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State of Utah
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DIVISION OF OIL, GAS AND MINING

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TO: Internal File

THRU: Susan M. White, Project Team Lead *SMW*

FROM: Priscilla W. Burton, Soils Reclamation Specialist *PB*

RE: Upper Pad Reclamation Appendix 14, PacifiCorp, Des Bee Dove Mine, C015/017- AM01A-1

SUMMARY:

Phase I reclamation will include the Little Dove/Beehive pad (2.13 acres), the substation and water storage area (0.75 acres) and the access road down to the Desert pad (0.97 acres). In all 3.95 acres will be reclaimed. Approximately 20,500 cubic yards of material will be redistributed against the cut slopes. The area is pre-SMCRA. These plans supersede those in the currently approved MRP, Volume 2 for the salvage of substitute topsoil. New plans are to open trenches in the area before reclamation to evaluate soils at the site for their reclamation potential.

Soil samples to date have shown that the best soil has a loamy texture (less than 55% sand), a pH of less than 7.6 and EC values of less than 2.0. Since the substitute topsoil will be only a surface layer of less than six inches and serve as a seedbed, it is imperative that SAR values are also kept low, less than 2.0. Low SAR values will also increase resistance to erosion (lower K factor).

Also important to remember samples of the coal refuse demonstrate that it is far less suitable for use in the rooting zone than other soils due to its texture (sand), organic carbon content (70 – 90%) and elevated SAR values.

TECHNICAL MEMO

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:

Elevation is 7,800 feet on a south to southeast exposure and slopes of 1 ½ H:1V to 2H:1V. The plant community is Utah juniper and pinyon pine. Plants within this community include Salina wildrye, western wheatgrass, and Indian ricegrass.

Soils have been described in the MRP as either

- Typic Ustochrepts (50%) which are characterized by a 35 cm thick (13 inches) sandy loam surface layer with 25% coarse fragments. Underlying this layer is a stony loam layer 100 cm thick (39 inches) with up to 50% coarse fragments.

or

- Lithic Ustorthents (25%) which are characterized by rock within 50 cm or 19 inches.

Also present are small areas of Mollisols on the north and east facing slopes. In general, Mollisols are deep, well drained, with a well developed A horizon. See the General Soil Map of the Permit Area, Drawing #CE-10502-DS.

Soil and Refuse sample sites are shown Drawing CS1814D. The following samples have been taken of the soils outside of the disturbed area boundary and represent undisturbed soil quality: SS5A, SS7A, SS8A, SS10A collected in 1990 and SS1, SS3, SS10 collected in 2001. Laboratory Data Sheets for these sites are found in Appendix A. The 1990 soil samples were collected by Val Payne in April 1990 and analyzed by ACZ Laboratories in Steamboat Springs, CO. The 2001 samples were collected by Dennis Oakley and Chuck Semborski in March 1990 and analyzed by Inter-Mountain Laboratories in Sheridan, WY.

Sample depths were not reported for the 1990 samples and profile descriptions are not available. Two samples taken by Mr. Val Payne, SS6A and SS9A could not be located on Plate CS1814D and therefore were not included in the following discussion. Generally, the undisturbed soils have pH values between 7.3 and 7.6; Electrical Conductivities (EC) between 0.42 and 1.06 mmhos/cm; Sodium Adsorption Ratios (SAR) between 0.2 and 1.7; Nitrate

Nitrogen between 1.1 to 3.5 ppm; Extractable Phosphorus between 1 and 2 ppm; Neutralization Potentials between 16 and 18 % CaCO₃ ; Texture of sandy loam or loam with the sand content varying from 49 to 54%; and Saturation percent of 30 to 39%. Soils in the location of SS10A were found to have much less sand (23%) than the other sites with texture bordering on clay loam (27% clay and 50% silt). As expected, this site had the highest saturation percentage. Coarse fragments (greater than 2mm) in the soils were 35 to 40%.

In 2001, samples were taken of undisturbed soils to a depth of 18 inches and samples were analyzed from 0 – 6 inches, 6 – 12 inches and 12 – 18 inch depths. No field notes were taken and it is not known whether a lithic contact was encountered at eighteen inches. The undisturbed soil sample sites (SS1, SS3, and SS10) were generally in the same physio-chemical parameters described for the 1990 soils above. With the soils in the vicinity of SS10 again exhibiting higher clay contents and higher saturation percentage. Electrical Conductivity at site SS1 and SS3 were noticeably higher than 1990 sampling, values over 2.0 mmhos/cm were recorded. SAR values remained below 1.0 with some noticeable increase in SAR with depth (from 0.24 to 0.96 at SS1). Phosphorus levels at SS 1 and SS 10 were over 3 ppm in the top six inches, similar to earlier sampling. Phosphorus levels at SS 3 were 0.41 ppm in the top six inches, much less than other sites.

