SITE SPECIFIC ADDENDUM
TO RAMS GENERAL WORK PLAN AND
SITE SAFETY AND HEALTH PLAN
Bullion Mine
20 September 2002

1.0 INTRODUCTION

1.1 RAMS Program

The U.S. Army Corps of Engineers (USACE) has been provided authority for Restoration of Abandoned Mine Sites (RAMS) through the Water Resource Development Act (WRDA) 1999 Section 560. This program is a regionally focused and stakeholder responsive program for the restoration of abandoned and inactive non-coal mines where water resources (ecosystem/habitat) have been degraded by past mining practices. This authority is intended to allow the USACE to provide support to agencies that manage lands impacted by past mining.

1.2 Partnering Strategy

USACE will coordinate in advance to obtain stakeholder buy-in on all work proposed to be performed by Corps Districts to ensure that the proposed work is supportive of stakeholders efforts in the area. The U.S. Forest Service (USFS) will obtain the necessary right of entry (ROE) or other access agreement to the identified locations. Individuals from the USACE Omaha District, the USFS Beaverhead-Deerlodge (GMUG) National Forest, and Bitterroot Resoration, Inc. will perform the field work.

1.3 Work Plan and the Site-Specific Addendum

This document is prepared as the Site-Specific Addendum (SSA) to the Restoration of Abandoned Mine Sites Work Plan (USACE, 2002). The RAMS Work Plan was written to encompass all investigative activities to be accomplished by various districts of the USACE under the RAMS program. The purpose of this SSA is to present methods and procedures for conducting a site characterization of the Bullion Mine site involving a vegetation survey, surface water quality, mine waste, soils, and sediment sampling.

This SSA describes the media, locations, analyses, frequencies, and techniques associated with the major field tasks outlined above and will be used in conjunction with the RAMS Work Plan. The RAMS Work Plan contains a more complete discussion of the RAMS program, along with a thorough discussion of the following: sampling requirements; field quality control; chemical data quality objectives; project organization and quality control responsibility; laboratory analytical and preparation procedures; sample collection, handling and documentation procedures; preventative maintenance procedures; calibration procedures and frequency; corrective action; and data reduction. This document references the RAMS Work Plan for the current field activities and contains site-specific information not included in the RAMS Work Plan.

2.0 PROJECT INFORMATION

2.1 Site Description

The Bullion Mine project site is located on the Beaverhead-Deerlodge National Forest approximately eight miles north of Basin, Montana in Section 13 and 14 Township 7 North, and Range 6 West, Montana Principle Meridian. Currently, the Forest Service and EPA are partners in a CERCLA response action at the mine and mill site. However, the Forest Service has identified eroded tailings that have re-deposited downstream from the site. The project site consists of approximately a half-mile of tailings along Jack and "Jill" Creeks, which lead to Basin Creek, a major tributary of the Boulder River.

The Basin Creek Drainage contains historic milling waste associated with numerous historic mining and milling sites, including the Bullion Mine and Milling Complex. On October 22, 1999, EPA added the Basin Creek Drainage, which contains the Bullion Mine and Milling Complex, to the National Priorities List. The Bullion Mine and Mill Complex, which lies upstream of the project site, occupies approximately one half-mile of "Jill Creek."

2.2 Project Goals

The goal of this investigation is to identify potential contaminant sources and collect environmental samples to determine whether or not significant contamination exists for the purpose of determining whether or not contaminated mine tailings and soils should be removed.

3.0 FIELD INVESTIGATION

3.1 Field Investigation Activities

Sampling methods have been identified. The Standard Operating Procedures (SOPs), developed for this project, will be adhered to during the course of this field investigation: A1 (Surface Soil/Rock Sampling Equipment and Procedures); A3 (Subsurface Soil/Rock Sampling Equipment and Procedures); A4 (Soil/Rock Homogenization Equipment and Procedures); A7 (Investigative Derived Waste Procedures); A11 (Surface Water and Sediment Sampling Equipment and Procedures), A12 (Equipment Decontamination Procedures); A13 (Sample Handling, Documentation, and Tracking Procedures); and A14 (Field Documentation); A15 (Survey Equipment and Procedures).

Sampling location coordinates obtained from a hand-held Global Positioning Satellite (GPS) device will be recorded in the field logbook in longitude and latitude. The device has an approximate accuracy of plus-or-minus 1 meter.

