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TO: Internal File

THRU: Paul Baker, Team Lead *PKS*

FROM: Robert Davidson, Soils Reclamation Specialist *RAD*

RE: Revised Reclamation Plan Amendment, PacifiCorp, Deer Creek Mine, ACT/015/018-99C

TECHNICAL ANALYSIS:

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Topsoil Substitutes and Supplements

No topsoil was salvaged at the Deer Creek site, and therefore, construction fills within the surface disturbance area will be used as substitute topsoil. The Deer Creek Mine was developed prior to the Surface Mining Reclamation Control Act (SMRCA) and topsoil was not salvaged or stockpiled during construction and mine development activities. The amendment states that no other topsoil is available for reclamation and that soil material will be obtained from the existing fills within the surface disturbance area.

The existing MRP contains several commitments for obtaining and characterizing substitute topsoil within the Deer Creek Mine surface disturbance area through an exploration, sampling program. The amendment contains an Exploration/Sampling Program for locating Substitute topsoil and characterizing Refuse.

Exploration/Sampling Program - Substitute Topsoil

The exploration/sampling program will be implemented during the reclamation phase of the mine. The purpose of the exploration/sampling program is to locate suitable substitute soil to use as cover material where needed. PacifiCorp states that they are confident that the exploration/sampling program, when implemented, will find that the soils within the Deer Creek and Elk canyons will be suitable topsoil substitute. PacifiCorp therefore assumes that adequate quantities and quality material will be available during culvert excavation. Sampling will be conducted as the soil is excavated and will determine soil suitability based on pH and EC analysis. Therefore, the amendment states that PacifiCorp will determine soil suitability promptly and will immediately stockpile the soil to be used as substitute topsoil.

The Division is unable to make an adequacy determination because several problems exist with the exploration/sampling program as follows:

- The sampling plan only provides for pH and EC analysis. The substitute topsoil must include all analyses listed in **Table 2, Overburden Evaluation for Vegetative Root Zone**, Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining (Leatherwood, 1988).
- Field sampling and survey work must be performed by a **Certified Professional Soil Scientist** or a **qualified Soil Scientist**. In the later case, sufficient information must be submitted with the amendment to enable the Division to determine the qualifications of the Soil Scientist for conducting a soil survey according to the standards of the National Cooperative Soil Survey.

Exploration/Sampling Program - Refuse Piles

PacifiCorp proposes to sample the refuse piles located in Deer Creek and Elk canyons while the mine is still in operations. The amendment states that the purpose for the refuse sampling plan is to determine if the refuse material is acid/toxic forming or if the refuse can be used as substitute soil.

Sampling will be performed using an auger (if possible), shovel, backhoe, or coring tool to collect composite samples at 1 foot depth intervals, and will extend to a depth of 4 feet below the proposed final contour. Sampling sites are identified on Map2-17 in the Mine Reclamation Plan, volume 4. Samples will be double sealed in plastic bags and send to a certified laboratory for analysis using soil suitability criteria found in Appendix A of the Division guidelines for topsoil and overburden. According to the amendment's Table 200-A-3, analyses will include pH, EC, color, texture, SAR Se, boron, acid/base potential, sulfur, calcium carbonate, and organic carbon.

The Division is unable to make an adequacy determination for the refuse sampling plan for the following reasons:

- Map 2-17 could not be located in the amendment nor in the existing Mine Reclamation Plan.
- The sample density must be statistically based, using a random sample grid pattern, to accurately represent and characterize the refuse piles.
- Field Sampling must be performed by a **Certified Professional Soil Scientist, qualified Soil Scientist, or a qualified professional**. In the later two cases, sufficient information must be submitted with the amendment to enable the Division to determine the qualifications of the Soil Scientist or professional for conducting the sampling.
- Analyses of Refuse does include saturation percent, available water capacity nor rock fragments. Physical characterization of the refuse helps determine suitability of the material to retain moisture and sustain vegetative root growth.