A soil survey of the Des Bee Dove mine site by Dr. A.R. Southard, Soil Scientist, Utah State University is referred to in this amendment. When used in the application, all referenced materials will either be provided to the Division or be readily available to the Division (R645-301-122). Please provide to the Division a copy of the soil survey report for the Des Bee Dove Mine site by Dr. A.R. Southard.

Findings:

Information in the proposed amendment is not considered adequate to meet the requirement of this section. Prior to approval, the permittee must provide the following in accordance with:

R645-301-122, Please provide to the Division a copy of the soil survey report for the Des Bee Dove Mine site by Dr. A.R. Southard, as referenced on page 2, Section 200 of the submittal.

TECHNICAL MEMO

CLIMATOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.18; R645-301-724.

Analysis:

The average annual precipitation is 6 – 8 inches (page 2-153, Volume 1 of the approved MRP).

Findings:

The requirements of this section of the regulations are considered adequate.

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

The Little Dove/Beehive area is 2.13 acres. Fifteen thousand cubic yards of soil will be used as backfill. The substitute topsoil will be generated from within the fill. All slopes will be created between 1.5h:1v and 2h:1v. Substitute topsoil will be graded over slopes of 2h:1v. Slopes greater than 2h:1v will have isolated pockets of soil placed in the rock slope, as required by the R, B, &G Engineering Inc, Slope Stability Report dated September 2001 (Section 540, Appendix C). Total volume of substitute topsoil required is not reported.

Drawing CS1814D shows locations of soil and refuse sampling. Useful soils information within the area to be reclaimed is represented by sample sites 1107 and 1110 collected from pre-SMCRA fill slopes in 1980 and 1983 and shown in Table 1 of Section 200. The persons collecting the samples and the laboratory analyzing the samples and methods used are unknown. The pre-SMCRA fill slope was sampled from 0 – 4, 4 – 12, and 12 – 24 inches in depth. The soils are sandy loam in texture with a pH of 8.0 to 8.3. The EC's and SAR were both less than 1.0. Except the subsoil in the wash (sample 1111, depth unknown) where the EC was 2.1 and the SAR was 1.0. Calculation of SAR on these samples is cast into doubt since the sodium is reported in meq/L and the Ca + Mg is reported as a percentage.

Recent sampling of the disturbed area included sites SS7, SS7A, SS7B, SS8, and SS9. These samples were bagged at six inch intervals to a depth of 18 inches by Dennis Oakley and Chuck Semborski and analyzed by Intermountain Laboratories of Sheridan WY in March

through May of 2001 (Table 3 and laboratory analyses are attached at the end of Section 200). Soils from sample area SS7, SS7A and SS7B are proposed as a source of substitute topsoil for Phase I. Although sampled, SS8 soils will not be salvaged. Soils at SS9 will be utilized to reclaim the access road.

Results of sampling at SS7, were discouraging due to the SAR value over 6 in the top six inches, combined with a percent sand of 62% both of which would lower the available water holding capacity. (Saturation percent was 21 to 31%.) Nitrogen, phosphorus and Total Organic Carbon were all elevated suggesting that this soil sample was mixed with refuse.

Re-sampling at sites SS7A and SS7B, dispelled this worry as SAR values to a depth of eighteen inches were less than 2.0. At sites SS7A and SS7B the texture was very different, much less sand was reported (27 – 37%). Silt content (38 – 48%) and clay content (22 – 26%) increased to make a soil that has a loam texture with a Saturation Percentage between 30 and 37%. The pH is near neutral between 6.9 and 7.3. Less sandy soil is preferable for use as substitute topsoil.

Soils along the access road are represented by SS9. Here the pH is a uniform 7.1 and EC rises from 1.96 to 3.02 mmhos/cm with depth. The SAR climbs from 0.81 to 1.76 with depth. The soil has a loam texture with sand decreasing from 51 to 35% with depth. Saturation percent is 34 – 35%. Total organic carbon values are over 25% in the top foot and drop to 14% below twelve inches. Phosphorus is between 0.6 and 0.8 ppm. Interestingly, Boron is elevated over background levels (about five times) and is between 1.4 to 1.7 ppm. Even at these levels, Boron is not a cause for concern. This soil will be suitable for use as substitute topsoil.

Although soils at site SS8 will not be salvaged, it is interesting to note the properties of this soil that was successfully reclaimed by an interim seeding in 1988. The soil has a pH of 7.3 and very low EC between 0.55 and 0.88. The SAR ranges between 0.86 and 0.95. The texture is a loam with between 45 and 55% sand. The Saturation Percent is between 29 and 32%. Total Organic Carbon is less than 14% and falls with depth. Phosphorus is between 2 and 3 ppm. Boron levels are between 1.4 and 1.8 ppm. There are no plans to salvage this soil during backfilling and grading, but it is among the best in the disturbed area.

This submittal includes plans to further evaluate the Little Dove/Beehive pad soil conditions by creating trenches in the pad with a backhoe. Four trench locations will be useful in evaluating the Phase I soils:

1. near the Beehive portal parallel to the drainage;
2. near the Deseret Mine belt/return portal parallel to the drainage;
3. along the Beehive Access road near the switch back;
4. and near the substation area.