3.1.1 <u>Surface Water Samples</u>

The sampling locations will be located upgradient and downgradient from potentially contaminated areas. The locations will be designed to determine the degree of stream degradation that is occurring as a result of these areas. Field measurements of Flow, pH, and specific conductance will be obtained. Surface water samples will be collected with a depth-integrated wading devise and poured into sample containers supplied by SVL. All excess water will be disposed of by pouring gently out on the stream bank adjacent to the sampling location. A total of 6 surface water samples, including one Quality Control (QC) sample will be collected and will be analyzed for:

Target Constituent	**Analytical Method**
Metals	
Arsenic	EPA M200.2 ICP-Total metals
Cadmium	EPA M200.2 ICP- Total metals
Copper	EPA M200.2 ICP- Total metals
Lead	EPA M200.2 ICP- Total metals
Zinc	EPA M200.2 ICP- Total metals
PH	EPA M150.1
Conductivity	EPA M120.1

3.1.2 Mine Waste Samples

The sampling locations will be located on and around mine waste tailings piles. The sampling sites, located at cross-sections along the contaminated stream, will be designed to determine the types and amounts of contamination. Samples will be collected in augered holes at a maximum depth of 3 feet. Samples will be composited and stored in containers supplied by SVL. Ten mine waste and soil samples will be collected and analyzed for:

Target Constituent	**Analytical Method**
Metals	
Arsenic	EPA M200.2 ICP-Total metals
Cadmium	EPA M200.2 ICP- Total metals
Copper	EPA M200.2 ICP- Total metals
Lead	EPA M200.2 ICP- Total metals
Zinc	EPA M200.2 ICP- Total metals

In addition, a total of 3 mine waste samples (surface rock/soil samples) plus one QC sample collected at the locations identified in Table 1 and will be analyzed for:

Target Constituent	**Analytical Method**
Metals	
Arsenic	EPA M200.7 ICP-water-extractable
Cadmium	EPA M200.7 ICP- water-extractable
Copper	EPA M200.7 ICP- water-extractable
Lead	EPA M200.2 ICP- water-extractable
Zinc	EPA M200.7 ICP- water-extractable

3.1.3 Sediment Samples

Six sediment samples, co-located with the surface water samples will be and analyzed for:

Target Constituent	Analytical Method
Metals	
Arsenic	EPA M200.2 ICP-Total metals
Cadmium	EPA M200.2 ICP- Total metals
Copper	EPA M200.2 ICP- Total metals
Lead	EPA M200.2 ICP- Total metals
Zinc	EPA M200.2 ICP- Total metals
PH	EPA M150.1
Conductivity	EPA M120.1

3.1.4 A riparian health assessment will be conducted in the injured area. It will assess the types, health, and density of riparian vegetation, as well as geomorphological features.

3.2 Stream Discharge Equipment and Procedures

Flow rate measurements will be obtained using an FP201 Global Flow Probe hand-held flow meter with a 5- to 15-foot expandable handle. The flow meter has a 2-inch propeller sensor that rotates freely on a bearing shaft with no mechanical interconnections. Magnetic material in the propeller passes a pickup coil in the housing, thereby producing electrical impulses. The electrical impulses are then carried by wire to a readout display located on top of the handle, which amplifies and converts the signal into velocity readings measured in feet per second. Instantaneous, average and maximum velocity readings are displayed. The range of the flow meter is 0 to 25 feet per second, with accuracies of plus-or-minus 0.1 feet per second for instantaneous velocity, and plus-or-minus 0.01 feet per second for average and maximum velocity.

At each surface water sampling location, the stream channel will be subdivided into 1 to 5 segments of equal length depending on the width of the stream channel. Ideally, each segment will range from 3 to 5 feet across. The depth of the stream will be measured in the middle of each segment. These measurements will be recorded by drawing a diagram on graph paper with a scale of 1 square foot per graph paper square, assuming the measured depth is consistent across each stream segment. The cross-sectional area of each stream channel segment will be calculated by counting the number of squares in the stream segment, and will be recorded in the field logbook.

After calculating the cross-sectional areas, velocity measurements will be obtained from each stream segment. The flow meter handle will be extended to the appropriate length and the flow probe placed in the middle of each stream segment for a minimum of 1 minute. The flow probe will be moved slowly back and forth from top to bottom during the 1-minute timeframe in order to obtain a vertical flow profile. The average and maximum flow velocities for each stream segment will be recorded in the field logbook. For each stream segment, the average velocity will then be multiplied by the cross-sectional area in order to determine the flow for that segment. Once the flow for each segment is obtained, all of the segment flows will be added together to obtain a total stream flow. The date, time, and GPS coordinates in longitude and latitude for each sampling location will be recorded in the field logbook.

3.3 Sample Identification Scheme

The sample ID scheme will be the following designation.

UU-VVVV-XXXX-ZZ
where:

UU = Project designation = **MT**
VVVV = Designation of sampling area location will be replaced with **BUL** (For Bullion)
XXXX = **WR** (waste rock/mine waste sample), **SO** (Soil), **SW** (surface water sample) or **SD** (sediment sample) plus the two-digit sample location number

4.0 CHEMISTRY REQUIREMENTS

Sample analytical and handling requirements are given in this section of the SSA Work Plan.

