reporting limits, and container types, are provided in Table 3-4.

3.6 Tissue Sampling

The following sections describe the required field activities for the collection of biological tissues.

3.6.1 Plant Tissue

Plant tissues will be collected from the seven biometric stations as determined in the field as shown on Figure 3-1. The plant species will be selected in the field based on plant abundance, usability by Site herbivores (e.g., meadow voles, Canada geese), and location relative to contaminant sources. Both shoots and roots from the same plant(s) will be collected as separate samples. Shoots of the desired species will be clipped with stainless steel scissors, wrapped in aluminum foil, and then placed into an 8-oz glass container. Roots of the desired species will be collected by clipping and washing with de-ionized water to remove adhering soil, wrapped in aluminum foil, and then placed into an 8-oz

glass container. Because approximately 100 grams each of both shoots and roots are needed for analysis at each station, compositing from several plants at the stations may be necessary.

The required analyses for plant tissue samples are shown in Table 3-2. Analytical DQOs, project reporting limits, and container types, are provided in Table 3-5.

3.6.2 Earthworms

Earthworm will be collected from the seven biometric stations as determined in the field as shown on Figure 3-1. Because earthworms may be difficult to collect at a particular sampling location and soil type, a composite sample from the station will be collected. At least 50 grams of earthworms will be needed at each station. Shovels will be used to find the worms. All worms will be washed with de-ionized water to remove all soil, wrapped in aluminum foil, and then placed into an 8-oz glass container. The required analyses for earthworm tissues are shown in Table 3-1. Analytical DQOs, project reporting limits, and container types, are provided in Tables 3-2 through and 3-4, respectively.

3.6.3 Aquatic Invertebrates

Aquatic invertebrates will be collected from seven biometric stations along the Monongahela River as depicted on Figure 3-2. Approximately 10 grams of invertebrates from each location will be composited to form a single sample. Crayfish will be targeted as it is a primary prey item. Invertebrates may need to be collected with shovels, scoops, scraping off rocks, or captured using kick nets. Once the required mass is obtained, then they shall be rinsed with de-ionized water to remove detritus, wrapped in aluminum foil, and then placed into an 8-oz glass container. The required analyses for aquatic invertebrate tissues are shown in Table 3-2. Analytical DQOs, project reporting limits, and container types, are provided in Table 3-5.

3.6.4 Fish Tissue

Fish will be collected at seven biometric stations along the Monongahela River and shown in Figure 3-4. Fish will be captured using electroshocking techniques from a boat. At each location the following types of fish will be collected:

- Individual edible sized fish > 6 inches in length and comprised of either bullhead or white sucker;

4.0 Site Mobilization/Demobilization

TetraTech/Black & Veatch will identify and provide all necessary personnel, equipment, and materials for mobilization and demobilization to and from the site for the purpose of conducting the sampling and other field work described herein. Equipment and supplies will be stored in vehicles or at the designated command post.

Field preparatory activities will include review of sampling procedures, procurement of field equipment, laboratory coordination, confirmation of site access, as well as field planning meetings attended by field personnel and QA staff.

4.1 Equipment, Supplies, and Containers

TetraTech/Black & Veatch will provide all equipment and supplies necessary for field activities, including those required for sampling, health and safety, equipment and personnel decontamination, and general field operations.

All sample containers will be pre-cleaned and traceable to the facility that performed the cleaning. Sampling containers will not be cleaned or rinsed in the field.

Prior to acceptance, all supplies and consumables will be inspected to ensure that they are in satisfactory condition and free of defects. Where applicable, certificates of analysis for consumables will be reviewed and retained on file for possible future reference if deemed necessary.

Spare parts for all field equipment will be stored at the command post. The command post location will vary depending on the reach being investigated and sampling logistics.

4.2 Equipment Decontamination

Currently, equipment that is expected to require decontamination includes the Henry pushpoint sampler, stainless steel coring device, the sediment dredge sampler, shovel or scoops, and the bowls, and spoons used for homogenizing samples. All sampling and field equipment will be decontaminated prior to use.

4.3 Management of Investigation-Derived Wastes

Wastes generated from sampling activities are likely to include used personal protective equipment (PPE), and decontamination water and other liquids. Based on the nature of the site and the existing data, only non-hazardous IDW will be generated. Non-hazardous IDW such as decontamination fluids from the washing and rinsing of sampling equipment will be disposed to the ground at the site or to a wastewater treatment plant via a sanitary sewer. Disposable PPE and uncontaminated wastes (packaging, trash, flagging, etc.) will be double-bagged and disposed of as normal solid waste. A trash receptacle will be mobilized during field activities and staged in the site vehicle/sample processing area for the duration of field activities. The trash bags will be removed from the site periodically by the field team at the completion of fieldwork.

4.4 Special Training Requirements

The only special training required for this investigation is expected to be the OSHA 1910.120 40-hour HAZWOPER training with current 8-hour refreshers. A site-specific Health and Safety Plan (HASP) Addendum to the existing HASP will be prepared by TetraTech/Black & Veatch to address the unique activities associated with this investigation, such as electroshocking and use of motorized boats.

5.0 Field Documentation

All field activities will be documented in accordance with guidance provided in the EPA Region III ASQAB procedures (EPA 2005). Field documentation includes logbooks, field forms, photographs, sample labeling, and chain of custody records, as discussed below.

5.1 Field Logbooks and Photographs

Field activities will be recorded in hardbound, sequentially numbered, waterproof field logbooks and on forms designed for specific field activities. All entries in logbooks and forms will be made in permanent black ink, and will be clear, objective, and legible. For the field logbooks, a single strikeout, initialed and dated is required for documentation changes. The correct information should be entered in close proximity to the erroneous entry. All deviations from the guiding documents will be recorded in the field logbook(s). Any major deviations will be documented according to the either in the field logbook, on change forms, or in a memorandum to the project file.

Representative photographs will be taken to document sampling locations, sample collection procedures, equipment decontamination, and other field activities. Photograph notes will be recorded in the field log book.

5.2 Sample Documentation

This section provides guidance on establishing and assigning new sampling stations, and associated sample identification numbering. In addition, information is presented on the labeling of samples and documenting custody of the samples through chain-of-custody (COC) records and CLP Traffic Reports.

5.2.1 Station Identification and Sample Numbering System

Sample numbers will be assigned using the following convention:

<Station Name> - <Media Code> - <Sample info> - <Serial Number>

Where:

- <Station Name> is the station prefix based on initials of the site, "BJ".
- <Media Code> is a two-letter code for the environmental media sampled

- <Sample info> is a one letter code to convey additional information about the sample
- <Serial Number> is a two-digit number assigned sequentially to each sample taken from that station.