Trench locations are not shown a map with this submittal, but were shown on Drawing CM-10336-DS that was submitted with Amendment AM01C. A fifth location was suggested by the

TECHNICAL MEMO

Division in a review of AM01C, dated October 3, 2001. The fifth trench would be perpendicular to the drainage on the Little Dove/Beehive pad.

Findings:

Information provided in the proposed amendment is adequate to meet the Operations Topsoil and Subsoil requirements of the Regulations. Prior to approval, the Permittee must provide the following in accordance with:

R645-301-233, Incorporate the response to AM01C (NOV 01-7-1-1 Abatement information) into the submittal. Provide depth increments on the laboratory analysis sheets for samples taken in 2001 at SS7A and SS7B. Correct the legend on Drawing CS1814D for soil sample location symbols and dates.

RECLAMATION PLAN**TOPSOIL AND SUBSOIL**

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

Analysis:**Redistribution**

	2.13 acres Little Dove/Beehive	15,000 cy fill
	0.75 acres substation and access road	2,500 cy fill
	<u>0.97</u> acres access road	<u>3,000</u> cy fill
TOTAL	3.85 acres	20,500 cy fill

Topsoil substitute replacement depth is not mentioned in this submittal. For a cover of 6 inches over the entire site, 3,105 cubic yards would be required. However, much of the site will be on a slope of 1.5h:1v and will receive only isolated pockets of soil between stabilized rocks that are of a maximum size of 30 inches and less than 20% less than one inch (page 20, Soil Trenching and Management Plan).

To backfill the access road, fill will be imported from the Little Dove/Beehive pad or from the Valley Fill excavation. Soil trenching in the bathhouse pad will provide information on the best material to have in the top four feet along this access road.

The source of substitute topsoil for the access road is the berms along the road. The source of substitute topsoil for the substation is within the substation pad berms. Substitute topsoil will be identified for use on the slopes in the Little Dove/Beehive area after trenching. Soil samples have shown that the best soil has a loamy texture (less than 55% sand), a pH of less than 7.6 and EC values of less than 2.0. Since the substitute topsoil will be only a surface layer of less than six inches and serve as a seedbed, it is imperative that SAR values are also kept low, less than 2.0. To evaluate K-factors, percent very fine sand must be reported. K factors are important in determining the erosivity of the soils.

Findings:

Information provided in the proposed amendment is not adequate to meet the Reclamation Topsoil and subsoil requirements of the Regulations until the % very fine sand is included in the analytical parameters as requested by the technical analysis of AM01C (NOV 01-7-1-1). Substitute topsoil will be identified for use in the Little Dove/Beehive area and along the access road after trenching.

STABILIZATION OF SURFACE AREAS

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

Analysis:

Slopes will be 1 ½ H: 1V or 2H:1V. According to the Slope Stability Report (Reclamation Plan, Appendix C) the fill should be sorted so that all minus 4" to minus 8" material can be compacted in lifts that no greater than 1 foot thickness. An all rock 4" to 8" can be compacted in lifts not exceeding three feet. Large boulders will be segregated and used as erosion protection, by nesting the boulder into the slopes at various locations (items 5 and 6 in Procedural Steps of Reclamation Table).

The soil will moved by means of a trackhoe and spread and compacted with a dozer. The R, B, &G Engineering Inc, Slope Stability Report dated September 2001 (Section 540, Appendix C) recommends that at least 4 passes of a D-9 dozer are made over the rock fill.

The primary means of sediment control on the site will be gouging (page 12, Section 540), which will be limited to the slopes of 2h:1v where soils are available to gouge. Steeper slopes will consist of rock with isolated pockets of soil placed in the rock slope, as required by the R, B, &G Engineering Inc, Slope Stability Report (Section 540, Appendix C).

One ton per acre of certified weed free alfalfa hay will be incorporated into the soil with pocking. A soil tackifier will be applied according to manufacturers specifications.

TECHNICAL MEMO

The seed mix is listed in Table 1 of Section 340. If hydroseeding is used, 1500 lbs/acre of wood fiber mulch will be added to the hydroseeder along with tackifier for cover and protection (page 4, Section 340).

The area will be monitored annually for rills and gullies (page 7, Section 350 Performance Standards). Should rills and gullies be noted, the plan indicates that they will be repaired according to R645-301-357.360 through 357.365. R645-301-357.360 through R645-301-364 outline the requirements for restarting the bond clock. R645-301-357.365 requires that any treatment practices used for rill and gully repair will be approved by the Division.

Findings:

The information provided is adequate for the purposes of Reclamation Stabilization of Surface Areas as required by the Regulations.

RECOMMENDATION:

The submittal is recommended for approval as soon as the response to AM01C are incorporated (The NOV 01-7-1-1 abatement plan). Trenching is expected to provide a glimpse at what lies below the surface of the Little Dove/Beehive pad. From this information, the best material available can be placed on the surface as substitute topsoil.