4.1 Project and Data Quality Objectives

4.1.1 Project Objectives

Surface water, sediment, soil, and mine waste samples from Bullion mine site will be obtained for chemical analysis. For this project 6 surface water samples, 10mine waste samples, and 6 sediment samples, and 10 soil samples will be collected and analyzed.

4.1.2 Data Quality Objectives

The analytical results will be used to gain information about the extent of mine-related contamination.

4.2 Preservation, Holding Time, and Shipment

Water samples shall be fixed and held on ice until they are shipped to the lab within holding times. The waste rock and soil metal samples will be batched also. They will not be held on ice. All samples will be sent to the laboratory at the close of field activities. The sample/samples will be analyzed and the sensitivity and quality control samples acceptance criteria will meet that set by the Environmental Chemistry Branch Laboratory criteria and/or as per the Draft General Work Plan, Restoration of Abandoned Mine Sites, June 2002.

4.3 Labeling and Shipment Procedures.

The filled sample bottles and jars will be labeled as specified in the General Work Plan, 2002. The Laboratory Identification Management System (LIMS) number is: **LIMS # 6717.**

The labeled bottles will be placed in the cooler with the appropriate chain-of-custody. The cooler will be shipped by overnight mail to the laboratory: SVL Analytic in Kellogg, Idaho.

4.4 Sample Analysis

The following analytical methods will be used for the field samples and appropriate required quality control samples for this site:

Parameter	Method	Matrix
Metals	EPA SW 6010B/7470 series for Hg	water
pH	EPA 150.1	water
Conductivity	EPA 120.1	water
Metals	EPA SW 6010B/7470 series for Hg	soil/sediment
Metals (SPLP)	EPA SW 1312/6010B/7470 series for Hg	leachate

5.0 SAFETY REQUIREMENTS

Information on health and safety issues associated with this field effort may be found in the Bullion Site Safety and Health Plan (SSHP), Sept. 2002.

6.0 QUALITY CONTROL REVIEW

Quality control review consists of an evaluation of the field procedures and analytical procedures and a review of the data to ensure appropriate QC compliance were met.

6.1 Field Quality Control

All documentation in field logbooks will be reviewed by the project team for completeness. A review of the placement or coordinates of the sample will be performed to ensure that this correlates to sample nomenclature. Placement and frequency of the quality control samples will be reviewed to ensure compliance to set criteria. Location coordinates, flow rate measurements, cross-sectional area calculations, and discharge calculations will be reviewed for completeness and accuracy by the project technical team.

6.2 Laboratory Quality Control

Upon completion of analysis, the analyst will calculate the final sample results and associated QC results from the raw data. The analyst will review all raw data for any peaks that appear suspect or will have any effect on the data. The analyst will review all analytical instrument parameters such as internal standards, retention times, and controls to ensure compliance. The analyst will also review accuracy of equations including units and also quality control results for the analytical batch. When the analyst has completed the analysis of the samples, a second level of data and instrument review will be performed by another laboratory person. This will give a check on instrument performance, interpretation, and calculation of the data results. Before the data package is released, a third level of review will be performed by the Quality Control Officer of the lab to ensure complete data accuracy and compliance. The sample temperature upon receiving the samples, holding times, and a complete case narrative of the quality control will be submitted along with each data package. The three levels of laboratory review of the data package will be performed on 100 % of the data.

6.3 Data Evaluation

The project chemist will make a separate review of a portion of the data package obtained from the laboratory. This will include a review of the Case Narrative that is included in the data package. If no noted deficiencies are encountered, it can be assumed that the data package as obtained from the laboratory is of sufficient quality that batch validation can be performed. The batch data evaluation will be performed on 100 % of the data package obtained from the laboratory. In performing this, the evaluator will use the National Functional Guidelines as a guide. The parameters and QC results that are used in the validation are:

- Holding times
- Sample temperatures during shipment and before analysis
- Blanks (trip and method)
- LCS
- MS/MSD
- Surrogates

Data evaluation consists of comparing the above six items along with other checks as given in section 5.7 of the General Work Plan, 2002 to set project criteria and flagging the data values accordingly. The evaluation should show how the holding times and shipment and holding temperatures are met and any noncompliance along with how the analytical batch blanks and spikes samples meet set criteria. Data tables will be produces for all analytical data along with the resulting data qualification flags.

7.0 REPORT REQUIREMENTS

The report for this field effort will consist of:

- a brief summary of field activities,
- a map of final sampling locations,
- a table of sampling location coordinates in longitude and latitude, flow rate velocities, stream channel cross-sectional area, and calculated discharge rate,
- a table of analytical results for all parameters and comparison to state standards, if any, and
- a brief summary of data quality based on data evaluation.