ATTACHMENT 2 – QUALITY ASSURANCE PROJECT PLAN

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SUPPLEMENTAL MINE WASTE ROCK DUMP AND FACILITY SOIL AND VEGETATION CHARACTERIZATION

QUALITY ASSURANCE PROJECT PLAN

Revision 3

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Approved by:

_____	_____
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ACRONYMS AND ABBREVIATIONS

AA	Atomic Absorption
AOC	Administrative Order on Consent
ASTM	American Society for Testing and Materials
CD	Compact Disk
Cr VI	Hexavalent Chromium
CVAA	Cold Vapor Atomic Absorption
DQI	Data Quality Indicator
DQO	Data Quality Objectives
dw	Dry Weight
EDD	Electronic Data Deliverable
EDF	Electronic Deliverable Format (Geo-Tracker)
EPA	United States Environmental Protection Agency
ER	Equipment Rinsate Blank Sample
FCR	Field Change Request
FSP	Field Sampling Plan
GPS	Global Positioning System
HSP	Health and Safety Plan
ICP	Inductively Coupled Plasma
ICPMS	Inductively Coupled Plasma/Mass Spectroscopy
ID	Identification
IDEQ	Idaho Department of Environmental Quality
LCS	Laboratory Control Sample
LLCCS	Low-Level Calibration Check Standard
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mL	Milliliters
MS	Matrix Spike
MSD	Matrix Spike Duplicate
na	Not Applicable
NELAP	National Environmental Laboratory Accreditation Program
NOAEL	No Observed Adverse Effect Level
OB	Overburdened
ORNL	Oak Ridge National Laboratory
P4	P4 Production, LLC
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
USEPA	United States Environmental Protection Agency

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1.0 PROGRAM MANAGEMENT

1.1 INTRODUCTION

This quality assurance project plan (QAPP) is one part of P4 Production's (P4) Supplemental Waste Rock Dump and Facility Soil and Vegetation Characterization Sampling and Analysis Plan (SAP) for three Monsanto mine sites, Ballard, Henry, and Enoch Valley mines, as part of the Consent Order/Administrative Order on Consent (CO/AOC). The SAP is comprised of a Field Sampling Plan (FSP), this QAPP, and a Health and Safety Plan (HSP). This QAPP has been prepared consistent with United States Environmental Protection Agency (USEPA) guidelines (USEPA, 2002). The QAPP describes the measures that will be employed during the soil and vegetation characterization project to assure that data generated are of known and defensible quality in relation to the overall objectives of the investigation. The various plans and procedures cited in this document govern the project sample acquisition efforts, sample handling and chain-of-custody protocols, laboratory analyses, data handling and data management, field documentation, quality auditing of field operations, corrective/preventive action processes, and management of project quality records.

1.2 PROJECT ORGANIZATION

The project team for the soil and vegetation characterization project consists of P4 and MWH personnel, one contracted and one subcontracted analytical laboratories, and one contracted 3rd-party data validator. The contracted entities are identified as follow:

- Microbac, Marietta, Ohio, is the contract laboratory for metals analysis; Microbac may subcontract to Test America, St. Louis, Missouri, for uranium analysis.
- Laboratory Data Consultants, Inc., Carlsbad, California, is the contract 3rd-party data validator.

The overall organization of the project team is depicted in Figure 1-1. The primary responsibilities of key personnel are described as follows:

- **P4 Program Manager:** The P4 Program Manager is Barry Koch. Mr. Koch is the company's point of contact with IDEQ for all technical and administrative matters associated with implementation of the AOC. He is also the manager of all contracts used by P4 to implement the AOC. Mr. Bob Geddes will provide Management Support to Mr. Koch.

- **MWH Program Manager:** The MWH Program Manager is Cary Foulk; Mr. Foulk is responsible for ensuring that the sampling methods and data analyses reflected in the WP and the SAP meet the objectives of the soil and vegetation characterization project. The Program Manager is responsible for the review and approval of program and project plans, for training program personnel, for monitoring the progress of the investigation, for review and approval of all project deliverables, and for overseeing the project managers. The Program Manager also serves as MWH's primary liaison with P4 and the regulatory community, and is responsible to the vice president in charge for the overall technical and quality performance of the project.

- **Quality Manager**: Ruth Siegmund is MWH's program Quality Manager. She is responsible for coordinating the development and approval of the QAPP and its supporting procedures, and will participate in the review and approval of all project deliverables. She will also provide oversight on field and laboratory procedures and coordinate and implement any necessary corrective and preventive action processes.

- **Field Team Leader:** Dean Brame will serve as MWH's Field Team Leader and is responsible to the MWH Program Manager for managing the day-to-day implementation of the field sampling activities, quality assurance/quality control (QA/QC) measures, and health and safety project requirements defined in the SAP. Mr. Brame will be responsible for supervising the day-to-day activities of the field team; for ensuring that all necessary training activities are conducted; for ensuring that all field equipment is properly calibrated, maintained, and/or decontaminated prior to use, as described in the FSP and this QAPP; for ensuring that field logs, sample acquisition/chain-of-custody records, and photographic records are properly identified, maintained, and protected from damage or loss; and for periodically reporting field progress to the MWH Program Manager and other project managers. Mr. Brame will also be responsible for coordinating sample delivery to the contract laboratories.

- **Program Safety Officer and Assistant Field Team Leader:** Colin Duffy will serve as MWH's Program Safety Officer and assistant Field Team Leader. Mr. Duffy will be responsible for ensuring that the HSP for field sampling activities complies with applicable state and federal health and safety regulations and guidelines, as well as relevant P4 and MWH corporate policies. He will be responsible for delivering appropriate health and safety training to all field personnel in accordance with the requirements of the approved HSP, and for maintaining all necessary project health and safety records. Mr. Duffy will be responsible for implementing the day-to-day sampling activities; for properly calibrating, maintaining, and/or decontaminating all field equipment prior to use; for completing field logs, sample acquisition/chain-of-custody records, and photographic records; and for reporting field progress on a daily basis to the MWH Field Team Leader and Program Manager.

- **Program Controller:** Celeste Christensen will serve as MWH's Program Controller. Ms. Christensen will manage all documents and ensure that they are properly filed. She will ensure that documents are presented in a clear and consistent manner and will maintain document control on all plans, reports, and technical memoranda associated with this project.

- **Key Technical Support Personnel:**

  - Soils Technical Expert - Dean Brame
  - Vegetation Technical Expert – Randy Walsh
  - Lead Technical Advisor – Bill Wright
  - Reclamation Specialist – Mike Vice
  - Environmental Regulatory Specialist – Paul Stenhouse
  - Hydrology and Engineering – Ted Eary/Leland Fuhrig
  - Mine Geology Specialist – Dave Carpenter
  - Aquatic & Terrestrial Biology – Colin Duffy

- Toxicology & Risk Assessment – Bruce Narloch
- Chemistry and Mine Facilities - Suzanne Anderson
- Geology – Bryan Massey
- Hydrogeology & Geochemistry – Cary Foulk

Changes in project staff may be made as circumstances dictate. The MWH Program Manager will advise the P4 Program Manager in advance of any such changes in the key personnel.

1.3 PROGRAM DESCRIPTION

The overall scope and purpose of the soil and vegetation characterization project is discussed in Section 3.0 of the SAP. At the discretion of the MWH Program Manager and the P4 Program Manager, any required scope modifications or additions may be accommodated either by revisions to the SAP documents or through the use of the field change request (FCR) process described in Section 1.6.6.

1.4 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

1.4.1 Purpose of QAPP

The QAPP describes the measures that will be employed during the soil and vegetation characterization project to assure that data generated are of known and defensible quality in relation to the overall objectives of the investigation. The primary objective of this QAPP is to assure that the precision and accuracy of project data are known and documented, that sample collection, analysis, and reporting are complete, and that samples are representative of tested environmental media. This plan also provides guidance for documentation of information collected in the field, sample custody, and the collection of appropriate field QC samples.

1.4.2 Data Quality Objectives

The DQOs for this sampling program are described in the SAP. These DQOs are consistent with USEPA guidelines (USEPA, 2006), which describe the systematic planning of data collection activities to assure that the proper type, quality, and quantity of data are collected. The DQOs will be fulfilled by following specific procedures and requirements outlined in the FSP and this QAPP for sample collection and handling; field and laboratory QC sample analysis; a laboratory-specific preventative maintenance measures; data review and reduction by the designated laboratories; data verification, validation, and reporting; and quality auditing and corrective/preventive action processes.

The field sampling and analysis design is provided as Step 7 of the DQO process in the SAP, and is detailed in Section 3 of the FSP. A total of 21 potential source areas and 3 background locations will be evaluated:

- Fourteen (14) waste rock dumps (6 at Ballard Mine, 5 at Henry Mine, and 3 at Enoch Valley Mine)
- Two (2) partially backfilled pits at Ballard Mine
- Two (2) historic ore haul roads (one each at Ballard and Henry Mines)
- One (1) historic facility at Ballard Mine (Ballard Mine Shop)
- Two (2) active facilities at Enoch Valley Mine (one haul road and the tipple area)
- Three (3) background locations (one at each of the three mine sites)

Sample identification for the 21 potential source areas is listed on Table 1-1. Samples will be collected as described in Section 4.2 of the FSP. At each waste rock dump, partially backfilled pit, historic ore haul road, and background location, 10 composite samples will be collected from 10 randomly selected quadrats. One of the 10 composite samples from each of these areas will be collected in triplicate.

Each soil sample will be tested for all target analytes using the analytical instrumentation specified as follows:

- Antimony, arsenic, cadmium, chromium (total), cobalt, copper, manganese, nickel, selenium, silver, thallium, and uranium by inductively coupled plasma/mass spectrometry (ICPMS).
- Boron, molybdenum, vanadium, and zinc by inductively coupled plasma (ICP) atomic emission spectrometry
- Mercury by cold vapor atomic absorption (CVAA)
- Hexavalent chromium (Cr VI) by colorimetric analysis

Each plant tissue sample will be tested for all target analytes with the exception of hexavalent chromium; total chromium for the ICPMS analysis will be used to evaluate hexavalent chromium in plant tissue samples.

The associated soil screening levels for each target analyte are provided on Table 1-2. The screening values are as follows:

- Oak Ridge National Laboratory (ORNL) Human Health Soil Screening Levels
- USEPA ecological soil screening levels
- Ecological Soil Screening Levels (calculated from the lowest reported no observed adverse effects level [NOAEL]-based benchmark for food from ORNL)

1.4.3 Data Quality Indicators

Data quality indicators (DQIs) may be expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity. The DQIs are summarized in the following subsections, and the project performance measurement criteria are established on Table 1-3.

1.4.3.1 Precision

Precision is the mutual agreement among individual measurements of the same property and is a measure of uncertainty. There are two general forms of uncertainty. The first is lack of knowledge, and includes the random error component of the data collection process. Given the availability of appropriate resources and the absences of other constraints, such uncertainty can potentially be reduced or eliminated. The second form of uncertainty is inherent stochastic variability. For example, even if it were possible to sample and analyze for selenium with no error, different concentrations in different water bodies would be observed along with different concentrations over space and time in even one given water body. Variability is irreducible, that is to say, even with no time, resource, or other constraints, variability cannot be eliminated, and can only be described. The overall random error component of precision is a function of the sampling and analytical precision, and is assessed by the analysis of field replicates. The analytical precision is determined by the analysis of field replicate samples analyzed by the laboratory.

Precision can be measured as relative percent difference (RPD), or as relative standard deviation (RSD), which is also known as a coefficient of variation. Formulae are provided as follows:

$$RPD = \frac{\left| x_i - x_j \right|}{\left(\frac{x_i + x_j}{2} \right)} \times 100$$

Where: x_i and x_j are replicate or duplicate values of x

$$RSD = \frac{s}{\bar{x}} \times 100$$

Where: s is sample standard deviation and $\bar{x}$ is the sample mean

1.4.3.2 Accuracy

Accuracy is defined as the degree of agreement between the true or expected value and the measured value for a given measurement. It is a measure of the bias or systematic error of the entire data collection process. Potential sources of systematic errors include:

- Sample collection methods
- Physical or chemical instability of the samples
- Interference effects
- Calibration of the measurement system
- Contamination

Accuracy can either be evaluated with a background level of an analyte or with the introduction of a known quantity of analyte. The evaluation of laboratory standard control samples will use the former method, as indicated in the first formula below. The evaluation of laboratory spiked samples will use the latter method, as indicated by the second formula below.

$$R = \frac{x}{t} \times 100$$

Where: x is the sample value and t is the true or assumed value

$$R = \frac{x_s - x}{t} \times 100$$

Where: x is the value of the spike sample; x is the value of the unspiked sample; and t is the true or assumed value

1.4.3.3 Representativeness

Data representativeness is defined as the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program. Representativeness of samples will be achieved through the careful selection of sampling locations and methods. The sampling program has been designed so that the samples collected are representative of the medium being sampled and that a sufficient number of samples will be collected to meet the DQOs.

1.4.3.4 Completeness

Completeness refers to the amount of useable data produced during a project. The procedures established in this PgmQAP are designed to ensure, to the extent possible, that data will be valid and usable. To achieve this objective, every effort will be made to collect each required sample and to avoid sample loss.

$$C = \frac{n}{N} \times 100$$

Where: n is the number of valid samples results and N is the total number of results associated with all planned samples

1.4.3.5 Comparability

Data comparability is defined as the measure of the confidence with which one data set can be compared to another. Comparability is a qualitative parameter, but must be considered in the design of the sampling plan and selection of analytical methods, quality control protocols, and data reporting requirements.

1.4.3.6 Sensitivity

Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing difference levels of a variable of interest.

1.4.4 Goals

This section identifies numerical goals for precision and accuracy for the various environmental media. The completeness goal for measurements is 90 percent for soil and vegetation samples. Failure to meet these goals will be considered in the data validation process described in Section 2.7.3. If data are unusable, as defined by the validation procedure, the results will be rejected. Further evaluations will be made and resampling or other appropriate actions initiated.

The following tables summarize the calibration and QC procedures and DQI goals for this project:

- Table 1-4: ICPMS Metals by EPA Method 6020A
- Table 1-5: ICP Metals by EPA Method 6010B/C
- Table 1-6: Mercury by EPA Method 7470A/7471A
- Table 1-7: Cr VI by EPA Method 7196A

Plant tissue matrix is a non-standard matrix. The laboratory will prepare plant tissue samples and perform method validation per the procedures provided in Standard Operating Procedure (SOP) SOP VEG-1 provided in Appendix A. The control limits for plant tissue samples will be established from the method validation.

1.4.4.1 Precision

Precision will be determined on field data and laboratory analysis data by the analysis of field triplicates, laboratory replicate, matrix spike and matrix spike duplicate (MS and MSD) results and evaluation of the RPD. The RPD goals for MS/MSD are specified for each analytical method on Tables 1-4 through 1-7.

Three replicate samples (triplicates) will be collected at 10 percent of sampling locations. Each parameter of the triplicate samples and its applicable project screening values will be tabulated and presented in the report of investigation, along with one of the following calculations:

- The RPD between two values: If one of the triplicate results is not detected for the tested parameter, then the RPD for the two remaining results will be calculated; however, if one or both the detected values are less than the reporting limit, then the absolute difference between the values will be calculated.
- The percent RSD (%RSD): If the given parameter is detected in each of the triplicate samples, and all values are greater than their reporting limits, then a %RSD will be calculated.

RPDs, absolute differences, and %RSDs will not be calculated for other result scenarios. The data users will take into account the field replicate variability when assessing trends and/or decisions made with respect to field sample results. Since the material tested is waste rock, and composite samples are being collected, variability associated with triplicate results will be a reflection of obvious variability associated with the material being sampled, as well as any inherent variability in the sampling and analysis of the tested material. Therefore, the precision of triplicate samples will be used to document this variability but will not be used to assess data usability with respect to comparisons of sample results to screening values.

1.4.4.2 Accuracy

Sample accuracy will be determined by the collection and analysis of field blanks. One equipment rinsate blank will be collected each day of sample for each sampling media (soil and vegetation) per field team. Laboratory accuracy is determined by the analysis of calibration and method blanks, calibration verification samples, laboratory control samples, and matrix spike samples. The laboratory criteria are specified on Tables 1-4 through 1-7.

1.4.4.3 Representativeness

Representativeness is addressed by the description of the sampling techniques and the rationale used to select the sampling locations. Sampling methods are described in the standard operating procedures (SOPs) contained in the FSP. Representativeness is also evaluated using RSD between replicate field samples, as well as a review of the results of equipment rinsate samples. These results will be tabulated and discussed in the report of investigation.

Laboratory representativeness will be evaluated by reviewing completed chain-of-custody records (or "chains"), sample receipt forms, and sample preparation documentation to ensure that samples are stored, processed, and reported properly.

1.4.4.4 Completeness

The completeness goal of this project will be 90 percent for each sample matrix (soil and vegetation). A data gap analysis will be presented in the report of investigation.

1.4.4.5 Comparability

Comparability will be ensured by sampling and analyzing soil and vegetation samples consistent with procedures outlined in the FSP SOPs and standard EPA procedures. Data generated from soil and vegetation samples will be reported in milligrams per kilograms (mg/kg) dry weight (dw) for metals.

Data generated from equipment rinsate samples will be reported in milligrams per liter (mg/L) for metals.

Laboratory data will be verified by a third-party validator and validated by MWH (see Section 2.7.3). Final project deliverables will be subject to independent technical review prior to submittal.

1.4.4.6 Sensitivity

Analytical sensitivity is assessed from instrument method detection limits (MDLs) for metals analysis. For metals' analysis, sensitivity is verified on a daily basis through the analysis of low-level calibration check standards (LLCCS). An LLCCS is spiked at the reporting limit. The acceptance criteria are specified on Tables 1-4 through 1-7.

Additionally, the analytical methodology needs to be sufficiently sensitive to detect the target parameters at concentrations less than the screening levels established for this project. The method reporting limits (and MDLs) for metals are listed on Table 1-2 with the applicable screening levels. All reporting limits are sufficiently sensitive to detect target parameters at a concentration less than all screening levels with three exceptions:

- The reporting limit for arsenic is 0.300 mg/kg, which is greater than the ORNL ecological soil screening level for mammalian receptors (0.25 mg/kg). However, the MDL of 0.075 mg/kg is less than the mammalian screening value.
- The reporting limit for molybdenum is 3.00 mg/kg, which is greater than the ORNL ecological soil screening level for avian receptors (2.9 mg/kg). However, the MDL of 1.5 mg/kg is less than the avian screening value.
- Both the reporting limit and MDL for molybdenum (3.00 and 1.5 mg/kg) are greater than the ORNL ecological soil screening level for mammalian receptors (0.5 mg/kg).

1.5 TRAINING REQUIREMENTS

MWH field personnel will be trained in the requirements of the SAP in a project meeting prior to the initiation of field activity. All personnel will read the SAP documents prior to the start of field work, and will acknowledge completion of training at the time of the project meeting. Meeting notes and attendance sheets will be kept and forwarded to the project records. In addition, prior to conducting each day's sampling activities, the Field Team Leader, or designee will conduct a "tailgate" meeting with field staff to review field procedures and sampling requirements, in order to better ensure that samples are collected and handled according to FSP and QAPP requirements. Tailgate meeting discussion subjects and attendees will be documented in the Field Logbook.

The Field Team Leader will maintain a hard copy of the current approved version of the entire SAP for ready-reference in the field vehicle or field office. Additionally, each field team will have a hard copy of the SAP.

1.6 DOCUMENTATION AND RECORDS REQUIREMENTS

1.6.1 Field Logbooks

Sample collection activities will be documented in permanently bound, page-numbered, weather-resistant field logbooks assigned to the Field Team Leader, or, if multiple sampling teams are used, to a designee in charge of each team. Each notebook will be identified to the project, task, and to

the individual assigned custody of the logbook. For all sampling to be performed, the appropriate SOP, appended to the FSP, will also be employed. If logbook custody is transferred to another individual, such transfer will be noted in the logbook and signed and dated by both parties. All entries will be made in indelible ink; errors will be corrected by one single line through the text being revised, and all such corrections will be initialed and dated.

With the exception of the information contained in the appropriate SOP, governing the media to be sampled, bound field logbooks will be used to record the following information, as appropriate for the type of sampling being performed:

- Date, time, subjects, and attendees of daily tailgate training sessions
- Sample date, time, types, numbers, and quantities
- Sample container preservation steps performed
- Sample locations, including global positioning system (GPS) coordinates
- Numbers of associated photographs, with appropriate cross-references to the affected camera
- Sampling equipment used
- Decontamination steps performed
- Acknowledgements that chain-of-custody forms and express shipment information were properly completed

In addition, other ancillary information will be recorded, including:

- Time of arrivals/departures of MWH personnel and/or other visitors to the sampling site(s)
- Weather conditions
- Presence of livestock or wild game
- Time and subject of any incoming or outgoing telephone/radio contacts
- Any unusual events

The logbooks will be kept up to date on a daily basis; backup copies of each day's entries will be made on a weekly basis and forwarded separately to the project quality records, in addition to copies of all outgoing chains-of-custody and sample shipping documents.

1.6.2 Field Forms

In addition to the field logbooks, field forms will be required to be filled out by the sampling team conducting the sampling. All efforts will be made to fill out the information at the sampling location. Field forms for the sampling of soil and vegetation are used to supplement the field logbooks. The appropriate forms are located in the applicable SOP, appended to the FSP.