Operational Soil Sampling

The existing Mine Reclamation Plan commits to an operational soil sampling plan where soil materials from fill slopes will be sampled every 5 years. The 5 year sampling commitment has not been met. The only soil sampling periods included samples taken during 1980 and 1983. Appendix 2-A, Table 2-A-1 lists soil sample analysis for disturbed, undisturbed and coal waste of the Deer Creek Mine area for years 1980 and 1983. The amendment states that soil tests on the disturbed and undisturbed areas and coal waste show that the materials in the portal area should support selected vegetative materials with the conclusion that procurement of borrow topsoil for reclamation is not needed. The Division recognizes that the 1980 thru 1983 Operational Sampling took place prior to the Division's 1988 guidelines for topsoil and overburden. However, reclamation standards for soil and overburden are now rated using the 1988 guidelines. Therefore, since sampling did not follow the current 1988 Division guidelines for topsoil and overburden, information in Table 200-A-1 is incomplete as contained in the amendment and does not show that the fill or refuse materials in Deer Creek and Elk canyons are suitable for achieving the revegetation standards. Further sampling using current guidelines needs to be performed before a determination can be made concerning substitute soil and refuse suitability.

Table 200-A-1 contains erroneous information as follows:

- Sodium Absorption Ratios are calculated incorrectly for samples 1101, 1105 thru 1122, and DC#1 thru DC#4.

- The "Ca + Mg" column does not contain units.
- Differentiate between total and soluble methods for the Ca + Mg, Ca% and Mg% values.
- Texture class as shown for samples 1101, 1102, 1103, DC#1 and DC#3 are incorrect based on particle size distribution.

Contemporaneous Reclamation - Pre-SMCRA Terraces

The amendment states that a series of soil samples were collected along the pre-SMCRA terraces and access road and tested for soil suitability. A hand held auger was used to collect the samples to document the potential depth of the growth media. Hand augers are extremely inefficient in rocky and non-tilled, hard compacted soil. Therefore, potential depth readings using hand augers is at best, unreliable. Sampling was performed during November 1999. Sampling results are referenced to Table 200-A-2, Soil Sample Analysis Results for Terrace Enhancement Project, as contained in Appendix R645-301-200-A. No analysis results from the November 1999 sampling are included in Table 200-A-2.

Findings:

Information provided in the application is not considered adequate to meet the requirements of this section of the regulations. The applicant must provide the following in accordance with:

R645-301-130, All soil survey work, field sample collecting, and data interpretation must be performed by a qualified Soil Scientist. Sufficient information must be submitted with the amendment to enable the Division to determine the qualifications of the person conducting the soil survey and interpreting the results.

R645-301-120, R645-301-224 and R645-301-233, (Part 1) For substitute topsoil and refuse characterization, include all analyses listed in **Table 2, Overburden Evaluation for Vegetative Root Zone**, Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining (Leatherwood, 1988). The sampling plan only provides for pH and EC analysis for substitute topsoil characterization. Analyses of refuse does include saturation percent, available water capacity nor rock fragments.

(Part 2) Sampling as listed in Table 200-A-1 did not follow the current 1988 Division guidelines for topsoil and overburden. Furthermore, Table 200-A-1 contains erroneous calculations and information for SAR, units, and texture. Therefore, information in Table 200-A-1 is incomplete and

erroneous as contained in the amendment and does not show that the fill or refuse materials in Deer Creek and Elk canyons are suitable for achieving the revegetation standards.

(Part 3) No analysis results from the November 1999 sampling are included in Table 200-A-2.

R645-301-120 and R645-301-521, The refuse sampling plan refers to Map 2-17. Map 2-17 could not be located in the amendment nor in the existing Mine Reclamation Plan.

R645-301-553.252, For the refuse sampling plan, sample density must be statistically based, using a random sample grid pattern to accurately represent and characterize the refuse piles.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Soil Redistribution

The amendment states that reclamation will involve three disturbed areas: Deer Creek Canyon, Deer Canyon, and Elk Canyon. The Deer Creek mine site disturbed area will be reclaimed by redistributing soil and spoil by cutting and/or filling the existing mine site footprint. Reclamation will be completed sequencing activities from top to bottom, thus minimizing construction equipment travel over redistributed material. As re-contouring is completed, salvaged substitute topsoil material will be evenly distributed. The soiled surface will be roughened by deep gouging (pocking) by using a trackhoe to create depressions approximately 3' dia x 1.5' deep. The amendment states that these depressions will be developed throughout the reclaimed area and will influence moisture retention and greatly reduce sediment loss.

