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June 16, 1999

TO: File

THRU: Joe Helfrich, Permit Supervisor

THRU: Daron Haddock, Permit Supervisor

FROM: Robert Davidson, Soils Reclamation Specialist RAD

RE: Topsoil Borrow Site Amendment, Cyprus Plateau Mining Corporation, Star Point Mine, ACT/007/006-99B, File #2, Carbon County, Utah

SYNOPSIS

As part of the five-year renewal for the Star Point Mine, Cyprus Plateau Mining Corporation (CPMC) made several changes in their Mining and Reclamation Plan (MRP). These changes included a new reclamation plan for the refuse pile. The permit was renewed independent of the renewal changes within the MRP. The permit changes were reviewed and analyzed by the Division with several subsequent submittals by CPMC addressing the deficiencies. The Division responded to each subsequent submittal with updated Technical Analyses on August 25, 1997, again on April 7, 1998, and finally on October 15, 1998. The final five-year renewal submittal resulted with the following stipulation:

- The proposed topsoil borrow site (SW 1/4, SW 1/4 Section 2, T.15 S. R. 8 E) will be permitted by January 1, 1999.

The deadline date was extended to March 31, 1999. Cyprus responded by submitting a Topsoil Borrow site amendment on February 17, 1999. The Division responded on April 19, 1999, with a technical analysis that contained several deficiencies. Cyprus responded on June 3, 1999 addressing the deficiencies. This review analyzes the soils portion of the Topsoil Borrow amendment.

ENVIRONMENTAL RESOURCE INFORMATION

SOILS RESOURCE INFORMATION

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

Analysis:

Chapter 2, Soils, Sections 210 through 224, discuss soil resources within a proposed topsoil borrow area. The borrow area is located approximately 1 mile northeast of the Star Point Mine tipple area and Wattis, Utah. Relevant soils information contained in the amendment includes a current Order I soil survey, published Order III soil survey, and soil characterizations. This Analysis section discusses resource information as follows:

- Prime Farmland Investigation
- Soil Survey Information
- Soil Characterization

Prime Farmland Investigation

During the Order-I soil survey, a Prime Farmland survey of the borrow area was conducted. No evidence of past soil cultivation in the soil borrow area was found during the site investigation. The amendment identifies that this conclusion is shared both by the soil survey staff and Leland Sasser of the Price area Natural Resource Conservation Service (NRCS). Therefore, based on the Order-I soil survey and personal communication with Leland Sasser of the NRCS, no Prime Farmland exists within the Topsoil Borrow area.

Soil Survey Information

The soil survey information contains both general and site specific surveys as follows:

(1) General, Third Order Soil Survey

Appendix 2-2 includes relevant soil descriptions and information extracted from the Carbon County Soil Survey, published by the United States Department of Agriculture, Soil Conservation Service, National Cooperative Soil Survey, issued in June 1988.

(2) Site specific, First Order Soil Surveys

A site specific Order-I soil survey was performed and prepared by Mr. James Nyenhuis, Certified Professional Soil Scientist (ARCPACS #2753). The Order-I soil survey was

conducted in October 1998 and is contained in Appendix 2-1 as prepared by Mt. Nebo Scientific, Inc. Drawing 2-1(A) is the Order-I soils map of the borrow area and also shows soil test pit locations.

All mapping and soil survey work were performed according to the standards of the National Cooperative Soil Survey. The First Order Soil Survey for the proposed topsoil borrow area was correlated with the published National Cooperative Soil Survey for Carbon County. According to the published NRCS report, the borrow area was mapped as Strych very stony loam, 3 to 15 percent slopes (NRCS map unit 113) Steep side slopes along the northwest edge of the borrow area included the Gerst-Badland-Rubbleland Complex, 15 to 50 percent slopes (NRCS map unit 33).