Media codes include the following:

- SS = surface soil
- SD = sediment
- SW = surface water
- PW = pore water

Sample information codes include the following:

- D = field duplicate samples identified following the serial number.
- B = sample collected from bottom of water column
- X = sample collected for toxicity testing
- PR = plant root sample
- PS = plant shoot
- EW = earthworm
- I = invertebrate (aquatic)
- SF = small (< 6-inch in length) fish, composited whole-body
- LF-B = large (> 6-inch in length) bottom fish (bullheads, suckers), filleted
- LF-T = large (> 6-inch in length) top fish (bass), filleted
- R = rinsate blank

The following are examples of sample identification. BJ-SW-B-03D would be the third surface water sample taken from the bottom of the water column as a duplicate. BJ-SW-02-LF would represent a large fish sample collected from SW-02. And finally, BJ-SS-R-05 would be the rinsate blank of soil sample BJ-SS-05.

5.2.2 Sample Handling and Shipment

Samples collected during this field program will consist of soil, sediment, pore water, and surface water samples (including samples for toxicity testing) and various QC samples. All sample collection procedures are outlined in the EPA Region III ASQAB sample submission procedures (EPA 2005). The following SOPs of the guidance apply to all sample documentation unless otherwise noted in this document:

Section 3 - Sample Collection Requirements

Section 4 - Paperwork Requirements

Section 5 - Sample Shipping Requirements

5.2.3 Field Sample Custody and Documentation

To maintain a record of sample collection, transfer between personnel, transport, and receipt by the laboratory, a chain-of-custody (COC) record will be filled out for each sample at the time of collection. Chain-of-custody records will be used to document sample custody transfer from the field to the laboratory. Methods that will be used in documenting sample possession are outlined in Section 4 of the ASQAB procedures.

CLP Routine Analytical Service Paperwork Requirements. Custody of samples being analyzed through the CLP will be documented using CLP Traffic Reports & Chain-of-Custody Records, in accordance with the methods and procedures outlined in ASQAB (EPA 2005). Paperwork requirements for shipping environmental samples to CLP laboratories include COC, Shipping Logs, CLP sample numbers, sample tags, EPA custody seals, and communication of shipping information. Note that these CLP requirements apply only if samples are sent to CLP laboratories for analysis.

CLP Traffic Report/Chain of Custody forms will be used for all samples shipped from the site. The following items will be conducted when completing the forms:

- Since each form consists of four copies, the sampler should press hard when completing the form. The copies should be distributed in the following manner: the top copy goes to RSCC, the second copy goes to CLASS, and the bottom two copies are sent with the samples to the lab. A photocopy of the form should be made for the project files.
- Environmental samples must be designated by a dash (-) in the "field QC" column. The MS/MSD is considered lab QC, not field QC. Do not enter MS/MSD information in the column used to designate field QC.
- The CLP generates unique sample numbers that must be assigned to each sample. The CLP sample numbers are printed on adhesive labels which are affixed to sample bottles prior to shipment. Sample numbers will be assigned and transcribed to the Chain of Custody/Traffic Report by the sampler or Field Project Leader.

Sample Tags. A sample tag will be completed and attached to each sample container. Any voided sample tags will be retained in the project file.

Custody Seals. At least two custody seals will be placed across cooler openings in such a way that the seals will be broken when the cooler is opened. The sampler or Field Project Leader will sign and date custody seals.

Communicating Shipping Information. The Field Project Leader or designee will notify the CLASS coordinator of all sample shipments. The following information will be provided:

- case number
- name of laboratory
- date of shipment
- overnight carrier and air bill number
- number and matrices of samples shipped
- case status
- sampler's name and phone number.

Sample Packaging and Shipping. Samples will be packaged and shipped in accordance with Sections 5 and 6 of the ASQAB procedures.

5.2.4 Corrections to and Deviations from Documentation

For the field logbooks, a single strikeout, initialed and dated is required for documentation changes. The correct information should be entered in close proximity to the erroneous entry. All deviations from the guiding documents will be recorded in the field logbook(s). Any major deviations will be documented according to the either in the field logbook, on change forms, or in a memorandum to the project file.

6.0 Field Quality Control and Data Management

6.1 Field Quality Control (QC) Samples

The following types of QC samples will be collected in the field and shipped to the appropriate subcontractor laboratory for analysis:

- Field duplicates - Field duplicates will be collected at a single sampling location, collected identically and consecutively over a minimum period of time. This type of field duplicate measures the total system variability (field and laboratory variance). Field duplicates will be collected at a minimum frequency of one per 20 samples (5 percent) per sampling media/sampling technique.
- Equipment rinsate blanks - If equipment is decontaminated in the field, an equipment rinsate blank will be prepared and submitted for analysis at a minimum frequency of one per 20 samples per media/sampling technique (5%). These blanks will consist of analyte-free water poured over the equipment used to collect the sample after equipment decontamination. The sample identification code will relate to the sample collected prior to blank collection. It is presently anticipated that equipment rinsate blanks will be required for soil/sediment samples only.
- Preservative blanks - A preservative (or temperature) blank will be prepared for collecting cooler temperature upon laboratory receipt. The blank is prepared in the field by filling a sample container with tap or analyte-free water. One preservative blank will be prepared for each cooler.

6.2 Data Management

Sample results and QC data from the laboratories will be delivered to the Project Manager as a hard-copy and electronic data deliverable (EDD). Electronic copies of all project deliverables, including graphics, will be maintained by project number in TetraTech/Black & Veatch's Wilmington, DE office. All validated analytical data, field measurements, locational data, and descriptive information will be uploaded into the Big John Salvage – Houlton Road project database. Electronic files will be routinely backed up and archived.

7.0 References

American Standard Testing Methods (ASTM). 2004. *Standard Guide for Conducting Laboratory Soil Toxicity or Bioaccumulation Tests with the Lumbricid Earthworm Eisenia fetida and the Enchytraeid Potworm Enchytraeus albidus*. ASTM E1676-04.

ASTM. 2002. *Standard Procedures for Conducting Terrestrial Plant Toxicity Tests*. ASTM E1963-02.

Black & Veatch. 2006a. *Final Screening Level Ecological Risk Assessment Report, Big John Salvage – Hoult Road Superfund Site, Fairmont Township, Marion County, West Virginia*. Prepared by Tetra Tech/Black & Veatch Joint Venture for USEPA Region III, Philadelphia, PA. July 2006.

Black & Veatch. 2006b. *Technical Memorandum: Ecological Sampling Work Plan – Step 4, Big John Salvage – Hoult Road*. From Dane Pehrman, Black & Veatch, to Eric Newman, EPA Region III, dated July 22, 2006.

Craddock, T. 2006. *West Virginia Save Our Streams Monitoring Manuals: Levels 1-3*. WV Department of Environmental Protection, Division of Water and Waste Management.

