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DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

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April 9, 1999

TO: File

THRU: Joe Helfrich, Permit Supervisor *JGH*

FROM: Robert Davidson, Soils Reclamation Specialist *RAD*

RE: Barn Canyon Ventilation Facility, Permit Amendment, Cyprus Plateau Mining Corporation, Willow Creek Mine, ACT/007/038-98B, Folder #2, Carbon County, Utah

**SYNOPSIS:**

Cyprus Plateau Mining Corporation (CPMC) has submitted an amendment for the Barn Canyon Ventilation Facility. The ventilation facility will consist of a ventilation shaft and emergency escape hoist with provisions to install a ventilation fan at a latter date if conditions develop that necessitate the use of a ventilation a fan. The original Barn Canyon Ventilation submittal was on March 6, 1998. The Division found the amendment inadequate and responded with a technical analysis on April 2, 1998. Cyprus responded with an additional submittal on July 13, 1998. Again, there were deficiencies with the plan and the Division's response was completed on September 16, 1998. Cyprus resubmitted the amendment on March 8, 1999 with corrections to the original amendment addressing the most recent deficiencies. This soils Technical Analysis addresses this most recent submittal.

**TECHNICAL ANALYSIS:**

**ENVIRONMENTAL RESOURCE INFORMATION**

**SOILS RESOURCE INFORMATION**

Regulatory Reference: 30 CFR Sec. 783.21, 817.200(c); R645-301-220, -301-411.

**Analysis:**

The Barn Canyon Ventilation Facility amendment contains adequate information regarding the soils environmental resources as follows:

- Order-I Soil Survey
- Order-I Soil Survey Map
- Soils Identification, Description and Characterization

**Order-I Soil Survey**

An Order-I soil survey supplies information for the ventilation facility area. Mr. Jim Nyenhuis, ARCPACS Certified Professional Soil Scientist, conducted the survey for Mt. Nebo Scientific on January 14, 1998. Mr. Robert Davidson, Soils Senior Reclamation Specialist, Utah Division Oil, Gas and Mining (DOGM), was also present on the site during fieldwork. Four soil pits were dug, described, and sampled for the survey. Two native, undisturbed soils (BC3 and BC4), and two disturbed sites (BC1 and BC2) were sampled. For site BC2, the surface had been disturbed with the underlying soil substratum (C horizon) still present. Standard soil descriptions were completed in the field and a total of eleven soil samples were collected from the four pits. *Copies of the actual field data sheets are not provided with the amendment submittal and need to be included with the submittal for inclusion with the MRP.*

**Order-I Soil Survey Map**

The amendment contains an Order-I soils map delineating each soil, sampling locations and soil descriptions for each map unit (Figure 3.1-1). The map scale 1:360 is within the required 1:15,840 or larger scale for Order-I surveys. Likewise, the 0.91 acre surveyed site is within the minimum delineation size (2.5 acres) for an Order-I soil survey.

*Figure 3.1-1 shows the order 1 soil survey. The following problems are identified:*

- *No elevation markers are given for identifying the map contour intervals.*
- *No bar scale is provided to ensure the map's accuracy (e.g., 1" = 30').*

- *The map, dated Feb. 20, 1998, is not current with the most recent submittal made on March 9, 1999, nor does the Figure 3.1-1 correlate with Map 31A, Barn Canyon Facility Site Plan, of the current submittal. Disturbed area boundaries are not accurate. Undisturbed contour lines do not match or correlate. A topsoil stockpile area is located down the canyon from the ventilation shaft area which is inconsistent with the current submittal.*

### Soils Identification, Description and Characterization

For the Order-I soil survey, the four soil areas described are listed as follows with their respective soil series and taxonomic class:

MAP UNIT	PIT LOCATION	SOIL SERIES	TAXONOMIC CLASS <sup>1</sup>
A	BC-4	Perma Sandy Loam 10-25% slopes	loamy-skeletal, mixed, Typic Haploboroll
B	BC-3	Pathead Cobbly Loam 35-65% slopes	loamy-skeletal, mixed (calcareous), frigid Typic Ustorthent
C	BC-2	Disturbed Hillside Pathead (C horizon) 4-12% slopes	loamy-skeletal, mixed (calcareous), frigid Typic Ustorthent
D	BC-1	Disturbed Drainage 3-8% slopes.	None

The Order-I soil survey provides (1) a description of each map unit in areas A, B, C, and D; (2) a profile description of each of the soils at the four sample sites, BC1 through 4; and (3) a copy of the soil laboratory data for the eleven soil samples taken from the four sample sites.