Based on the site-specific soil descriptions, and laboratory data, the two dominant soils on the proposed soil borrow area do not classify as Strych; therefore, at the present time, these two soil units do not have series names. The Order-I soil survey was in agreement with the NRCS for the Gerst-Badland-Rubbleland Complex. Soils and map units for the Star Point Soil Borrow area are identified as follows:

Map Unit	
A	Calcidic Argiustolls, 2 to 6 percent slopes
B	Aridic Calciustepts, 2 to 6 percent slopes
C	Gerst-Badland-Rubbleland Complex, 15 to 50 percent slopes
DL	Disturbed land

Map Unit A. Map unit A is classified as a "fine-loamy, mixed, superactive, mesic Calcidic Argiustoll" and comprises approximately 85 percent of Unit A, and is described by pits SP2, SP6, SP7, SP8 and SP10. This dominant inclusion has an argillic subsoil horizon. Two inclusions comprise the other 15 percent of Unit A. The larger 10 percent inclusion is classified as a "loamy-skeletal, mixed, superactive, mesic Aridic Calciustoll" and has a cambic horizon, rather than an argillic subsoil horizon, and was described by pit SP4. The smaller 5 percent inclusion is classified as a "fine loamy, mixed, superactive, mesic, Calcidic Argiustoll," but with a non-skeletal (<35 percent rock) "C" horizon, and is described by pit SP5.

Map Unit A is the most widespread unit of the study area, occupying 65 percent of the gently sloping alluvial fan-upland bench surface.

Calcidic Argiustoll is a very deep, well drained soil which has formed in mixed alluvium from sandstone and shale. Calcidic Argiustolls have a mollic epipedon (a dark-colored surface layer at least 7 inches thick, and with sufficient organic matter content to meet mollic criteria), an argillic subsoil horizon and a calcic subsoil horizon. Slopes are 300 to 400 feet long and are linear, slightly concave, or slightly convex. The present vegetation is mainly big sagebrush; mixed grasses including crested wheatgrass, Indian ricegrass, and Salina wildrye;

black sagebrush; broom snakeweed; galleta; and sparse, scattered pinyon and Utah juniper.

Map Unit B. Map Unit B is a very deep, well drained soil and is classified as a "loamy-skeletal, mixed, superactive, mesic, Aridic Calciustept," and is described by pit locations SP1, SP3, and SP9. No inclusions were noted in this map unit.

Map Unit B is located on slightly convex areas that have more surface rock, often cobbles and stones, and a vegetation of more pinyon and Utah juniper, often in small groves, and less grass and sagebrush than Map Unit A. In context of an alluvial fan model, Map Unit B occupies the convex, more rocky, depositional fingers that traverse the length of the fan surface. Map unit B occupies about 35 percent of the study area, whereas Unit A occupies the 65 percent.

Map Unit C. A steep sideslope located on the northwest edge of the upland bench study area is mapped within the NRCS survey as Map Unit 33 - Gerst-Badland-Rubbleland Complex, 15 to 50 percent slopes. Map Unit C is 45 percent Gerst extremely stony loam, eroded; 25 percent Badland; 20 percent Rubbleland; and 10 percent other soils and miscellaneous areas including rock outcrop. The components of this unit area are intricately intermingled, and therefore, the map unit is called a complex.

Map Unit DL. The disturbed land map unit is comprised of the abandoned railroad grade embankment located in the southwest portion of the study area. The majority of the railway materials have been removed from atop the embankment. The embankment is currently used as an access route and is composed of compacted, crushed-rock fill and is in a stable, non-eroded condition. The embankment has not been reclaimed, but has natural vegetation on the side slopes.

Soil Characterization

Soil pedons were characterized by the soil horizons at each sampling location. All profile descriptions are given in both table and text format, with field notes recorded on standard NRCS "232" forms. Photos were taken at each pit location, with a general photo of the study alluvial fan area showing landscape and vegetation.

The soil horizons at each sampling location were sampled and characterized according to the State of Utah Division of Oil, Gas and Mining (DOGM) guidelines for topsoil and overburden[1]. Sampled parameters included: pH, electrical conductivity (EC); saturation percent; calcium, magnesium, and sodium; sodium adsorption ratio (SAR); texture including sand, very fine sand, silt, and clay; organic matter percent; calcium carbonate percent; Boron; and

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[1]Leatherwood, J., and Duce, D., 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.

Selenium. Total Kjeldahl Nitrogen (TKN), Nitrate Nitrogen, Total Organic Carbon (TOC), and 1/3 bar and 15 bar water capacity were not analyzed. TKN, Nitrate Nitrogen, and TOC are not necessary given that organic matter percent will be determined. Available water capacity is estimated through the use of soil texture and saturation percent. Rock fragment content (% by volume), and Munsell color were determined in the field by Mr Nyenhuis.