1.6.3 Chain-of-Custody Records

Documentation of sample custody must be maintained from the time the samples are collected through: receipt at the destination laboratory; sample homogenization, preparation, and analysis; data recording and reduction; data validation; and final release of laboratory analytical data. Initial information concerning sample collection will be recorded in the field logbook as described in Section 1.5.1. Information on the custody, transfer, handling, and shipping of samples will be recorded by field personnel on a project-specific chain-of-custody form for Microbac (Figure 1-2). A chain-of-custody form will be completed for each set of samples collected daily and will contain the following information:

- Sampler's signature and affiliation
- Project name and identification number
- Date and time of collection
- Sample identification number and matrix
- Analyses requested
- Number of containers
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times
- Method of shipment
- Shipping papers/waybill identification number (e.g., Federal Express tracking number as identified on pre-printed packing labels)

A copy of each as-transmitted chain-of-custody form will be retained in the project records.

1.6.4 Analytical Laboratory Records

The contracted analytical laboratory will be responsible for preparing analytical laboratory reports that are reviewed and approved by the laboratory's QA manager prior to submittal to MWH.

Microbac's report will contain the following:

- A hard-copy data package with Level 3 deliverables (see Section 1.6.4.1) and a scanned (e.g., ".pdf") report with Level 4 deliverables (see Section 1.6.4.2).
- Electronic data deliverable (see Section 1.6.4.3)

The hard-copy and scanned reports will be paginated and organized with a table of contents. The hard-copy deliverable will contain a cross reference that correlates the field identification as provided on the chain-of-custody document with the laboratory's sample identification. Results should be presented on a form equivalent to the United States Environmental Protection Agency's (USEPA or EPA) Contract Laboratory Program (CLP) "Form 1." Results from QC samples associated with each distinct analytical method are to be presented all together on QC summary sheets for ease of review. A Case Narrative will be provided for each analytical method. The Case Narrative will discuss any problem related to sample-receipt, corrective action taken by the laboratory, QC outliers or other problems, method deviations, and/or clarifications or anomalies observed by the laboratory.

Sample Results (CLP "Form 1" or equivalent) – This form contains all required data for field samples. The Form 1 will provide the following information:

- Field sample identification
- Laboratory sample identification
- Sample result(s) and appropriate units, method detection limit, and reporting limit. Concentrations equal to or greater than the method detection limit (MDL) must be reported. Concentrations between the MDL and reporting limit will be flagged as estimated ("J" flagged). Parameters that are not detected or present at a concentration less than the MDL are flagged as "U" and interpreted to be not detected at a value equal to or greater than the MDL. Do not report "not detected" (or "ND").
- Sample collection and receipt dates

- Sample preparation date/time
- Analysis date/time
- Dilution factor
- Preparation batch number or identification
- Analysis batch number or identification
- Sample matrix and instrument
- For soil and vegetation sample, the samples will be reported as "dry-weight"

1.6.4.1 Summary or "Level 3" Data Deliverable Package for Metals' Analysis

All summary forms need to be present, following the Form 1s, with clear association of the QC batch to each sample (on the CLP Form specified or equivalent):

- Summary of all field sample results (as described above)
- Results of diluted and undiluted samples
- Sample results and preparation blank (Form IA-IN and IB-IN)
- Initial calibration verification (ICV), and continuing calibration verification (CCV) (Form IIA-IN)
- Low-level calibration check standard (LLCSS) (Form IIB-IN)
- Initial calibration blanks (ICB), continuing calibration blank (CCB), and preparation blanks (Form III-IN)
- Inductively coupled plasma (ICP) interference check sample (Form IVA-IN) or inductively coupled plasma-mass spectrometer (ICPMS) interference check sample (Form IVB-IN)
- Matrix spike and matrix spike duplicate (MS/MSD) sample recovery and MS/MSD relative percent difference (RPD) (Form VA-IN)
- Post-digest spike sample recovery (Form VB-IN)
- Laboratory duplicate precision (Form VI-IN)
- Laboratory control sample (LCS) recovery (Form VII-IN)
- ICP and ICPMS serial dilution percent differences (Form VIII-IN)
- MDLs (Form IX-IN)
- ICP interelement correction factors (Forms XA-IN and XB-IN)
- ICP and ICPMS linear ranges (Form XI-IN)
- Preparation log (Form XII-IN)
- Analysis run Log (Form XIII-IN)
- ICPMS tunes (Form XIV-IN)
- ICPMS internal standards relative intensity summary (Form XV-IN)
- Sample log-in sheet (Form DC-1)
- Deliverables inventory sheet (Form DC-2)
- Case narrative
- Chain-of-custody

1.6.4.2 Full Raw Data or "Level 4" Data Deliverable Package

The Full Raw Data Package includes all items specified for the Summary Data Package (Level 3), plus instrument raw data and/or documentation of the following:

- Calibration standards (including source, preparation date)
- Blanks (ICB, CCB, and preparation)
- ICV, CCV standards
- Interference check samples

- Serial dilution samples
- LLCCS
- LCS
- Diluted and undiluted Samples
- Dilution factors
- Sample volumes
- Laboratory duplicates
- Matrix spikes (source, concentration, volume)
- Post-digest spikes (source, concentration, volume)
- Method of standard addition results
- Instrument identification
- Analysis date and time
- Integration time (CVAA only)
- All inorganic methods: full raw data print outs from instruments
- Full run log for each analysis
- ICPMS to include: internal standard recoveries, tune data (atomic mass unit and peak width), and molecular interference check data

1.6.4.3 Electronic Data Deliverable

Laboratory electronic data deliverables (EDDs) will contain detailed sample and laboratory QC sample data, including associations with QC batch sample results in GeoTracker Electronic Deliverable Format (EDF). Specifications for the GeoTracker EDF are provided in Appendix B.

1.6.5 Documents and Records

Documents and records are defined as completed, legible documents which furnish objective evidence of the items or services, activities affecting quality or the completeness of data, and which are maintained for the specific project. These records will be organized and managed in MWH's Bellevue, Washington program office and will include, at a minimum, the following:

- Original and backup copies of all bound field logbooks
- Field copies and original (laboratory) copies of all chain-of-custody documents
- Personnel training records (except that any medical monitoring program will be maintained in MWH's personnel files)
- Incoming and outgoing project correspondence (letters, telephone conversation records, faxes, and hard copies of e-mail messages)
- Copies of all laboratory agreements and amendments thereto
- Purchasing records for project supplies
- As-received laboratory data packages (hard copy and EDDs)
- Validated laboratory data packages
- All approved field change request (FCR) forms
- Draft and final versions of all reports and any associated presentation materials
- Draft and final delivered versions of the SI reports and its supporting procedures

1.6.6 Field Change Request Forms

Due to the conditions associated with field sampling activities, unexpected situations may occur that will require deviations or modifications to the requirements of the SAP. Other changes may be required by P4 during the course of this project. In such situations, the Program Manager may authorize the Field Team Leader or designee to undertake SAP modifications, provided that the

scope of such modifications is discussed with the program Quality Manager and approved beforehand and documented on a FCR form as shown in Figure 1-3. Each FCR will be uniquely numbered and will identify the project and task, the affected sections of the SAP or its supporting procedures, the scope of the requested variation, and the justification for its acceptance. At the Program Manager's discretion, the FCR may be forwarded to appropriate P4 representatives for review purposes prior to implementation. The field team leader will update field personnel of any changes.

2.0 MEASUREMENT/DATA ACQUISITION

2.1 SAMPLING PROCESS

2.1.1 Sampling Design

The number and type of samples that will be collected and general sampling locations are presented in the FSP. Samples to be collected are summarized on Table 1-1.

2.1.2 Sampling and Analytical Methods – General Considerations

The SOPs invoked for the field sampling activities were developed from standard American Society for Testing and Materials (ASTM) methods. Analytical procedures performed by Microbac and Test America will conform to standard EPA methods.

2.2 SAMPLING ACTIVITIES

2.2.1 Sampling Activity Summary

Sampling activities are summarized in the FSP, and consist of soil and vegetation sampling at Ballard, Henry, and Enoch Valley mine sites.

2.2.2 Sample Collection and Preparation Protocols

Sampling activities and field parameter measurements will be performed in accordance with the FSP; and the related soil and vegetation sampling SOPs that are provided in the FSP.

Soil samples will be collected in two 16-ounce glass jars with Teflon®-lined lids. Vegetation samples will be collected in one 5-gallon paper bag. Sample containers, preservation techniques, sample volumes, and holding time requirements are summarized on Table 2-1. All containers will be submitted to Microbac as discussed in Section 2.3.1.

2.2.3 Sampling Equipment Requirements

Sampling equipment is specified in the matrix-specific sampling SOPs. All sample collection containers will be constructed of appropriate materials to facilitate decontamination; soil samples will be collected in glass jars, vegetation sampling will be performed using stainless steel sheers and collected in paper bags.

Field equipment will be decontaminated between each sample. An equipment rinsate sample will be collected each day of sample collection for each matrix per field team. Equipment rinsate blank samples will be collected in pre-preserved polyethylene containers as specified on Table 2-1.

2.2.4 Sample Routing Requirements

Soil and vegetation samples will be routed to Microbac. Microbac may subcontract uranium analysis to Test America, St. Louis, Missouri.

2.2.5 Sample Preservation Requirements

Sample containers with the necessary preservative will be provided by the contract laboratory in accordance with Table 2–1. All sample containers (jars, paper bags, bottles) will be bagged in plastic

bags, placed on wet ice, and stored in coolers prior to shipping to the appropriate laboratory for analysis.

2.2.6 Decontamination Procedures

Equipment used for collecting samples will be decontaminated prior to all sample acquisition activities. Sampling equipment will be decontaminated as follows:

- Remove excess rock fragments, soil, sediment, and vegetation
- Wash equipment with Crystal White™ (or equivalent) biodegradable soap/deionized water solution
- Rinse with potable water
- Rinse three times with deionized water

All rinsate may be disposed of onsite. Field personnel will handle field equipment and containers carefully to minimize the potential for cross-contamination. Containers will be handled in a manner to prevent direct contact with internal surfaces. Sampling personnel will avoid wearing items or clothing that may interfere with dexterity or create a potential source for cross contamination.

2.2.7 In-Process Sampling Data Review and Change Control

Review of field collection data will be conducted on site by the Field Team Leader on at least a daily basis. Based on this review, the Field Team Leader may request re-sampling or re-analysis of a particular sample or group of samples if omissions or discrepancies are found. Any changes in sampling procedures that may be required in order to address unanticipated field situations will be processed as an FCR as noted in Section 1.6.6. Other discrepancies will be discussed with the program Quality Manager and corrective and preventive action initiated as appropriate.

2.3 SAMPLE CUSTODY REQUIREMENTS

2.3.1 Sample Labeling and Handling

Samples will be labeled with all necessary information on laboratory supplied labels using waterproof ink. Pre-printed labels will contain the following information:

- Site location
- Sample identification
- Method of preservation, if used
- Sample matrix

The date and time of sample collection and sampler's initials will be added to the label at time of collection.

Each sample will be assigned a unique identification number. This number will be coded according to sample location according to the following format:

AABB-MXXxxx-YYY-ZZ-c

where:

- **AA** indicates the year (two digits) the sampling event <u>started</u>

- **BB** indicates the month (two digits) the sampling event started.

- **M** designates "M" for Monsanto and is used to differentiate from other sample stations identified by MWH for Idaho Mine Association (IMA) mine-specific investigations.

- **XX** denotes the station type, as follows:

AR:	Active Ore Haul Road
CS:	Culturally Significant plants
BB:	Ballard Mine Background
BH:	Henry Mine Background
BE:	Enoch Valley Mine Background
BS:	Ballard Mine Shop
HR:	Historic Ore Haul Road
PB	Pit Backfill Area (Ballard)
PO	Pit Area (Other)
TA:	Enoch Valley Mine Tipple Area
WD:	Waste Rock Dump

- **xxx** denotes the specific three-digit station number/location (ascending order starting at 001), for example:
  - WD080 is Ballard Mine Overburden Dump MWD080
  - HR001 Ballard Haul Road, HR002 Henry Haul Road, HR003 Enoch Valley Haul Road
  - BB001, BH001 or BH002, and BE001 are the waste rock dump background stations at Ballard, Henry, and Enoch Valley mines, respectively.

- **YYY** sample quadrat number; quadrats are sequentially numbered (with a leading zero) on each source or background area, for example:
  - MWD080-007 indicates a sample collected from quadrat seven on Ballard Mine Overburden Dump #1.

- **ZZ** denotes media type; media types are as follows:
  - SS: Surface Soil
  - GF: Grasses and Forbs
  - GS: Grasses
  - FB: Forbs
  - SF: Shrub Fruit
  - SL: Shrub Leaves
  - SM: Shrub Stems

- **c** denotes the replicate number 1, 2 or 3.

For example, sample number **0906-MWD080-007-SS-1** describes the first replicate of a surface soil sample, collected from quadrat seven on Monsanto (P4), Ballard Mine Overburden Dump #1 in June 2009.

For equipment rinsate samples, the number will be identified as **AABB – ER – ZZ – bb**

AA:	Indicates the year (two digits) the sampling event started
BB:	Indicates the month (two digits) the sampling event started
ER:	Equipment Rinsate
ZZ:	Media type (surface soil or vegetation)
bb:	Rinsate number (01, 02, 03,…. etc.)

Sample containers will be sealed in plastic bags with wire ties and immediately placed on ice in an insulated cooler to ≤ 6 °C. Insulated coolers will be provided by the contract laboratories or purchased locally. All samples will be stored in the coolers and handled as specified in Section 2.3.2.

2.3.2 Chain of Custody

Field personnel responsible for the collection of samples will sign and retain a copy of the chain-of-custody form, document the method of shipment, and send the original with the samples. The original signed chain-of-custody form will be sealed in a watertight plastic envelope and attached to the inside lid of the cooler. Coolers will be secured with strapping tape and a container seal applied that is covered with clear strapping tape. After samples are packed and sealed, coolers will be transferred to P4 Productions LLC, Shipping and Receiving: 1853 Highway 34, Soda Springs, Idaho for express carrier pickup. If for any reason samples cannot be shipped on date of collection, the coolers will be transferred to Fox Hills Ranch for storage. Samples will be stored in a refrigerator fitted with a keyed lock; the key location will be made known only to the Field Team Leader or designees.

Samples will be shipped by overnight express carrier to Microbac in time to meet all required holding times; the carrier waybill number will be recorded on the original chain-of-custody document. Copies of the chains and waybills will be forwarded to the project quality records by the Field Team Leader. Immediately after the sample coolers are delivered to the carrier, the Field Team Leader or Analytical Task Manager will notify the analytical laboratory to expect sample deliveries. Samples will not be shipped on Friday without making prior arrangements with the destination laboratories.

Samples will be sent to Microbac at the following address:

Microbac
158 Starlite Drive
Marietta, OH 45750
(740) 373-4071
Attn: Kathy Albertson

MWH's FedEx account number is 237-076-389.

2.3.3 Holding Time Considerations

Immediately after collection, sample containers will be enclosed in plastic bags and placed in field coolers with wet ice. If there is no likelihood that a holding time will be violated, samples may be stored in the locked refrigerator at Fox Hills Ranch for one or more days. Constituent-specific holding times are presented in Table 2-1. Sample shipment will be scheduled to prevent the exceedance of any required holding period. Failure to conduct analyses within the required holding times may potentially require the qualification of associated analytical results and will prompt appropriate corrective and preventive action measures as discussed in Section 3.

2.3.4 Laboratory Operations

2.3.4.1 Laboratory Receipt and Logging

Coolers containing samples to be analyzed will be shipped via overnight express courier to Microbac. When samples arrive at each laboratory, the designated laboratory custodian receiving the sample cooler will inspect the cooler custody seal. The custodian will sign the shipping chain-of-custody record and attach the carrier billing. The shipping chain and waybill will be archived in the laboratory project file; a copy of the shipping chain and waybill will be forwarded to MWH's Bellevue office for filing in the project quality records. The custodian will then open the cooler to inspect the samples for integrity and compare the number of containers and label information with the chain-of-custody form attached to the inside of the cooler lid. Cooler temperatures will be checked and documented on the chain-of-custody form. Broken custody seals, damaged sample containers, sample labeling discrepancies between container labels and the chain-of-custody form, and analytical request discrepancies will be noted on the chain-of-custody form. The Analytical Task Manager will be notified of any such problems; the Program Manager, or Field Team Leader, and the Quality Manager will be advised in turn if the issue constitutes a nonconformance. In any case, discrepancies or nonconformance will be resolved and addressed prior to the samples being released to the laboratory for analysis.

Once any discrepancies are resolved, the laboratory custodian will enter the samples into an analytical custody log and will assign each sample a unique identification number that is cross-referenced to the sample number assigned in the field. The identification number will be used by the laboratory in its internal tracking system and the status of any given sample can be checked at any time by referring to the laboratory numbers on the chain and in the laboratory log books. Both the laboratory and sample numbers will be cited when the analytical results are reported. The laboratory custodian will then sign the chain. The original chain-of-custody will be routed to the laboratory's data management group. Copies of chains documenting custody changes and documentation will be received and kept in the laboratory project files. The original chain-of-custody record will remain with the samples until final disposition of the samples by the laboratory. Samples, extracts, or digestates will not be sent to another laboratory without the written authorization of the Program Manager. If so authorized, such samples will be transmitted using a chain-of-custody form approved by the Program Manager. After sample disposal, a copy of the original chain-of-custody will be sent to the Program Manager by the analytical laboratory to be incorporated into the project quality records.

2.3.5 Sample Storage and Security

While in the laboratory, the samples and aliquots that require storage at ≤ 6°C, but above freezing, will be kept in a locked refrigerator prior to analysis. At a minimum, the following procedures will be applied:

- Samples and extracts will be stored in a secure area controlled by the laboratory's designated sample custodian
- Samples will be removed from the shipping container and stored in their original containers unless damaged; damaged samples will be disposed in an appropriate manner after notifying the MWH Analytical Task Manager, and authorization to dispose is received and documented
- Whenever samples are removed from storage, removal will be documented
- Sample transfers will be documented on internal chain-of-custody records
- Samples and extracts will be stored after completion of analyses in accordance with contractual requirements, or until instructed otherwise by the MWH Analytical Task Manager
- Samples will not be stored with standards or sample extracts

2.3.6 Sample Tracking

Laboratory personnel will use chain-of-custody records or databases to generate backlist reports of any unanalyzed samples. The reports will include the collection times along with the project name and laboratory sample number, and will include the project name, field sample identifications, and sample matrix. Sample analyses will be scheduled on the basis of holding time considerations. Analytical assignments will be reviewed on a daily basis to ensure that holding times are not exceeded. If holding times are exceeded during laboratory custody, the MWH Analytical Task Manager will be immediately notified.

2.3.7 Sample Custody Records

Minimum requirements for laboratory sample chain-of-custody controls are as follows:

- Samples will be stored in a secured area
- Access to the laboratory will be through a monitored area; other outside access doors to the laboratory will be kept locked in accordance with local fire requirements
- A visitor's log will be maintained, and visitors will be escorted while in the laboratory
- Refrigerators, freezers, and other sample storage areas will be securely locked or maintained in a secured area
- Only authorized personnel will have keys to locked sample storage area(s)
- Samples will remain in secure sample storage until removed for preparation or analysis
- Sample transfers into and out of storage will be documented
- Custody records will be maintained by the laboratory's sample management group.

Samples, extracts, and digestates will be retained at the laboratory for at least 60 days after the laboratory's final analytical data report has been submitted to MWH, so that any potential analytical problems can be properly addressed. The samples, extracts, and digestates may then be discarded in an approved and environmentally safe manner unless otherwise directed by the Analytical Task Manager.

2.4 ANALYTICAL METHOD REQUIREMENTS

2.4.1 Sample Preparation

For each soil and vegetation sample, Microbac will air dry the sample, then grind or mill and homogenize the sample. The laboratory will prepare soil samples consistent with SOP SOIL-1 and plant tissue samples consistent with SOP VEG-1 (SOPs are provided in Appendix A).

Subsamples will be obtained for matrix spikes prior to sample preparation and analysis.

2.4.2 Target Analytes and Methods

Table 1-2 provides a list of the target analytes. Target analytes will be analyzed using the following methods:

- Antimony, arsenic, cadmium, chromium (total), cobalt, copper, manganese, nickel, selenium, silver, thallium, and uranium by ICPMS using EPA Method 6020A
- Boron, molybdenum, vanadium, and zinc by ICP using EPA Method 6010B/C
- Mercury by CVAA using EPA Methods 7470A (water QC) and 7471A (soil and vegetation)
- Cr VI by colorimetric analysis using EPA Method 7196A (soil samples only).

2.5 QUALITY CONTROL REQUIREMENTS

2.5.1 Field Quality Control Samples

2.5.1.1 Equipment Blanks

Blanks are defined as sample material that is free of reportable concentrations of target analytes; the blanks are introduced at various stages of sample handling to monitor possible contamination introduced by various field activities. Only rinsate (or equipment) blanks will be used for this project. An equipment blank is a sample of the deionized water being used by the field team that is collected using decontaminated sampling equipment. Decontaminated sampling equipment in this event includes shears for vegetation and soil corers and mixing bowls for soil. One equipment rinsate blank sample will be collected at the end of each day of sampling per matrix per field team. Samples for equipment rinsate will be analyzed for all target analytes except Cr VI. Total chromium values will be used to evaluate impact of potential contamination for Cr VI.

2.5.1.2 Duplicate Sampling

A true field duplicate is a subsample that has been divided from the primary sample at some step in the sampling process. Field duplicate samples provide information on the precision of the sampling, transfer, and analytical process. True field duplicate sampling of the soil and vegetation is not possible, so, at a subset of sampling locations, primary samples will be collected in triplicate. Specifically, at 10 percent of sampling locations, three individual primary samples will be collected; all three samples are primary samples but are collected in triplicate. Triplicate sampling will allow for statistically valid evaluations of sampling and analysis precision, of duplicate analysis performance, and for hypothesis testing.