Smithson, J. 1997. *Watershed Assessment Program Standard Operating Procedures*. West Virginia Division of Environmental Protection, Office of Water Resources, Watershed Assessment Program.

U.S. Environmental Protection Agency (EPA). 2005. *Sample Submission Procedures for the Analytical Service & Quality Assurance Branch Laboratory*. Revision 9. EPA Region III, Analytical Service & Quality Assurance Branch, Environmental Science Center, Fort Meade, MD. August 2005.

EPA. 2004. *USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review*. Office of Superfund Remediation and Technology Innovation, EPA 540/R-04-004, October 2004.

EPA. 2000. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates*. Office of Research and Development. EPA600/R-99/064, March 2000.

EPA. 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. Office of Emergency and Remedial Response, Washington, D.C. OSWER 9240.1-05A-P, EPA 540/R-99/008, October 1999.

EPA. 1997a. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final*. Environmental Response Team, Edison, NJ. EPA/540-R-97-006, June 5, 1997.

EPA. 1996. *Ecological Effects Test Guidelines*. OPPTS 850.1300, EPA 712-C-96-120.

EPA. 1991. *Compendium of ERT Toxicity Testing Procedures*. OSWER Directive 9360.4-08. EPA/540/P-91/009.

TABLES

Table 3-1
Abiotic Sample Locations and Required Analyses
Big John Salvage - Hoult Road Site
Ecological Sampling and Analysis Plan

Handwritten notes:
 WVA SALS
 BACK PAGES

Sample Designation	Sample Location		TAL Metals	SVOC (PAHs)	TOC	Grain Size	Earthworm Toxicity	Plant Toxicity	Benthic Invertebrate Toxicity	Fish Toxicity	Aquatic Invertebrate
	West Virginia State Plane Feet										
	Easting	Northing									
BJ-SS-01	1793438.965950	363898.522722	X	X	X						
BJ-SS-02	1792665.163150	363891.116170	X	X	X						
BJ-SS-03	1792474.209170	364035.622490	X	X	X						
BJ-SS-04	1792078.191890	364069.888462	X	X	X						
BJ-SS-05	1792814.781700	363845.101547	X	X	X						
BJ-SS-06	1793287.825920	363715.681801	X	X	X						
BJ-SS-07	1792298.426030	364242.426920	X	X	X						
BJ-SS-08	1792168.615380	363909.251974	X	X	X						
BJ-SS-09	1792415.528710	363659.533256	X	X	X		X	X			
BJ-SS-10	1792797.911850	364609.867837	X	X	X		X	X			
BJ-SS-11	1792834.463180	364488.967284	X	X	X		X	X			
BJ-SS-12	1792893.507640	364086.902653	X	X	X		X	X			
BJ-SS-13	1793587.982910	364151.570391	X	X	X		X	X			
BJ-SS-14	1793095.945770	363985.683585	X	X	X		X	X			
BJ-SS-15	1793453.024150	364311.833915	X	X	X		X	X			
BJ-SD-01	1792053.715470	363198.718201	X	X	X	X			X		
BJ-SD-02	1791890.554220	363963.536557	X	X	X	X			X		
BJ-SD-03	1791533.638990	364187.883274	X	X	X	X			X		
BJ-SD-04	1790972.772190	364758.947647	X	X	X	X			X		
BJ-SD-05	1789953.014390	369929.119731	X	X	X	X			X		
BJ-SD-06	1790857.571430	373563.261700	X	X	X	X			X		
BJ-SD-07	1792732.571430	360104.928367	X	X	X	X			X		
BJ-PW-01	1791906.199910	363975.794132	X	X							
BJ-PW-02	1792030.798750	363829.390499	X	X							
BJ-PW-03	1792220.811970	363813.815644	X	X							
BJ-PW-04	1792417.055140	363879.230034	X	X							
BJ-PW-05	1792628.873160	363873.000092	X	X							
BJ-PW-06	1792815.771420	363773.321023	X	X							
BJ-PW-07	1793002.669670	363798.240790	X	X							
BJ-PW-08	1793189.567930	363754.631197	X	X							
BJ-SW-01	1792524.305330	363036.034610	X	X						X	X
BJ-SW-02	1792128.472000	363286.034610	X	X						X	X
BJ-SW-03	1791878.472000	363994.367944	X	X						X	X
BJ-SW-04	1790961.805330	364765.201277	X	X						X	X
BJ-SW-05	1790711.805330	366931.867944	X	X						X	X
BJ-SW-06	1790024.305330	370119.367944	X	X						X	X
BJ-SW-07	1792732.638660	360056.867944	X	X						X	X

Table 3-2
Abiotic Sample Locations and Required Analyses
Big John Salvage - Hoult Road Site
Ecological Sampling and Analysis Plan