Samples were sent to Inter-Mountain Laboratory (IML, Farmington, NM) for analysis according to the Division's Guidelines for Management of Topsoil and Overburden<sup>2</sup> and by consultation with Mr. Robert Davidson, DOGM. Parameters analyzed include pH, EC, saturation percent, Ca, Mg, Na, SAR, texture, CaCO<sub>3</sub>, soluble B, soluble Se, TOC, and organic matter.

With the exception of rock fragments, soils have physical and chemical properties that

<sup>1</sup> Jensen, E.H., and Borchert, J.W., 1988. Soil Survey of Carbon Area, Utah Soil Conservation Service, United States Department of Agriculture, Washington D.C.

<sup>2</sup> Leatherwood, James, and Dan Duce. 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah, Department of Natural Resources, Division of Oil, Gas and Mining. Salt Lake City, Utah.

are within DOGM's acceptable range for soil and overburden guidelines. The Division recognizes that native soils contain high percentages of rock fragments, is inevitable and does not present a reclamation hazard. Certainly, to reclaim and restore the land to pre-mining conditions will require soils with indigenous rock fragment volumes and content. Therefore, it is not only acceptable, but desirable to salvage soils containing intrinsic rock, gravels, cobbles and boulders.

**Findings:**

The permittee must provide the following, prior to approval, in accordance with the requirements of:

**R645-301-120**, Include copies of the actual field data sheets with the submittal for inclusion into the MRP. The second submittal (July 13, 1998) included the field data sheets, but did not incorporate the sheets into the appropriate soils survey appendix.

**R645-301-140**, Figure 3.1-1 shows the order 1 soil survey. The following problems and inconsistencies need to be corrected:

- Provide elevation markers identifying map contour intervals.
- Provide a bar scale to ensure the map's accuracy (e.g., 1" = 30').
- Update the Feb. 20, 1998 map (Figure 3.1-1) to be current with the most recent submittal made on March 9, 1999, which includes correlating Figure 3.1-1 (Feb. 20, 1998) with Map 31A, Barn Canyon Facility Site Plan, of the current submittal (March 9, 1999).
  - Disturbed area boundaries are not accurate.
  - Undisturbed contour lines do not match or correlate.
  - A topsoil stockpile area is located down the canyon from the ventilation shaft area which is inconsistent with the current submittal.

## **OPERATION PLAN**

### **TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-230.

**Analysis:**

The Order-I soil survey for Barn Canyon Air Ventilation Shaft and emergency escape hoist includes discussion of topsoil suitability, potential soil salvage depths, soil storage and stockpiling, and discussion for salvaging excess fills as substitute topsoil for each of the four soil map units as follows:

- Topsoil Salvage and Segregation
- Substitute Topsoil
- Topsoil Storage

### **Topsoil Salvage**

Soil salvage recommendations are based on the Order-I soil survey which identifies topsoil suitability and volumes calculated for each of the four soil map units.

*Map Unit A, Perma sandy loam*, is mapped in an undisturbed area under predominantly Gambel's oak vegetation. An average 2 feet of suitable soil is available for salvage. Pockets of soil salvage may reach depths of 35 inches, but are not included within the projected soil salvage volumes.

*Map Unit B, Pathead cobbly loam*, is mapped in an undisturbed area under mixed vegetation including scattered Juniper. An average of 18 inches of suitable soil is available for salvage.

*Map Unit C, disturbed hillside*, is located in an old disturbed side-hill cut where a pad site was created. Present vegetation consists of mixed grasses and some sagebrush. Six inches of this soil is identified for salvage.

*Map Unit D, disturbed drainage*, is located adjacent to the main dirt road in Barn Canyon and includes the Barn Canyon drainage channel bottom areas. No soil salvage will occur from this unit because the exposed surface soils are compacted and the underlying soil substratum contain greater than 65% total gravels, cobbles and stones.

*Topsoil salvage projections need to be updated for each Map Unit as affected by disturbance acreage which is given in the current March 1999 submittal. Within the Barn Canyon submittal, potential topsoil salvage depths and volumes need to be summarized for each of the four soil map units as follows:*

MAP UNIT	AVERAGE SOIL SALVAGE DEPTH (INCHES)	AFFECTED ACREAGE	SOIL SALVAGE (CUBIC YARDS)
A	24	?	?
B	18	?	?
C	6	?	?
D	0	-	-
<b>Total</b>	?	?	?

**Substitute Topsoil**

The Barn Canyon submittal, Map 31B, Shaft Facility Operational Cross Sections, and Map 31B, Shaft Facility Reclamation Cross Sections, both identify excess cut produced during construction and the need for excess fill during reclamation. The cut and fill balance is also shown in Table 5.4-1, Barn Canyon Shaft Facility Cut and Fill balance as follows:

Surfaces Being Compared	Cut (yd3)	Fill (yd3)	Net (yd3)
Existing & Operational	3090	538	2552 (a)
Operational & Reclaimed	611	3251	2640 (b)

(a) Excess cut will be hauled to the Gravel Canyon topsoil stockpile except for the Mollisol soil which will be hauled to the Willow Creek Mine topsoil stockpile.