2.5.2 Laboratory Quality Control Samples

Laboratory quality control samples will be introduced into the measurement process to evaluate laboratory performance and sample measurement bias. Control samples may be prepared from environmental samples or be generated from standard materials in the laboratory. Laboratory quality control samples used in each analytical method are discussed in the following sections. The requirements and acceptance criteria for the method-applicable QC samples are summarized for EPA Methods 6020A, 6010B/C, 7470A/7471A, and 7196A on Tables 1-4 through 1-7, respectively. Additionally, the laboratory will report, consistent with requirements listed in Section 1.6.4, the results of undiluted as well as diluted sample results and will consult with the MWH project chemist to justify and document the need for dilution.

2.5.2.1 Calibration Blanks

A calibration blank is used in establishing the analytical curve and monitoring for instrument contamination. The calibration blank is prepared by acidifying reagent water to the same concentrations of the acids found in the standards and samples. An initial calibration blank (ICB) is analyzed immediately following the initial calibration verification (ICV) standard, and a continuing calibration blank (CCB) is analyzed immediately following any continuing calibration verification (CCV) standard.

2.5.2.2 Method Blanks

Method blanks will be used for the laboratory processes. A method blank is a volume of deionized water or laboratory clean-matrix for solid samples (e.g., clean sand) that is carried through the entire sample preparation and analysis procedure. The method blank volume or weight will be approximately equal to the sample volumes or sample weights being processed. Method blanks are used to monitor interference caused by constituents in solvents and reagents and on glassware and other sampling equipment. A method blank is prepared and analyzed with each analytical batch of 20 or fewer samples.

2.5.2.3 Matrix Spikes

A spike is a sample to which is added a known amount of analyte(s) before analysis. From the concentrations of the analyte in the spiked and unspiked samples, a percent recovery is calculated. Many samples show matrix effects in which other sample components interfere with the determination of the analyte. The value of the percent recovery indicates the extent of the interference. A *matrix spike* is prepared by adding an analyte to a subsample of a field sample before sample preparation and analysis. An *analytical spike* is prepared by adding analyte to an aliquot of a processed sample prior to analysis, and is used to determine whether the analysis system provides results that are representative of the sample when a matrix spike is outside its limits. A post-digestions spike is an example of an analytical spike.

2.5.2.4 Laboratory Control Samples (Verification Solutions)

A laboratory control sample (LCS), or a blank spike, is an aqueous or solid control sample of known composition that is analyzed using the same sample preparation, reagents, and analytical methods employed for the project samples. An LCS is obtained from an outside source or is prepared in the laboratory by spiking reagent water or a clean solid matrix for a stock solution that is different than that used for the calibration standards. The LCS is the primary indicator of process control used to demonstrate whether the sample preparation and analytical steps are in control, apart from sample matrix effects. LCSs contain the target analytes identified in the method.

2.5.2.5 Laboratory Duplicate Samples

Duplicate samples are samples that have been divided into two portions at some step in the measurement process. Each portion is then carried through the remaining steps of the process. Duplicate samples provide information on the precision of the operations involved. Analytical duplicates are a pair of subsamples from a field sample that are taken through the entire preparation and analysis procedure; any difference between the results indicates the precision of the entire method in the given matrix. Under the laboratory protocols, the matrix spike is duplicated to provide a matrix spike duplicate. Matrix spike duplicates will be prepared for every analytical batch of at least 10 samples. Analytical duplicates are prepared by taking two aliquots of a process sample and analyzing them in the same manner. Both matrix and analytical spike duplicates are used to monitor the precision of the analytical process.

2.5.2.6 Performance Evaluation Samples

Project-specific laboratory performance evaluations via performance evaluate samples are not anticipated as part of this site characterization, but may be performed at P4's option, or as directed by the oversight agencies/tribes, if analytical or validation exercises indicate the presence of potential laboratory QA issues.

2.6 INSTRUMENT/EQUIPMENT CALIBRATION AND MAINTENANCE REQUIREMENTS

2.6.1 Field Equipment

For this sampling program, there is no field equipment that will be used which requires calibration.

2.6.2 Laboratory Equipment

2.6.2.1 Instrumentation Requiring Calibration

All analytical measurement instruments and equipment used by the laboratories will be controlled by a formal calibration and preventive maintenance program. At a minimum, each laboratory program will require that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. All instruments and equipment that measure a quantity, or whose performance is expected at a stated level, are subject to calibration. In addition, each laboratory's preventive maintenance program will include the following, as a minimum:

- A listing of the instruments and equipment that will be used in the project
- The frequency of maintenance considering manufacturer's recommendations and previous experience with the equipment
- A file for each instrument containing a list of spare parts maintained, external contracts, and a listing of the items to be checked or serviced during maintenance

2.6.2.2 Calibration Methods

Physical and chemical calibrations will be performed within each laboratory as described in this subsection. Physical calibration refers to physical measurements that are made on equipment to verify or provide corrections to the observed data. Calibration acceptance criteria for analytical methods are summarized for EPA Methods 6020A, 6010B/C, 7470A/7471A, and 7196A on Tables 1-4 through 1-7, respectively. Physical calibrations will be documented on data sheets that are

designed for each specific application. At a minimum, the information record will include the date, analyst, instrument identification, identification of reference standard, expected values, measured values, and correction factors, if applicable.

Chemical calibration or standardization refers to operations in which instrument response is related to analyzed concentration. The minimum requirements for chemical calibration will be as specified in the applicable method. Chemical calibrations consist of initial and continuing calibrations, which are documented in several ways depending on the type of instrument. For non-computerized data systems such as strip chart recorders and meter readouts, the instrument responses will be transcribed, along with other pertinent information, onto data sheets for each specific analysis. When computerized data systems are used, the data will be collected and stored in computer files, as well as hard-copy printouts, which may either be included with the data package or kept in a central record. With computerized data systems, the run logs provide a cross-reference to the calibration runs. At a minimum, the information recorded for the calibrations will include the data, analyst, instrument identification, standard identification and concentrations, raw instrument responses, file descriptor, and calibration parameters such as regression coefficients, correlation coefficients, or response and calibration factors.

Initial calibration consists of the establishment of a calibration or standard curve, which associates instrument response and analyzed concentration. The curve is constructed by measuring the responses of a series of standard solutions containing the analytes of interest at known concentrations. This initial calibration will be verified each working day by measurement of one or more calibration standards.

2.6.2.3 Calibration Apparatus

The use of calibration apparatus will be according to the manufacturer's instructions or the laboratories' SOPs.

2.6.2.4 Calibration Standards

Primary standards will be obtained as either neat materials, which will be used to prepare stock standard solutions, or as prepared solutions to be used as stock standards. Records will be maintained on primary standards that include date of receipt, source, purity, composition, storage conditions, and expiration dates. Primary standards will be traceable to National Institute of Standards and Technology standards, or will be vendor-certified. The preparation of stock, intermediate, and working standard solutions will be documented in standards preparation logbooks. Each stock, intermediate, and working standard will be assigned a number to permit traceability of preparation from stock to working standards and to reference the analysis of the standards. Logbooks will be completed by the appropriate analysts as they prepare standards and will be subject to supervisory review. At a minimum, working standards will be labeled with preparation data, and the number or designation of the logbook where information on the standard is recorded. Measurements made during standards preparation will also be recorded.

2.6.2.5 Calibration Frequency

The frequency of instrument calibration will be according to the manufacturer's instructions and is summarized for EPA Methods 6020A, 6010B/C, 7470A/7471A, and 7196A on Tables 1-4 through 1-7, respectively.

2.7 DATA ACQUISITION, VALIDATION, REVIEW AND REPORTING

2.7.1 Field Data

Raw field measurements and observations will be entered in field notebooks. Sample collection information will be recorded on each chain-of-custody form. These documents and records will be reviewed for completeness by the Field Team Leader at the end of each day. The overall quality of the field data from any given sampling round will be further evaluated during the process of data validation as described below.

2.7.2 Laboratory Data Validation

Any anomaly or problem encountered during receipt, preparation, or analysis of samples will be documented in the laboratory's case narrative (see Section 1.6.3) as part of the hard-copy deliverable for each data package. The laboratories will establish calibration curves and calculation of sample concentrations from instrument responses. Raw laboratory data will be converted to sample concentrations using formulas defined by applicable laboratory SOPs. The calculations will be performed by computerized data systems interfaced to the instruments, by personal calculators, or through programs installed on stand-alone personal computers. Each laboratory analyst will be responsible for the reduction of the raw data that they generate. At a minimum, such activities will include:

- Reduction of raw data generated to reportable values
- An initial review of analytical and quality control data
- Performance of manual calculations and transfer of data onto forms, laboratory reports, and laboratory databases
- Preparation of computer files for instrumental calculations
- Generation of data forms for the analytical reports
- Copying of relevant forms and logs for inclusion in the laboratory reports
- Submittal of the laboratory report to a supervisor for a QA/QC review
- Resolution of discrepancies noted during the QA/QC review

For non-instrument methods and for methods using instruments without computerized data systems that require manual calculations, the responsible analyst will enter bench-generated data into bound laboratory workbooks with form-specific instrument responses, standard and spike concentrations, sample numbers, and other pertinent information. For instruments that are directly coupled to computerized data systems, raw data consist of instrument responses in the form of printer output or computer-generated data files. Printer output will be filed by sample batch, and the data files archived on disk or magnetic tape. Computer data files will be identified by unique, sequential descriptors cross-referenced in the run logs to the analysis sequence. At a minimum, strip chart recordings will be labeled with the following information:

- Sample identification number
- Date and time of analysis
- Instrument identification
- Name of analyst(s)
- Applicable operational parameters
- Date file identification
- Positively identified elements or compounds

2.7.3 Data Verification and Validation

The following definitions are provided in *Guidance for Quality Assurance Project Plans* (USEPA, 2002):

- Verification – the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications.
- Validation – an analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set.

Based on these definitions, the 3rd-pary validator technically will be performing data verification of the sample, calibration, and QC data provided by the laboratory against the criteria specified in this QAPP. The validator will use the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA, 2004) as a basis for performing data verification and qualification of data. Where appropriate, specific references to the USEPA Functional Guidelines, as well as additional detail and/or deviation from that guidance, is detailed for EPA Methods 6020A, 6010B/C, 7470A/7471A, and 7196A on Tables 1-4 through 1-7, respectively. The validator will document the data verification process on their in-house worksheets and summarize the results in data validation reports (templates provided in Appendix C).

The validator will use the following data qualifiers ("USEPA Flag"):

U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximated concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The result is unusable. The sample result is rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

And the following "Reason Codes":

1	Holding Time
2	Sample Preservation (including receipt temperature)
3	Sample Custody
4	Missing Deliverable
5	ICPMS Tune
6	Initial Calibration
7	Initial Calibration Verification
8	Continuing Calibration Verification
9	Low-Level Calibration Check Sample

10 Calibration Blank
11 Laboratory or Preparation Blank
12 ICPMS or ICP Interference Check Standard
13 Laboratory Control Sample or Laboratory Control Sample Duplicate Recovery
14 Laboratory Control Sample Precision
15 Laboratory Duplicate Precision
16 Matrix Spike or Matrix Spike Duplicate Recovery
17 Matrix Spike/Matrix Spike Duplicate Precision
18 ICPMS or ICP Serial Dilution
19 ICPMS Internal Standard
20 Field Replicate Precision
21 Equipment Rinsate Blank
22 Linear Range Exceeded
23 Other reason

The validator will populate an MWH-supplied electronic data deliverable (EDD) with the following data:

- Field Header "USEPA Flag": Populate with USEPA flags specified above and in template reports.
- Field Header "Reason Code": Populate with all applicable Reason Codes as specified above and in template reports.
- Field Header "Final Result": Populate with the final, qualified result, including any adjustment based on blank contamination.

The validator will perform USEPA Stage 2B verification/validation (USEPA, 2009) on approximately 90 percent of sample data and USEPA Stage 4 verification/validation on the remaining 10 percent of sample data.

The MWH Program Quality Manager will take the lead on validating the verified data. Data will be tabulated and assessed against the screening values. The reporting limits associated with non-detected values will be reviewed against the screening limits to evaluate whether the reported results are sufficiently sensitive as compared to the screening values. Results that are estimated (J+ or J-) will be assessed for impact on data usability. Rejected results, as well as any sample that could not be collected or analyzed for any reason, will be evaluated, and a data-gap assessment will be performed and documented in the report.

2.7.4 Data Analysis and Reporting

A report will be prepared at the direction of the MWH Program Manager to address the information needs of P4 and regulatory agencies and tribes. Concentrations of equipment rinsate blank samples will be expressed in terms of weight per unit volume (mg/L) for metals. Concentrations of solid matrices (soil and vegetation samples) will be expressed in terms of weight per unit weight of the dried sample (mg/kg dw) for metals. The number of significant figures in the field and laboratory data presented in the final report will be consistent with the limits of uncertainty inherent in the measurement or analytical method. For the derivation of preliminary, risk-based benchmark concentrations, results are reported to one significant figure. Therefore, two significant figures will be retained for inputs to the risk model to minimize rounding error.

2.7.5 Data Storage and Retrieval

All field and laboratory records with accompanying data assessment summary forms will be archived as part of the project quality records. All records will be stored for a minimum of five years. In addition, MWH will maintain an electronic database to support the hard-copy record system.

3.0 ASSESSMENT/OVERSIGHT

3.1 FIELD AUDIT

MWH's Quality Manager or designee will conduct an onsite systems audit of field sampling practices during sampling activities. Any nonconformance observed in the audit will be documented and resolved. The oversight agencies/tribes may request and/or carry out additional field audits.

3.2 LABORATORY AUDITS

As previously noted, laboratory performance audit samples will not be prepared for this site characterization. On-site audits of the laboratories are not scheduled to be conducted. Microbac, and Test America are each certified via National Environmental Laboratory Accreditation Program (NELAP). The oversight agencies/tribes may request and/or carry out laboratory audits.

3.3 INDEPENDENT TECHNICAL REVIEW

An independent technical review will be performed by the Program Manager or designee for all draft and final project reports. All comments will be resolved and incorporated prior to any client submittals.

3.4 CORRECTIVE AND PREVENTIVE ACTION

Any nonconformance with approved FSP requirements that may be observed in the field audit will be promptly evaluated and resolved.

4.0 REFERENCES

United States Environmental Protection Agency (USEPA), 2002. *Guidance for Quality Assurance Project Plans*. EPA/240/R-02/009. Prepared by the USEPA Office of Environmental Information, Washington, DC. December.

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

USEPA, 2006. *Guidance on Systematic Planning Using the Data Quality Objective Process*. EPA/240/B-06/001. Prepared by the USEPA Office of Environmental Information, Washington, DC. February.

USEPA, 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*. EPA 45-R-08-005. Office of Solid Waste and Emergency Response. January 13.