Handwritten note: HWS saws Pb, Cu, + PAHs

Sample Designation	Sample Location		TAL Metals (Pb and Hg)	SVOC (PAHs)	Lipid Content	% moisture
	West Virginia State Plane Feet		ILM05.3	OLM04.3	Flex Clause	
	Easting	Northing				
BJ-SS-09-EW	1792415.528710	363659.533256	X	X	X	X
BJ-SS-10-EW	1792797.911850	364609.867837	X	X	X	X
BJ-SS-11-EW	1792834.463180	364488.967284	X	X	X	X
BJ-SS-12-EW	1792893.507640	364086.902653	X	X	X	X
BJ-SS-13-EW	1793587.982910	364151.570391	X	X	X	X
BJ-SS-14-EW	1793095.945770	363985.683585	X	X	X	X
BJ-SS-15-EW	1793453.024150	364311.833915	X	X	X	X
BJ-SS-09-PR	1792415.528710	363659.533256	X	X	X	X
BJ-SS-10-PR	1792797.911850	364609.867837	X	X	X	X
BJ-SS-11-PR	1792834.463180	364488.967284	X	X	X	X
BJ-SS-12-PR	1792893.507640	364086.902653	X	X	X	X
BJ-SS-13-PR	1793587.982910	364151.570391	X	X	X	X
BJ-SS-14-PR	1793095.945770	363985.683585	X	X	X	X
BJ-SS-15-PR	1793453.024150	364311.833915	X	X	X	X
BJ-SS-09-PS	1792415.528710	363659.533256	X	X	X	X
BJ-SS-10-PS	1792797.911850	364609.867837	X	X	X	X
BJ-SS-11-PS	1792834.463180	364488.967284	X	X	X	X
BJ-SS-12-PS	1792893.507640	364086.902653	X	X	X	X
BJ-SS-13-PS	1793587.982910	364151.570391	X	X	X	X
BJ-SS-14-PS	1793095.945770	363985.683585	X	X	X	X
BJ-SS-15-PS	1793453.024150	364311.833915	X	X	X	X
BJ-SD-01-I	1792053.715470	363198.718201	X	X	X	X
BJ-SD-02-I	1791890.554220	363963.536557	X	X	X	X
BJ-SD-03-I	1791533.638990	364187.883274	X	X	X	X
BJ-SD-04-I	1790972.772190	364758.947647	X	X	X	X
BJ-SD-05-I	1789953.014390	369929.119731	X	X	X	X
BJ-SD-06-I	1790857.571430	373563.261700	X	X	X	X
BJ-SD-07-I	1792732.571430	360104.928367	X	X	X	X
BJ-SW-01-SF	1792524.305330	363036.034610	X	X	X	X
BJ-SW-02-SF	1792128.472000	363286.034610	X	X	X	X
BJ-SW-03-SF	1791878.472000	363994.367944	X	X	X	X
BJ-SW-04-SF	1790961.805330	364765.201277	X	X	X	X
BJ-SW-05-SF	1790711.805330	366931.867944	X	X	X	X
BJ-SW-06-SF	1790024.305330	370119.367944	X	X	X	X
BJ-SW-07-SF	1792732.638660	360056.867944	X	X	X	X
BJ-SW-01-LF-T	1792524.305330	363036.034610	X	X	X	X
BJ-SW-02-LF-T	1792128.472000	363286.034610	X	X	X	X
BJ-SW-03-LF-T	1791878.472000	363994.367944	X	X	X	X
BJ-SW-04-LF-T	1790961.805330	364765.201277	X	X	X	X
BJ-SW-05-LF-T	1790711.805330	366931.867944	X	X	X	X
BJ-SW-06-LF-T	1790024.305330	370119.367944	X	X	X	X
BJ-SW-07-LF-T	1792732.638660	360056.867944	X	X	X	X
BJ-SW-01-LF-B	1792524.305330	363036.034610	X	X	X	X
BJ-SW-02-LF-B	1792128.472000	363286.034610	X	X	X	X
BJ-SW-03-LF-B	1791878.472000	363994.367944	X	X	X	X
BJ-SW-04-LF-B	1790961.805330	364765.201277	X	X	X	X
BJ-SW-05-LF-B	1790711.805330	366931.867944	X	X	X	X
BJ-SW-06-LF-B	1790024.305330	370119.367944	X	X	X	X
BJ-SW-07-LF-B	1792732.638660	360056.867944	X	X	X	X

**Table 3-3
Project Analytes, Methods, Container Types, Preservation, and Holding Times
Soil and Sediment Samples**

Target Analyte	CAS Number	Screening Criteria	Project Quantitation Limit	Method ⁽²⁾	Analysis Type ⁽³⁾	Container Type	Preservative	Holding Times
TARGET ANALYTE LIST INORGANICS								
ALUMINUM	7429-90-5	Note 1	20 mg/kg	ILM05.3	ICP-AES	8oz. wide-mouth clear glass jar	Cool to 4°C or less	6 months
ANTIMONY	7440-36-0	Note 1	6 mg/kg					
ARSENIC	7440-38-2	Note 1	1 mg/kg					
BARIIUM	7440-39-3	Note 1	20 mg/kg					
BERYLLIUM	7440-41-7	Note 1	0.5 mg/kg					
CADMIUM	7440-43-9	Note 1	0.5 mg/kg					
CALCIUM	7440-70-2	Note 1	500 mg/kg					
CHROMIUM	7440-47-3	Note 1	1 mg/kg					
COBALT	7440-48-4	Note 1	5 mg/kg					
COPPER	7440-50-8	Note 1	2.5 mg/kg					
IRON	7439-89-8	Note 1	10 mg/kg					
LEAD	7439-92-1	Note 1	1 mg/kg					
MAGNESIUM	7439-95-4	Note 1	500 mg/kg					
MANGANESE	7439-96-5	Note 1	1.5 mg/kg					
MERCURY	7439-97-8	Note 1	0.1 mg/kg					
NICKEL	7440-02-0	Note 1	4 mg/kg					
POTASSIUM	7440-09-7	Note 1	500 mg/kg					
SELENIUM	7782-49-2	Note 1	3.5 mg/kg					
SILVER	7440-22-4	Note 1	1 mg/kg					
SODIUM	7440-23-5	Note 1	500 mg/kg					
THALLIUM	7440-28-0	Note 1	2.5 mg/kg					
VANADIUM	7440-62-2	Note 1	5 mg/kg					
ZINC	7440-66-8	Note 1	6 mg/kg					
CYANIDE	57-12-5	Note 1	2.5 mg/kg					
POLYAROMATIC HYDROCARBONS (PAHs)								
ACENAPHTHENE	83-32-9	Note 1	330 µg/kg	OLM04.3	GC/MS	Included in same jar as SVOC analysis	Cool to 4°C or less	14 days
ACENAPHTHYLENE	208-96-8	Note 1	330 µg/kg					
ANTHRACENE	120-12-7	Note 1	330 µg/kg					
BENZO(A)ANTHRACENE	56-55-3	Note 1	330 µg/kg					
BENZO(A)PYRENE	50-32-8	Note 1	330 µg/kg					
BENZO(B)FLUORANTHENE	205-99-2	Note 1	330 µg/kg					
BENZO(G,H,I)PERYLENE	191-24-2	Note 1	330 µg/kg					
BENZO(K)FLUORANTHENE	207-08-9	Note 1	330 µg/kg					
CHRYSENE	218-01-9	Note 1	330 µg/kg					
DIBENZO(a,h)ANTHRACENE	53-70-3	Note 1	330 µg/kg					
FLUORANTHENE	206-44-0	Note 1	330 µg/kg					
FLUORENE	86-73-7	Note 1	330 µg/kg					
INDENO(1,2,3-cd)PYRENE	193-39-5	Note 1	330 µg/kg					
NAPHTHALENE	91-20-3	Note 1	330 µg/kg					
PHENANTHRENE	85-01-8	Note 1	330 µg/kg					
PYRENE	129-00-0	Note 1	330 µg/kg					
Total Organic Carbon	--	--	--					
Grain Size	--	--	--	ASTM D422	--	4oz. wide-mouth clear glass jar	--	--
42-Day Toxicity Test using Potworms - <i>Enchytraeus albidus</i> - soil	--	--	--	ASTM E1676	toxicity and bioaccumulation	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾
42-Day Toxicity Test using Ryegrass - <i>Lolium perenne</i> - soil	--	--	--	ASTM E1963	toxicity	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾
42-Day Toxicity Test - <i>Hyalella azteca</i> - sediment	--	--	--	Test Method 100.4	toxicity test	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾
28-Day <i>Lumbriculus variegatus</i> Bioaccumulation Test - sediment	--	--	--	Test Method 100.3 (bioaccumulation), ILM05.3 (inorganics), OLM04.3 organics ⁽⁵⁾	bioaccumulation test and chemical analysis of tissue	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾

Notes:

(1) Data will be used to estimate a biota uptake factor (with parallel bioaccumulation test); therefore, the lowest practicable quantitation limit is requested.

