0017

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

November 10, 2004

OK

TO: Internal File

THRU: Jim Smith, Environmental Scientist/Hydrologist/Team Lead DS

FROM: PB Priscilla Burton, Environmental Scientist/Soils

RE: Update Appendix XIV, PacifiCorp, Des-Bee-Dove Mine, C/015/0017, Task # 2046

SUMMARY:

Profile DBDA32D shown on Drawing #CS1854D corresponds to the additional area reclaimed disturbed and reclaimed on the Des Bee Dove bathhouse outslope.* This is the longest slope in the reclaimed site and the one most prone to erosion. The RUSLE parameters used calculate an annual sediment yield of 0.02 tons/acre from this slope. This rate of erosion is acceptable when compared to undisturbed soil loss rates.

*Change Order #2 to Phase II of the Des Bee Dove reclamation plan was reviewed as AM03B (see technical memo dated March 28, 2003 in M: files/coal/2003/internal/0023.pdf). It added 0.6 acres to the disturbed area between stations 3+00 and 7+00 (see Plate 500-3, Appendix XV) at the bathhouse pad outslope. The length of the slope from the pad to the drainage was reshaped to recover fill, rip rap, and substitute topsoil from the outslope. According to the information submitted at that time, the length of the cut would be 125 to150 ft with a slope angle of 1.9H:1V. The Division required the Permittee to randomly sample the slope between Sta 5+00 and 7+00 for pH, EC and SAR before using any of the material as substitute topsoil.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.21; 30 CFR 817.22; 30 CFR 817.200(c); 30 CFR 823; R645-301-220; R645-301-411.

Analysis:

The site soil survey conducted by Dr. A.R. Southard in 1989 reports a taxonomic classification for the soil as loamy-skeletal, mixed, mesic, Lithic Ustorthents (an Entisol). Dr. Southard reported that the "C" horizon of this soil (below 4 inches) was strongly calcareous and alkaline (pH 8.8) and that bedrock was found at 14 inches.

The 1970 Carbon/Emery Soil Survey indicates the Rock Land-Shaly Colluvial Land – Castle Valley- Kenilworth Association would be dominant in the Des Bee Dove canyon. Therefore, the Permittee used the Kenilworth Series soil (KeE2) soil as a comparison for the undisturbed soil. The Kenilworth Series is classified in the 1970 Carbon-Emery Area Soil Survey as loamy-skeletal, mixed, mesic Xerollic Calciorthids (an Aridisol). The Kenilworth very stony sandy loam, 0 – 20% slopes, eroded is the typical soil profile of this series. The soil has active sheet erosion with gullies two to three feet deep common in some places. Coatings of lime on the surface rock are common and indicate erosion has removed the supporting soil from around the rock. Table 3 of the 1970 Survey states the following for the KeE2 soil: 50 – 75% gravels and 20 - 50% rock fragments larger than 3 inches; and Hydrologic Group B (having a moderate infiltration rate when thoroughly wet). Table 9 of the 1970 Carbon-Emery Area Soil Survey provides the physical and chemical characteristics of the Kenilworth very stony sandy loam, 0 – 20% slopes, surface horizon (0 – 7 inches): pH 7.7, 15% clay, 62.6% sand (with 17.9% very fine sand), 21.8% silt, 2.6% organic matter, 4% Exchangeable Sodium, and 37.6% $CaCO_3$ equivalent.

The undisturbed soil samples SS1 and SS5 (taken in 2001) had similar amounts of clay and sand in the profile, as did the soil sampled from trenches in the disturbed area in 2002. The average SAR value of SS1 and SS5 was 0.58 units. The average SAR value of the bathhouse trench soil samples was 6.02 units (Exhibit B of Appendix C of Section 200 in Appendix XIV). Soil samples were taken between stations 3+00 and 7+00 in April 2003 and SAR values ranged from 3.42 to 5.68 units (see Change Order #2 Appendix XV for analytical results).

Findings:

The information provided meets the requirements of the R645 Rules for Soils Environmental Resource Information.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Redistribution

The Permittee randomly sampled the bathhouse pad outslope on April 9, 2003, between Station 5+00 and 7+00 for pH, EC and SAR before using any of the material as substitute topsoil (see April 15, 2003 field visit report in M: files/coal/2003/internal/0033.pdf). Intermountain Laboratories/Sheridan analyzed the samples for pH, Electrical Conductivity, and Sodium Adsorption Ratio. The analytical report is included in Change Order #2 of Appendix XV of the MRP. The SAR values reported for the soil are between 3.42 and 5.68 units. These SAR values are within reason for the permeability class used in developing the K factor for the bathhouse disturbed area soils (see discussion of the Revised Universal Soil Loss Equation in Reclamation Plan – Stabilization of Surface Areas).

Findings:

The information provided meets the R645 Rule requirements of Reclamation Plan, Topsoil and Subsoil.

STABILIZATION OF SURFACE AREAS

Regulatory Reference: 30 CFR Sec. 817.95; R645-301-244.

Analysis:

As a result of Change Order #2 (Tab in Appendix XV of the MRP), the areas seeded varied from the Proposed Seeded Area shown on Drawing 300-1. As built drawings showing the area seeded will be provided to the Division with the Phase I Bond Release application.

Between stations 3+00 and 7+00 (Drawing 500-3), the final slope configuration was reduced from 1.3H:1V to 1.9H:1V (Tab 2, Change Order 2, App XV, see also technical memo dated March 28, 2003 in M: files/coal/2003/internal/0023.pdf). This area corresponds to slope profile DBDA32D shown on Map CS1854D.

The Revised Universal Soil Loss Equation (RUSLE) was used to calculate the average annual soil loss from the disturbed area. The parameters entered into the program are described in Table 2 Annual predicted soil loss from the disturbed area (page 3, App B of App XIV and electronically on a disc). To calculate the annual soil loss from the reclaimed site, the Permittee used the following parameters in the RUSLE model:

- K value of 0.36, permeability class 3 (moderately permeable). The K value for the Kenilworth Soil was not provided by the 1970 Carbon/Emery soil survey, but the upper limit of 0.37 for the K factor value was used, as suggested by Mr. Dan Larsen (Substitute Topsoil Assessment, January 2002 *in* Appendix C of Section 200 of Appendix XIV).
- Control practices (P) were extreme roughening (gouging).
- Crop factor (C) chosen was a time invariant option using average annual production values and designating the cover crop as desert grassland, with vegetation information entered directly. In addition, under C factor, the percentage surface and subsurface rock is listed as 64%, which takes into account the 55% rock fragment content of the soil and the application of hydromulch/tackifier.
- Precipitation and temperature data from the 1988 Carbon County Soil Survey (page 151) was added to the city database. Hiawatha had an average of 13.51 inches over the time period 1951 – 1980.

Slope lengths in the Des Bee Dove reclaimed site range from 100 - 502 ft. The slope gradient ranged from 33.7 to 69%. The maximum annual soil loss shown in Table 2 for the Des Bee Dove reclaimed site is 0.24 tons/acre. Control practices (P) reduce this loss to a sediment yield of 0.02 tons/acre.

Findings:

The information provided meets the requirements of Reclamation Plan, Topsoil and Subsoil.

RECOMMENDATIONS:

As built drawings showing the area seeded will be provided to the Division with the Phase I Bond Release application. The application is recommended for approval.