STANDARD OPERATING PROCEDURE No. 11.0
SAMPLE MANAGEMENT

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Approved by: _____ **Date:** _____

Attachment A

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1.0 PURPOSE AND SCOPE

The purpose of this document is to define the standard operating procedure (SOP) for sample management including sample handling, documentation, and analysis for samples collected from the following matrices for chemical analyses: sediment, soil, surface water and groundwater. The analogous requirements for biota and ecological toxicity analyses can be found in the applicable sampling SOP for each of these matrices. This procedure is intended to be used together with the other SOPs.

2.0 RESPONSIBILITIES AND QUALIFICATIONS

The Project Manager or Field Manager has the overall responsibility for implementing this SOP. They will be responsible for assigning appropriate environmental staff to implement this SOP and for ensuring that the procedures are followed by all personnel.

All personnel performing these procedures are required to have the appropriate health and safety training. In addition, all personnel are required to have a complete understanding of the procedures described within this SOP and receive specific training regarding these procedures, if necessary.

All environmental staff and laboratory staff are responsible for reporting deviations from this SOP to the Project Manager or Field Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The procedures for sample management set forth in this SOP are intended for use with the following SOPs:

SOP No. 1.0	Surface Water and Seep Sampling
SOP No. 19.0	Plant Sample Collection
SOP No. 26.0	Monitor Well Groundwater Sampling
SOP No. 30.0	Drilling and Sampling of Subsurface Soil Materials

4.0 EQUIPMENT LIST

The following equipment will be used for sample management:

- Shipping forms
- Sample containers
- Ziploc bags
- Ice
- Tape (clear and strapping)
- Scissors/knife

- Cooler/ice chest
- Custody seal
- Garbage bags
- Waterproof Pens
- Chain of Custody (COC) Forms
- Sample Labels
- Logbook
- Gloves
- Preservative (if necessary)
- Packing material
- Trip blank (as necessary)
- Temperature blank

5.0 PROCEDURES FOR SAMPLE HANDLING, DOCUMENTATION AND ANALYSIS

5.1 SAMPLE LABELING

All sample labels should be filled out with waterproof ink (see Figure 3). Soil and water sample labels may be supplied by the laboratory. For soil and sediment samples collected in jars and sample bottles for groundwater and surface water analyses, sample labels may be completed and attached prior to sample collection. Labels may be partially completed prior to sample collection. The date, time, sampler's initials, and the sample identification number should not be completed until the time of sample collection. Generally, each label shall contain the following information:

- Project/Facility Name
- Grab or composite sample
- Sampler's company affiliation
- Date and time of sample collection
- Analyses required
- Preservation used
- Sampler's initials
- Filtered (if applicable)
- Sample identification (see section 5.2, Figure 1)

5.2 SAMPLE NOMENCLATURE SCHEME

The sample identification (ID) number (also called field ID number) will be comprised of five components as discussed below. (Note: This sample nomenclature scheme has been adopted because it is generally consistent with the historical data contained in the database.)

Component 1	Component 2	Component 3	Component 4	Component 5

Component 1:

Component 2: TO BE MODIFIED

Component 3:

Component 4

Component 5:

Figure 1: Sample Identification (Example)

5.3 SAMPLE HANDLING

This section discusses proper sample containers, preservatives, and handling and shipping procedures. Refer to the Sample Analysis Plan for a summary of the information contained in this section.

5.3.1 Sample Containers

Certified, commercially clean sample containers shall be obtained from the contracted analytical lab. If appropriate, the bottles shall be labeled by the laboratory to indicate the type of sample to be collected. Required preservatives shall be prepared and placed with the bottles for aqueous analyses at the laboratory prior to shipment to the site.

5.3.2 Sample Preservation

All samples will be stored on ice to obtain a temperature of 4°C in an insulated cooler immediately following sample collection. Soil and sediment samples do not require additional preservation. As noted above, sample containers for aqueous samples will be obtained from the laboratory containing the appropriate preservatives.

5.4 SAMPLE SHIPPING

Sample containers will be placed in resealable plastic storage bags and wrapped in protective packing material (if appropriate). Samples will then be placed in a cooler with ice (double bagged using plastic trash bags) for shipment to the laboratory. The drain on the cooler shall be

taped shut. Samples collected in glass containers will be packed in foam liners and bubble packing or Styrofoam peanuts to ensure that no breakage occurs during shipment. A temperature blank should be included in each cooler. Samples will be sent to the analytical laboratory via Federal Express or equivalent. Sample shipments will be insured if needed. Shipping receipts should be retained for documentation and sample tracking.

