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TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 9, 2011

TO: Internal File

THRU: Steve Christensen, Permit Supervisor *SKC*

FROM: Priscilla Burton, CPSSc, Environmental Scientist III *Priscilla SAS*

RE: Reclamation Commitments, Consol Energy Company, Emery Deep Mine, C0150015, Task #3889

SUMMARY:

Despite repeated attempts to establish vegetation on the topsoil and subsoil stockpiles, effective cover has not been established. Consequently, a commitment to assess previous revegetation methods and their outcomes is the first item to be addressed by the commitment in Chapter III, page 4a of the MRP. Appendix III-1 provides a consultant's report of the revegetation status of 15 seeded locations and 6 reference areas at the Emery Mine, and the soil chemistry for the surface 6 inches at each site. The report concludes that excessive sodium in the surface soils and lack of water is the most likely cause of poor vegetation establishment and that growth of vegetation on the stockpiles is further limited by livestock grazing.

The second item listed on page 4a (Chap. III) is to develop plans to enhance vegetation at each site, for the purpose of applying successful methodology in final reclamation. The following recommendations should be considered in formulating said plans: Stockpiles should be graded to gentle slopes (4h:1v) and have only shallow roughening, such as ripping on the contour, to allow water infiltration but to avoid water impoundment; All sites should have 1 T/ac barley straw incorporated with ripping; Saline-sodic sites should have sulfur incorporated into the surface to lower the pH and induce dissolution of the lime reportedly present in the soil; Seed mix should contain only salt tolerant species; The seeded soil surface should be partially covered with a layer of woodstraw or gravel mulch to limit evaporation from the soil surface; and finally subsoil and topsoil stockpiles should be fenced to keep out livestock.

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TECHNICAL ANALYSIS:

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Appendix III-1 provides a consultant's report of the revegetation status of 15 seeded locations and 6 reference areas at the Emery Mine, and the soil chemistry for the surface 6 inches at each site. The report concludes that excessive sodium in the surface soils and lack of water is the most likely cause of poor vegetation establishment and that growth of vegetation on the stockpiles is further limited by livestock grazing.

The soils report included in Appendix III-1 states that 8 of the 15 revegetation sites are saline-sodic, that is they are alkaline and high in both salinity and sodium (sites 5, 6, 8, 10, 11, 14, 20 and 21). The extreme salt content appears not to affect vegetation growth where water is available in the subsoil (site 6, Pond 6 banks and site 11, pond 1 banks). Both of these sites have 39% desirable cover and greasewood and intermediate wheat grass are the predominant species. Whereas, site 3 pond 6 topsoil pile, and site 4 pond 6 subsoil pile west, have less salinity and less sodicity, but barely have any vegetative cover at all (0.27% and 1.38 % desirable cover, respectively). In this case, the aspect, slope and grazing of the pile may have had more impact on vegetation establishment than the salinity. A similar situation may exist for the substation topsoil pile, site 9, where establishment is low.

The soils report also indicates that there is a high lime content in the soils, although the report does not specify exact percentages. Amelioration of sodicity in the presence of lime can be achieved by application of sulfur or sulfuric acid to the soil to reduce the pH and encourage the dissolution of lime. In theory, the calcium will then replace the sodium on the clay exchange sites and sodium will be leached out of the soil profile. A protective layer of wood straw or pea sized gravel over the soil will help to prevent the upward migration of salts to the surface by evaporation.

The most notable soil characteristic that the successfully revegetated site 19 test plot area shares with the well vegetated reference areas (sites 12, 13, 15, 16, 17, 18) is a loam texture. Adding organic matter to clay soils is recommended to improve soil structure and infiltration.

The "Reclamation Monitoring Report" does not include results for sites 20, 21, and 22.

The "Reclamation Monitoring for the Emery Mine, Soils" report is missing soil description forms and Table 2 is incomplete and does not include evaluations for each of the 22 sampling sites as described on page 2 of the Soils report.

Phase 2 of the commitment on page 4a, Chap III, states that based on those investigations, and in consultation with the Division, the permittee will implement the best practices to improve reclamation success. The finding written under R645-301-240 below presents my recommendation for the best management practices to be implemented.

Findings:

R645-301-130, The "Reclamation Monitoring Report" does not include results for sites 20, 21, and 22. The "Reclamation Monitoring for the Emery Mine, Soils" report is missing soil description forms and Table 2 is incomplete and does not include evaluations for each of the 22 sampling sites as described on page 2 of the Soils report.

R645-301-240, The following recommendations should be considered in formulating reclamation plans as described in item 2, page 4a of Chapter III of the MRP: Stockpiles should be graded to gentle slopes (4h:1v) and have only shallow roughening, such as ripping on the contour, to allow water infiltration but to avoid water impoundment; All sites should have 1 T/ac barley straw incorporated with ripping; Saline-sodic sites should have sulfur incorporated into the surface to lower the pH and induce dissolution of the lime reportedly present in the soil; Seed mix should contain only salt tolerant species; The seeded soil surface should be partially covered with a layer of woodstraw or gravel mulch to limit evaporation from the soil surface; and finally subsoil and topsoil stockpiles should be fenced to keep out livestock.

RECOMMENDATIONS:

Soil amendments and reclamation practices should now be implemented at the 15 revegetation sites in accordance with item 2, page 4a Chapter III of the MRP.