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TABLES

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TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-01-SS	MWD080-01	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-01-VE	MWD080-01	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-03-SS	MWD080-03	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-03-VE	MWD080-03	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-04-SS	MWD080-04	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-04-VE	MWD080-04	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-05-SS	MWD080-05	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-05-VE	MWD080-05	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-07-SS-1	MWD080-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-07-SS-2	MWD080-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-07-SS-3	MWD080-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-07-VE-1	MWD080-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-07-VE-2	MWD080-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-07-VE-3	MWD080-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-08-SS	MWD080-08	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-08-VE	MWD080-08	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-09-SS	MWD080-09	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-09-VE	MWD080-09	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-10-SS	MWD080-10	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-10-VE	MWD080-10	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-01-SS	MWD081-01	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-01-VE	MWD081-01	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-02-SS	MWD081-02	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-02-VE	MWD081-02	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-03-SS	MWD081-03	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-03-VE	MWD081-03	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-05-SS	MWD081-05	Soil	Primary	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-05-VE	MWD081-05	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-06-SS	MWD081-06	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-06-VE	MWD081-06	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-07-SS-1	MWD081-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-07-SS-2	MWD081-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-07-SS-3	MWD081-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-07-VE-1	MWD081-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-07-VE-2	MWD081-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-07-VE-3	MWD081-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-08-SS	MWD081-08	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-08-VE	MWD081-08	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-09-SS	MWD081-09	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-09-VE	MWD081-09	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-10-SS	MWD081-10	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-10-VE	MWD081-10	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-02-SS	MWD082-02	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-02-VE	MWD082-02	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-02-SS	MWD082-03	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-03-VE	MWD082-03	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-04-SS	MWD082-04	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-04-VE	MWD082-04	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-05-SS	MWD082-05	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-05-VE	MWD082-05	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-06-SS	MWD082-06	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-06-VE	MWD082-06	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-07-SS-1	MWD082-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-07-SS-2	MWD082-07	Soil	Triplicate	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pit #3 OB Dump	0906-MWD082-07-SS-3	MWD082-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-07-VE-1	MWD082-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-07-VE-2	MWD082-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-07-VE-3	MWD082-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-08-SS	MWD082-08	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-08-VE	MWD082-08	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-09-SS	MWD082-09	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-09-VE	MWD082-09	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-10-SS	MWD082-10	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-10-VE	MWD082-10	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-02-SS	MWD083-02	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-02-VE	MWD083-02	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-03-SS	MWD083-03	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-03-VE	MWD083-03	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-04-SS	MWD083-04	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-04-VE	MWD083-04	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-05-SS	MWD083-05	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-05-VE	MWD083-05	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-06-SS	MWD083-06	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-06-VE	MWD083-06	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-07-SS-1	MWD083-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-07-SS-2	MWD083-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-07-SS-3	MWD083-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-07-VE-1	MWD083-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-07-VE-2	MWD083-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-07-VE-3	MWD083-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-08-SS	MWD083-08	Soil	Primary	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pit #4 OB Dump	0906-MWD083-08-VE	MWD083-08	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-09-SS	MWD083-09	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-09-VE	MWD083-09	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-10-SS	MWD083-10	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-10-VE	MWD083-10	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-01-SS	MWD084-01	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-01-VE	MWD084-01	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-02-SS	MWD084-02	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-02-VE	MWD084-02	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-03-SS	MWD084-03	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-03-VE	MWD084-03	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-04-SS	MWD084-04	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-04-VE	MWD084-04	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-06-SS	MWD084-06	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-06-VE	MWD084-06	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-07-SS-1	MWD084-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-07-SS-2	MWD084-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-07-SS-3	MWD084-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-07-VE-1	MWD084-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-07-VE-2	MWD084-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-07-VE-3	MWD084-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-08-SS	MWD084-08	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-08-VE	MWD084-08	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-09-SS	MWD084-09	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-09-VE	MWD084-09	Vegetation	Primary	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-10-SS	MWD084-10	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-10-VE	MWD084-10	Vegetation	Primary	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(5 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pit #2 OB Dump	0906-MWD093-01-SS	MWD093-01	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-01-VE	MWD093-01	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-03-SS	MWD093-03	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-03-VE	MWD093-03	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-04-SS	MWD093-04	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-04-VE	MWD093-04	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-05-SS	MWD093-05	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-05-VE	MWD093-05	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-06-SS	MWD093-06	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-06-VE	MWD093-06	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-07-SS-1	MWD093-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-07-SS-2	MWD093-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-07-SS-3	MWD093-07	Soil	Triplicate	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-07-VE-1	MWD093-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-07-VE-2	MWD093-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-07-VE-3	MWD093-07	Vegetation	Triplicate	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-08-SS	MWD093-08	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-08-VE	MWD093-08	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-09-SS	MWD093-09	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-09-VE	MWD093-09	Vegetation	Primary	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-10-SS	MWD093-10	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-10-VE	MWD093-10	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-01-SS	MMP035-01	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-01-VE	MMP035-01	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-02-SS	MMP035-02	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-02-VE	MMP035-02	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-03-SS	MMP035-03	Soil	Primary	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Partially Backfilled Pit	0906-MMP035-03-VE	MMP035-03	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-04-SS	MMP035-04	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-04-VE	MMP035-04	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-05-SS	MMP035-05	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-05-VE	MMP035-05	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-07-SS-1	MMP035-07	Soil	Triplicate	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-07-SS-2	MMP035-07	Soil	Triplicate	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-07-SS-3	MMP035-07	Soil	Triplicate	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-07-VE-1	MMP035-07	Vegetation	Triplicate	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-07-VE-2	MMP035-07	Vegetation	Triplicate	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-07-VE-3	MMP035-07	Vegetation	Triplicate	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-08-SS	MMP035-08	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-08-VE	MMP035-08	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-09-SS	MMP035-09	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-09-VE	MMP035-09	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-10-SS	MMP035-10	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-10-VE	MMP035-10	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-01-SS	MMP036-01	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-01-VE	MMP036-01	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-02-SS	MMP036-02	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-02-VE	MMP036-02	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-03-SS	MMP036-03	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-03-VE	MMP036-03	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-05-SS	MMP036-05	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-05-VE	MMP036-05	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-06-SS	MMP036-06	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-06-VE	MMP036-06	Vegetation	Primary	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Partially Backfilled Pit	0906-MMP036-07-SS-1	MMP036-07	Soil	Triplicate	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-07-SS-2	MMP036-07	Soil	Triplicate	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-07-SS-3	MMP036-07	Soil	Triplicate	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-07-VE-1	MMP036-07	Vegetation	Triplicate	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-07-VE-2	MMP036-07	Vegetation	Triplicate	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-07-VE-3	MMP036-07	Vegetation	Triplicate	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-08-SS	MMP036-08	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-08-VE	MMP036-08	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-09-SS	MMP036-09	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-09-VE	MMP036-09	Vegetation	Primary	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-10-SS	MMP036-10	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-10-VE	MMP036-10	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-01-SS	MHR001-01	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-01-VE	MHR001-01	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-02-SS	MHR001-02	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-02-VE	MHR001-02	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-03-SS	MHR001-03	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-03-VE	MHR001-03	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-05-SS	MHR001-05	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-05-VE	MHR001-05	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-06-SS	MHR001-06	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-06-VE	MHR001-06	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-07-SS-1	MHR001-07	Soil	Triplicate	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-07-SS-2	MHR001-07	Soil	Triplicate	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-07-SS-3	MHR001-07	Soil	Triplicate	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-07-VE-1	MHR001-07	Vegetation	Triplicate	X	X	X	
Ballard	Haul Road #1	0906-MHR001-07-VE-2	MHR001-07	Vegetation	Triplicate	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(8 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Haul Road #1	0906-MHR001-07-VE-3	MHR001-07	Vegetation	Triplicate	X	X	X	
Ballard	Haul Road #1	0906-MHR001-08-SS	MHR001-08	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-08-VE	MHR001-08	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-09-SS	MHR001-09	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-09-VE	MHR001-09	Vegetation	Primary	X	X	X	
Ballard	Haul Road #1	0906-MHR001-10-SS	MHR001-10	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-10-VE	MHR001-10	Vegetation	Primary	X	X	X	
Ballard	Historic Facility	0906-MBS001-01-SS	MBS001-01	Soil	Primary	X	X	X	X
Ballard	Historic Facility	0906-MBS001-01-VE	MBS001-01	Vegetation	Primary	X	X	X	
Ballard	Historic Facility	0906-MBS001-02-SS	MBS001-02	Soil	Primary	X	X	X	X
Ballard	Historic Facility	0906-MBS001-02-VE	MBS001-02	Vegetation	Primary	X	X	X	
Ballard	Historic Facility	0906-MBS001-04-SS	MBS001-04	Soil	Primary	X	X	X	X
Ballard	Historic Facility	0906-MBS001-04-VE	MBS001-04	Vegetation	Primary	X	X	X	
Ballard	Historic Facility	0906-MBS001-05-SS	MBS001-05	Soil	Primary	X	X	X	X
Ballard	Historic Facility	0906-MBS001-05-VE	MBS001-05	Vegetation	Primary	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-04-SS	MWD085-04	Soil	Primary	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-04-VE	MWD085-04	Vegetation	Primary	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-05-SS	MWD085-05	Soil	Primary	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-05-VE	MWD085-05	Vegetation	Primary	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-06-SS	MWD085-06	Soil	Primary	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-06-VE	MWD085-06	Vegetation	Primary	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-07-SS-1	MWD085-07	Soil	Triplicate	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-07-SS-2	MWD085-07	Soil	Triplicate	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-07-SS-3	MWD085-07	Soil	Triplicate	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-07-VE-1	MWD085-07	Vegetation	Triplicate	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-07-VE-2	MWD085-07	Vegetation	Triplicate	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-07-VE-3	MWD085-07	Vegetation	Triplicate	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(9 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	North Pit OB Dump	0906-MWD085-08-SS	MWD085-08	Soil	Primary	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-08-VE	MWD085-08	Vegetation	Primary	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-09-SS	MWD085-09	Soil	Primary	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-09-VE	MWD085-09	Vegetation	Primary	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-10-SS	MWD085-10	Soil	Primary	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-10-VE	MWD085-10	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-01-SS	MWD086-01	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-01-VE	MWD086-01	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-02-SS	MWD086-02	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-02-VE	MWD086-02	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-03-SS	MWD086-03	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-03-VE	MWD086-03	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-04-SS	MWD086-04	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-04-VE	MWD086-04	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-05-SS	MWD086-05	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-05-VE	MWD086-05	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-06-SS	MWD086-06	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-06-VE	MWD086-06	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-08-SS	MWD086-08	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-08-VE	MWD086-08	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-09-SS	MWD086-09	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-09-VE	MWD086-09	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-10-SS	MWD086-10	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-10-VE	MWD086-10	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-01-SS	MWD087-01	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-01-VE	MWD087-01	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-02-SS	MWD087-02	Soil	Primary	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(10 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-02-VE	MWD087-02	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-03-SS	MWD087-03	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-03-VE	MWD087-03	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-04-SS	MWD087-04	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-04-VE	MWD087-04	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-05-SS	MWD087-05	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-05-VE	MWD087-05	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-07-SS-1	MWD087-07	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-07-SS-2	MWD087-07	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-07-SS-3	MWD087-07	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-07-VE-1	MWD087-07	Vegetation	Triplicate	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-07-VE-2	MWD087-07	Vegetation	Triplicate	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-07-VE-3	MWD087-07	Vegetation	Triplicate	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-08-SS	MWD087-08	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-08-VE	MWD087-08	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-09-SS	MWD087-09	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-09-VE	MWD087-09	Vegetation	Primary	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-10-SS	MWD087-10	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-10-VE	MWD087-10	Vegetation	Primary	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-01-SS-1	MWD088-01	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-01-SS-2	MWD088-01	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-01-SS-3	MWD088-01	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-01-VE-1	MWD088-01	Vegetation	Triplicate	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-01-VE-2	MWD088-01	Vegetation	Triplicate	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-01-VE-3	MWD088-01	Vegetation	Triplicate	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-03-SS	MWD088-03	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-03-VE	MWD088-03	Vegetation	Primary	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(11 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Mine Pit #2 OB Dump	0906-MWD088-04-SS	MWD088-04	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-04-VE	MWD088-04	Vegetation	Primary	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-05-SS	MWD088-05	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-05-VE	MWD088-05	Vegetation	Primary	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-06-SS	MWD088-06	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-06-VE	MWD088-06	Vegetation	Primary	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-07-SS	MWD088-07	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-07-VE	MWD088-07	Vegetation	Primary	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-08-SS	MWD088-08	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-08-VE	MWD088-08	Vegetation	Primary	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-10-SS	MWD088-10	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-10-VE	MWD088-10	Vegetation	Primary	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-01-SS	MWD090-01	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-01-VE	MWD090-01	Vegetation	Primary	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-03-SS	MWD090-03	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-03-VE	MWD090-03	Vegetation	Primary	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-05-SS	MWD090-05	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-05-VE	MWD090-05	Vegetation	Primary	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-06-SS	MWD090-06	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-06-VE	MWD090-06	Vegetation	Primary	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-07-SS-1	MWD090-07	Soil	Triplicate	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-07-SS-2	MWD090-07	Soil	Triplicate	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-07-SS-3	MWD090-07	Soil	Triplicate	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-07-VE-1	MWD090-07	Vegetation	Triplicate	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-07-VE-2	MWD090-07	Vegetation	Triplicate	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-07-VE-3	MWD090-07	Vegetation	Triplicate	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-08-SS	MWD090-08	Soil	Primary	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	South Pit OB Dump	0906-MWD090-08-VE	MWD090-08	Vegetation	Primary	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-09-SS	MWD090-09	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-09-VE	MWD090-09	Vegetation	Primary	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-10-SS	MWD090-10	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-10-VE	MWD090-10	Vegetation	Primary	X	X	X	
Henry	Haul Road #2	0906-MHR002-01-SS	MHR002-01	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-01-VE	MHR002-01	Vegetation	Primary	X	X	X	
Henry	Haul Road #2	0906-MHR002-02-SS	MHR002-02	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-02-VE	MHR002-02	Vegetation	Primary	X	X	X	
Henry	Haul Road #2	0906-MHR002-03-SS	MHR002-03	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-03-VE	MHR002-03	Vegetation	Primary	X	X	X	
Henry	Haul Road #2	0906-MHR002-05-SS	MHR002-05	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-05-VE	MHR002-05	Vegetation	Primary	X	X	X	
Henry	Haul Road #2	0906-MHR002-06-SS	MHR002-06	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-06-VE	MHR002-06	Vegetation	Primary	X	X	X	
Henry	Haul Road #2	0906-MHR002-07-SS-1	MHR002-07	Soil	Triplicate	X	X	X	X
Henry	Haul Road #2	0906-MHR002-07-SS-2	MHR002-07	Soil	Triplicate	X	X	X	X
Henry	Haul Road #2	0906-MHR002-07-SS-3	MHR002-07	Soil	Triplicate	X	X	X	X
Henry	Haul Road #2	0906-MHR002-07-VE-1	MHR002-07	Vegetation	Triplicate	X	X	X	
Henry	Haul Road #2	0906-MHR002-07-VE-2	MHR002-07	Vegetation	Triplicate	X	X	X	
Henry	Haul Road #2	0906-MHR002-07-VE-3	MHR002-07	Vegetation	Triplicate	X	X	X	
Henry	Haul Road #2	0906-MHR002-08-SS	MHR002-08	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-08-VE	MHR002-08	Vegetation	Primary	X	X	X	
Henry	Haul Road #2	0906-MHR002-09-SS	MHR002-09	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-09-VE	MHR002-09	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-01-SS	MWD091N-01	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-01-VE	MWD091N-01	Vegetation	Primary	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(13 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Enoch Valley	South Dump	0906-MWD091N-02-SS	MWD091N-02	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-02-VE	MWD091N-02	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-03-SS	MWD091N-03	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-03-VE	MWD091N-03	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-05-SS	MWD091N-05	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-05-VE	MWD091N-05	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-08-SS	MWD091N-08	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-08-VE	MWD091N-08	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-09-SS	MWD091N-09	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-09-VE	MWD091N-09	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-01-SS	MWD091S-01	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-01-VE	MWD091S-01	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-02-SS	MWD091S-02	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-02-VE	MWD091S-02	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-04-SS	MWD091S-04	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-04-VE	MWD091S-04	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-05-SS	MWD091S-05	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-05-VE	MWD091S-05	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-06-SS	MWD091S-06	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-06-VE	MWD091S-06	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-08-SS	MWD091S-08	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-08-VE	MWD091S-08	Vegetation	Primary	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-09-SS	MWD091S-09	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-09-VE	MWD091S-09	Vegetation	Primary	X	X	X	
Enoch Valley	North Dump	0906-MWD092-01-SS	MWD092-01	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-01-VE	MWD092-01	Vegetation	Primary	X	X	X	
Enoch Valley	North Dump	0906-MWD092-02-SS	MWD092-02	Soil	Primary	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(14 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Enoch Valley	North Dump	0906-MWD092-02-VE	MWD092-02	Vegetation	Primary	X	X	X	
Enoch Valley	North Dump	0906-MWD092-03-SS	MWD092-03	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-03-VE	MWD092-03	Vegetation	Primary	X	X	X	
Enoch Valley	North Dump	0906-MWD092-05-SS	MWD092-05	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-05-VE	MWD092-05	Vegetation	Primary	X	X	X	
Enoch Valley	North Dump	0906-MWD092-06-SS	MWD092-06	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-06-VE	MWD092-06	Vegetation	Primary	X	X	X	
Enoch Valley	North Dump	0906-MWD092-07-SS-1	MWD092-07	Soil	Triplicate	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-07-SS-2	MWD092-07	Soil	Triplicate	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-07-SS-3	MWD092-07	Soil	Triplicate	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-07-VE-1	MWD092-07	Vegetation	Triplicate	X	X	X	
Enoch Valley	North Dump	0906-MWD092-07-VE-2	MWD092-07	Vegetation	Triplicate	X	X	X	
Enoch Valley	North Dump	0906-MWD092-07-VE-3	MWD092-07	Vegetation	Triplicate	X	X	X	
Enoch Valley	North Dump	0906-MWD092-08-SS	MWD092-08	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-08-VE	MWD092-08	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MAR001-01-SS	MAR001-01	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MAR001-01-VE	MAR001-01	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MAR001-02-SS	MAR001-02	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MAR001-02-VE	MAR001-02	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MAR001-03-SS	MAR001-03	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MAR001-03-VE	MAR001-03	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MAR001-04-SS	MAR001-04	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MAR001-04-VE	MAR001-04	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MAR001-05-SS	MAR001-05	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MAR001-05-VE	MAR001-05	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MTA001-01-SS	MTA001-01	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MTA001-01-VE	MTA001-01	Vegetation	Primary	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(15 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Enoch Valley	Active Facility	0906-MTA001-02-SS	MTA001-02	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MTA001-02-VE	MTA001-02	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MTA001-03-SS	MTA001-03	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MTA001-03-VE	MTA001-03	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MTA001-04-SS	MTA001-04	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MTA001-04-VE	MTA001-04	Vegetation	Primary	X	X	X	
Enoch Valley	Active Facility	0906-MTA001-05-SS	MTA001-05	Soil	Primary	X	X	X	X
Enoch Valley	Active Facility	0906-MTA001-05-VE	MTA001-05	Vegetation	Primary	X	X	X	
Ballard	Background	0906-MBB001-02-SS	MBB001-02	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-02-VE	MBB001-02	Vegetation	Primary	X	X	X	
Ballard	Background	0906-MBB001-03-SS	MBB001-03	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-03-VE	MBB001-03	Vegetation	Primary	X	X	X	
Ballard	Background	0906-MBB001-04-SS	MBB001-04	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-04-VE	MBB001-04	Vegetation	Primary	X	X	X	
Ballard	Background	0906-MBB001-06-SS	MBB001-06	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-06-VE	MBB001-06	Vegetation	Primary	X	X	X	
Ballard	Background	0906-MBB001-07-SS-1	MBB001-07	Soil	Triplicate	X	X	X	X
Ballard	Background	0906-MBB001-07-SS-2	MBB001-07	Soil	Triplicate	X	X	X	X
Ballard	Background	0906-MBB001-07-SS-3	MBB001-07	Soil	Triplicate	X	X	X	X
Ballard	Background	0906-MBB001-07-VE-1	MBB001-07	Vegetation	Triplicate	X	X	X	
Ballard	Background	0906-MBB001-07-VE-2	MBB001-07	Vegetation	Triplicate	X	X	X	
Ballard	Background	0906-MBB001-07-VE-3	MBB001-07	Vegetation	Triplicate	X	X	X	
Ballard	Background	0906-MBB001-09-SS	MBB001-09	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-09-VE	MBB001-09	Vegetation	Primary	X	X	X	
Henry	Background A [d]	0906-MBH001-01-SS	MBH001-01	Soil	Primary	X	X	X	X
Henry	Background A [d]	0906-MBH001-01-VE	MBH001-01	Vegetation	Primary	X	X	X	
Henry	Background A [d]	0906-MBH001-02-SS	MBH001-02	Soil	Primary	X	X	X	X

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(16 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Background A [d]	0906-MBH001-02-VE	MBH001-02	Vegetation	Primary	X	X	X	
Henry	Background A [d]	0906-MBH001-03-SS	MBH001-03	Soil	Primary	X	X	X	X
Henry	Background A [d]	0906-MBH001-03-VE	MBH001-03	Vegetation	Primary	X	X	X	
Henry	Background A [d]	0906-MBH001-04-SS	MBH001-04	Soil	Primary	X	X	X	X
Henry	Background A [d]	0906-MBH001-04-VE	MBH001-04	Vegetation	Primary	X	X	X	
Henry	Background A [d]	0906-MBH001-06-SS	MBH001-06	Soil	Primary	X	X	X	X
Henry	Background A [d]	0906-MBH001-06-VE	MBH001-06	Vegetation	Primary	X	X	X	
Henry	Background A [d]	0906-MBH001-07-SS-1	MBH001-07	Soil	Triplicate	X	X	X	X
Henry	Background A [d]	0906-MBH001-07-SS-2	MBH001-07	Soil	Triplicate	X	X	X	X
Henry	Background A [d]	0906-MBH001-07-SS-3	MBH001-07	Soil	Triplicate	X	X	X	X
Henry	Background A [d]	0906-MBH001-07-VE-1	MBH001-07	Vegetation	Triplicate	X	X	X	
Henry	Background A [d]	0906-MBH001-07-VE-2	MBH001-07	Vegetation	Triplicate	X	X	X	
Henry	Background A [d]	0906-MBH001-07-VE-3	MBH001-07	Vegetation	Triplicate	X	X	X	
Henry	Background A [d]	0906-MBH001-09-SS	MBH001-09	Soil	Primary	X	X	X	X
Henry	Background A [d]	0906-MBH001-09-VE	MBH001-09	Vegetation	Primary	X	X	X	
Henry	Background B [d]	0906-MBH002-01-SS	MBH002-01	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-01-VE	MBH002-01	Vegetation	Primary	X	X	X	
Henry	Background B [d]	0906-MBH002-02-SS	MBH002-02	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-02-VE	MBH002-02	Vegetation	Primary	X	X	X	
Henry	Background B [d]	0906-MBH002-03-SS	MBH002-03	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-03-VE	MBH002-03	Vegetation	Primary	X	X	X	
Henry	Background B [d]	0906-MBH002-04-SS	MBH002-04	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-04-VE	MBH002-04	Vegetation	Primary	X	X	X	
Henry	Background B [d]	0906-MBH002-06-SS	MBH002-06	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-06-VE	MBH002-06	Vegetation	Primary	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(17 of 18)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Background B [d]	0906-MBH002-07-SS-1	MBH002-07	Soil	Triplicate	X	X	X	X
Henry	Background B [d]	0906-MBH002-07-SS-2	MBH002-07	Soil	Triplicate	X	X	X	X
Henry	Background B [d]	0906-MBH002-07-SS-3	MBH002-07	Soil	Triplicate	X	X	X	X
Henry	Background B [d]	0906-MBH002-07-VE-1	MBH002-07	Vegetation	Triplicate	X	X	X	
Henry	Background B [d]	0906-MBH002-07-VE-2	MBH002-07	Vegetation	Triplicate	X	X	X	
Henry	Background B [d]	0906-MBH002-07-VE-3	MBH002-07	Vegetation	Triplicate	X	X	X	
Henry	Background B [d]	0906-MBH002-09-SS	MBH002-09	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-09-VE	MBH002-09	Vegetation	Primary	X	X	X	
Enoch Valley	Background	0906-MBE001-02-SS	MBE001-02	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-02-VE	MBE001-02	Vegetation	Primary	X	X	X	
Enoch Valley	Background	0906-MBE001-03-SS	MBE001-03	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-03-VE	MBE001-03	Vegetation	Primary	X	X	X	
Enoch Valley	Background	0906-MBE001-04-SS	MBE001-04	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-04-VE	MBE001-04	Vegetation	Primary	X	X	X	
Enoch Valley	Background	0906-MBE001-05-SS	MBE001-05	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-05-VE	MBE001-05	Vegetation	Primary	X	X	X	
Enoch Valley	Background	0906-MBE001-06-SS	MBE001-06	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-06-VE	MBE001-06	Vegetation	Primary	X	X	X	
Enoch Valley	Background	0906-MBE001-08-SS	MBE001-08	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-08-VE	MBE001-08	Vegetation	Primary	X	X	X	
Enoch Valley	Background	0906-MBE001-10-SS	MBE001-10	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-10-VE	MBE001-10	Vegetation	Primary	X	X	X	
na	Field QC [f]	0906-ER-SS-##	na	Water	ER-Soil	X	X	X	
na	Field QC [f]	0906-ER-VE-##	na	Water	ER-Veg	X	X	X	

TABLE 1-1A
SAMPLES TO BE COLLECTED
SPRING SOIL AND VEGETATION (Not by Life Form)
(18 of 18)

						Analytical Method [a]			
Mine	**Station Description**	**Field Sample Identification [e]**	**Location**	**Matrix**	**QC Sample Type**	**ICPMS Metals (SW6020A) [b]**	**ICP Metals (SW6010B) [c]**	**Mercury by CVAA (SW7470/1A)**	**Chromium VI (SW7196A)**

[a] Microbac will test samples for ICPMS (except uranium) and ICP metals, mercury, and hexavalent chromium (soil samples only). Microbac may subcontract uranium analysis to Test America.

[b] ICPMS Metals include antimony, arsenic, cadmium, chromium (III+VI, total), cobalt, copper, manganese, nickel, selenium, silver, thallium and uranium.

[c] ICP metals are boron, molybdenum, vanadium, and zinc.

[d] Based on field conditions as described in the FSP, either Background A samples or Background B samples will be collected (not both).

[e] Vegetation matrix is labeled in this table with the general (-VE) ending. Field samples will end with one of four specific vegetation designations depending on what is collected: (-GF) for grasses and forbs, (-SF) for shrub fruit, (-SL) for shrub leaves, and (-SM) for shrub stems. Field QC samples will retain the (-VE) ending.

[f] Equipment rinsate (ER) samples will be taken daily by each team and numbered sequentially. The number of ER samples will be dependent on the number of days in the field, as well as the number of equipment pieces that are rinsed following sample collection. The ER samples in Table 1-1A also apply to the vegetation life forms samples in Table 1-1B.