(2) Methods:

ICP-AES ILM05.3 - Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Inorganic Analysis

OLM04.3 - Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis

SSSA CHAPTER 34 - Bartsch, P.M. and P.R. Bloom, 1996. Methods of Soil Analysis, Part 3. Chemical Methods, 3rd ed., Soil Science Society of America and American Society of Agronomy, Madison, WI.

ASTM D422 - American Society for Testing and Materials. D422 Standard Test Method for Particle-Size Analysis of Soils, 2002.

Test Method 100.4 - Methods for Measuring Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates, Second Edition, Method 100.4, EPA/600/R-99/064, U.S. Environmental Protection Agency, 2000. Volume requirements: Twelve 100-ml replicates.

ASTM E1676 - American Society for Testing and Materials. E1676-04: Standard Guide for Conducting Laboratory Soil Toxicity or Bioaccumulation Tests with the Lumbricid Earthworm *Eisenia fetida* and the Enchytraeid Potworm *Enchytraeus albidus*, 2004. Volume requirements: Five 500-g replicates.

ASTM E1963-02 - Standard Procedures for Conducting Terrestrial Plant Toxicity Tests (ASTM, 2002).

Test Method 100.3 - Methods for Measuring Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates, Second Edition, Method 100.3, EPA/600/R-99/064, U.S. Environmental Protection Agency, 2000. Volume requirements: Five 1-2 L replicates.

(3) Analysis Type:

ICP-AES - Inductively Coupled Plasma/Atomic Emission Spectroscopy

GC/MS - Gas Chromatography/Mass Spectrometry

GC/ECD - Gas Chromatography/Electron Capture Detector

(4) Holding times are based on semivolatiles since they have the shortest holding time.

**Table 3-3
Project Analytes, Methods, Container Types, Preservation, and Holding Times
Soil and Sediment Samples**

Target Analyte	CAS Number	Screening Criteria	Project Quantitation Limit	Method ⁽²⁾	Analysis Type ⁽³⁾	Container Type	Preservative	Holding Times
TARGET ANALYTE LIST INORGANICS								
ALUMINIUM	7429-90-5	Note 1	20	ILM05.3	ICP-AES	8oz. wide-mouth clear glass jar	Cool to 4°C or less	6 months
ANTIMONY	7440-36-0	Note 1	6					
ARSENIC	7440-38-2	Note 1	1					
BARIUM	7440-39-3	Note 1	20					
BERYLLIUM	7440-41-7	Note 1	0.5					
CADMIUM	7440-43-9	Note 1	0.5					
CALCIUM	7440-70-2	Note 1	500					
CHROMIUM	7440-47-3	Note 1	1					
COBALT	7440-48-4	Note 1	5					
COPPER	7440-50-8	Note 1	2.5					
IRON	7439-89-6	Note 1	10					
LEAD	7439-92-1	Note 1	1					
MAGNESIUM	7439-95-4	Note 1	500					
MANGANESE	7439-96-5	Note 1	1.5					
MERCURY	7439-97-6	Note 1	0.1					
NICKEL	7440-02-0	Note 1	4					
POTASSIUM	7440-09-7	Note 1	500					
SELENIUM	7782-49-2	Note 1	3.5					
SILVER	7440-22-4	Note 1	1					
SODIUM	7440-23-5	Note 1	500					
THALLIUM	7440-28-0	Note 1	2.5					
VANADIUM	7440-62-2	Note 1	5					
ZINC	7440-66-6	Note 1	6					
CYANIDE	57-12-5	Note 1	2.5					
POLYAROMATIC HYDROCARBONS (PAHS)								
ACENAPHTHENE	83-32-9	Note 1	330	OLM04.3	GC/MS	Included in same jar as SVOC analysis	Cool to 4°C or less	14 days
ACENAPHTHYLENE	208-96-8	Note 1	330					
ANTHRACENE	120-12-7	Note 1	330					
BENZO(A)ANTHRACENE	56-55-3	Note 1	330					
BENZO(A)PYRENE	50-32-8	Note 1	330					
BENZO(B)FLUORANTHENE	205-99-2	Note 1	330					
BENZO(G,H,I)PERYLENE	191-24-2	Note 1	330					
BENZO(K)FLUORANTHENE	207-08-9	Note 1	330					
CHRYSENE	218-01-9	Note 1	330					
DIBENZO(a,h)ANTHRACENE	53-70-3	Note 1	330					
FLUORANTHENE	206-44-0	Note 1	330					
FLUORENE	86-73-7	Note 1	330					
INDENO(1,2,3-cd)PYRENE	193-39-5	Note 1	330					
NAPHTHALENE	91-20-3	Note 1	330					
PHENANTHRENE	85-01-8	Note 1	330					
PYRENE	129-00-0	Note 1	330					
Total Organic Carbon	--	--	--					
Grain Size	--	--	--	ASTM D422	--	4oz. wide-mouth clear glass jar	--	--
42-Day Toxicity Test using Potworms - <i>Enchytraeus albidus</i> - soil	--	--	--	ASTM E1676	toxicity and bioaccumulation	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾
42-Day Toxicity Test using Ryegrass - <i>Lolium perenne</i> - soil	--	--	--	ASTM E1963	toxicity	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾
42-Day Toxicity Test - <i>Hyalella azteca</i> - sediment	--	--	--	Test Method 100.4	toxicity test	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾
28-Day <i>Lumbriculus variegatus</i> Bioaccumulation Test - sediment	--	--	--	Test Method 100.3 (bioaccumulation), ILM05.3 (inorganics), OLM04.3 organics ⁽⁵⁾	bioaccumulation test and chemical analysis of tissue	1 gallon plastic bucket w/ sealed lid	Cool to 4°C or less	7 days ⁽⁴⁾

Notes:

(1) Data will be used to estimate a biota uptake factor (with parallel bioaccumulation test); therefore, the lowest practicable quantitation limit is requested.

(2) Methods:

ICP-AES ILM05.3 - Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Inorganic Analysis

OLM04.3 - Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis

SSSA CHAPTER 34 - Bertach, P.M. and P.R. Bloom, 1996. Methods of Soil Analysis, Part 3. Chemical Methods, 3rd ed., Soil Science Society of America and American Society of Agronomy, Madison, WI.

ASTM D422 - American Society for Testing and Materials, D422 Standard Test Method for Particle-Size Analysis of Soils, 2002.

