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TO: File

THRU: Daron Haddock, Permit Supervisor *DH*

FROM: Robert Davidson, Soils Reclamation Specialist *RAD*

RE: Final Review and Analysis of Crandall Canyon Reclamation Plan, AMAX Coal Company, Castle Gate Mine, ACT/007/004-95D, Folder #2, Carbon County, Utah

## SYNOPSIS

On April 20, 1995, Amax Coal Company, Castle Gate Mine, submitted a proposed reclamation plan for Crandall Canyon. The plan was developed to address Division Order 94A, dated August 18, 1994. An initial Division review and analysis was completed on June 28, 1995. In response to the Division's initial review, Amax Coal Co. provided a revised reclamation plan submittal on September 1995. Several deficiencies were found by the Division (January 10, 1996) that prevented final approval of the revised reclamation plan. These included, in part, the following for soils (R645-301-200):

- Errors in Appendix 3.7S must be corrected. Information should be provided so that Acid/Base potentials can be calculated by the Division. Section 3.7 should include a Table of Volumes utilizing the information gained by the sampling reported in Appendix 3.7S. The Reclamation Plan should outline the soils which will be substitute topsoil and reflect the special handling of these soils. Ambiguities in Sections 3.7-4 and 3.7-5 should be clarified. Reclamation should include ripping of the entire road surface if the road is removed.
- The applicant needs to demonstrate that the proposed substitute topsoil materials are equal to or more suitable for sustaining vegetation than the premining topsoil and result in a soil medium that is the best available in the permit area to support revegetation. Although the recent soil



sampling/testing has generally shown the chemical and physical characteristics are acceptable for revegetation, the amount of vegetation growing on these soils does not appear to be as great as would be expected for the area. Suggested methods are to show the existing vegetation meets revegetation standards or to establish field trials and try final revegetation techniques.

- On page 3.7-47, the application implies that the cutoff for unacceptable levels of selenium is 0.11 mg/kg. This apparent typographical error should be corrected.
- As required in the Division Order, the applicant needs to show adequate soil/spoil preparation plans including methods to reduce compaction to at least a depth of 18-24 inches prior to the application of borrow soils or hydro seeding.

AMAX Coal Company promptly responded to the Division's Draft Technical Analysis (TA) on February 20, 1996.

## **ENVIRONMENTAL RESOURCE INFORMATION SOILS RESOURCE INFORMATION**

Regulatory Reference: 30 CFR Sec. 783.21, 817.200(c); R645-301-222, -223, -233.

### **Analysis:**

Sodium-adsorption-ratio (SAR) values were originally calculated incorrectly, as submitted by the Laboratory, using milliequivalents per kilogram of soil (meq/kg). The SAR is defined as  $Na^+ / (Ca^{++} + Mg^{++}) / 2)^{1/2}$ , where  $Na^+$ ,  $Ca^{++}$  and  $Mg^{++}$  refer to the concentrations of the designated soluble cations expressed in milliequivalents per liter (meq/L), not meq/kg. In addition to the erroneous SAR values, the analysis methods used by the laboratory to determine pH, electrical conductivity, soluble calcium, magnesium, and sodium were not those recommended by the Division's topsoil and overburden guidelines (Table 6, "Guidelines for Topsoil and Overburden Management"). These parameters were determined using an Environmental Protection Agency (EPA) accepted laboratory method that allows for the use of soil sample extracts as soil/water ratios of 1:5. The Division's guidelines recommend using American Society of Agronomy (ASA) methods that require the use of saturated soil-paste extracts. Although the saturated soil-paste extract method is recommended for soil analyses to determine soil

salinity characteristics and provides for more accurate results, the EPA extract method using soil/water ratios of 1:5 is an alternate, accepted method. Since the Division's guidelines are "recommended" but not required, AMAX has elected to retain the EPA 1:5 extract analytical results. Therefore, the analyses reported in the soil evaluation plan have been used to preliminarily determine the suitability and quantity of the soils in Crandall Canyon to be used as substitute topsoil.

Prior to reclamation construction activities, AMAX will thoroughly sample the soils in the middle and upper pads, to further determine the suitability of the soils as substitute topsoil. The samples will be analyzed for the parameters outlined in the Division's "Guidelines for Topsoil and Overburden Management" using the recommended ASA methods, including the saturated soil extract procedure for pH, electrical conductivity, soluble calcium, magnesium, and sodium.

Section 3.7-5(5) and Appendix 3.7S were corrected for proper clarification of analytical methods dealing with soil saturation extracts, EPA 1:5 extracts, and the Division's recommended soil guidelines. References to analytical methods used to determine specific parameters have been modified to reflect actual analytical methods used. Corrected SAR values have been added to Appendix 3.7S and replace the erroneous values in Table 2. Laboratory data sheets that include the information for determining Acid/Base potential have been added to Appendix 3.7S in the analytical results appendix. Fertilizer recommendations have been modified in Section 3.7 to state that fertilizer requirements will again be evaluated after the pre-reclamation sampling is complete. The verb tense used within the text to describe reclamation activities with the access road has been changed to the proper tense. Table 3.7-10 was mistakenly referred to in the text as Table 3.1-10; the reference was changed. The reference to Simon, Li, and Assoc. have been added to the list of references. The discussion about partial ripping of P-1 was a misunderstanding by the Division and not an issue. The text reference was for access road A-1, not P-1. Discussion in the reclamation plan for access road P-1 indicates that P-1 will be entirely reclaimed with the facilities area.

**Findings:**

This portion of the application is considered complete and accurate.

**OPERATION PLAN  
TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec.817.22; R645-301-232, -233, -234, -242, -243.

**Analysis:**

The vegetation issue regarding the soils of the upper and lower pad has been addressed on page 3.7-49 of the revised text. A vegetation field study will be conducted in the spring or summer of 1996 to assess the factors relating to poor establishment of vegetation in the middle and upper pads. Statistical comparisons of the vegetation in the middle and upper pads with a reference area will help delineate whether any further work will be done. If the comparison results demonstrate inadequate vegetation, field trials may be conducted to establish the proper reclamation techniques needed in those areas where soil from the middle and upper pads is used as substitute topsoil.

The text on page 3.7-48 has been modified to state that the maximum allowable concentration of selenium within the topsoil is 0.10.

**Findings:**

This portion of the application is considered complete and accurate.

**RECLAMATION PLAN  
TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-232, -233, -234, -242, -243.

**Analysis:**

The text on pages 3.7-33 and 3.7-50 has been modified to state that soil preparation will include loosening soils to 18-24 inches.

**Findings:**

This portion of the application is considered complete and accurate.