CVAA - cold vapor atomic absorption
ER - equipment rinsate blank sample
ICP - inductively coupled plasma-atomic emission spectrometry
ICPMS - inductive coupled plasma/mass spectrometry
ID - identification
na - not applicable
OB - overburden
QC - quality control

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-02-SS	MWD080-02	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-02-GS	MWD080-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-02-FB	MWD080-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-02-SF	MWD080-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-02-SL	MWD080-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-02-SM	MWD080-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-06-SS	MWD080-06	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #1	0906-MWD080-06-GS	MWD080-06	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD080-06-FB	MWD080-06	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #3	0906-MWD080-06-SF	MWD080-06	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #4	0906-MWD080-06-SL	MWD080-06	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #5	0906-MWD080-06-SM	MWD080-06	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-04-SS	MWD081-04	Soil	Primary	X	X	X	X
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-04-GS	MWD081-04	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-04-FB	MWD081-04	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-04-SF	MWD081-04	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-04-SL	MWD081-04	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0906-MWD081-04-SM	MWD081-04	Vegetation	LF	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-01-SS	MWD082-01	Soil	Primary	X	X	X	X
Ballard	Mine Pit #3 OB Dump	0906-MWD082-01-GS	MWD082-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-01-FB	MWD082-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-01-SF	MWD082-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-01-SL	MWD082-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #3 OB Dump	0906-MWD082-01-SM	MWD082-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-01-SS	MWD083-01	Soil	Primary	X	X	X	X
Ballard	Mine Pit #4 OB Dump	0906-MWD083-01-GS	MWD083-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-01-FB	MWD083-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-01-SF	MWD083-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-01-SL	MWD083-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #4 OB Dump	0906-MWD083-01-SM	MWD083-01	Vegetation	LF	X	X	X	

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-05-SS	MWD084-05	Soil	Primary	X	X	X	X
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-05-GS	MWD084-05	Vegetation	LF	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-05-FB	MWD084-05	Vegetation	LF	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-05-SF	MWD084-05	Vegetation	LF	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-05-SL	MWD084-05	Vegetation	LF	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0906-MWD084-05-SM	MWD084-05	Vegetation	LF	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-02-SS	MWD093-02	Soil	Primary	X	X	X	X
Ballard	Mine Pit #2 OB Dump	0906-MWD093-02-GS	MWD093-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-02-FB	MWD093-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-02-SF	MWD093-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-02-SL	MWD093-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #2 OB Dump	0906-MWD093-02-SM	MWD093-02	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-06-SS	MMP035-06	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP035-06-GS	MMP035-06	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-06-FB	MMP035-06	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-06-SF	MMP035-06	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-06-SL	MMP035-06	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP035-06-SM	MMP035-06	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-04-SS	MMP036-04	Soil	Primary	X	X	X	X
Ballard	Partially Backfilled Pit	0906-MMP036-04-GS	MMP036-04	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-04-FB	MMP036-04	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-04-SF	MMP036-04	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-04-SL	MMP036-04	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0906-MMP036-04-SM	MMP036-04	Vegetation	LF	X	X	X	
Ballard	Haul Road #1	0906-MHR001-04-SS	MHR001-04	Soil	Primary	X	X	X	X
Ballard	Haul Road #1	0906-MHR001-04-GS	MHR001-04	Vegetation	LF	X	X	X	
Ballard	Haul Road #1	0906-MHR001-04-FB	MHR001-04	Vegetation	LF	X	X	X	
Ballard	Haul Road #1	0906-MHR001-04-SF	MHR001-04	Vegetation	LF	X	X	X	
Ballard	Haul Road #1	0906-MHR001-04-SL	MHR001-04	Vegetation	LF	X	X	X	
Ballard	Haul Road #1	0906-MHR001-04-SM	MHR001-04	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-02-SS	MWD085-02	Soil	Primary	X	X	X	X

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(3 of 11)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	North Pit OB Dump	0906-MWD085-02-GS	MWD085-02	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-02-FB	MWD085-02	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-02-SF	MWD085-02	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-02-SL	MWD085-02	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-02-SM	MWD085-02	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-03-SS	MWD085-03	Soil	Primary	X	X	X	X
Henry	North Pit OB Dump	0906-MWD085-03-GS	MWD085-03	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-03-FB	MWD085-03	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-03-SF	MWD085-03	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-03-SL	MWD085-03	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0906-MWD085-03-SM	MWD085-03	Vegetation	LF	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SS-1	MWD086-07	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SS-2	MWD086-07	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SS-3	MWD086-07	Soil	Triplicate	X	X	X	X
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-GS-1	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-FB-1	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SF-1	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SL-1	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SM-1	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-GS-2	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-FB-2	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SF-2	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SL-2	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SM-2	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-GS-3	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-FB-3	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SF-3	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SL-3	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0906-MWD086-07-SM-3	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-06-SS	MWD087-06	Soil	Primary	X	X	X	X
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-06-GS	MWD087-06	Vegetation	LF	X	X	X	

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-06-FB	MWD087-06	Vegetation	LF	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-06-SF	MWD087-06	Vegetation	LF	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-06-SL	MWD087-06	Vegetation	LF	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0906-MWD087-06-SM	MWD087-06	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-02-SS	MWD088-02	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-02-GS	MWD088-02	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-02-FB	MWD088-02	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-02-SF	MWD088-02	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-02-SL	MWD088-02	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-02-SM	MWD088-02	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-09-SS	MWD088-09	Soil	Primary	X	X	X	X
Henry	Mine Pit #2 OB Dump	0906-MWD088-09-GS	MWD088-09	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-09-FB	MWD088-09	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-09-SF	MWD088-09	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-09-SL	MWD088-09	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0906-MWD088-09-SM	MWD088-09	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-02-SS	MWD090-02	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-02-GS	MWD090-02	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-02-FB	MWD090-02	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-02-SF	MWD090-02	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-02-SL	MWD090-02	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-02-SM	MWD090-02	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-04-SS	MWD090-04	Soil	Primary	X	X	X	X
Henry	South Pit OB Dump	0906-MWD090-04-GS	MWD090-04	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-04-FB	MWD090-04	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-04-SF	MWD090-04	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-04-SL	MWD090-04	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0906-MWD090-04-SM	MWD090-04	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-04-SS	MHR002-04	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-04-GS	MHR002-04	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-04-FB	MHR002-04	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-04-SF	MHR002-04	Vegetation	LF	X	X	X	

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(5 of 11)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Haul Road #2	0906-MHR002-04-SL	MHR002-04	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-04-SM	MHR002-04	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-10-SS	MHR002-10	Soil	Primary	X	X	X	X
Henry	Haul Road #2	0906-MHR002-10-GS	MHR002-10	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-10-FB	MHR002-10	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-10-SF	MHR002-10	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-10-SL	MHR002-10	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0906-MHR002-10-SM	MHR002-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-06-SS	MWD091N-06	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-06-GS	MWD091N-06	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-06-FB	MWD091N-06	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-06-SF	MWD091N-06	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-06-SL	MWD091N-06	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-06-SM	MWD091N-06	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SS-1	MWD091N-07	Soil	Triplicate	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-07-SS-2	MWD091N-07	Soil	Triplicate	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-07-SS-3	MWD091N-07	Soil	Triplicate	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-07-GS-1	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-FB-1	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SF-1	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SL-1	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SM-1	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-GS-2	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-FB-2	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SF-2	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SL-2	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SM-2	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-GS-3	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-FB-3	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SF-3	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-07-SL-3	MWD091N-07	Vegetation	LF Triplicate	X	X	X	

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(6 of 11)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Enoch Valley	South Dump	0906-MWD091N-07-SM-3	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-10-SS	MWD091N-10	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-10-GS	MWD091N-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-10-FB	MWD091N-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-10-SF	MWD091N-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-10-SL	MWD091N-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-10-SM	MWD091N-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-03-SS	MWD091S-03	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-03-GS	MWD091S-03	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-03-FB	MWD091S-03	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-03-SF	MWD091S-03	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-03-SL	MWD091S-03	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-03-SM	MWD091S-03	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SS-1	MWD091S-07	Soil	Triplicate	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-07-SS-2	MWD091S-07	Soil	Triplicate	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-07-SS-3	MWD091S-07	Soil	Triplicate	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-07-GS-1	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-FB-1	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SF-1	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SL-1	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SM-1	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-GS-2	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-FB-2	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SF-2	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SL-2	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SM-2	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-GS-3	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-FB-3	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SF-3	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SL-3	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-07-SM-3	MWD091S-07	Vegetation	LF Triplicate	X	X	X	

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(7 of 11)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Enoch Valley	South Dump	0906-MWD091S-10-SS	MWD091S-10	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091S-10-GS	MWD091S-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-10-FB	MWD091S-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-10-SF	MWD091S-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-10-SL	MWD091S-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091S-10-SM	MWD091S-10	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-04-SS	MWD092-04	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-04-GS	MWD092-04	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-04-FB	MWD092-04	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-04-SF	MWD092-04	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-04-SL	MWD092-04	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-04-SM	MWD092-04	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-09-SS	MWD092-09	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-09-GS	MWD092-09	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-09-FB	MWD092-09	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-09-SF	MWD092-09	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-09-SL	MWD092-09	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-09-SM	MWD092-09	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-10-SS	MWD092-10	Soil	Primary	X	X	X	X
Enoch Valley	North Dump	0906-MWD092-10-GS	MWD092-10	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-10-FB	MWD092-10	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-10-SF	MWD092-10	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-10-SL	MWD092-10	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0906-MWD092-10-SM	MWD092-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091-04-SS	MWD091N-04	Soil	Primary	X	X	X	X
Enoch Valley	South Dump	0906-MWD091N-04-GS	MWD091N-04	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-04-FB	MWD091N-04	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-04-SF	MWD091N-04	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-04-SL	MWD091N-04	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0906-MWD091N-04-SM	MWD091N-04	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-01-SS	MBB001-01	Soil	Primary	X	X	X	X

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(8 of 11)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Background	0906-MBB001-01-GS	MBB001-01	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-01-FB	MBB001-01	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-01-SF	MBB001-01	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-01-SL	MBB001-01	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-01-SM	MBB001-01	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-05-SS	MBB001-05	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-05-GS	MBB001-05	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-05-FB	MBB001-05	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-05-SF	MBB001-05	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-05-SL	MBB001-05	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-05-SM	MBB001-05	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-08-SS	MBB001-08	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-08-GS	MBB001-08	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-08-FB	MBB001-08	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-08-SF	MBB001-08	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-08-SL	MBB001-08	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-08-SM	MBB001-08	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-10-SS	MBB001-10	Soil	Primary	X	X	X	X
Ballard	Background	0906-MBB001-10-GS	MBB001-10	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-10-FB	MBB001-10	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-10-SF	MBB001-10	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-10-SL	MBB001-10	Vegetation	LF	X	X	X	
Ballard	Background	0906-MBB001-10-SM	MBB001-10	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-05-SS	MBH001-05	Soil	Primary	X	X	X	X
Henry	Background A [d]	0906-MBH001-05-GS	MBH001-05	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-05-FB	MBH001-05	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-05-SF	MBH001-05	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-05-SL	MBH001-05	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-05-SM	MBH001-05	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-08-SS	MBH001-08	Soil	Primary	X	X	X	X

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(9 of 11)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Background A [d]	0906-MBH001-08-GS	MBH001-08	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-08-FB	MBH001-08	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-08-SF	MBH001-08	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-08-SL	MBH001-08	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-08-SM	MBH001-08	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-10-SS	MBH001-10	Soil	Primary	X	X	X	X
Henry	Background A [d]	0906-MBH001-10-GS	MBH001-10	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-10-FB	MBH001-10	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-10-SF	MBH001-10	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-10-SL	MBH001-10	Vegetation	LF	X	X	X	
Henry	Background A [d]	0906-MBH001-10-SM	MBH001-10	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-05-SS	MBH002-05	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-05-GS	MBH002-05	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-05-FB	MBH002-05	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-05-SF	MBH002-05	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-05-SL	MBH002-05	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-05-SM	MBH002-05	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-08-SS	MBH002-08	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-08-GS	MBH002-08	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-08-FB	MBH002-08	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-08-SF	MBH002-08	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-08-SL	MBH002-08	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-08-SM	MBH002-08	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-10-SS	MBH002-10	Soil	Primary	X	X	X	X
Henry	Background B [d]	0906-MBH002-10-GS	MBH002-10	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-10-FB	MBH002-10	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-10-SF	MBH002-10	Vegetation	LF	X	X	X	
Henry	Background B [d]	0906-MBH002-10-SL	MBH002-10	Vegetation	LF	X	X	X	

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(10 of 11)

Mine	Station Description	Field Sample Identification [e]	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Henry	Background B [d]	0906-MBH002-10-SM	MBH002-10	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-01-SS	MBE001-01	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-01-GS	MBE001-01	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-01-FB	MBE001-01	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-01-SF	MBE001-01	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-01-SL	MBE001-01	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-01-SM	MBE001-01	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SS-1	MBE001-07	Soil	Triplicate	X	X	X	X
Enoch Valley	Background	0906-MBE001-07-SS-2	MBE001-07	Soil	Triplicate	X	X	X	X
Enoch Valley	Background	0906-MBE001-07-SS-3	MBE001-07	Soil	Triplicate	X	X	X	X
Enoch Valley	Background	0906-MBE001-07-GS-1	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-FB-1	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SF-1	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SL-1	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SM-1	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-GS-2	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-FB-2	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SF-2	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SL-2	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SM-2	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-GS-3	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-FB-3	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SF-3	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SL-3	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-07-SM-3	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0906-MBE001-09-SS	MBE001-09	Soil	Primary	X	X	X	X
Enoch Valley	Background	0906-MBE001-09-GS	MBE001-09	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-09-FB	MBE001-09	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-09-SF	MBE001-09	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-09-SL	MBE001-09	Vegetation	LF	X	X	X	
Enoch Valley	Background	0906-MBE001-09-SM	MBE001-09	Vegetation	LF	X	X	X	

TABLE 1-1B
SAMPLES TO BE COLLECTED
SPRING VEGETATION BY LIFE FORM
(11 of 11)

						Analytical Method [a]			
Mine	**Station Description**	**Field Sample Identification [e]**	**Location**	**Matrix**	**QC Sample Type**	**ICPMS Metals (SW6020A) [b]**	**ICP Metals (SW6010B) [c]**	**Mercury by CVAA (SW7470/1A)**	**Chromium VI (SW7196A)**

[a] Microbac will test samples for ICPMS (except uranium) and ICP metals, mercury, and hexavalent chromium (soil samples only). Microbac may subcontract uranium analysis to Test America.

[b] ICPMS Metals include antimony, arsenic, cadmium, chromium (III+VI, total), cobalt, copper, manganese, nickel, selenium, silver, thallium and uranium.

[c] ICP metals are boron, molybdenum, vanadium, and zinc.

[d] Based on field conditions as described in the FSP, either Background A samples or Background B samples will be collected (not both).

[e] Vegetation samples are assigned one of 5 separate designations depending on the vegetation type collected. They are as follows: (-GS) for grasses, (-FB) for forbs, (-SF) for shrub fruit, (-SL) for shrub leaves, and (-SM) for shrub stems.

CVAA - cold vapor atomic absorption
ER - equipment rinsate blank sample
ICP - inductively coupled plasma-atomic emission spectrometry
ICPMS - inductive coupled plasma/mass spectrometry
ID - identification
na - not applicable
OB - overburden
QC - quality control

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TABLE 1-1C
SAMPLES TO BE COLLECTED
FALL VEGETATION - FORBS
(1 of 3)

Mine	Station Description	Field Sample Identification	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Ballard	Mine Pit #1 OB Dump #1	0908-MWD080-02-FB	MWD080-02	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #1	0908-MWD080-06-FB	MWD080-06	Vegetation	LF	X	X	X	
Ballard	Mine Pit #1 OB Dump #2	0908-MWD081-04-FB	MWD081-04	Vegetation	LF	X	X	X	
Ballard	Mine Pit #3 OB Dump	0908-MWD082-01-FB	MWD082-01	Vegetation	LF	X	X	X	
Ballard	Mine Pit #4 OB Dump	0908-MWD083-01-FB	MWD083-01	Vegetation	LF	X	X	X	
Ballard	Mine Pits #5 and #6 OB Dump	0908-MWD084-05-FB	MWD084-05	Vegetation	LF	X	X	X	
Ballard	Mine Pit #2 OB Dump	0908-MWD093-02-FB	MWD093-02	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0908-MMP035-06-FB	MMP035-06	Vegetation	LF	X	X	X	
Ballard	Partially Backfilled Pit	0908-MMP036-04-FB	MMP036-04	Vegetation	LF	X	X	X	
Ballard	Haul Road #1	0908-MHR001-04-FB	MHR001-04	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0908-MWD085-02-FB	MWD085-02	Vegetation	LF	X	X	X	
Henry	North Pit OB Dump	0908-MWD085-03-FB	MWD085-03	Vegetation	LF	X	X	X	
Henry	Mine Pit #1 OB Dump	0908-MWD086-07-FB-1	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0908-MWD086-07-FB-2	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 OB Dump	0908-MWD086-07-FB-3	MWD086-07	Vegetation	LF Triplicate	X	X	X	
Henry	Mine Pit #1 Canyon Fill Dump	0908-MWD087-06-FB	MWD087-06	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0908-MWD088-02-FB	MWD088-02	Vegetation	LF	X	X	X	
Henry	Mine Pit #2 OB Dump	0908-MWD088-09-FB	MWD088-09	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0908-MWD090-02-FB	MWD090-02	Vegetation	LF	X	X	X	
Henry	South Pit OB Dump	0908-MWD090-04-FB	MWD090-04	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0908-MHR002-04-FB	MHR002-04	Vegetation	LF	X	X	X	
Henry	Haul Road #2	0908-MHR002-10-FB	MHR002-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0908-MWD091N-04-FB	MWD091N-04	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0908-MWD091N-06-FB	MWD091N-06	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0908-MWD091N-07-FB-1	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0908-MWD091N-07-FB-2	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0908-MWD091N-07-FB-3	MWD091N-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0908-MWD091N-10-FB	MWD091N-10	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0908-MWD091S-03-FB	MWD091S-03	Vegetation	LF	X	X	X	
Enoch Valley	South Dump	0908-MWD091S-07-FB-1	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0908-MWD091S-07-FB-2	MWD091S-07	Vegetation	LF Triplicate	X	X	X	

TABLE 1-1C
SAMPLES TO BE COLLECTED
FALL VEGETATION - FORBS
(2 of 3)

Mine	Station Description	Field Sample Identification	Location	Matrix	QC Sample Type	Analytical Method [a]			
						ICPMS Metals (SW6020A) [b]	ICP Metals (SW6010B) [c]	Mercury by CVAA (SW7470/1A)	Chromium VI (SW7196A)
Enoch Valley	South Dump	0908-MWD091S-07-FB-3	MWD091S-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	South Dump	0908-MWD091S-10-FB	MWD091S-10	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0908-MWD092-04-FB	MWD092-04	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0908-MWD092-09-FB	MWD092-09	Vegetation	LF	X	X	X	
Enoch Valley	North Dump	0908-MWD092-10-FB	MWD092-10	Vegetation	LF	X	X	X	
Ballard	Background	0908-MBB001-01-FB	MBB001-01	Vegetation	LF	X	X	X	
Ballard	Background	0908-MBB001-05-FB	MBB001-05	Vegetation	LF	X	X	X	
Ballard	Background	0908-MBB001-08-FB	MBB001-08	Vegetation	LF	X	X	X	
Ballard	Background	0908-MBB001-10-FB	MBB001-10	Vegetation	LF	X	X	X	
Henry	Background A [d]	0908-MBH001-05-FB	MBH001-05	Vegetation	LF	X	X	X	
Henry	Background A [d]	0908-MBH001-08-FB	MBH001-08	Vegetation	LF	X	X	X	
Henry	Background A [d]	0908-MBH001-10-FB	MBH001-10	Vegetation	LF	X	X	X	
Henry	Background B [d]	0908-MBH002-05-FB	MBH002-05	Vegetation	LF	X	X	X	
Henry	Background B [d]	0908-MBH002-08-FB	MBH002-08	Vegetation	LF	X	X	X	
Henry	Background B [d]	0908-MBH002-10-FB	MBH002-10	Vegetation	LF	X	X	X	
Enoch Valley	Background	0908-MBE001-01-FB	MBE001-01	Vegetation	LF	X	X	X	
Enoch Valley	Background	0908-MBE001-07-FB-1	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0908-MBE001-07-FB-2	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0908-MBE001-07-FB-3	MBE001-07	Vegetation	LF Triplicate	X	X	X	
Enoch Valley	Background	0908-MBE001-09-FB	MBE001-09	Vegetation	LF	X	X	X	

[a] Microbac will test samples for ICPMS (except uranium) and ICP metals, mercury, and hexavalent chromium (soil samples only). Microbac may subcontract uranium analysis to Test America.

[b] ICPMS Metals include antimony, arsenic, cadmium, chromium (III+VI, total), cobalt, copper, manganese, nickel, selenium, silver, and thallium and uranium.

[c] ICP metals are boron, molybdenum, vanadium, and zinc.

[d] Based on field conditions as described in the FSP, either Background A samples or Background B samples will be collected (not both).