Test Method 100.4 - Methods for Measuring Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates, Second Edition, Method 100.4, EPA/600/R-99/064, U.S. Environmental Protection Agency, 2000. Volume requirements: Twelve 100-ml replicates.

ASTM E1676 - American Society for Testing and Materials, E1676-04: Standard Guide for Conducting Laboratory Soil Toxicity or Bioaccumulation Tests with the Lumbricid Earthworm *Eisenia Fetida* and the Enchytraeid Potworm *Enchytraeus albidus*, 2004. Volume requirements: Five 500-g replicates.

ASTM E1963-02 - Standard Procedures for Conducting Terrestrial Plant Toxicity Tests (ASTM, 2002).

Test Method 100.3 - Methods for Measuring Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates, Second Edition, Method 100.3, EPA/600/R-99/064, U.S. Environmental Protection Agency, 2000. Volume requirements: Five 1-2 L replicates.

(3) Analysis Type:

ICP-AES - Inductively Coupled Plasma/Atomic Emission Spectroscopy

GC/MS - Gas Chromatography/Mass Spectrometry

GC/ECD - Gas Chromatography/Electron Capture Detector

(4) Holding times are based on semi-volatiles since they have the shortest holding time.

**Table 3-5
Project Analytes, Methods, Container Types, Preservation, and Holding Times
Tissue Samples**

Target Analyte	CAS Number	Screening Criteria	Project Quantitation Limit		Method ⁽²⁾	Analysis Type ⁽³⁾	Container Type	Preservative	Holding Times
TARGET ANALYTE LIST INORGANICS									
LEAD	7439-92-1	Note 1	1	mg/kg	ILM05.3 with a Flex clause, which includes sample preparation, cleanup, percent lipid, and percent moisture determination.	ICP-AES	Use the same sample as provided below for PAHs	Dry Ice	14 days
MERCURY	7439-97-6	Note 1	0.1	mg/kg					
POLYAROMATIC HYDROCARBONS (PAHs)									
ACENAPHTHENE	83-32-9	Note 1	330	µg/kg	OLM04.3 with a Flex clause, which includes sample preparation, cleanup and percent lipid and percent moisture determinations.	GC/MS	Earthworms - 50 g min in 8oz. wide-mouth clear glass jar. Plant shoots - 100 g min in 8oz. wide-mouth clear glass jar. Plant roots - 100 g min in 8oz. wide-mouth clear glass jar. Aquatic invertebrates - 10 g min in 8oz. wide-mouth clear glass jar. Small fish - 100 g min wrapped in foil. Large fish - 1 whole-body fish wrapped in foil	Dry ice	14 days
ACENAPHTHYLENE	208-96-8	Note 1	330	µg/kg					
ANTHRACENE	120-12-7	Note 1	330	µg/kg					
BENZO(A)ANTHRACENE	56-55-3	Note 1	330	µg/kg					
BENZO(A)PYRENE	50-32-8	Note 1	330	µg/kg					
BENZO(B)FLUORANTHENE	205-99-2	Note 1	330	µg/kg					
BENZO(G,H,I)PERYLENE	191-24-2	Note 1	330	µg/kg					
BENZO(K)FLUORANTHENE	207-08-9	Note 1	330	µg/kg					
CHRYSENE	218-01-9	Note 1	330	µg/kg					
DIBENZO(a,h)ANTHRACENE	53-70-3	Note 1	330	µg/kg					
FLUORANTHENE	206-44-0	Note 1	330	µg/kg					
FLUORENE	86-73-7	Note 1	330	µg/kg					
INDENO(1,2,3-cd)PYRENE	193-39-5	Note 1	330	µg/kg					
NAPHTHALENE	91-20-3	Note 1	330	µg/kg					
PHENANTHRENE	85-01-8	Note 1	330	µg/kg					
PYRENE	129-00-0	Note 1	330	µg/kg					

Notes:

(1) Data will be used to estimate a biota uptake factor (with parallel bioaccumulation test); therefore, the lowest practicable quantitation limit is requested.

(2) Methods:

ILM05.3 - Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Inorganic Analysis

OLM04.3 - Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis

(3) Analysis Type:

ICP-AES - Inductively Coupled Plasma/Atomic Emission Spectroscopy

GC/MS - Gas Chromatography/Mass Spectrometry

GC/EC - Gas Chromatography with Electron Capture

FIGURES

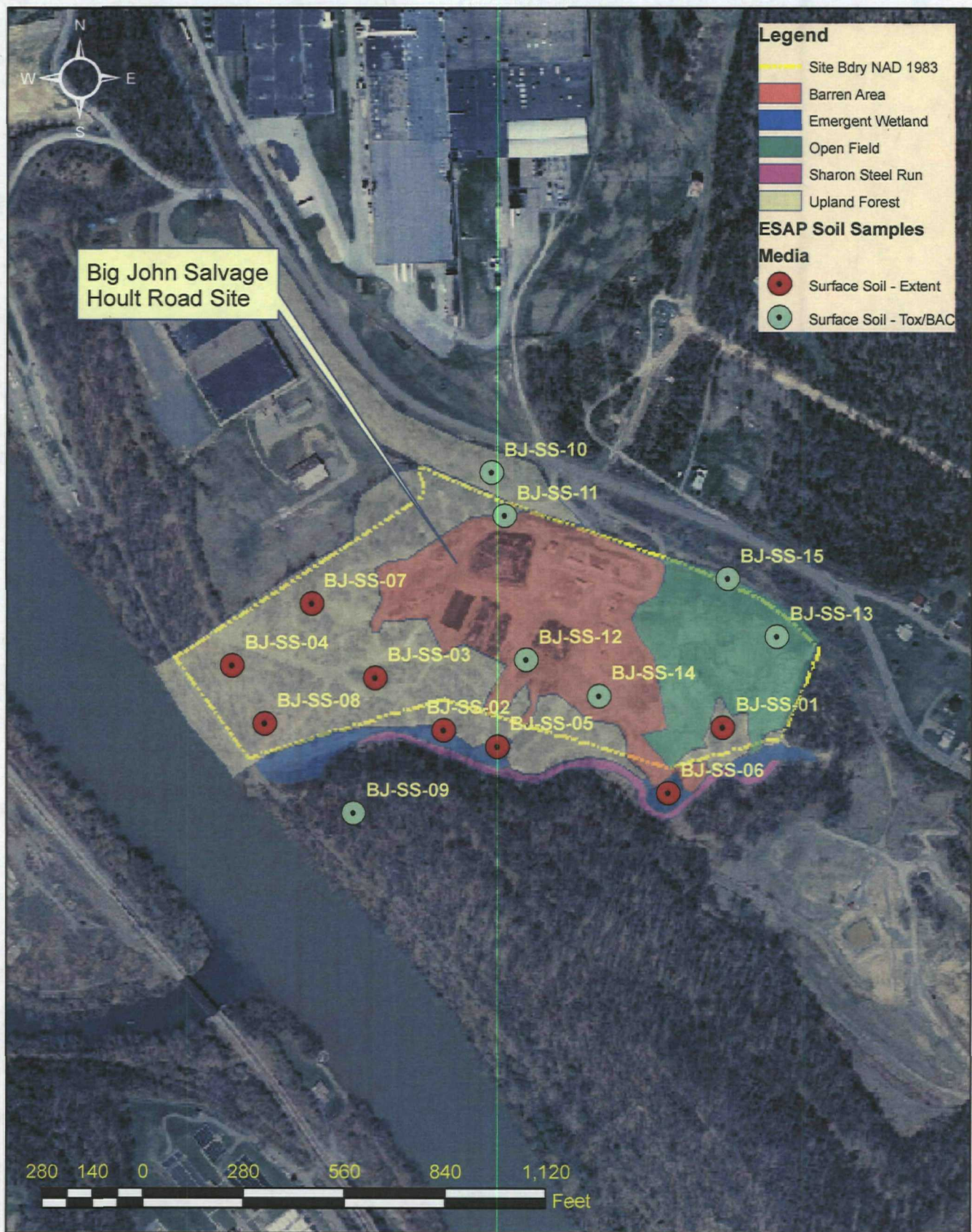


Figure 3-1
Ecological SAP
Surface Soil Sampling Locations

Big John Salvage
Hoult Road Site
Fairmont, Marion County, WV

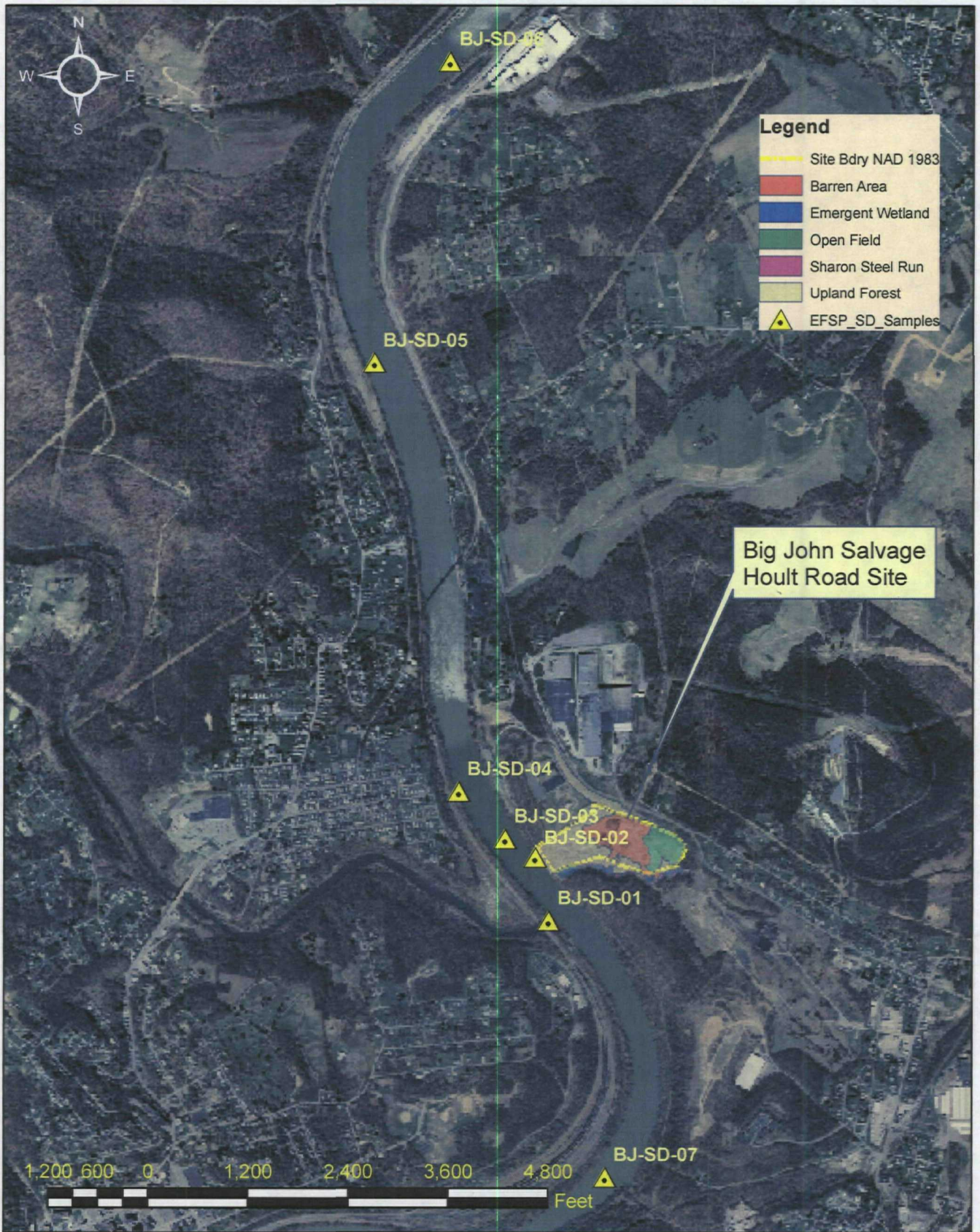


Figure 3-2
Ecological SAP