No unacceptable criteria were found for salvageable soils and substitute soils except for percent rock content within the mine site disturbance or proposed facilities area. Although DOGM suitability criteria considers >30% (by volume) rock fragments (for both gravels <3" in size and cobbles 3 to 10" in size) to be unacceptable, and >10% stones and boulders >10" in size to also be unacceptable, the recent trend is to salvage "**native soils**" with "**intrinsic rock content.**" Appendix 2-2 reports that native soils can be salvaged containing a higher rock content than the DOGM guidelines deems acceptable. Ultimate site reclaimability using these rocky soils enhances reclamation success by providing an environment similar to native conditions. Higher rock content soils provide for a more stable reclaimed surface, aid in water harvesting and ultimate water holding capacity of interstitial soils, and create wildlife habitat and niches on the surface were surface boulders and larger cobble sized rocks are placed.

In summary, all soil materials in Map Units A and B are suitable and acceptable throughout the ten-foot depth of sampling and evaluation for use in reclamation activities as a borrow source.

Findings:

The requirements of this section of the regulations are considered adequate.

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Chapter 2, Soils, Sections 230 through 234 discusses the soil's operation plan for the proposed Starpoint Topsoil Borrow Area amendment. Topsoil protection incorporates traditional methods of salvaging/stockpiling during borrow operations. Relevant analysis information includes soil salvage, stockpiling, and topsoil substitutes and supplements. The Analysis section discusses operation information as follows:

- Topsoil Salvage
- Subsoil Removal
- Temporary Topsoil Storage
- Substitute Topsoil

Topsoil Salvage

Topsoil salvage will take place within the disturbed area boundary where disturbances are anticipated, including the access road. *For the purpose of maximizing topsoil recovery during construction, all topsoil salvage should occur under the on-site supervision of a Soil Scientist.* Topsoil salvage and protection is discussed within the amendment for (1) Topsoil Unit A and B areas and (2) Gerst-Badland-Rubbleland Complex areas.

(1) Topsoil Unit A and B areas

Topsoil salvage areas are identified in Appendix 2-1 as Map Units A and B which are shown on Map 2-1 (A). Based on the Order-I soil survey, the A horizon topsoil is approximately 10 inches thick, and will be removed and placed in the soil storage pile. Volume calculations approximate 26,740 cy of soil can be salvaged from the site and used to reclaim the borrow area. The soil salvage operations are staged (Map 5-1), with approximately 15,690 cy salvaged during Stage 1, and 11,050 cy salvaged during Stage 2 and live hauled to the Stage 1 area. Approximately 4.640 cy of topsoil will be taken from the temporary soil stockpile and distributed with the 11,050 cy (15,690 cy total) to cover the Stage 1 area. If the borrow soils in Stage 2 area are not needed for the mine site reclamation, then the topsoil salvaged from Stage 1 will be re-distributed over the Stage 1 borrow area at a depth of approximately 10 inches.

Topsoil Salvage Area Depths

Soil Map Unit	depth (in)
A	10
B	10
C	6-10
DL	0

The amendment states that if Map Units A and B will be disturbed outside the soil harvest boundary, 10 inches of the A horizon will be salvaged and stockpiled with the soils

salvaged from within the soil salvage boundary.

(2) Gerst-Badland-Rubbleland Complex areas

The soils Map 2-1 (A) shows that Map Unit C lies within the northwest boundary of the disturbance area. Furthermore, Map 5-1, shows that soil harvest disturbance will occur directly over Map Unit C. The NRCS soil survey identifies the Gerst-Badland-Rubbleland Complex mapping unit (#33) as containing significant amounts of soils - 40% Gerst extremely stony loam and 15% other soils. Gerst soils support a significant vegetation community with an overstory of pinyon and Utah juniper with a 15 percent canopy, and understory vegetation with 40 percent grasses, 20 percent forbs, and 40 percent shrubs. These "rocky" soils have intrinsic value for restoring Gerst-Badland-Rubbleland Complex slopes and surfaces during reclamation to match current soil and vegetation conditions. The current vegetation community evolved to fit environmental conditions as they currently exist.