CVAA - cold vapor atomic absorption
ER - equipment rinsate blank sample
FB - Forb
LF - Life Form

TABLE 1-1C
SAMPLES TO BE COLLECTED
FALL VEGETATION - FORBS
(3 of 3)

						Analytical Method [a]			
Mine	**Station Description**	**Field Sample Identification**	**Location**	**Matrix**	**QC Sample Type**	**ICPMS Metals (SW6020A) [b]**	**ICP Metals (SW6010B) [c]**	**Mercury by CVAA (SW7470/1A)**	**Chromium VI (SW7196A)**

ICP - inductively coupled plasma-atomic emission spectrometry
ICPMS - inductive coupled plasma/mass spectrometry
ID - identification
na - not applicable
OB - overburden
QC - quality control

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TABLE 1-2

ACHIEVABLE LABORATORY LIMITS AND APPLICABLE PROJECT SCREENING VALUES

(Page 1 of 2)

Method	Sampling Parameter	Units	Achievable Laboratory Limits [1]		Soil Screening Levels for Human Health and Ecological Receptors							
					ORNL Human Health Soil Screening Levels [2]		Eco-SSL [3]				ORNL Ecological Soil Screening Levels [4]	
			RL	MDL	Residential	Industrial	Plants	Soil Invert.	Avian	Mam-malian	Avian	Mammalian
EPA 6020A	Antimony	mg/kg	0.100	0.050	31 [a]	410 [a]	na	78	na	0	na	0.25
	Arsenic	mg/kg	0.300	0.075	0.39 [b]	1.6 [b]	18	na	43	46	2	0.25 [x]
	Cadmium	mg/kg	0.100	0.025	70 [c,d]	810 [c,d]	32	140	0.77	0.36	1.2	3.5
	Chromium, total:											
	Chromium III	mg/kg	0.400 [e]	0.100 [e]	120,000 [f]	1,500,000 [f]	na	na	26	34	0.83	10,000
	Chromium VI	mg/kg	0.400 [e]	0.100 [e]	39 [g]	200 [g]	na	na	na	130	na	12
	Cobalt	mg/kg	0.500	0.125	23	300	13	na	120	230	na	na
	Copper	mg/kg	0.600	0.150	3,100	41,000	70	80	28	49	38.9	55.7
	Manganese	mg/kg	0.200	0.050	1,800 [h]	23,000 [h]	220	450	4,300	4,000	825	322
	Nickel	mg/kg	0.800	0.200	1,600 [i]	20,000 [i]	38	280	210	130	64	147
	Selenium	mg/kg	0.200	0.100	390	5,100	0.52	4.1	1.2	0.63	0.33	0.73
	Silver	mg/kg	0.200	0.050	390	5,100	560	na	4.2	14	na	na
	Thallium	mg/kg	0.020	0.010	5 [i]	66 [i]	- -	- -	- -	- -	na	na
	Uranium	mg/kg	0.500	0.100	230 [i]	3100 [i]	- -	- -	- -	- -	21	6
EPA 6010B	Boron	mg/kg	25.000	10.000	16,000 [j]	200,000 [j]	- -	- -	- -	- -	24 [x]	103
	Molybdenum	mg/kg	3.000	1.500	390	5,100	- -	- -	- -	- -	2.9 [x]	0.5 [y]
	Vanadium	mg/kg	0.500	0.125	390 [c]	5,200 [c]	na	na	7.8	280	9.4	0.7
	Zinc	mg/kg	1.000	0.500	23,000 [a]	310,000 [a]	160	120	46	79	12	586
EPA 7470A	Mercury	mg/kg	0.250	0.010	7 [k]	28 [k]	- -	- -	- -	- -	0.4	4.7
EPA 7196A	Chromium VI	mg/kg	0.100	0.050	39	200	na	na	na	130	na	12

- - no screening level established

[1] Generally achievable laboratory reporting limits for soil samples; method detection limits may vary annually. Since the method will be performed on dried samples,

TABLE 1-2

ACHIEVABLE LABORATORY LIMITS AND APPLICABLE PROJECT SCREENING VALUES

the basis for these RLs can be considered dry weight. Reporting limits for plant tissue samples will be deteremined by the method validation (see Appendix A).
[2] Oak Ridge National Laboratory (ORNL) screening levels for chemical contaminants; units are mg/kg, dry weight.
[3] EPA ecological soil screening levels (SSL); units are mg/kg, dry weight.
[4] Calculated from lowest reported no observed adverse effects level (NOAEL)-based benchmark for food from ORNL; units are mg/kg, dry weight.

[a] metallic
[b] inorganic
[c] and compounds
[d] in diets
[e] value is for total chromium
[f] insoluble salts. Although the correct screening level is listed, 1,500,000 mg/kg is not possible because there are 1,000,000 mg in a kg.
[g] particulates
[h] in water
[i] soluble salts
[j] and borates only
[k] elemental

[x] Screening value is less than the RL but greater than the MDL.
[y] Screening value is less than both the RL and MDL (laboratory does not analyze molybdenum by 6020A).

MDL - method detection limit
mg/kg - milligrams per kilogram
NA - not applicable
na - not available (insufficient data available to derive and Eco-SSL)
RL - reporting limit

TABLE 1-3

PROJECT PERFORMANCE MEASUREMENT CRITERIA
(Page 1 of 1)

DQI	Criteria	Project-Specific Goal [a]
Detection levels	The analytical detection levels should be less than the applicable screening criteria.	The achievable laboratory reporting limits and method detection limits for soil samples are listed on Table 2-1. Laboratory reporting limits are less than all screening levels except those for arsenic, boron, and molybdenum (see Section 1.4.4.6).
Accuracy	Spiked target analytes should be recovered within the limits established for each target analyte.	Recoveries of target analytes spiked into laboratory control samples, matrix spike samples, and low-level calibration samples should be within the control limits specified on Tables 1-4 through 1-7 for those quality control samples. [b]
Precision	Measured values of target analytes should be reproducible within the limits established for each target analytes.	Relative percent differences (RPDs) measured between laboratory control samples and laboratory control sample duplicates & matrix spike and matrix spike duplicates should be within the control limits specified on Tables 1-4 through 1-7 for those quality control samples. The RPDs or relative standard deviations (RSDs) for triplicate samples should be assessed as described in Section 1.4.4.1.
Completeness	Each sample that is planned to be collected should be collected, analyzed, reported, and validated for each target analyte as specified in Section 1.4.2, except where actual site conditions prevent collection of sample as planned (e.g., plants not growing at a given location).	A minimum of 90% of planned soil and 90% of plant tissue samples will be collected. All target analytes will be tested, reported, and validated for each collected sample.

[a] Detection levels, accuracy, and precision data for plant tissue samples will be determined when methods have been validated (see Appendix A).

[b] Plant tissue matrix is a non-standard matrix, so standard reference material (SRM) will be included as a quality control sample (see Appendix A).

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TABLE 1-4

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 6020A (ICPMS)
(Page 1 of 4)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
MS tuning sample	Prior to initial calibration, solution as specified in Section 7.10 of method (e.g., ^{7}Li, ^{59}Co, ^{115}In, and ^{205}Tl)	Mass calibration ≤ 0.1 amu from the true value. Resolution < 0.9 amu full width at 10% peak height. Stability: RSD ≤ 5% for at least three replicate analysis.	Retune instrument then reanalyzing tuning solution.	Per Section II of ICP-MS NFG, except substitute with method acceptance limits.	RSD > 5% = J/UJ (professional judgment on criteria related to non-target analytes).
Initial calibration (ICAL) for all target analytes (minimum one standard and a blank)	Daily initial calibration prior to sample analysis	If more that one standard is used, correlation coefficient (r) ≥ 0.995	Correct problem then repeat initial calibration.	Per Section III of ICP-MS NFG.	r < 0.995 = J/UJ
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source)	All analytes within ±10% of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Per Section III of ICP-MS NFG.	%R < 90 or >110% = J/UJ
Initial Calibration Blank (ICB)	After ICV	No analyte detected ≥ 2X MDL	Correct problem and reanalyze.	Per Section IV of ICPMS NFG, except U at detected value if result > MDL < RL.	Per Table 14 in NFG, except U at detected value if result > MDL < RL.
Low-Level Calibration Check Standard	Daily, after ICAL (at a concentration ≤ RLs).	The analyte(s) within ±30% of expected value.	Correct problem then reanalyze.	Per Section III of ICP-MS NFG.	%R < 70% or > 130% (%R < 50% or > 150% for Co, Mn, or Zn) =

TABLE 1-4

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 6020A (ICPMS)
(Page 2 of 4)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
(LLCCS)					J/UJ
Interference Check Solution A & AB (ICS-A & ICS-AB)	At the beginning of an analytical run or once during a 12-hour period, whichever is more frequent	ICS-A: All non-spiked analytes < 2X MDL. ICS-AB: Within ± 20% of expected value.	Correct problem and reanalyze ICS-A and ICS-AB.	Per Section III of ICP-MS NFG.	ICS < 80% or > 120% = J/UJ
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	The analyte within ±10% of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.	Per Section III of ICP-MS NFG.	CCV < 90 or > 110% = J/UJ
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	No analyte detected ≥ 2X MDL	Correct problem then reanalyze calibration blank and previous 10 samples. Apply "B" flag to all associated positive results for the specific analyte(s) as appropriate.	Per Section IV of ICPMS NFG, except U at detected value if result > MDL < RL.	Per Table 14 in NFG, except U at detected value if result > MDL < RL.
Method blank (or preparation blank)	One per analytical batch	No analyte detected ≥ RL	Assess data. Correct problem. If necessary, reprep and analyze method blank and all samples processed with the contaminated blank. Apply B-flag to all associated positive results for the specific analyte(s) in the preparation batch.	Per Section IV of ICPMS NFG, except U at detected value if result > MDL < RL.	Per Table 14 in NFG, except U at detected value if result > MDL < RL.

TABLE 1-4

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 6020A (ICPMS)
(Page 3 of 4)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Laboratory Control Sample (LCS) for all analytes	One LCS per analytical batch	Vendor-specified or laboratory-determined control limits (but not wider than 80-120% recovery). If LCS/LSC duplicate (LCSD) used, then use RPD ≤ 20.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS and all samples in the preparation batch.	Per Section VI of ICP-MS NFG, except substitute 80-120% recovery and ≤ 20 RPD limits.	%R < 80 or > 120% for water = J/UJ; < 50% = J detects, R non-detects
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix	Laboratory-determined control limits (but not wider than 75-125% recovery and RPD ≤ 20).	Flag associated sample results and perform post-digestion spike addition.	Per Section VIII of ICP-MS NFG, except substitute 75-125% recovery and ≤ 20 RPD limits.	%R < 75 or > 125% for water = J/UJ; < 30% = J detects, R non-detects. Water RPD <20%, soil < 35%. Low level (< 5 X RL, use ± RL water, 2 X RL for soil). For MS, if %R < 30% and post spike< 75% or not run, J detects, R non-detects. If post spike > 75 %, UJ non-detects.
Post-digestion spike addition	If MS/MSD fails	Recovery within 75-125% of expected results.	Perform dilution test.	Not applicable	None; see dilution test.
Serial dilution (SD) test	One SD sample per every 20 samples (required for samples containing concentrations > 50 X MDL)	Fivefold (1+4) dilution must agree within ±10% of the original determination.	Flag associated sample results and discuss in case narrative.	Per Section IX of ICPMS NFG.	%D < 90 > 110% = J/UJ
Internal	Every sample;	IS intensity ≥ 70% < 130%	Perform corrective action	Per Section X of	IS %R < 70% > 130 % =

TABLE 1-4

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 6020A (ICPMS)
(Page 4 of 4)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Standards (ISs)	internal standards selected from list specified in Section 1.4 of method.	of intensity of the IS in the ICAL.	as described in Section 9.6 of method.	ICP-MS NFG, except substitute 70-130 % limits.	J/UJ
Concentrations between the MDL and RL	All samples	Not applicable	Flag as estimated value ("J" flag)	Not applicable	Not applicable

[a] National Functional Guidelines (NFG) for Inorganic Data Review (USEPA, 2004).
[b] Refer to NFG for detailed evaluation protocols.

ICPMS – inductively coupled plasma/mass spectrometry
MDL – method detection limit
RL – reporting limit
RPD – relative percent difference
RSD – relative standard deviation

TABLE 1-5

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 6010B/C (ICP)
(Page 1 of 3)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Initial calibration (ICAL) for all target analytes (minimum one standard and a blank)	Daily initial calibration prior to sample analysis	If more that one standard is used, correlation coefficient (r) $\geq$ 0.995	Correct problem then repeat initial calibration.	Per Section II of ICP NFG.	r < 0.995 = J/UJ
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source)	All analytes within $\pm$10% of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Per Section II of ICP NFG.	%R < 90 or >110% = J/UJ
Initial Calibration Blank (ICB)	After ICV	No analyte detected $\geq$ 2X MDL	Correct problem and reanalyze.	Per Section III of ICP NFG, except U at detected value if result > MDL < RL.	Per Table 4 in NFG, except U at detected value if result > MDL < RL.
Low-Level Calibration Check Standard (LLCCS)	Daily, after ICAL (at a concentration ≤ RLs).	The analyte(s) within $\pm$30% of expected value.	Correct problem then reanalyze.	Per Section II of ICP NFG.	%R < 70% or > 130% (%R < 50% or > 150% for Sb, Pb, Tl) = J/UJ
Interference Check Solution A & AB (ICS-A & ICS-AB)	At the beginning of an analytical run	ICS-A: All non-spiked analytes < 2X MDL. ICS-AB: Within ± 20% of expected value.	Correct problem and reanalyze ICS-A and ICS-AB.	Per Section IV of ICP NFG.	ICS < 80% or > 120% = J/UJ

TABLE 1-5

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 6010B/C (ICP)
(Page 2 of 3)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	The analyte within ±10% of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.	Per Section II of ICP NFG.	CCV < 90 or > 110% = J/UJ
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	No analyte detected ≥ 2X MDL	Correct problem then reanalyze calibration blank and previous 10 samples. Apply "B" flag to all associated positive results for the specific analyte(s) as appropriate.	Per Section III of ICP NFG, except U at detected value if result > MDL < RL.	Per Table 4 in NFG, except U at detected value if result > MDL < RL.
Method blank (or preparation blank)	One per analytical batch	No analyte detected ≥ RL	Assess data. Correct problem. If necessary, reprep and analyze method blank and all samples processed with the contaminated blank. Apply B-flag to all associated positive results for the specific analyte(s) in the preparation batch.	Per Section III of ICP NFG, except U at detected value if result > MDL < RL.	Per Table 4 in NFG, except U at detected value if result > MDL < RL.
Laboratory Control Sample (LCS) for all analytes	One LCS per analytical batch	Vendor-specified or laboratory-determined control limits (but not wider than 80-120% recovery). If LCS/LSC duplicate (LCSD) used, then use RPD ≤ 20.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS and all samples in the preparation batch.	Per Section V of ICP NFG, except substitute 80-120% recovery and ≤ 20 RPD limits.	%R < 80 or > 120% for water = J/UJ; < 50% = J detects, R non-detects

TABLE 1-5

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 6010B/C (ICP)
(Page 3 of 3)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix	Laboratory-determined control limits (but not wider than 75-125% recovery and RPD ≤ 20).	Flag associated sample results and perform post-digestion spike addition.	Per Section VII of ICP NFG, except substitute 75-125% recovery and ≤ 20 RPD limits.	%R < 75 or > 125% for water = J/UJ; < 30% = J detects, R non-detects. Water RPD <20%, soil < 35%. Low level (< 5 X RL, use ± RL water, 2 X RL for soil). For MS, if %R < 30% and post spike< 75% or not run, J detects, R non-detects. If post spike > 75 %, UJ non-detects.
Post-digestion spike addition	If MS/MSD fails	Recovery within 75-125% of expected results.	Perform dilution test.	Not applicable	None; see dilution test.
Serial dilution (SD) test	One SD sample per every 20 samples (required for samples containing concentrations > 50 X MDL)	Fivefold (1+4) dilution must agree within ±10% of the original determination.	Flag associated sample results and discuss in case narrative.	Per Section VIII of ICP NFG.	%D < 90 > 110% = J/UJ
Concentrations between the MDL and RL	All samples	Not applicable	Flag as estimated value ("J" flag)	Not applicable	Not applicable

[a] National Functional Guidelines (NFG) for Inorganic Data Review (USEPA, 2004).
[b] Refer to NFG for detailed evaluation protocols.

ICP – inductively coupled plasma-atomic emission spectrometry
MDL – method detection limit
RL – reporting limit
RPD – relative percent difference
%R – percent recovery

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TABLE 1-6

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 7470A/7471A (CVAA)
(Page 1 of 3)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Initial calibration (ICAL) for all target analytes (minimum five standards and a blank)	Daily initial calibration prior to sample analysis	Blank plus five calibration concentrations, correlation coefficient (r) $\geq$ 0.995	Correct problem then repeat initial calibration.	Per Section II of AA NFG.	r < 0.995 = J/UJ
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source)	All analytes within $\pm$10% of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Per Section II of AA NFG.	%R < 80 or >120% = J/UJ
Initial Calibration Blank (ICB)	After ICV	No analyte detected $\geq$ 2X MDL	Correct problem and reanalyze.	Per Section III of AA NFG, except U at detected value if result > MDL < RL.	Per Table 24 in NFG, except U at detected value if result > MDL < RL.
Low-Level Calibration Check Standard (LLCCS)	Daily, after ICAL (at a concentration ≤ RLs).	The analyte(s) within $\pm$30% of expected value.	Correct problem then reanalyze.	Per Section II of AA NFG.	%R < 70% or > 130% = J/UJ
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	The analyte within $\pm$10% of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.	Per Section II of AA NFG.	CCV < 80 or > 120% = J/UJ

TABLE 1-6

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 7470A/7471A (CVAA)
(Page 2 of 3)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	No analyte detected ≥ 2X MDL	Correct problem then reanalyze calibration blank and previous 10 samples. Apply "B" flag to all associated positive results for the specific analyte(s) as appropriate.	Per Section III of AA NFG, except U at detected value if result > MDL < RL.	Per Table 24 in NFG, except U at detected value if result > MDL < RL.
Method blank (or preparation blank)	One per analytical batch	No analyte detected ≥ RL	Assess data. Correct problem. If necessary, reprep and analyze method blank and all samples processed with the contaminated blank. Apply B-flag to all associated positive results for the specific analyte(s) in the preparation batch.	Per Section III of AA NFG, except U at detected value if result > MDL < RL.	Per Table 24 in NFG, except U at detected value if result > MDL < RL.
Laboratory Control Sample (LCS) for all analytes	One LCS per analytical batch	Vendor-specified or laboratory-determined control limits (but not wider than 80-120% recovery). If LCS/LSC duplicate (LCSD) used, then use RPD ≤ 20.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS and all samples in the preparation batch.	Per Section IV of AA NFG, except substitute 80-120% recovery and ≤ 20 RPD limits.	%R < 80 or > 120% for water = J/UJ; < 50% = J detects, R non-detects
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix	Laboratory-determined control limits (but not wider than 75-125% recovery and RPD ≤ 20).	Flag associated sample results and perform post-digestion spike addition.	Per Section VI of AA NFG, except substitute 75-125% recovery and ≤ 20 RPD limits.	%R < 75 or > 125% for water = J/UJ; < 30% = J detects, R non-detects. Water RPD <20%, soil < 35%. Low level (< 5 X RL, use ± RL water, 2 X

TABLE 1-6

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 7470A/7471A (CVAA)
(Page 3 of 3)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
					RL for soil). For MS, if %R < 30% and post spike< 75% or not run, J detects, R non-detects. If post spike > 75 %, UJ non-detects.
Concentrations between the MDL and RL	All samples	Not applicable	Flag as estimated value ("J" flag)	Not applicable	Not applicable

[a] National Functional Guidelines (NFG) for Inorganic Data Review (USEPA, 2004).
[b] Refer to NFG for detailed evaluation protocols.

AA – atomic absorption
CVAA – cold vapor atomic absorption
MDL – method detection limit
RL – reporting limit
RPD – relative percent difference
%R – percent recovery

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TABLE 1-7

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 7196A
(Page 1 of 2)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
Initial calibration (ICAL) for hexavalent chromium (Cr VI) (minimum three standards and a blank)	Daily initial calibration prior to sample analysis	Blank plus a minimum of three calibration concentrations, correlation coefficient (r) ≥ 0.995	Correct problem then repeat initial calibration.	Per Section II of AA NFG.	r < 0.995 = J/UJ
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source)	Cr VI within ±10% of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Per Section II of AA NFG.	%R < 80 or >120% = J/UJ
Reference Blank	Once prior to ICAL or sample analysis	NA – use for blank subtraction of field and QC samples	NA	NA	NA
Low-Level Calibration Check Standard (LLCCS)	Daily, after ICAL (at a concentration ≤ RLs).	Cr VI within ±30% of expected value.	Correct problem then reanalyze.	Per Section II of AA NFG.	%R < 70% or > 130% = J/UJ
Continuing Calibration Verification (CCV)	After every 15 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	Cr VI within ±10% of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.	Per Section II of AA NFG.	CCV < 80 or > 120% = J/UJ
Method blank (or preparation blank)	One per analytical batch	Cr VI not detected ≥ RL	Assess data. Correct problem. If necessary, re-prep and analyze method blank and all samples processed with the contaminated blank. Apply B-flag to all	Per Section III of AA NFG, except U at detected value if result > MDL < RL.	Per Table 24 in NFG, except U at detected value if result > MDL < RL.

TABLE 1-7

SUMMARY OF CALIBRATION AND QC PROCEDURES FOR EPA METHOD 7196A
(Page 2 of 2)

Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section [a]	Data Validation Qualification [b]
			associated positive results for the specific analyte(s) in the preparation batch.		
Laboratory Control Sample (LCS)	One LCS per analytical batch	Vendor-specified or laboratory-determined control limits (but not wider than 80-120% recovery). If LCS/LCS duplicate (LCSD) used, then use RPD ≤ 20.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS and all samples in the preparation batch.	Per Section IV of AA NFG, except substitute 80-120% recovery and ≤ 20 RPD limits.	%R < 80 or > 120% for water = J/UJ; < 50% = J detects, R non-detects
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix	Laboratory-determined control limits (but not wider than 90-110% recovery and RPD ≤ 20).	Flag associated sample results and perform post-digestion spike addition.	Per Section VI of AA NFG, except substitute 90-110% recovery and ≤ 20 RPD limits.	%R < 90 or > 110% for water = J/UJ; < 50% = J detects, R non-detects. Water RPD <20%, soil < 35%. Low level (< 5 X RL, use ± RL water, 2 X RL for soil).
Concentrations between the MDL and RL	All samples	Not applicable	Flag as estimated value ("J" flag)	Not applicable	Not applicable

[a] National Functional Guidelines (NFG) for Inorganic Data Review (USEPA, 2004).
[b] Refer to NFG for detailed evaluation protocols.