Sediment Sampling Locations

Big John Salvage
Hoult Road Site
Fairmont, Marion County, WV

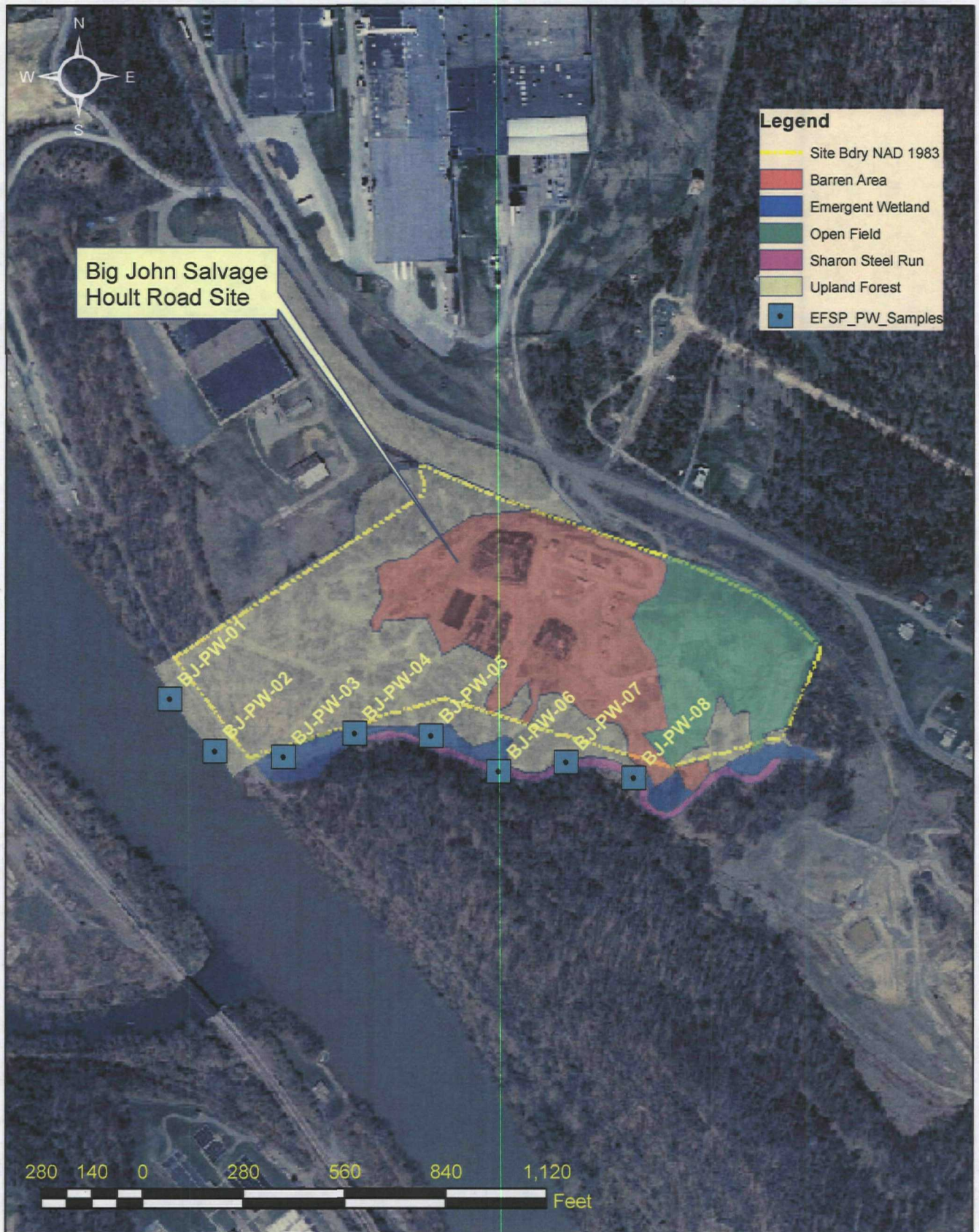


Figure 3-3
Ecological SAP
Pore Water Sampling Locations

Big John Salvage
Hoult Road Site
Fairmont, Marion County, WV

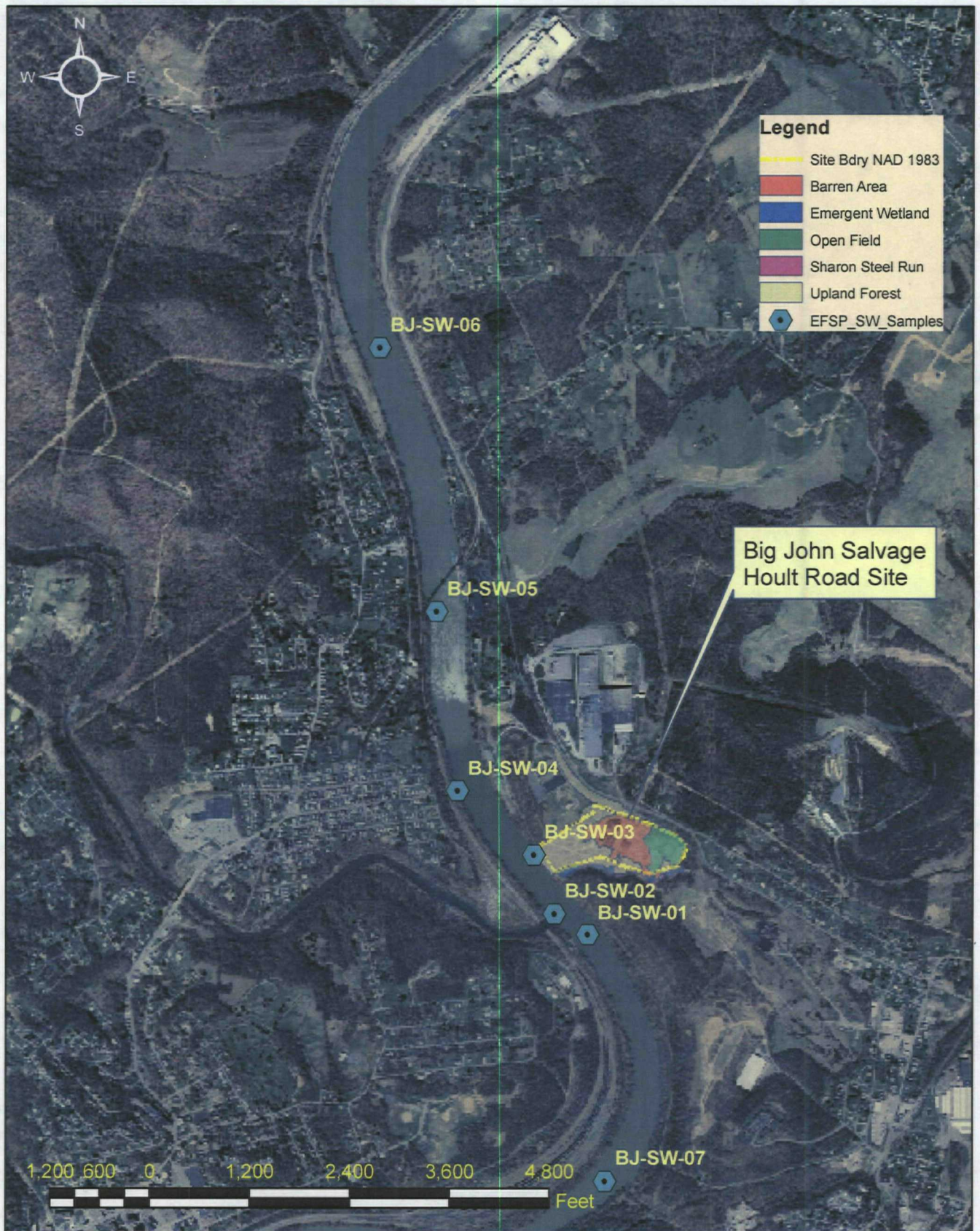


Figure 3-4
Ecological SAP
Surface Water Sampling Locations

Big John Salvage
Hoult Road Site
Fairmont, Marion County, WV