Topsoil Borrow Amendment Chapter 2 and Appendix 2-1 state that the Gerst-Badland-Rubbleland Complex mapping unit is not recommended for any topsoil salvage. However, the amendment states where disturbance occurs in Map Unit C, soil will be salvaged between 6 and 10 inches. Since topsoil is less than six inches thick and soils are intricately intermingled, the operator may remove the topsoil and the unconsolidated materials immediately below the topsoil and treat the mixture as topsoil. Salvaged Map Unit C topsoil will not be segregated in stockpile from other topsoil because of the limited quantity of soil salvage.

Subsoil Removal

Subsoil removed from the borrow area will be transported directly to the reclamation site and placed. Approximately 242,900 cubic yards of topsoil and subsoil is potentially available from the borrow area. Subtracting the 10-inches of A horizon topsoil, a potential volume of 216,160 cubic yards of subsoil is available as substitute topsoil form the site and may be removed from 10 inches and 10 feet. Approximately 113,950 cubic yards will be available from the Stage 1 area and 101,640 cubic yards from the Stage 2 area.

Temporary Topsoil Storage

The first 10 inches, Horizon A, will be stripped and stored in the northeast corner of the borrow site within the disturbed area boundary (Drawing 5-1, Chapter 5 of Exhibit 233). The soils will be stored only as long as it takes to salvage the remaining horizons to be used for reclamation of the Star Point Mine site. The stockpile will be constructed with minimal soil disturbance.

The stockpile will be constructed in horizontal lifts for 1.5 to 2.0 feet. Tracked equipment will be used to reduce compaction. The pile will be graded to a maximum slope of

2:1. The vegetation removed with the 10 inches of Horizon A will be incorporated into or placed on top of the stockpile.

Substitute Topsoil

No unacceptable criteria were found for salvageable soils and substitute soils except for percent rock content within the mine site disturbance or proposed facilities area. Although DOGM suitability criteria considers >30% (by volume) rock fragments (for both gravels <3" in size and cobbles 3 to 10" in size) to be unacceptable, and >10% stones and boulders >10" in size to also be unacceptable, the recent trend is to salvage "**native soils**" with "**intrinsic rock content.**" Appendix 2-2 reports that native soils can be salvaged containing a higher rock content than the DOGM guidelines deems acceptable. Ultimate site reclaimability using these rocky soils enhances reclamation success by providing an environment similar to native conditions. Higher rock content soils provide for a more stable reclaimed surface, aid in water harvesting and ultimate water holding capacity of interstitial soils, and create wildlife habitat and niches on the surface were surface boulders and larger cobble sized rocks are placed.

Findings:

The requirements of this section of the regulations are considered adequate.

RECOMMENDATIONS:

For the purpose of maximizing topsoil recovery, all topsoil salvage should occur under the on-site supervision of a Soil Scientist.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Chapter 2, Soils, Sections R645-301-240 through -244, discusses the soil's reclamation plan for the proposed West Ridge Mine. The Analysis section discusses reclamation information as follows:

- Soil Redistribution

- Soil Nutrients and Amendments
- Soil Stabilization

Soil Redistribution

The re-contoured surface will be ripped or loosened (see approved MRP, Chapter 3 and Section 244) after the borrow soil has been removed. Ripping will be between 12 and 24 inches for reducing surface compaction, and providing a roughened surface to assure topsoil adherence and help promote root penetration. The temporarily stockpiled soils will be distributed to the re-contoured loosened disturbed surface. Maps 5-2, 5-3 and 5-4 show where topsoil will be distributed. Based on the 26,740 cy of salvaged topsoil and an estimated 19.9 acres, approximately 10 inches of soil will be replaced in the reclaimed area.

To help prevent soil compaction, soil moving equipment will refrain from unnecessary operation over spread topsoil. Front-end-loaders and other wheel mounted equipment will be used to transport soil. However, only track-mounted equipment will be used to spread topsoil to help minimize compaction. Replaced topsoil will be loosened prior to seeding.

Soil Nutrients and Amendments

Refer to Section 243 and Chapter 3 of the approved MRP for soil nutrient and amendments.

Soil Stabilization

Erosion control measures may include but will not be limited to mulching, surface roughening and deep gouging. Refer to Section 243 and Chapter 3 of the approved MRP for additional details.

Findings:

The requirements of this section of the regulations are considered adequate.