A completed chain-of-custody (COC) form (see Figure 2) for each cooler will be placed in a Ziploc bag and placed inside of the cooler. Coolers will be wrapped with strapping tape at two locations to secure lids. A signed and dated custody seal shall be placed on the outside of each cooler in such a manner as to allow detection of tampering (e.g., the seal must be broken to open the cooler). An example custody seal is included as Figure 4.

5.5 HOLDING TIME REQUIREMENTS

The holding time is specified as the maximum allowable time between sample collection and analysis and/or extraction, based on the analyte of interest, stability factors, and preservation methods. Allowable holding times for chemical analysis parameters are listed in the Sampling Analysis Plan. Samples should be sent to the laboratory after collection in sufficient time to allow the laboratory to meet holding time requirements.

6.0 QUALITY CONTROL REQUIREMENTS

QC requirements relevant to analysis of environmental samples shall be followed during analytical activities to meet the quality objectives and criteria. The purpose of this QC program is to produce data of known and documented quality that satisfy the project objectives and that meet or exceed the requirements of the standard methods of analysis.

6.1 QC SAMPLES

A number of QC samples will be employed to assess various data quality parameters, such as representativeness of the environmental samples, the precision of sample collection and handling procedures, the thoroughness of the field equipment decontamination procedures, and the accuracy of laboratory analysis. A summary of QC samples for all chemical analysis methods is included in the Sampling Analysis Plan. Types of QC samples are discussed below and the number of these samples is also summarized in the Sampling Analysis Plan.

6.1.1 Matrix Spike/Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) samples are prepared by spiking additional aliquots of sample with known concentrations of all project target analytes.

The sample to be used for the MS/MSD analyses shall be designated on the chain of custody and additional sample volume shall be submitted, as necessary. The MS/MSD results are used to document the bias of a method due to sample matrix. Consequently, MSs and MSDs are not used to control the analytical process. A minimum of one MS and one MSD sample shall be analyzed for every 20 environmental samples of a given matrix. Alternately, a laboratory may

prepare and analyze a MS sample and a laboratory duplicate sample as discussed below. Analysis of a MS/MSD or MS/LD sample set to assess matrix effects on accuracy and precision is typically dependent on the analyte class (e.g., inorganic vs. organic) and the likelihood of detecting the target analyte.

6.1.2 Laboratory Duplicate

A laboratory duplicate (LD) is prepared by taking an additional aliquot of a sample and preparing and analyzing it in the same fashion as the parent sample. The LD is used to assess the precision of the method due to sample matrix. A minimum of one LD shall be analyzed for every 20 environmental samples of a given matrix. Alternately, the laboratory may analyze a MS/MSD pair as a means of assessing precision. Analysis of a MS/MSD or MS/LD sample set to assess matrix effects on accuracy and precision is typically dependent on the analyte class (e.g., inorganic vs. organic) and the likelihood of detecting the target analyte.

6.1.3 Field Blank

The field blank consists of American Society of Testing and Materials (ASTM) Type II reagent grade water supplied by the laboratory that is poured into applicable sample container at the sampling site (in the same vicinity as the associated samples). It is handled like an environmental sample and transported to the laboratory for analysis.

Field blanks are used to assess the potential introduction of contaminants from ambient sources (e.g., blowing dirt, gasoline motors in operation, etc.) to the samples during sample collection. The frequency of collection for field blanks shall be a minimum of one field blank for every 20 environmental samples that are collected for organic analyses. Field blanks shall be collected at or near a sample location and if possible, downwind of possible contamination sources.

6.1.4 Rinsate Blank

A rinsate blank is a sample of ASTM Type II reagent grade water poured into or over or pumped through the sampling device, collected in a sample container, and transported to the laboratory for analysis. ASTM Type II reagent grade water obtained from the laboratory is used to prepare the rinsate blank sample. Rinsate blanks are used to assess the effectiveness of equipment decontamination procedures used to prevent cross-contamination between sampling locations. The frequency of collection for rinsate blanks shall be a minimum of 1 rinsate blank for every 20 environmental samples collected with a given type of sampling equipment, and only for sampling equipment which is decontaminated and reused to collect environmental samples. Rinsate blanks will be prepared in a manner identical to samples and shall be analyzed for all laboratory analyses requested for the environmental samples collected at the site using the subject equipment.

