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State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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TO: Internal File

THRU: Paul Baker, Team Lead *PBB*

FROM: Robert Davidson, Senior Reclamation Specialist (Soils) *RAD*

RE: Phase I Bond Release Application, Castle Gate Holding Company, Castle Gate Mine, ACT/007/004-BR00B

SUMMARY:

The Hardscrabble Canyon portion of the Castle Gate Mine was reclaimed in 1984 and 1985 and 1993 through 1999. The substation was not reclaimed because it may eventually be used for power transmission. The road through the disturbed area was altered but left in place for the post-mining land use. On May 22, 2000, the Division gave final approval for the as-built designs.

The bond release application consists of a detailed cover letter, a copy of the proposed newspaper advertisement, and copies of letters to local government agencies and owners of adjacent lands. The applicant is relying on the already-approved as-built designs for most of the information needed for the bond release.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Hardscrabble Canyon was disturbed by mining prior to the enactment of SMCRA, therefore, no salvaged topsoil was available for reclamation. During reclamation, the existing

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soils and overburden materials at the site were identified and used as substitute topsoil with final soil placement depth averaging 24 inches. The natural rock content of these substitute soils was retained and incorporated into the reclaimed surface. After placement of the substitute soils, the surface was deep gouged and roughened.

Portions of the previously reclaimed Goose Island refuse area were re-disturbed last fall to increase soil cover depth and to improve a drainage channel. Surface roughening techniques included deep gouging the newly placed soils.

Several erosion control measures have been implemented with recent reclamation efforts to help reduce soil loss from the reclaimed slopes and include the following:

1. Ripping of the re-graded surface prior to placement of growth media
2. Incorporation of hay and/or straw mulch into the growth media
3. Deep gouging of the growth media
4. Seeding and establishing vegetation
6. Addition of surface mulch following seeding
7. Crimping the surface mulch and applying a tackifier

Reclamation slopes are concave with natural rock outcrops retained in several areas. The operator used existing, reasonably-available material on-site to backfill the highwall and cut slopes. However, upper areas of the highwall and selected cut slopes remain that blended into the natural environment. On reclaimed cut slopes and other reclaimed areas, deep gouging techniques for surface roughening were used.

Coal debris, coal refuse and any acid- and/or toxic-forming material exposed or excavated during reclamation grading was removed and used as backfill against the highwall, cut slopes, and excavated trenches, and then covered with four feet of overburden material and substitute soils. Within the approved MRP, analytical appendix 3.3M, section 4.0 Analytical results, coal samples were shown to be single grained with a loamy sand to sandy loam texture. Because of the water limiting conditions of coal and coal-waste material, vegetation regeneration would have been severely restricted if the coal material had not been buried under four feet of soil.

Substitute Topsoil Evaluation

The Mine Reclamation Plan contains environmental resource information concerning sources of substitute topsoil. Studies were performed to assess these materials for reclamation purposes. Both the 1990 and 1995 soil investigations were conducted to evaluate the physical and chemical characteristics of the soil materials according to the Division's guidelines for topsoil and overburden¹. In addition, the 1995 soil investigation was conducted to locate areas of buried coal debris that would likely be encountered during reclamation. Descriptions of the soils and coal debris were made using trenches, soil pits and soil borings.

¹Leatherwood, J., and Duce, D., 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah Department of Natural Resources, Division of Oil, Gas and Mining.

During reclamation, additional sources of substitute soils were located and approved for reclamation use. Within the area of the old scalehouse, high saline-sodic soils were encountered. Mitigating efforts were employed to utilize these soils during reclamation. The higher salt affected soils, were buried under deeper fills than lesser salt affected soils. Mitigating efforts included hay and straw mulch incorporation into the upper layers of soil to help improve aeration and water holding capacity.

Deleterious effects to vegetative growth from soils within the scalehouse has become apparent during the 2000 summer. Adverse weather has dominated the growing season during the 2000 summer with hot and dry conditions. The majority of the reclaimed site vegetation appears to be reasonably drought tolerant except within the central part of the reclaimed site near the old scalehouse, on the north side of the road, where drought stress is readily apparent in the reestablished vegetation. As mentioned, this area contains the substitute soils with high SAR values.

Reclaimed vegetation in the reclaimed scale house area appears to be adversely affected, both in cover and size, in comparison with surrounding reclaimed vegetation (see attached photo). As a result, the Division sampled soils in this small, affected area on August 29, 2000. Field observations were made and the soil sample was tested for pH, EC, Ca, Mg, and SAR:

- The soil is hard and very difficult to penetrate and break up with a spade. When finally disturbed with the spade, the soil has no structure and sifts like loose flour. There is plenty of larger rock with a greater abundance of gravel within the soil matrix.
- Random samples were taken from a dozen locations within this area and a composite soil sample was mixed into a gallon sized sample.
- Results of soil testing after air drying, sieving through an 18 mesh sieve, and preparing a saturation soil paste and extract:

Saturation %	39 %
pH	7.9
EC	5.14 mmhos/cm
Ca	25 meq/L
Mg	21 meq/L
Na (by difference)	5.5 meq/L
SAR	1.1

Chemical testing shows no problems with respect to total salt or sodium. However,

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physical properties show that the soil has no structure and sets up to a very hard consistency. This area was used for both equipment staging during reclamation work and where soil was screened to recover rip-rap. Most likely, this soil is what was left over after screening soil to collect rip-rap rock. During screening, the soil's structure and coherency would have been completely destroyed.

Findings:

Information in the proposal is adequate to meet the requirements of this section of the regulations.

RECOMMENDATIONS:

To help relieve the physical problems and rebuild soil structure, the Division recommends that organic matter (e.g., composted bio-solids) be added to the soil and worked into the upper 6 to 8 inches.

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Figure 1. Castle Gate Mine, Hardscrabble Canyon, Old Scale House area were equipment staging area was located during reclamation. Vegetation appears to be impacted from adverse soil conditions that include lack of structure and crusting.