MDL – method detection limit
RL – reporting limit
RPD – relative percent difference
%R – percent recovery

TABLE 2-1

REQUIREMENTS FOR SAMPLE CONTAINERS, VOLUMES, PRESERVATION, AND HOLDING TIMES

Parameter(s)	Analytical Method	Sample Container	Preservation	Holding Time
Soil Samples				
ICPMS Metals	6020A	2 x 16-ounce glass jar	Cool to ≤ 6 ºC for chromium VI and mercury (other metals not required to be cooled)	6 months
ICP Metals	60210B/C			6 months
Mercury	7471A			28 days
Chromium VI	7196A			30 days to extraction and 7 days from extraction to analysis
Uranium [a]	6020A			6 months
Vegetation Samples (Grasses)				
ICPMS Metals	6020A	5-gallon paper bag	Cool to ≤ 6 ºC for mercury (other metals not required to be cooled)	6 months
ICP Metals	60210B/C			6 months
Mercury	7471A			28 days
Uranium [a]	6020A			
Equipment Rinsate Blank Samples (Water)				
ICPMS Metals	6020A	1 x 500 mL poly (unfiltered)	pH < 2 with nitric acid	6 months
ICP Metals	60210B/C	1 x 500 mL poly (unfiltered)	pH < 2 with nitric acid	6 months
Mercury	7470A	1 x 500 mL poly (unfiltered)	pH < 2 with nitric acid; cool to ≤ 6 ºC	28 days
Uranium [b]	6020A	1 x 500 mL poly (unfiltered)	pH < 2 with nitric acid	6 months

[a] A portion of the dried and milled sample prepared by Microbac may be submitted to Test America for uranium analysis.

[b] Samples collected for uranium analysis will be submitted to Microbac, and Microbac will send to Test America for uranium analysis.

mL - milliliters

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FIGURES

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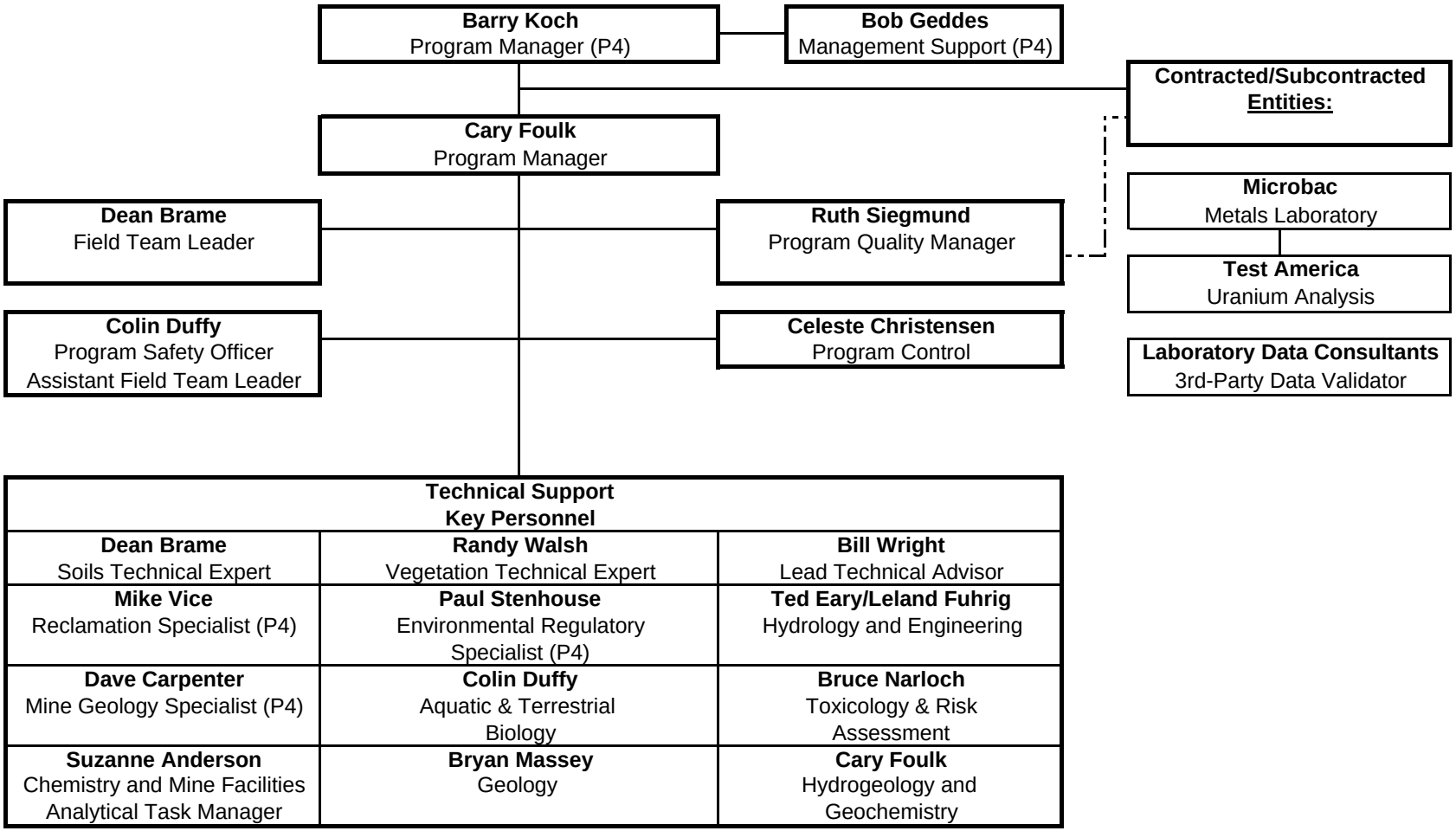

Figure 1-1:
Project Organization Chart

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MWH **CHAIN OF CUSTODY RECORD** **MWH CONTACT: Suzanne Anderson 425/896-6966**

FED EX #: _____ **COOLER #:** _____ **LAB: Microbac, 158 Starlite Dr, Marietta, OH 45750**

SAMPLER(S) PRINTED NAME AND SIGNATURE

PROJECT NAME: P4 Production LLC - Soil & Vegetation Sampling Program

PROJECT NUMBER: Direct bill to Monsanto

ZymaX ID	FIELD SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	ANALYSIS REQUEST: ICPMS Metals (6020A) [1]	ICP Metals (6020B/C) [2]	Mercury (7470A/7471A)	Chromium VI (7196A)	Uranium-Water (6020A)				Comments

Comments/Instructions:

1 - ICPMS metals are Sb, As, Cd, Cr (total) Co, Cu, Mn, Ni, Se, Ag, Tl, and U.

2 - ICP metals are B, Mo, V, and Zn.

Samples are to be dried, ground or milled, and homogenized before preparation; a subsample of the prepared sample will be shipped to TestAmerica (St. Louis) for uranium analysis. Results are to be reported as dry weight.

Signature:	Print Name:	Company Name/Title:	Date:
RELINQUISHED BY:		MWH	
RECEIVED BY:			
RELINQUISHED BY:			
RECEIVED BY:			

For Lab Use Only: Sample Condition Upon Receipt:

ORIGINAL: Send with sample (sign only in blue or black ink) **COPIES: Retained by Sampler, Sent to Office**

MWH USE ONLY:

Figure 1-2:
Chain-of-Custody Form

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FIELD CHANGE REQUEST	
Project Reference:	FCR No.:
Task description:	
Affected plan or procedures:	
Requested variation(s):	
Justification:	
Requested by:	Date:
Field change authorized by:	Date:
Approved by:	Date:
Approved by:	Date:
Comments:	

Figure 1-3:
Field Change Request Form

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APPENDICES

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Appendix A
Preparation and Method Validation SOPs

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1.0 Introduction

P4 Production (P4) will be collecting and analyzing plant samples (vegetation) to establish the uptake concentrations of target elements in plants growing on mine dumps at its Southeast Idaho mine sites. Vegetation samples are non-standard matrices, so the laboratory will need to perform in advance preparation and analysis of the investigation samples a method validation study on site-specific matrix. This standard operating procedure (SOP) specifies the process and requirements for the validation study and specifies procedures for preparing vegetation samples for analysis. Data generated from the method validation study will provide the matrix-specific method detection limits (MDLs), reporting limits (RLs), and precision and accuracy acceptance criteria for laboratory control samples (LCSs) and National Institute of Standards and Technology (NIST) standard reference material (SRM).

The laboratory will use the procedures presented herein for the sample preparation and analysis of plant tissue for the analytes listed in Section 2.0. Procedures are included for initial method setup and testing, as well as the routine quality control (QC) measures required for each preparation batch of project samples.

2.0 Target Analytes

A total of 17 analytes will be tested in the prepared vegetation samples. Arsenic, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, silver, thallium, and uranium will be analyzed by inductively coupled plasma atomic emission spectrometry (ICP-AES)/mass spectrometry (MS) or ICPMS; antimony, boron, molybdenum, vanadium, and zinc will be analyzed by ICP-AES (ICP); and mercury by manual cold vapor atomic absorption technique (CVAA).

Table 2-1: Target Analytes

Analytical Method	**Analyte**
6020A – ICPMS	Arsenic
	Cadmium
	Chromium
	Cobalt
	Copper
	Manganese
	Nickel
	Selenium
	Silver
	Thallium

Analytical Method	Analyte
	Uranium
6010B – ICP	Antimony
	Boron
	Molybdenum
	Vanadium
	Zinc
7471A – CVAA	Mercury

The method validation will be performed for each of the three instrumentation methods.

3.0 Method Validation and Sample Matrices

The method will be validated in advance of sample receipt using vegetation similar to readily-available NIST SRM, such as tomato leaves or spinach (e.g., NIST SRM 1573a). Bulk matrix will be purchased from a local commercial facility (e.g., grocery store or farmers market).

The vegetation material expected to be sampled is primarily grasses. These samples will be collected in multiple large-capacity (e.g., 5-gallon) paper bags. A minimum mass of 100 grams (g) of material will be obtained for each sample.

4.0 Preparation Procedures for Plant Tissue Samples

Sample preparation of plant tissue consists of the procedures used to obtain a dry aliquot of homogenous material. The laboratory will use the following procedures to chop, dry, grind, sub-sample, digest, and analyze all plant tissue samples.

4.1 Drying

Select a sufficient mass (approximately 100 g) of whole plants that will yield at least 10 g of dry tissue. The analyst will chop the whole plants (as received) using a stainless steel knife or other chopping device. The chopped sample will be spread on a clean surface and will be air-dried for 160 hours at room temperature.

4.2 Grinding

Grind/macerate the dry plant material using a glass (or agate) mortar and pestle, food processor, Wiley mill, or similar device with stainless steel blades, reducing the dry plant material to a particle size of 4 millimeters (mm). Sieve the material through a No. 5 (4 mm) sieve and transfer the sample to an appropriate labeled storage container.

4.3 Digestion

The analysts will mix the sieved sample and take a representative sub-sample of at least 1.0 g for each of the following digestion procedures:

- Perform one microwave digestion using SW-846 method 3051A to prepare samples for analysis by ICP/MS method 6020A.

- Perform a second microwave digestion following SW-846 method 3051A to prepare samples for analysis by ICP method 6010B and mercury by CVAA method 7471A.

Note: The laboratory will perform a microwave digestion for mercury as per Health Canada Method T – 306 (2) (Health Canada, 1999), rather than perform the separate mercury digestion normally used for 7471A. If data obtained from the method validation for mercury are unacceptable, then the laboratory will re-validate the method using a separate digestion for mercury employing the hot block digestion specified in method 7471A.

Each prepared sample so processed, for the validation study or investigation, will be analyzed for the metals listed in Table 2-1 using SW-846 methods 6010B, 6020A, and 7471A (USEPA, 2007) and consistent with the criteria specified in the project QAPP.

5.0 Testing and Validation of Plant Methods

The laboratory will perform the following analyses to test and validate the proposed procedures in plant tissue. The laboratory will select spinach and /or tomato leaves for this investigation phase, based on the availability of SRM for these species.

5.1 Matrix Evaluation/Background Study

A matrix blank and background study will be performed on 10 replicates of leaf tissue, prepared as specified in Section 4.0, to assess background levels required prior to the method detection limit (MDL)/level of detection (LOD) study and the initial demonstration of capability (IDOC).

A background concentration for each target analyte will be determined from the analysis of these samples. If target analytes are detected in the background study, the values will be evaluated and results of the MDL/LOD study and IDOC will be adjusted to account for the background concentration.

5.2 MDL/LOD Study

An MDL/LOD study will be performed on the prepared plant tissue using procedures outlined in 40 CFR 136 Appendix B followed by verification samples to establish the LOD. The level of sensitivity is estimated for each target analyte as listed in Table 5-1.

Table 5-1: Estimated Sensitivity for MDL Study

Analytical Method	Element	Estimated Sensitivity (mg/kg)
6020A – ICPMS	Arsenic	0.075
	Cadmium	0.025
	Chromium	0.100
	Cobalt	0.125
	Copper	0.150
	Manganese	0.050
	Nickel	0.200
	Selenium	0.100
	Silver	0.050
	Thallium	0.010
	Uranium	0.100
6010B – ICP	Antimony	0.050
	Boron	10
	Molybdenum	1.50
	Vanadium	0.125
	Zinc	0.500
7471A - CVAA	Mercury	0.010

The limit of quantitation (LOQ), or reporting limit (RL) will be determined by the low standard in the instrument initial calibration curve.

5.3 Initial Demonstration of Capability

An IDOC study will be performed to evaluate precision and accuracy in the matrix selected for the background study. The IDOC will consist of at least four replicate analyses of mid-range spikes on the prepared plant tissue (Section 4.0), consistent with procedures described in Appendix C of the National Environmental Laboratory Accreditation Conference (NELAC) Standard (USEPA, 2003). These data will be used to establish initial control limits for LCSs.

5.4 Analysis of Standard Reference Materials (SRM):

Perform an IDOC study, as in Section 5.3, of at least four replicate analyses on the selected NIST SRM (e.g., SRM 1570a – Spinach Leaves, SRM 1573a – Tomato Leaves).

5.5 Batch Quality Control for Project Samples

The following QC samples will be prepared, analyzed, and reported with each batch of twenty, or fewer, project samples. The laboratory will process all QC samples through the same digestion/extraction procedures as the project samples.

- Method/Preparation Blank: A digested blank consisting of media similar to the project that has been demonstrated to be free of the target metals at concentrations greater than the reporting limits.

- LCS and LCS Duplicate: Two aliquots of blank media will be spiked at the mid-range with each of the target metals. An LCS duplicate is not required in batches including a matrix spike (MS) and matrix spike duplicate (MSD).

- MS and MSD: The client will specify those samples for MS/MSD analysis on the chain-of-custody; otherwise, the laboratory will randomly select one sample per preparation batch for these tests. The laboratory will spike the matrix after the sample preparation steps, immediately prior to the digestion or extraction.

- Analysis of SRM: The laboratory will digest and analyze one SRM with each batch of project samples.

The acceptance limits for LCSs and SRMs will be those derived from the IDOC study as described in Section 5.3. The LCS control limits will be no wider than 50 to 150 percent recovery, and the precision limit will be no greater than a relative percent difference ≤ 50. The SRM control limits will be no wider than 50 to 150 percent recovery. The MS/MSD control limits will be set at 50 to 150 percent recovery, and the precision limit is an RPD ≤ 50.

6.0 References

Health Canada, 1999. Method T – 306, Determination of Ni, Pb, Cd, Cr, As, Se and Hg in Whole Tobacco, December.

United States Environmental Protection Agency (USEPA), 2003. National Environmental Laboratory Accreditation Conference Standard, EPA/600/R-04/003. June.

USEPA, 2007. Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods, SW- 846 -Third Edition, Final Updates I, II, IIA, IIB, III, IIIA, IIIB, and IV. February.

1.0 Introduction

P4 Production (P4) will be collecting and analyzing soil samples for target elements to characterization the mine dumps at its Southeast Idaho mine sites. This standard operating procedure (SOP) specifies the process and requirements for preparing soil samples for analysis. The laboratory will use the procedures presented herein for the sample preparation and analysis of soil samples for the analytes listed in Section 2.0.

2.0 Target Analytes

A total of 18 analytes will be tested in the prepared soil samples. Arsenic, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, silver, thallium, and uranium will be analyzed by inductively coupled plasma atomic emission spectrometry (ICP-AES)/mass spectrometry (MS) or ICPMS; antimony, boron, molybdenum, vanadium, and zinc will be analyzed by ICP-AES (ICP); mercury by manual cold vapor atomic absorption technique (CVAA); and hexavalent chromium by colorimetric methodology.

Table 2-1: Target Analytes

Analytical Method	**Analyte**
6020A – ICPMS	Arsenic
	Cadmium
	Chromium
	Cobalt
	Copper
	Manganese
	Nickel
	Selenium
	Silver
	Thallium
	Uranium
6010B – ICP	Antimony
	Boron
	Molybdenum
	Vanadium
	Zinc
7471A – CVAA	Mercury
7196A – Colorimetric	Hexavalent chromium

3.0 Methods for Preparation and Analysis of Soil Samples

Preparation of a project soil sample consists of the procedures used to obtain a dry aliquot of homogenous material. The laboratory will use the following procedures to dry, grind, sub-sample, and digest all soil samples.

3.1 Drying

The laboratory will determine the initial percent solids on each soil sample as received (the initial percent solids will be reported only, and not used to correct the metal results). Each soil sample will be air dried at room temperature to a constant weight, or to a final percent solids level of at least 99 percent.

3.2 Sieving and Grinding

Crush the dry soil using a gloved hand and sieve the material through a No. 10 (2mm) sieve. Discard the sticks, stones, or extraneous matter not passing the sieve. Grind the sieved soil using a glass (or agate) mortar and pestle or similar device, and transfer to a labeled container.

3.3 Digestion Procedure for ICP, ICPMS, and CVAA

The analysts will mix the sieved sample and take a representative sub-sample of at least 1.0 g, weighed to the nearest 0.01 g, for each of the following digestion procedures:

- Perform one microwave digestion using SW-846 method 3051A to prepare samples for analysis by ICP/MS method 6020A.

- Perform a second microwave digestion following SW-846 method 3051A to prepare samples for analysis by ICP method 6010B and mercury.

Note: The laboratory will perform a microwave digestion for mercury as per Health Canada Method T – 306 (2) (Health Canada, 1999), rather than perform the separate mercury digestion normally used for 7471A. If data obtained for mercury are unacceptable, then the laboratory will re-digest samples for mercury employing the hot block digestion specified in method 7471A.

Each prepared sample so processed, for the validation study or investigation, will be analyzed for the metals listed in Table 2-1 using SW-846 methods 6010B, 6020A, and 7471A (USEPA, 2007) and consistent with the criteria specified in the project QAPP.

3.4 Leaching Procedure for Hexavalent Chromium

The extract for hexavalent chromium is prepared via a 1:10 leaching procedure. Weigh 20.0g of sieved soil and transfer to a suitable extraction device, and add 200mL of reagent water (ASTM Type II or better). Shake the mixture for 30 minutes using a platform or wrist-action shaker. Allow the sample to settle and filter through 0.45-micron membrane filter paper. Transfer the leachate to suitable sample container and store at 0 – 6 C, or analyze immediately. Analysis time must not exceed 24 hours from time of filtration.

4.0 References

Health Canada, 1999. Method T – 306, Determination of Ni, Pb, Cd, Cr, As, Se and Hg in Whole Tobacco, December.

United States Environmental Protection Agency (USEPA), 2007. Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods, SW- 846 -Third Edition, Final Updates I, II, IIA, IIB, III, IIIA, IIIB, and IV. February.

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Appendix B
Specifications for the Geo-Tracker EDF

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The Electronic Deliverable Format™ (EDF)

Version 1.2i

The Laboratory Electronic Deliverable Format™ (LAB EDF)

GUIDELINES & RESTRICTIONS

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Appendix C
Data Validation Report Templates

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Report# #######

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Southeast Idaho Mine Sites

Report Date: November 1, 2008

Matrix: Water

Parameters: Mercury by CVAA EPA Method 7470A

Validation Level: EPA Level IV

Laboratory: Microbac

Sample Delivery Group (SDG): 44433

Sample Identification	Collection Date	Laboratory Identification
TSB-GJ-08-10	5/12/08	44433-01
TSB-GJ-08-20	5/12/08	44433-02
TSB-GJ-08-30	5/12/08	44433-03
TSB-GJ-08-40	5/12/08	44433-04
TSB-GJ-08-10MS	5/12/08	44433-05

Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analysis was performed per the EPA Method noted below:

- Method 7470A: Mercury.

This review follows the specific guidance in the QAPP Addendum (MWH 2008) to the project SAP (April 2004) using the intent of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as applicable to the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Raw data were reviewed for a minimum of 10% of the Sample Delivery Groups (SDGs) or laboratory data package deliverables associated with this sampling event as specified in the QAPP Addendum. This package includes raw data review.