6.1.5 Trip Blank

The trip blank consists of a VOC sample vial filled in the laboratory with ASTM Type II reagent grade water, transported to the sampling site, handled like an environmental sample and returned to the laboratory for analysis. Trip blanks are not opened in the field. Trip blanks are prepared

only when VOC samples are taken and are analyzed only for VOC analytes. Trip blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. One trip blank should accompany each cooler sent to the laboratory containing samples for analysis of VOCs.

6.1.6 Field Duplicates

A field duplicate sample is a second discrete sample volume collected at the same location as the original sample; homogenization is not performed between the original sample and the field duplicate. Aqueous field duplicate samples are collected from successive volumes from the same sample source and device (e.g., bailers). Sediment and soil field duplicates are collected in succession from the same sample source and device. Field duplicate samples are collected using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified (blind duplicate) as field duplicate samples by laboratory personnel performing the analysis.

Field duplicate sample results are used to assess precision of the sample collection process and the heterogeneity of the medium sampled. The frequency of collection for field duplicates is a minimum of one field duplicate sample from each group of 20 environmental samples of a given matrix. Specific locations for collection of field duplicate samples may be designated prior to the beginning of sample collection.

7.0 DOCUMENTATION AND TRACKING

7.1 FIELD NOTES

Documentation of observations and data acquired in the field will provide information on the acquisition of samples and also provide a permanent record of field activities. The observations and data will be recorded with waterproof ink in a permanently bound weatherproof field logbook with consecutively numbered pages and, if applicable, on field sampling data sheets.

The information in the field logbook will include the following as a minimum. Unless information is recorded on a field sample collection form and that form is cross referenced in the logbook entry. Additional information is included in the specific SOPs regarding the appropriate data sheets.

- Project name
- Location of sample
- Date and time of sample collection
- Sample identification numbers and sample depth (if applicable)
- Description of samples (matrix sampled), composite or grab sample
- Analysis to be performed

- Number and volume of sample containers
- Description of QA/QC samples (if collected)
- Sample methods or reference to the appropriate SOP
- Sample handling, including filtration and preservation, as appropriate for samples
- Field observations
- Results of any field measurements, such as depth to water, pH, temperature, turbidity, and conductivity
- Decontamination information
- Calibration information
- Personnel present
- Method of shipment
- Any deviations from SOPs

If samples are held for an extended period of time (i.e., inadvertently missed Fed-Ex pick up), field personnel will document all sample handling and custody in the field logbook.

7.2 CHAIN-OF-CUSTODY FORM

A record of each sample collected will be kept on a COC form. A given COC form shall not cover samples shipped in multiple coolers and every sample in the cooler shall be covered by the COC form(s) accompanying that cooler. The COC form will provide an accurate written record which can be used to trace the custody of all samples from the time of collection through data analyses and reporting. An example of an acceptable, completed COC form is provided in Figure 2.

The following will be specified for each sample on the COC form as a minimum:

- Sample number
- Sample date
- Sample time
- Requested analysis
- Number of containers
- Sampler's signature or initials
- Preservation technique
- Sample type (i.e., medium)

Also recorded on the COC is the signature of the person relinquishing custody, the date and time that custody was relinquished, the name and address of the laboratory, and the name and phone number of a contact person regarding the shipment.

A sample is considered in custody if it is:

1. In one's actual possession
2. In view, after being in physical possession
3. Locked so that no one can tamper with it, after having been in physical custody
4. In a secured area

The person responsible for custody of the sample prior to delivery of the samples to the laboratory will sign the COC form, retain the last copy of the three-part COC form, document the method of shipment, send the pink or second copy of the COC to the R2 Denver office, and send the original copy of the COC form with the sample (in a Ziploc bag). Upon receipt at the laboratory, the person receiving the samples will sign the COC form and return the second copy to the Field Manager or Quality Assurance Manager or specified designee. Copies of the COC forms and all custody documentation will be received and kept in the central files. The original COC forms will remain with the samples until final disposition of the samples by the laboratory. The analytical laboratory may dispose of the samples in an appropriate manner 60 to 100 days after data reporting. After sample disposal, a copy of the original COC will be sent to the Field Manager or Quality Assurance Manager or specified designee by the analytical laboratory to be incorporated into the central files.