(b) The excess fill needed for reclamation will be hauled from the Gravel Canyon topsoil stockpile where it was stored during construction of the Barn Canyon shaft facility. The stockpiled Mollisol soil will be hauled back to the Barn Canyon shaft facility area when it is time for the facility to be reclaimed.

The submittal states that the excess cut (2552 CY) will be stored in the Gravel Canyon topsoil stockpile, and that upon reclamation, the excess stored material will be retrieved to restore the cut slopes at the Barn Canyon facility area. The exact amount of soil identified for salvage is 906 CY, which when subtracted from the 2552 CY of excess cut, leaves 1646 CY of excess material. This 1646 CY of excess cut material is primarily deeper soils taken from both Map Unit A, Perma sandy loam, and from Map Unit B, Pathead cobbly loam. In particular, Map

Unit A, Perma sandy loam soils, are deep soils. Subsoils from both these soils are identified within the Order I soil survey. In addition, the Natural Resource Conservation Service's Carbon County Order III soil survey, provides additional soil characteristic information on subsoils. Therefore, excess fills obtained from the colluvium and residuum materials, qualify as acceptable substitute topsoil.

*In order for the excess cut material (i.e., 1646 CY) to be stored in the Gravel Canyon topsoil stockpile, the amendment needs to identify the excess cut material as substitute topsoil. The amendment needs to update all appropriate tables and text to reflect the extra material being stored in the Gravel Canyon topsoil stockpile (e.g., Table 4.2-1).*

### **Topsoil Storage**

Both the disturbed Map Unit C and undisturbed Map Unit B soils will be stored in the Gravel Canyon topsoil stockpile. Map Unit A Mollisol from the Barn Canyon shaft will be segregated and stored separately at the Willow Creek topsoil stockpile for later use as a final top dressing during reclamation of the Barn Canyon shaft site. *The Map Unit A Mollisol stored at the Willow Creek topsoil stockpile needs to be signed and segregated thru the life of the mine.*

*Summary (Subtotals) information in Table 4.2-1 needs some minor corrections:*

- *Riparian "Direct Placement" acreage should be 1.5 instead of 2.8*
- *Disturbed acreage should be 31.2 instead of 30.0*
- *Average thicknesses need to be recalculated for updated acreage and volumes*
- *Barn Canyon excess-cut substitute topsoil (1646 CY) stored in Gravel Canyon stockpile needs to be identified and included in the table.*

### **Findings:**

The permittee must provide the following, prior to approval, in accordance with the requirements of:

**R645-301-231.400**, Based on new projected disturbance acreage, update topsoil salvage projections for each soil survey Map Unit.

**R645-301-233**, The excess cut material (i.e., 1646 CY) must be characterized as substitute topsoil in order for the excess cut material to be stored in the Gravel Canyon topsoil stockpile. Update all appropriate tables and text to reflect the extra substitute topsoil material being stored in the Gravel Canyon topsoil stockpile (e.g., Table 4.2-1).

**R645-301-234.200**, Map Unit A Mollisol stored at the Willow Creek topsoil stockpile needs to be signed and segregated from other stockpiled topsoil through the life of the mine.

**R645-301-120**, Summary (Subtotals) information in Table 4.2-1 needs some minor corrections as follows:

- Riparian "Direct Placement" acreage should be 1.5 instead of 2.8
- Disturbed acreage should be 31.2 instead of 30.0
- Average thicknesses need to be recalculated for updated acreage and volumes
- Barn Canyon excess-cut substitute topsoil (1646 CY) stored in Gravel Canyon stockpile needs to be identified and included in the table.

## **RECLAMATION PLAN**

### **TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

#### **Analysis:**

The excess fill material needed for reclamation of the Barn Canyon area will be hauled from the Gravel Canyon topsoil stockpile where it was stored during construction ventilation shaft facility area. Excess cut material was stored at the Gravel Canyon topsoil stockpile and included salvaged topsoil and excess cut substitute topsoil.

The stockpiled Mollisol soil that is stored at the Willow Creek topsoil stockpile will be hauled back to the Barn Canyon shaft facility area at reclamation.

No further information is provided for reclamation commitments of the Barn Canyon ventilation disturbance area other than those generally contained in existing Mine Reclamation Plan.

#### **Findings:**

The information provided meets the regulatory requirements of this section.