Table 3-1, Reclamation Schedule, and Section R645-301-541 General, do not list soil exploration/sampling and salvage; nor does the table list soil replacement.

Soil Nutrients and Amendments

The amendment identifies on-site fills as possible substitute topsoil. The exploration program assumes that adequate quantities of substitute soil is available, but gives no **estimated volumes and cover depths** for the reclaimed site. If adequate quantities of substitute soils cannot be procured on-site, then a backup plan supplying borrow substitute soils needs to be addressed.

Soil Stabilization

After topsoil distribution, the surface will be roughened by deep gouging. Deep gouging creates depressions across the surface which increases water harvesting and helps reduce surface erosion. In addition, rock litter consisting of various sized rocks and boulders will be randomly placed on the slopes and/or nested into the soil to help control slope slippage. On slopes greater than 20%, a soil tackifier will be used to help stabilize surface soils. The biology section R645-301-341, Revegetation, states that tackifier will be applied at a rate of 500 lbs/ac to cover the straw mulch and stabilize the soil and will be applied as contemporaneously as possible. The soil commitment to apply tackifier mainly on slopes greater than 20% appears to be in conflict with the biology commitment to apply tackifier where ever straw mulch is used to stabilize all soil surfaces.

Rills and gullies which develop to a depth of nine inches or greater in areas that have been re-graded and topsoiled and which either; (1) disrupt the approved post-mining land use or the reestablishment of the vegetative cover, or (2) causes or contributes to the violation of water quality standards for receiving streams will be filled, re-graded, or otherwise stabilized. The topsoil will be replaced and the areas will be re-seeded.

Refuse Pile Reclamation

The MRP states that refuse within the Deer Creek Portal surface disturbance area will be used as substitute topsoil, in some cases be covered by less than four feet of material, based on analyses for toxic and acid forming properties.

Within the MRP's Chapter 3, page 3-65, Table 7, Deer Creek Mine - Waste Rock Analysis, several problems are identified associated with materials taken from roof and floor materials. Data is incomplete since no determinations were made for selenium or for Acid Base Potential.

The Division cannot make a determination of waste acceptability. The amendment Table 2-A-1, lists several samples taken in 1980 and 1983 for Coal Waste. However, numerous errors exist within the data and analyses are incomplete and do not follow the Division's Guidelines for

Topsoil and Overburden. Furthermore, unacceptable criteria are identified for Blind Canyon floor samples for SAR and pH, and poor criteria are met on Blind Canyon split samples for SAR and on Hiawatha floor samples for pH. Therefore, since data errors exist, data is incomplete, and roof and floor analyses identify toxicity, the Division cannot make a determination of waste acceptability. Until further sampling and data are supplied, the worst case scenario must therefore be assumed and the refuse piles and coal mine waste be covered with a minimum of four feet of the best available, nontoxic and noncombustible material.

Findings:

Information provided in the application is not considered adequate to meet the requirements of this section of the regulations. The applicant must provide the following in accordance with:

R645-301-553.252 and R645-301-233, Since data errors exist, data is incomplete, and roof and floor analyses identify toxicity, the Division cannot make a determination of coal waste and refuse acceptability. (1) All refuse and coal mine waste must be covered with a minimum of four feet of the best available, nontoxic and noncombustible material. (2) Refuse may not be used as substitute topsoil.

R645-301-120, Table 3-1, Reclamation Schedule, and Section R645-301-541 General, do not list soil exploration/sampling and salvage; nor does the table list soil replacement.

R645-301-232.720 and R645-301-350, The exploration program assumes that adequate quantities of substitute soil is available, but gives no **estimated volumes and cover depths** for the reclaimed site. The application needs to contain a commitment to develop a backup plan supplying borrow soils if adequate quantities of substitute soils cannot be procured on-site.

R645-301-120 and R645-301-244, The soil commitment to apply tackifier mainly on slopes greater than 20% appears to be in conflict with the biology commitment to apply tackifier where ever straw mulch is used to stabilize all soil surfaces.

RECOMMENDATION:

The amendment application should not be accepted until the above deficiencies have been adequately addressed by the applicant