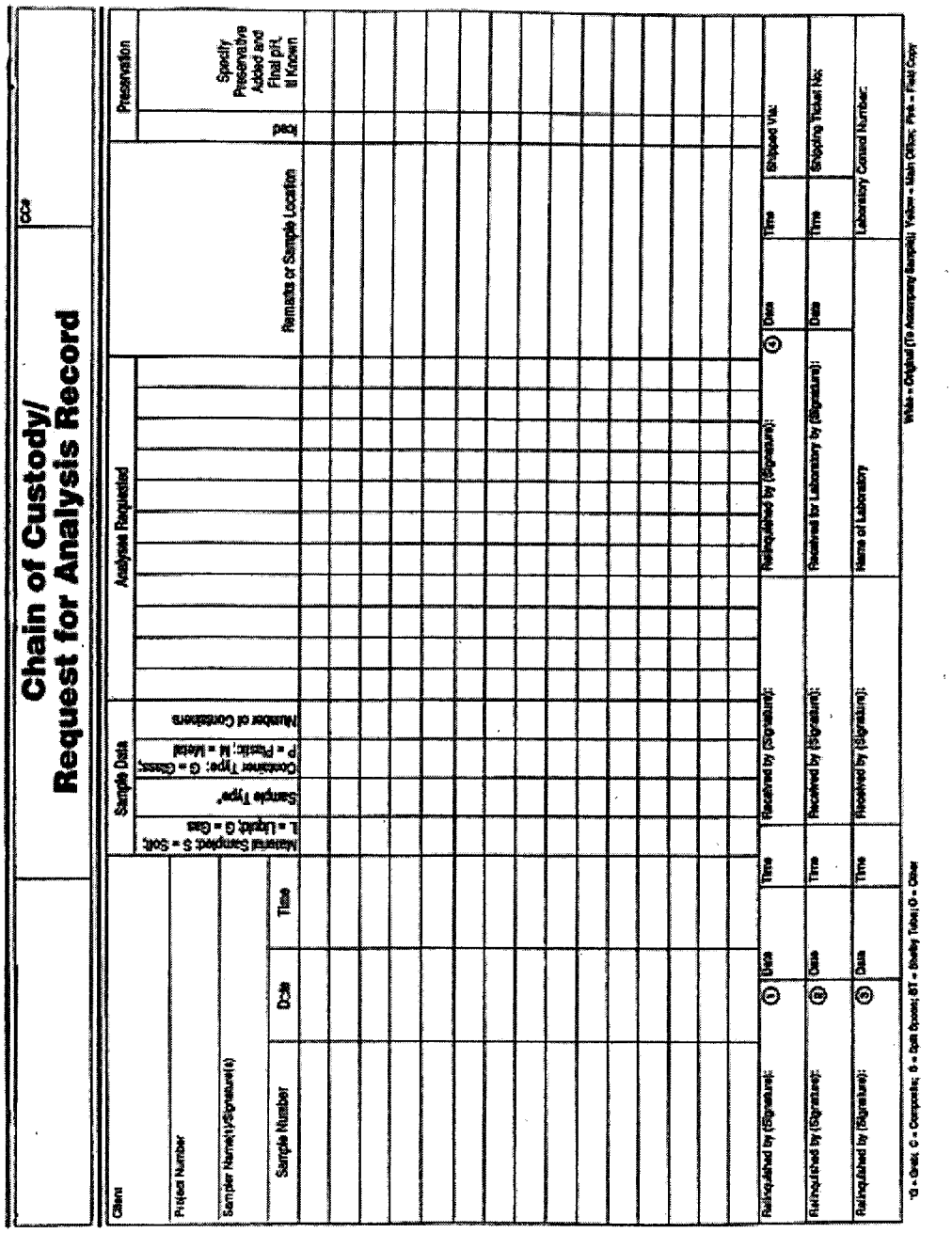
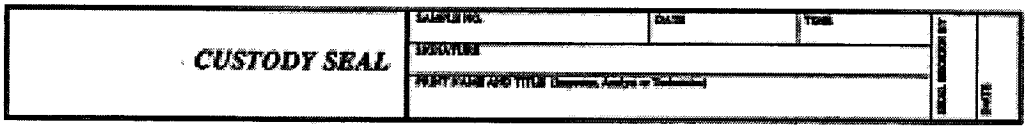


Figure 2: Chain-of-Custody Form (Example)

Powertech Resources, LLC Nunn, Colorado	**Specially Cleaned Sample Container** Lot #	
DATE:	TIME:	COLLECTED BY:
FIELD ID:		
SAMPLE TYPE: ☐ Grab ☐ Composite ☐ Other_____		
TESTS REQUIRED:		PRESERVATIVE

Figure 3: Sample Label (Example)



Custody Seal

Figure 4: Example Custody Seal