STANDARD OPERATING PROCEDURE NO. 8

SAMPLE PREPARATION (SOLIDS)

REVISION LOG		
Revision Number	Description	Date
8.0	Original SOP	12/3/03
8.1	Changes VTM, DEW	
8.2	Revisions by PJP	5/20/2004
8.3	Revisions by PJP	6/11/2004
8v4	Edits LMK	10/31/05
8v4	Edits accepted by LMK, sent to Jack Hamilton to post on Utah site and posted to Granite FTP Server.	10/31/05
8v5	Minor corrections and formatting changes. LMK Sent to Jack Hamilton to replace on the Utah website	6/28/06
8v5	Finalized by LMK for posting on website and to send George Robinson for lab audit	
8v6	Editorial by SKA	10/22/08

1.0 PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides technical guidance and procedures that will be employed for sample preparation. It addresses equipment, procedures, and personnel responsibilities.

2.0 RESPONSIBILITIES AND QUALIFICATIONS

The Team Leader and Characterization Team will have the overall responsibility for implementing this SOP. They will be responsible for assigning appropriate staff to implement this SOP and for ensuring that the procedures are followed accurately.

All personnel performing these procedures are required to have the appropriate health and safety training. In addition, all personnel are required to have a complete understanding

of the procedures described within this SOP, and to receive specific training regarding these procedures, if necessary.

All environmental staff and assay laboratory staff are responsible for reporting deviations from this SOP to the Team Leader.

3.0 DATA QUALITY OBJECTIVES

This SOP addresses objectives 2, 3, 4, 5, 6, and 7, plus any other SOP where sampling is required in the data quality objectives outlined by Virginia McLemore for the "Geological and Hydrological Characterization at the Molycorp Questa Mine, Taos County, New Mexico".

- Determine how mineralogy, stratigraphy, and internal structure of the rock piles contribute to weathering and stability.
- Determine if the sequence of host rock hypogene and supergene alteration and weathering provides a basis to predict the effects weathering can have on mine rock stability.
- Determine if cementation forms in the rock piles and if so, how the cementation contributes to the stability of the rock piles.
- Determine how reactive pyrite and carbonate minerals are so that a representative sample goes into the weathering cells.
- Determine how much and where the pyrite is in the waste rock piles and how the pyrite concentration affects the weathering process.
- Determine if pyrite oxidation, moisture content, and microbe populations affect rock pile weathering and stability.
- Determine if the geotechnical and geochemical characteristics of the bedrock (foundation) underlying the rock piles influence the rock pile stability.

4,0 RELATED STANDARD OPERATING PROCEDURES

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

- SOP 1 Data management (including verification and validation)
- SOP 2 Sample management (chain of custody)
- SOP 5 Sampling outcrops, rock piles, and drill core (solid)
- SOP 6 Drilling, logging, and sampling of subsurface materials (solid)
- SOP 9 Test pit excavation, logging, and sampling (solid)
- SOP 36 Sample preservation, storage, and shipment

5.0 EQUIPMENT LIST

The following materials are required for preparing samples for further analyses:

- Jaw crushers and catch bins
- Tungsten carbide disc grinders
- Paper
- Spatula
- Envelopes for crushed sample

- Sample preparation forms (Appendix 1)
- Indelible marker pens to label samples and fill out forms
- Deionized water
- Acetone in squirt bottle
- Shallow tin trays
- Compressed air and hose assembly
- Wire brush
- Silica sand (laboratory grade, clean and pure)
- Rock saws, diamond blade, including trim saw

6.0 PROCEDURES

6.1 Crushing

1. Fill out chain of custody forms, maintaining field sample ID's for each sample.
2. Prior to crushing, air-dry samples in shallow tin trays should they be damp.
3. Run silica sand in disc grinders in between samples to prevent cross contamination of samples. Rinse components of grinder with acetone.
4. If applicable, homogenize fine-grained material and split out 50 grams using cone and quarter method to be used for DI leach.
5. Crush rock samples using large jaw crusher (if necessary), then use small jaw crusher until particles are pea sized.
6. Homogenize.
7. Crush pea-size sample in tungsten carbide disc grinder (hockey puck) to approx. 100 mesh (feels like talcum powder between fingers).
8. Homogenize sample using cone and quartering techniques.
9. Split sample into three—one to chemical laboratory for analysis, one to X-ray laboratory, and one to Bureau archive. Archive remaining pea sized material.
10. Clean the jaw crushers and disc grinders with compressed air. Use a clean wire brush if necessary. Run silica sand in disc grinders in between samples to prevent cross contamination of samples. Rinse with acetone.

NOTE: Wash hands periodically. Follow normal procedures to prevent contamination. Maintain field number throughout sample preparation.

6.2 Thin sections

Thin sections will be required for most characterization and mineralization/alteration samples.

1. Fill out chain of custody form, maintaining field sample ID numbers for samples.
2. Samples will be marked with lines for cutting with rock saws (Outline area to be trimmed with indelible marker pen).
3. Chips approximately 1 inch by 0.5 inch and 0.5 inch thick will be made using trim saw. If sample contains water-soluble cement, then do not use water when cutting.

7.0 DOCUMENTATION

Each sample is assigned a unique field identification number in the field. A chain of custody form will be completed and sent with each sample batch.

Samples enter sample preparation with their assigned field identification number. After samples are prepped, a sample identification number is assigned according to SOP 2. Fill out sample preparation form (Appendix 1).

The field identification (ID) number for samples will be comprised of three components, separated by dashes, for example SSW-HRS-0001, as discussed below.

Field Identification Number (Field ID)

Component 1	Component 2	Component 3
Three letter abbreviation for the mine feature, for example SSW for Sugar Shack West.	Three letter initials of the sample collector, for example HRS for Heather R. Shannon.	Sequential four number designation, for example 0001.

Each sample is then assigned a separate sample identification number during sample preparation. The first part is identical to the field identification number and is followed by a sequential two numbers, for example SSW-HRS-0001-01.

Sample Identification Number (Sample ID)

Component 1	Component 2	Component 3	Component 4
Three letter abbreviation for the mine feature, for example SSW for Sugar Shack West.	Three letter initials of the sample collector, for example HRS for Heather R. Shannon.	Sequential four number designation, for example 0001.	Sequential two number designation, for example 01.

Any deviations from this sampling numbering system will be documented and reported to the Team Leader and Principle Investigators.

01 thin section
02 XRF, XRD
03 ICP, paste pH, paste conductivity
04 DI leach (uncrushed)
05 Moisture content, paste pH, paste conductivity
06 Clay mineralogy
07 Stable isotopes

08 Ar/Ar dating
09 Reflectance spectroscopy (uncrushed)
10 Archive

8.0 QUALITY ASSURANCE/QUALITY CONTROL

For each batch of 10 samples, 1 set of duplicate samples with a different sample ID number will be prepared. For each batch of 25 samples, 1 set of triplicate samples with a different sample ID number will be prepared. NMBGMR internal (Capulin, rhyolite, basalt, sand, Capulin waste rock pile) and commercial certified standards will be submitted blind with a sample ID number to the laboratory with each sample batch of 25 samples to assure analytical quality. NMBGMR will archive a split of all samples for future studies.

APPENDIX 1. FORMS

SAMPLE PREPARATION

Sample_id	Field_id	Preparation_ description	sample _mass	Prepped by	Laboratory _id
CAP-MLJ-0001-01	CAP-MLJ-0001	crushed and homogenized		DW, NW,	NM4
Deviation_SOP				SOP_ number	8
					NM4
Deviation_SOP				SOP_ number	8