

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

March 2, 2004

TO: Internal File

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

FROM: Priscilla Burton, Environmental Scientist/Soils

RE: Update Appendix XIV, PacifiCorp, Des-Bee-Dove Mine, C/015/0017, Task id # 1786

SUMMARY:

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 to 150 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.

This submittal identifies the profile that corresponds to the affected area as DBDA11D shown on dwg #CS1854D. However, the information on file with the Division indicates that the area affected by Change Order #2 is more accurately represented by DBDA3-2D. Information for this profile did not change with this application.

This review raises some questions about the derivation of the sediment yield value from the RUSLE equation. The Permittee is asked to provide a rationale for the choices made in developing the Cover and Management (C) factor. The Permittee is asked to base the Soil Erodibility (K) factor on an average annual precipitation of approximately 13 inches as reported for the Hiawatha weather station in the 1988 Carbon County Soil Survey (p 151).

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TECHNICAL ANALYSIS:

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 Sta 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. 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 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), the areas seeded varied from the Proposed Seeded Area shown on Dwg 300-1.

Between stations 3+00 and 7+00, the final slope configuration was reduced from 1.3H:1V to 1.9H:1V over a slope length of 125 to 150 feet (Tab 2, Change Order 2, App XV).

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). Slope Profiles are illustrated on Dwg CS1854D. This application changes the length of slope for profile A11D from 19.58 to 52.3 feet and the annual soil loss from this disturbed profile is now reported to be 0.23 Tons/year/acre. This profile falls on Station 12+00 of Dwg 500-3 in Appendix XV and does not fall within Stations 3+00 to 7+00 where the bathhouse pad reclamation was changed.

Slope Profile A3-2D, illustrated on Dwg CS1854D, is drawn across stations 4+00 and 5+00 shown on Dwg 500-3. This profile represents the reclamation work that resulted from Change Order #2 (see technical memo dated March 28, 2003 in M: files/coal/2003/internal/0023.pdf). Conditions given for profile A3-2D should have changed with this application.

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. However, 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 was used 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% CaCO₃ 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).

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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).

To calculate the annual soil loss from the reclaimed site, the Permittee used the following parameters in the RUSLE equation: a 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 suggested by Mr. Dan Larsen (Substitute Topsoil Assessment, January 2002 *In* Appendix C of Section 200 of Appendix XIV). The gouging technique was taken into account in the terracing practices described under input for P (practices).

In calculating the time-invariant Crop factor or C, the % 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.

The Division has the following questions regarding the RUSLE calculation:

1. Choice of time-varying vs. time-invariant cover and management (C factor) option. The C factor chosen was #2 time invariant option using average annual production values and designating the cover crop as desert grassland. The Division believes that the time varying scenario (option #1) fits the site, based on a single disturbance of subsoil fill with no rock cover, adjusting for moisture depletion and calculating the surface cover from soil and slope based on a selection for "no vegetation"
2. If the time-invariant C factor is used, the first choice to make is where the vegetation information is from. The Permittee chose #1 "from plant community & site potential." The Division believes that the choice of #3 "enter directly," might be more appropriate.
3. Hiawatha was added to the City data base with a reported rainfall of 5 inches, whereas the 1988 Carbon County Soil Survey (page 151) reports an average of 13.51 inches over the time period 1951 – 1980.

Findings:

The information provided does not meet the requirements of Reclamation Plan, Topsoil and Subsoil. Prior to approval, the Permittee must address the following:

- R645-301-244, (1)**The RUSLE calculation for the disturbed area slopes should be based on a 13 inch average annual rainfall for Hiawatha; and provide a rationale for the choices made concerning development of the C factor. **(2)** An As-Built of Dwg 300-1 should reflect the actual acreage seeded.

RECOMMENDATIONS:

The information provided should be modified to reflect existing conditions at the site before approval.

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