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TO: Folder #2

THRU: Daron Haddock, Permit Supervisor DRH

FROM: Robert Davidson, Soils Reclamation Specialist RAD

RE: Technical Analysis of Mining and Reclamation Plan, Horizon No. 1 Mine, Horizon Coal Corporation, PRO/007/020, Folder #2, Carbon County, Utah

SYNOPSIS

The following is the Technical Analysis of the soils for the Horizon Coal Corporation Mine Reclamation Plan.

ENVIRONMENTAL RESOURCE INFORMATION
SOILS RESOURCE INFORMATION

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

Analysis:

The soils within the proposed disturbance are primarily colluvium, alluvium, and residuum derived from sandstone, shale, limestone, and siltstone. Soil textures vary from silty clay loam within the Shupert-Winetti Complex, to gravelly loam within the Brycan, Rabbitex, Senchert and Curecanti Series.

The soil capability classification includes III-e3 irrigated, VII-e nonirrigated, VIe, nonirrigated and VIw, nonirrigated. Under native vegetation, the water erosion hazard associated with these soils is slight to moderate. Otherwise, the erosion hazard for disturbed soils are moderate for Shupert-Winetti Complex, Brycan, & Senchert Series, high for Rabbitex Series, and severe for Curecanti Series. The soils are generally deep, well drained and moderately permeable. The pH of the surface horizon ranges from 7.2 to 8.0. The electrical conductivity

ranges from 0.4 to 1.2 mmhos/cm at 25°C.

The Horizon Mine soil resource were originally surveyed at the Order II scale (Henry Sauer, personal communication with Leland Sasser USDA/SCS, 1991). The survey includes seven soil pits with horizon identification, soil descriptions, and physical/chemical properties. Correlation of the soil map units with currently recognized soil series or complexes are as follows:

- Brycan Loam - fine-loamy, mixed Cumulic Haploborolls
- Curecanti Family - loamy - skeletal, mixed Typic Argiborolis
- Rabbitex Site Loam 15 to 50 percent slope - fine - loamy, mixed Typic Calciborolls
- Senchert Loam - fine - loamy, mixed Argic Pachic Cryoborolls
- Shupert-Winetti Complex - loamy - skeletal, mixed (calcareous), frigid Typic Ustifluvent.

The depths of reported A horizon range from 0 for disturbed Shupert-Winetti Complex to 43 inches for Brycan Series. Soil profile depths generally range from 60 to 70 inches.

The major limiting factors for the soils within the planned disturbance are high clay content (>40% clay) and high percent coarse rock fragments (>35% coarse rock fragments). The Division currently does not consider high percentages of coarse rock fragments as a limiting factor in mine reclamation soils.. The removal of large boulders, prior to soil placement in stockpiles, is therefore unnecessary. Also as stated, a certain amount of coarse fragments can be tolerated depending upon the size and intended use of the reclaimed area. The only area limited by high clay content is the Shupert-Winetti Complex soil located at Test pit #1 which contains an average 43% clay in the top 30 inches.

Pit 8 was excavated and sampled in the embankment area during 1990. Pit 8 sample analysis (Appendix 8-1) indicated suspect levels of Boron. The 0 to 12 inch contained 4.8 mg/kg boron and in the 10 to 11 feet zone the boron level was 5.19 mg/kg. Boron which exceeds 5 mg/kg is considered unsuitable growth medium and must be covered with a minimum of 4 feet of suitable growth medium. Material in pit 8 is assumed to be refuse/coal waste material.

To verify the suspect Boron levels, three additional soil pits were excavated in the embankment area located southwest of the portals during 1996. Profile descriptions show that the materials consist mainly of layered coal debris, coal waste, rock fragments and disturbed soils from previous mining operations. Physical and chemical results show that the materials are within the Division's acceptable range for overburden for all parameters except coarse fragments;

none of the samples showed elevated levels of Boron. However, one pit sample showed an Acid/Base Potential (ABP) of -1.16 tons $CaCO_3$/1000 tons material. This value approaches the Division's cutoff limit for ABP at -5 tons $CaCO_3$/1000 tons. The concentration of coal eliminates most of the material from being used as topsoil. Therefore, the coal and coal waste materials from the embankment will be used as backfill in the facilities area and covered with at least four feet of acceptable backfill material as described in Section 3.3.2.5.

Two additional soil pits were excavated in the lower facilities area during 1996. The first pit was located in the bottom of Jewkes Creek channel while the second pit was located on top of the west bank of the Jewkes Creek drainage. In both locations, soils have been previously disturbed and covered with imported materials. The upper 5 feet of soils in the west bank have been previously disturbed and/or imported. Sample results indicate that soils in both areas would be acceptable as substitute topsoil and/or backfill with the exception of the coal fines layer in the Jewkes Creek channel. *The Jewkes Creek channel soils are unique since they have a fluvial origin which terminate at bed rock located 12 feet down. The material consists mainly of sandy loam interbedded with coal fines (≈30%) and loam with a high bedding angle. The Jewkes Creek soils contain less than 10 percent rocks with no coarse fragments.*

No prime farmlands and/or pasture land exists within the permit area as determined by the SCS. The soils have been used as rangeland in the past. Soil erosion and shallowness restrict the use of the land to grazing, woodland or wildlife.