The following are definitions of the data qualifiers:

U The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximated concentration of the analyte in the sample.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

R The result is unusable. The sample result is rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

UJ The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

The following are not data qualifiers but are provide for the purpose of evaluating the laboratory's performance:

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

The following “Reason Codes” will be applied as applicable to the validated data:

1 Holding Time
2 Sample Preservation (including receipt temperature)
3 Sample Custody
4 Missing Deliverable
5 ICPMS Tune
6 Initial Calibration
7 Initial Calibration Verification
8 Continuing Calibration Verification
9 Low-Level Calibration Check Sample
10 Calibration Blank
11 Laboratory or Preparation Blank
12 ICPMS or ICP Interference Check Standard
13 Laboratory Control Sample or Laboratory Control Sample Duplicate Recovery
14 Laboratory Control Sample Precision
15 Laboratory Duplicate Precision
16 Matrix Spike or Matrix Spike Duplicate Recovery
17 Matrix Spike/Matrix Spike Duplicate Precision
18 ICPMS or ICP Serial Dilution
19 ICPMS Internal Standard
20 Field Replicate Precision
21 Equipment Rinsate Blank
22 Linear Range Exceeded
23 Other reason

I(a). Deliverables and Chain-of-Custody Documentation

All deliverables were present and complete including the Case Narrative with full explanation of corrective actions and all package deliverables defined in the project SAP.

The chain-of-custodies were complete for sample identification, matrix, methods, preservation, dates and times of collection, dates and times of relinquishment and receipt. Any corrections preformed properly (i.e., crossed-out with a single line; correction visible, neat, and clear; and with initials of individual making correction).

I(b). Preservation and Holding Times

All technical holding time requirements (28 days) were met.

All samples were received intact with proper preservation (pH < 2 for water).

II. Calibration

An initial calibration was performed each day of analysis. The blank plus 4 standard curve produced a correlation coefficient of > 0.995. The frequency and analysis criteria (80-120%) of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

The low-level initial calibration verification (LLICV) and low-level continuing calibration verifications (LLCCVs) standard frequency and limits (70-130%) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Mercury	0.1 ug/L	All samples in SDG 44433

Sample concentrations were compared to concentrations detected in the ICB/CCB/PBs per the National Functional Guidelines (and associated field results between the MDL and RL were flagged as U at the detected values). No samples were qualified with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
TSB-GJ-08-10	Mercury	0.2 ug/L	0.2U ug/L

Sample "RINSATE 1" (from SDG 4444120137) was identified as a rinsate. No metal contaminants were found in this blank. Association of results in rinsates samples to field samples and impact of concentrations detected in rinsate samples to field sample results are not addressed in this report, but will be assessed as part of a separate data usability assessment.

IV. Laboratory Control Sample (LCS)

Spike amounts were reviewed and concentrations are noted to be at or near the mid-point of the calibration. Percent recoveries (%R) were within 80-120% with the following exceptions:

Spike ID (Associated Samples)	Analyte	LCS (%R) (Limits)	Flag	A or P
TSB-GJ-08-10LCS (All samples in SDG 44433)	Mercury	125.2 (80-120) -	J+ (all detects) UJ (all non-detects)	A

All samples in the batch for the analytes having %Rs outside control limits were qualified as summarized above.

V. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPDs) were within the acceptance criteria of $\leq$ 20% for water or $\leq$ 35% for soil. For low level results, <5 x RL, a difference of $\pm$ 1 x RL is allowed for water and $\pm$ 2 x RL for soils.

VI. Spike Sample Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Spike amounts were reviewed and concentrations are noted to be at or near the mid-point of the calibration. Percent recoveries (%R) were within 75-125% and relative percent differences (RPD) were within 20% limits with the following exceptions (qualification applies only if the spike value times 4 > sample result):

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
TSB-GJ-08-10MS/MSD (All samples in SDG 44433)	Mercury	140.1 (75-125)	135.4 (75-125)	-	J+ (all detects)	A

VII. Field Replicates

Field replicate samples were collected in triplicate. Control limit(s) were not established in the SAP since the average of the replicate samples is used as the final value for the field location. Results of field replicate samples or other project samples were not qualified

based on the precision of field replicate samples.

VIII(a). Sample Result Verification

All sample result verifications were acceptable.

VIII(b). Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

Metals - Data Qualification Summary - SDG 44433

SDG	Sample	Analyte	Flag	A or P	Reason
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Mercury	J+ (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Mercury	J+ (all detects)	A	Laboratory control sample (%R)

Metals - Laboratory Blank Data Qualification Summary - SDG 44433

SDG	Sample	Analyte	Modified Final Concentration	A or P
44433	TSB-GJ-08-10	Mercury	0.2U ug/L	A

Report# #######

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Southeast Idaho Mine Sites

Report Date: November 1, 2008

Matrix: Water

Parameters: Metals by ICP SW-846 Method 6010B

Validation Level: EPA Level IV

Laboratory: Microbac

Sample Delivery Group (SDG): 44433

Sample Identification	Collection Date	Laboratory Identification
TSB-GJ-08-10	9/15/08	44433-01
TSB-GJ-08-20	9/15/08	44433-02
TSB-GJ-08-30	9/15/08	44433-03
TSB-GJ-08-40	9/15/08	44433-04
TSB-GJ-08-10MS	9/15/08	44433-05
TSB-GJ-08-10MSD	9/15/08	44433-06

Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analysis was performed per the EPA SW 846 Method noted below:

- Method 6010B ICP: Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Niobium, Palladium, Phosphorus, Platinum, Potassium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Thallium, Tin, Titanium, Tungsten, Uranium, Vanadium, and Zinc, and Zirconium.

This review follows the specific guidance in the QAPP Addendum (MWH 2008) to the project SAP (April 2004) using the intent of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as applicable to the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Raw data were reviewed for a minimum of 10% of the Sample Delivery Groups (SDGs) or laboratory data package deliverables associated with this sampling event as specified in the QAPP Addendum. This package includes raw data review.

The following are definitions of the data qualifiers:

U The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximated concentration of the analyte in the sample.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

R The result is unusable. The sample result is rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

UJ The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

The following are not data qualifiers but are provide for the purpose of evaluating the laboratory's performance:

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

The following "Reason Codes" will be applied as applicable to the validated data:

1 Holding Time
2 Sample Preservation (including receipt temperature)
3 Sample Custody
4 Missing Deliverable
5 ICPMS Tune
6 Initial Calibration
7 Initial Calibration Verification
8 Continuing Calibration Verification
9 Low-Level Calibration Check Sample
10 Calibration Blank
11 Laboratory or Preparation Blank
12 ICPMS or ICP Interference Check Standard
13 Laboratory Control Sample or Laboratory Control Sample Duplicate Recovery
14 Laboratory Control Sample Precision
15 Laboratory Duplicate Precision
16 Matrix Spike or Matrix Spike Duplicate Recovery
17 Matrix Spike/Matrix Spike Duplicate Precision
18 ICPMS or ICP Serial Dilution
19 ICPMS Internal Standard
20 Field Replicate Precision
21 Equipment Rinsate Blank
22 Linear Range Exceeded
23 Other reason

I(a). Deliverables and Chain-of-Custody Documentation

All deliverables were present and complete including the Case Narrative with full explanation of corrective actions and all package deliverables defined in the project SAP.

The chain-of-custodies were complete for sample identification, matrix, methods, preservation, dates and times of collection, dates and times of relinquishment and receipt. Any corrections preformed properly (i.e., crossed-out with a single line; correction visible, neat, and clear; and with initials of individual making correction).

I(b). Preservation and Holding Times

All technical holding time requirements were met: 6 months for water and soil (note NIST soil standard reference samples are valid for up to 3 years).

All samples were received intact with proper preservation (pH < 2 for water).

II. Calibration

An initial calibration was performed each day of analysis. The frequency and analysis criteria (90-110%) of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

The low-level initial calibration verification (LLICV) and low-level continuing calibration verifications (LLCCVs) standard frequency and limits (70-130%) were met. Limit for antimony, lead and thallium are 50 -150%. Only undetected data, or values < 2 x RL are qualified or impacted.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Thallium Tungsten Vanadium Lithium Mercury	1.3 ug/L 1.1 ug/L 1.4 ug/L 2.7 ug/L 8.0 ug/L 0.1 ug/L	All samples in SDG 44433

Sample concentrations were compared to concentrations detected in the ICB/CCB/PBs per the National Functional Guidelines (and associated field results between the MDL and RL were flagged as U at the detected values). No samples were qualified with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
TSB-GJ-08-10	Mercury	0.2 ug/L	0.2U ug/L
TSB-GJ-08-20	Thallium Tungsten	0.40 ug/L 0.70 ug/L	0.40U ug/L 0.70U ug/L
TSB-GJ-08-30	Lithium	10.0 ug/L	10.0U ug/L

Sample "RINSATE 1" (from SDG 4444120137) was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
RINSATE 1	6/11/08	Calcium Iron Magnesium Manganese Silicon Sodium Strontium	131 ug/L 154 ug/L 17.9 ug/L 0.84 ug/L 38.6 ug/L 39.2 ug/L 1.5 ug/L	All samples in SDG 44433

Sample concentrations were compared to concentrations detected in the field blanks. No samples were qualified.

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

ICP interference check samples were reviewed for each analyte as applicable. Percent recovery (%R) of the ICSAB were within the QC limits of 80-120%.

V. Laboratory Control Sample (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Spike amounts were reviewed and concentrations are noted to be at or near the mid-point of the calibration. Percent recoveries (%R) were within 80-120% with the following exceptions:

Spike ID (Associated Samples)	Analyte	LCS (%R) (Limits)	Flag	A or P
TSB-GJ-08-10LCS (All samples in SDG 44433)	Antimony Copper Silicon Vanadium Lithium Nickel Tungsten Zinc	55.2 (80-120) 72.5 (80-120) 65.4 (80-120) 68.4 (80-120) - - - -	J- (all detects) UJ (all non-detects)	A

All samples in the batch for the analytes having %Rs outside control limits were qualified as summarized above.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPDs) were within the acceptance criteria of ≤ 20% and ≤ 35% for soils. For low level results, < 5 x RL, a difference of ± 1 x RL is allowed for water and ± 2 x RL for soils.

VII. Spike Sample Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Spike amounts were reviewed and concentrations are noted to be at or near the mid-point of the calibration. Percent recoveries (%R) were within 75-125% and relative percent differences (RPD) were within 20% limits (35% soils) with the following exceptions (qualification applies only if the spike value X 4 > sample result):

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
TSB-GJ-08-10MS/MSD (All samples in SDG 44433)	Sulfur Phosphorus	140.1 (75-125) 134.8 (75-125)	135.4 (75-125) -	- -	J+ (all detects) J+ (all detects)	A
TSB-GJ-08-10MS/MSD (All samples in SDG 44433)	Antimony Copper Silicon Vanadium Lithium Nickel Tungsten Zinc	55.2 (75-125) 72.5 (75-125) 65.4 (75-125) 68.4 (75-125) - - - -	39.4 (75-125) 60.9 (75-125) 44.6 (75-125) 56.0 (75-125) 69.8 (75-125) 71.1 (75-125) 60.6 (75-125) 62.2 (75-125)	- - - - - - - -	J- (all detects) UJ (all non-detects)	A
TSB-GJ-08-10MS/MSD (All samples in SDG 44433)	Niobium	40.6 (75-125)	29.7 (75-125)	-	J- (all detects) R (all non-detects)	A

Aluminum, calcium, iron, magnesium, manganese, strontium, and titanium results were outside the QC limits; results were not qualified since the original sample (TSB-GJ-08-10) was greater than 4X the spike amount.

VIII. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria of ±10% difference for values greater than 50 times the lower limit of quantitation (i.e., the reporting limits [RLs]) were met, with the following exceptions:

Sodium and Uranium results were outside the QC limits; data were not qualified since the concentration was less than 50 times the RLs.

IX. Field Replicates

Field replicate samples were collected in triplicate. Control limit(s) were not established in the SAP since the average of the replicate samples is used as the final value for the field

location. Results of field replicate samples or other project samples were not qualified based on the precision of field replicate samples.

X(a). Sample Result Verification

All sample result verifications were acceptable.

X(b). Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

Metals - Data Qualification Summary - SDG 44433

SDG	Sample	Analyte	Flag	A or P	Reason
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Sulfur Phosphorus	J+ (all detects) J+ (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Antimony Copper Silicon Vanadium Lithium Nickel Tungsten Zinc	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Niobium	J- (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Iron	J (all detects)	A	ICP serial dilution (%D)

Metals - Laboratory Blank Data Qualification Summary - SDG 44433

SDG	Sample	Analyte	Modified Final Concentration	A or P
44433	TSB-GJ-08-10	Mercury	0.2U ug/L	A
44433	TSB-GJ-08-20	Thallium Tungsten	0.40U ug/L 0.70U ug/L	A
44433	TSB-GJ-08-30	Lithium	10.0U ug/L	A

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Report# #######

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Southeast Idaho Mine Sites

Report Date: November 1, 2008

Matrix: Water

Parameters: Metals by ICPMS SW-846 Method 6020A

Validation Level: EPA Level IV

Laboratory: Microbac

Sample Delivery Group (SDG): 44433

Sample Identification	Collection Date	Laboratory Identification
TSB-GJ-08-10	9/15/08	44433-01
TSB-GJ-08-20	9/15/08	44433-02
TSB-GJ-08-30	9/15/08	44433-03
TSB-GJ-08-40	9/15/08	44433-04
TSB-GJ-08-10MS	9/15/08	44433-05
TSB-GJ-08-10MSD	9/15/08	44433-06

Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analysis was performed per the EPA SW 846 Method noted below:

- Method 6020A ICPMS: Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Niobium, Palladium, Phosphorus, Platinum, Potassium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Thallium, Tin, Titanium, Tungsten, Uranium, Vanadium, and Zinc, and Zirconium.

This review follows the specific guidance in the QAPP Addendum (MWH 2008) to the project SAP (April 2004) using the intent of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as applicable to the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Raw data were reviewed for a minimum of 10% of the Sample Delivery Groups (SDGs) or laboratory data package deliverables associated with this sampling event as specified in the QAPP Addendum. This package includes raw data review.

The following are definitions of the data qualifiers:

U The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximated concentration of the analyte in the sample.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

R The result is unusable. The sample result is rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

UJ The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

The following are not data qualifiers but are provide for the purpose of evaluating the laboratory's performance:

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

The following "Reason Codes" will be applied as applicable to the validated data:

1 Holding Time
2 Sample Preservation (including receipt temperature)
3 Sample Custody
4 Missing Deliverable
5 ICPMS Tune
6 Initial Calibration
7 Initial Calibration Verification
8 Continuing Calibration Verification
9 Low-Level Calibration Check Sample
10 Calibration Blank
11 Laboratory or Preparation Blank
12 ICPMS or ICP Interference Check Standard
13 Laboratory Control Sample or Laboratory Control Sample Duplicate Recovery
14 Laboratory Control Sample Precision
15 Laboratory Duplicate Precision
16 Matrix Spike or Matrix Spike Duplicate Recovery
17 Matrix Spike/Matrix Spike Duplicate Precision
18 ICPMS or ICP Serial Dilution
19 ICPMS Internal Standard
20 Field Replicate Precision
21 Equipment Rinsate Blank
22 Linear Range Exceeded
23 Other reason

I(a). Deliverables and Chain-of-Custody Documentation

All deliverables were present and complete including the Case Narrative with full explanation of corrective actions and all package deliverables defined in the project SAP.

The chain-of-custodies were complete for sample identification, matrix, methods, preservation, dates and times of collection, dates and times of relinquishment and receipt. Any corrections preformed properly (i.e., crossed-out with a single line; correction visible, neat, and clear; and with initials of individual making correction).

I(b). Preservation and Holding Times

All technical holding time requirements were met: 6 months for water and soil (note NIST soil standard reference samples are valid for up to 3 years).

All samples were received intact with proper preservation (pH < 2 for water).

II. ICP-MS Tune Analysis

ICP MS Tuning was performed by the laboratory. All isotopes in the tuning solution mass resolution were within 0.1 amu.

The percent relative standard deviations (%RSD) of all isotopes in the tuning solution were less than or equal to 5.0%.

III. Calibration

An initial calibration was performed each day of analysis. The frequency and analysis criteria (90-110%) of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

The low-level initial calibration verification (LLICV) and low-level continuing calibration verifications (LLCCVs) standard frequency and limits (70-130%) were met. Limit for cobalt, manganese and zinc are 50 -150%. Only undetected data, or values < 2 x RL are qualified or impacted.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Thallium Tungsten Vanadium Lithium	1.3 ug/L 1.1 ug/L 1.4 ug/L 2.7 ug/L 8.0 ug/L	All samples in SDG 44433

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
	Mercury	0.1 ug/L	

Sample concentrations were compared to concentrations detected in the ICB/CCB/PBs per the National Functional Guidelines (and associated field results between the MDL and RL were flagged as U at the detected values). No samples were qualified with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
TSB-GJ-08-10	Mercury	0.2 ug/L	0.2U ug/L
TSB-GJ-08-20	Thallium Tungsten	0.40 ug/L 0.70 ug/L	0.40U ug/L 0.70U ug/L
TSB-GJ-08-30	Lithium	10.0 ug/L	10.0U ug/L

Sample "RINSATE 1" (from SDG 4444120137) was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
RINSATE 1	6/11/08	Calcium Iron Magnesium Manganese Silicon Sodium Strontium	131 ug/L 154 ug/L 17.9 ug/L 0.84 ug/L 38.6 ug/L 39.2 ug/L 1.5 ug/L	All samples in SDG 44433

Sample concentrations were compared to concentrations detected in the field blanks. No samples were qualified.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

ICP interference check samples were reviewed for each analyte as applicable. Percent recovery (%R) of the ICSAB were within the QC limits of 80-120%.

VI. Laboratory Control Sample (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Spike amounts were reviewed and concentrations are noted to be at or near the mid-point of the calibration. Percent recoveries (%R) were within 80-120% with the following exceptions:

Spike ID (Associated Samples)	Analyte	LCS (%R) (Limits)	Flag	A or P
TSB-GJ-08-10LCS (All samples in SDG 44433)	Antimony Copper Silicon Vanadium Lithium Nickel Tungsten Zinc	55.2 (80-120) 72.5 (80-120) 65.4 (80-120) 68.4 (80-120) - - - -	J- (all detects) UJ (all non-detects)	A

All samples in the batch for the analytes having %Rs outside control limits were qualified as summarized above.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPDs) were within the acceptance criteria of $\leq$ 20% for water or $\leq$ 35% for soil. For low level results, <5 x RL, a difference of $\pm$ 1 x RL is allowed for water and $\pm$ 2 x RL for soils.

VIII. Spike Sample Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Spike amounts were reviewed and concentrations are noted to be at or near the mid-point of the calibration. Percent recoveries (%R) were within 75-125% and relative percent differences (RPD) were within 20% limits with the following exceptions (qualification applies only if the spike value X 4 > sample result):

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
TSB-GJ-08-10MS/MSD (All samples in SDG 44433)	Sulfur Phosphorus	140.1 (75-125) 134.8 (75-125)	135.4 (75-125) -	- -	J+ (all detects) J+ (all detects)	A
TSB-GJ-08-10MS/MSD (All samples in SDG 44433)	Antimony Copper Silicon Vanadium Lithium Nickel Tungsten Zinc	55.2 (75-125) 72.5 (75-125) 65.4 (75-125) 68.4 (75-125) - - - -	39.4 (75-125) 60.9 (75-125) 44.6 (75-125) 56.0 (75-125) 69.8 (75-125) 71.1 (75-125) 60.6 (75-125) 62.2 (75-125)	- - - - - - - -	J- (all detects) UJ (all non-detects)	A
TSB-GJ-08-10MS/MSD (All samples in SDG 44433)	Niobium	40.6 (75-125)	29.7 (75-125)	-	J- (all detects) R (all non-detects)	A

Aluminum, calcium, iron, magnesium, manganese, strontium, and titanium results were outside the QC limits; results were not qualified since the original sample (TSB-GJ-08-10) was greater than 4X the spike amount.

IX. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria of ±10% difference for values greater than 50 times the lower limit of quantitation (i.e., the reporting limits [RLs]) were met, with the following exceptions:

Sodium and Uranium results were outside the QC limits; data were not qualified since the concentration was less than 50 times the RLs.

X. ICP-MS Internal Standards

All internal standard percent recoveries (%R) were within 70-130% or a 2x dilution was run with acceptable recoveries with the following exceptions:

Sample	Internal Standard	%R (Limits)	Analyte	Flag	A or P
TSB-GJ-08-20	Scandium-45	127.557 (70-130)	Silicon Strontium	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
TSB-GJ-08-30	Scandium-45	129.653 (70-130)	Silicon Strontium	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

XI. Field Replicates

Field replicate samples were collected in triplicate. Control limit(s) were not established in the SAP since the average of the replicate samples is used as the final value for the field location. Results of field replicate samples or other project samples were not qualified based on the precision of field replicate samples.

XII(a). Sample Result Verification

All sample result verifications were acceptable.

XII(b). Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

Metals - Data Qualification Summary - SDG 44433

SDG	Sample	Analyte	Flag	A or P	Reason
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Sulfur Phosphorus	J+ (all detects) J+ (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
44433	TSB-GJ-08-10 TSB-GJ-08-20	Antimony Copper	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

SDG	Sample	Analyte	Flag	A or P	Reason
	TSB-GJ-08-30 TSB-GJ-08-40	Silicon Vanadium Lithium Nickel Tungsten Zinc			
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Niobium	J- (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
44433	TSB-GJ-08-20 TSB-GJ-08-30	Silicon Strontium	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Internal standards (%R)
44433	TSB-GJ-08-10 TSB-GJ-08-20 TSB-GJ-08-30 TSB-GJ-08-40	Iron	J (all detects)	A	ICP serial dilution (%D)

Metals - Laboratory Blank Data Qualification Summary - SDG 44433

SDG	Sample	Analyte	Modified Final Concentration	A or P
44433	TSB-GJ-08-10	Mercury	0.2U ug/L	A
44433	TSB-GJ-08-20	Thallium Tungsten	0.40U ug/L 0.70U ug/L	A
44433	TSB-GJ-08-30	Lithium	10.0U ug/L	A