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State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

007/004 #2

December 7, 1995

TO: Daron Haddock, Permit Supervisor

FROM:  Priscilla Burton, Soils Reclamation Specialist

RE: Technical Analysis of Crandall Canyon Reclamation Plan. Castle Gate Mine.
AMAX Coal Co. ACT/007/004/95D. Folder #2. Carbon Co., Utah.

Summary:

Due to a shortage of topsoil for reclaiming the 38 acre site, an analysis of the fill material has been presented in Appendix 3.7S of this submittal. This analysis shows that substitute topsoil can be found within the pad to supplement the 7,890 yd³ of stockpiled topsoil. Special handling will be required to ensure that the best available material is placed on the surface at the time of reclamation.

Errors in the calculation of Sodium Absorption Ratio (SAR) have been identified and should be corrected. The laboratory should supply the analytical data used to calculate the acid/base potential figures, so that these calculations can also be checked.

Table 3.1-10, Earthwork Volumes, was referred to, but could not be found within this submittal. As this is a critical portion of the reclamation plan it should be included. The plan indicates that topsoil will be replaced to a depth of six inches over 18 of the 38 acres disturbed. Some clarification of this statement is requested.

This review does not include an evaluation of soil volumes, reclamation contours or slopes.

SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.21

Analysis:

- 3.7-3A, B, and C Crandall Canyon Surface Facilities Maps
- 3.7-5A, B, and C Crandall Canyon Operations Topography Maps



3.7-7A, B, and C Crandall Canyon Reclamation Topography Maps
3.7-7D Crandall Canyon Reclamation Topography Cross-Sections and Profile
Sections 3.7-3 through 3.7-5
Appendix 3.7S Crandall Canyon Soil Sampling Results
Appendix 3.7C Test Hole MC 207 analysis

Excavated shaft materials present in the fill may be acidic (test hole MC207, Appendix 3.7C) and may contain elevated levels of selenium (soil sampling site EF-1-3). Most commonly, the fill consists of large rock fragments and boulders.

EarthFax has recommended in Appendix 3.7S that soils in the location of EF1 are buried in the fill due to slightly elevated selenium values. (This area has elevated SAR values as well.)

The remainder of the soils are suitable except for the excessive amounts of rock fragments which would not be suitable as a topsoil substitute (spread 6 inches thick). The following soils might be utilized as topsoil substitutes:

EF-2 proximity 0 - 48 inches
EF-3 proximity 0 - 6 inches
EF-4 proximity 0 - 48 inches
EF-5 proximity 0 - 72 inches
EF-6 proximity 30 - 96 inches
EF-7 proximity 0 - 24 inches.

This should provide an adequate amount of substitute topsoil material. The remainder of the soils tested, have too many boulders and large rock fragments to be included in topsoil.

Some issues should be clarified within Section 3.7 of the submittal.

Section 3.7-4

- 1) There appears to be a misprint on page 3.7-14 where reference is made to Appendix 3.7C for soil salvage information with regard to the access road development.
- 2) If the road P-1 has already been constructed, then the wrong verb tense has been used and this is confusing when discussing available topsoil material.

Section 3.7-5

- 1) The plan indicates that road P-1 "where compaction is evident" will be ripped with backhoe teeth. Standard practices require that the entire road surface be ripped prior to topsoil application.
- 2) Table 3.1-10 is referred to but not found in this submittal. Earthwork volumes are crucial to the discussion of substitute topsoil requirements. It is recommended that

Table 3.1-10 is reprinted in this Section.

3) A reference attributed to Simons, Li and Associates (1983) was not found with the list of references cited.

4) The plan states that 18 of 38 acres will be topsoiled, requiring 14,520 yd³ of topsoil for a six inch depth. Why will only 18 of 38 acres be topsoiled?

5) The plan describes three samples to be taken from the lower pad area at the time of reclamation. These samples will be drawn from the worst case soils. What is the purpose of this sampling? To identify materials requiring burial?

Some issues should be clarified within Appendix 3.7S of the submittal:

1) All reported SAR values have been miscalculated and appear to be off by a factor of five. Table 2 and the narrative (page 10) should be revised accordingly. SAR is calculated by dividing the exchangeable sodium value by the square root of the sum of the calcium and magnesium values divided by 2. This equation is handwritten below:

$$\frac{Na^+}{\left([Ca^{2+} + Mg^{2+}] / 2 \right)^{0.5}}$$

2) The laboratory should provide information necessary for the Division to check the calculations of Acid/Base Potential. Please have sulfur and calcium carbonate percentages reported.

3) Laboratory methods used were not those recommended by the Guidelines. Please revise Table 2 accordingly. The Division will attempt to find copies of EPA methods 353.1, 351.4, 6010, 9045, 9050, and 9060. In the event that the Division can not locate copies of these methods, please have the laboratory provide these methods.

4) Appendix 3.7S has included specific recommendations for fertilization at the time of reclamation, based upon the quality of the topsoil at its present state. These recommendations differ from the norm in that high application of potassium and phosphorus is suggested. These fertilization recommendations assume that "the lab followed the procedures used at USU laboratory. These recommendations should be incorporated into the plan after ascertaining whether the procedures used were the same. If not the same, then modification of the recommendations may be necessary. (Resampling may be practical considering the length of time which will pass before reclamation occurs.)

Findings:

The reclamation plan can not be considered technically adequate.

Although the Plan submitted has provided a full characterization of the existing soils in Crandall Canyon, there are errors and omissions which should be corrected. Special handling of soils as recommended in Appendix 3.7S should be incorporated into the reclamation plans described in Section 3.7.

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

R645-301-232.200 and R645-301-240

Errors in Appendix 3.7S must be corrected (described above). 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. The Division has evaluated Appendix 3.7S and provided recommendations in the discussion above. Ambiguities in section 3.7-4 and 3.7-5 (described above) should be clarified. Reclamation should include ripping of the entire road surface if the road is removed.