

STANDARD OPERATING PROCEDURE NO. 91**COLOR COMPARISON**

REVISION LOG		
Revision Number	Description	Date
91.0	Original SOP by KMD	8/19/2005
91.1	VTM	8/19/05
91v2	LMK edits, accepted changes, sent to Jack Hamilton to post on website	8/19/05
91v2	Finalized by LMK for posting ton Molycorp project website and to send to George Robinson for lab audit, no new edits	4/4/07
91v3	Editorial by SKA	10/28/08

1.0 PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides technical guidance and procedures that will be employed to identify uncrushed and powdered sample colors. It addresses equipment, laboratory procedures, laboratory data collection, and personnel responsibilities. A color identification number different from the Munsell color chart was established for the primary colors observed at the mine site. A separate color identification number was established in order to provide a numerical number for statistical analyses and for use in other computer programs such as MinPet. Using this chart limits the color classifications to a few primary colors, unlike the Munsell color chart which consists of several hundred shades and hues.

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. DATA QUALITY OBJECTIVES

This SOP addresses the following objectives 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 within alteration scars and outcrops provides a basis to predict the effects weathering can have on mine rock material.

4.0 RELATED STANDARD OPERATING PROCEDURES

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

- SOP 24 Petrographic analysis
- SOP 8 Sample preparation solid

5.0 EQUIPMENT LIST

The following materials and equipment are needed for identifying sample color:

- Lamp or other fixed source of light
- Color identification chart (attached as Appendix 1)
- Clear watch glass
- White filter paper
- Mortar and pestle
- De-ionized (DI) water and acetone
- Munsell color chart or GSA Rock Color Chart
- Weatherproof logbook and indelible pens to record sample color

6.0 PROCEDURES

1. Homogenize the uncrushed or powdered sample as much as possible using cone and quarter method (SOP 8).
2. Place a small amount of the sample on a clear watch glass and place the watch glass on a piece of white filter paper.
3. Using a lamp as a direct light source, compare the color of the sample to the color chart.
4. Record the color name and the number value for each sample in a logbook and record in a spreadsheet for inclusion in the project database.
5. If a sample has a color that is between two colors on the color chart, other color charts (e.x. Munsell) may be used to determine which color the sample most resembles.
6. For samples that have not already been crushed to a powder, use a mortar and pestle to grind the sample to a powder consistency and examine the color again.
7. Rinse the mortar with DI water and then wipe with a clean paper towel and acetone.

7.0 DOCUMENTATION

- A notebook or logbook will be used to record the sample number, color and numerical value assigned (Appendix 2) and the size of material examined (Appendix 1).

8.0 QUALITY ASSURANCE/QUALITY CONTROL

Periodically, samples should be re-examined either at a different time of the day than the initial examination or on a different day to guarantee consistency in color descriptions. A constant light source should prevent color descriptions from being affected by the different types of natural light.

APPENDIX 1. FORMS

Field_id	Color (Appendix 2)	Number of color	Powdered or gravel size material examined

Appendix 2. Identification of color identification number (partly based upon the Munsell color chart).

Black = 1.25

Very dark brown = 4.2

Dark gray = 1.4

Brown = 4.5

Gray = 1.6

Olive yellow = 5

Light gray = 1.7

Yellowish brown = 5.5

Purple gray = 2.0

Yellow = 6

Bluish gray = 2.6

Pale yellow = 6.8

Light greenish gray = 2.8

Yellowish red = 7

Dark grayish brown = 3.3

Dark red = 7.3