Findings:

The information provided meets the regulatory requirements of this section.

OPERATION PLAN
TOPSOIL AND SUBSOIL

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

Analysis:

Soil resource data show that most of the proposed disturbance area has been previously disturbed and consists mainly of fill material. Soil and substitute topsoil to be saved for reclamation were tested using the DOGM guidelines. All suitable soil will be salvaged and

stockpiled. In addition, Horizon commits to excavating the A horizon for the Curecanti Family and Senchert Series in accordance with the profile descriptions from The Soil Survey. The applicant will submit as-built surveys of the completed subsoil and topsoil stockpiles. The survey will include: volume of material, maximum and minimum elevations and slopes, cross sections, and all other pertinent dimensions with amended mass balance tables.

Approximately 13,670 cubic yards of topsoil and subsoil will be salvaged (page 8-21). Estimates of salvageable soil quantities (volume) may vary because of the amount and type of coarse rock fragments and the highly variable ranges allowed within soil taxonomic classifications. As a means of insuring proper excavation and separation of adequate quantities of topsoil (A or E horizon) and subsoil (B and/or C horizon) the applicant has committed to having a professional soil scientist on site during topsoil and subsoil removal operations (page 8-23). Topsoil and subsoil excavation will employ the "islands" method to insure that the proper thickness of the soil is removed. Soil recovery locations, soil type, and recovery calculations are given for soil removal.

The vegetative cover will be removed with and incorporated into the topsoil prior to stockpiling. Trash, concrete, and debris will be hauled to a properly licensed disposal facility as it is removed from the mine site during topsoil removal (page 8-23).

Coal and coal waste material from these areas will be handled as outlined in Section 3.3.2.5 and covered with four feet of appropriate fill (page 8-23).

The soil will be stockpiled in the upper facilities area as shown on Plate 3-1. The stockpile will not exceed a height of eight feet. Side slopes will not exceed 2h:1v. The stockpiles will be protected from wind and water erosion through construction of a containment berm around the stockpiles, the prompt establishment of a vegetative cover, and the application of straw mulch at a rate of two tons/acre. The stockpile area will be fenced to prevent livestock from entering the area. The soils will be tested and fertilized with an organic material, seeded (Table 3-2) for temporary reclamation, and labeled.

Since the Jewkes Creek channel soils are unique in their fluvial origin, these soils need special consideration for salvage and storage for reclamation use. *In the area of the proposed sediment pond, all excavated soils need to be salvaged for later reclamation. The sequence of salvage and storage needs to be identified to protect these often waterlogged soils from compaction and clodding during salvage activities.*

In the event that stored soil volumes are insufficient for final reclamation, soil will be

imported from outside the permit area (page 8-20). The requirements for substitute topsoil will be met in the event the mass balance calculations indicate a topsoil deficiency. *The application does not identify potential borrow sites.*

Findings:

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

1. R645-301-100. Description of the methods for removing and storing topsoil, subsoil, and other material. *In the immediate area of the proposed sediment pond, all excavated soils need to be salvaged for later reclamation. The sequence of salvage and storage needs to be identified to protect waterlogged soils from compaction and clodding during salvage activities.*

2. R645-301-232-720. That the requirements of R645-301-233 have been or will be fulfilled with regard to the use of substitute soil materials unless no available substitute material can be made suitable for achieving the revegetation standards of R645-301-356, in which event the operator will, as a condition of the permit, be required to import soil material of the quality and quantity necessary to achieve such revegetation standards. *The applicant needs to identify potential borrow sites for substitute topsoil.*

RECLAMATION PLAN
TOPSOIL AND SUBSOIL

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

Analysis:

Subsequent to backfilling and grading of spoil material and prior to topsoil placement, the spoil will be scarified to a depth of no less than 12 inches. The topsoil will be redistributed at a thickness of approximately 11 inches. The thickness is based on the total available medium (13,670 CY) divided by the total disturbed area (9.15 acres). Wooden stakes will be marked and placed throughout the site to insure proper depth of topsoil redistribution (page 8-24). Topsoil will be placed along the contour (page 3-32). The soil will then be harrowed to break up the cloddy surface and scarified to a depth of 18 inches. This will decrease the potential for a failure

surface and facilitate root penetration by breaking up the soil/spoil interface. The graded soil surface will be roughened by pitting and gouging to maximize surface roughness (page 8-24).

All exposed coal outcrops resulting from this operation, underground development waste, as well as toxic and acid forming materials will be covered with a minimum of 4 feet of non-combustible, non-acid, non-toxic material during backfilling and grading (page 8-23). Any refuse or coal waste material remaining on site must be tested for Boron to determine the acid/toxic forming potential prior to reclamation.

Fertilizer type and rate will be determined from soil analysis (page 8-24). Twenty samples per acre will be collected from the top 12 inches. Samples will be composited and thoroughly mixed. Five subsamples will be collected from the composite and analyzed in accordance with the Division Guidelines for the Management of Topsoil and Overburden.

Following fertilization and mulching, seeding will then commence using the final reclamation seed mix listed in Table 3-3. Erosion control matting will be used where the slope grades are 2h:1v or steeper.

Findings:

The information provided meets the regulatory requirements of this section.

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