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TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 24, 2012

TO: Internal File

THRU: April Abate, Team Lead. AGA 10-5-2012

FROM: Priscilla Burton, Environmental Scientist III/Soils PBurton SQS

RE: Phase III Bond Release, Castle Gate Holding Co., Castle Gate Mine, C/007/0038, 04
Task ID #4153

SUMMARY:

The application for Phase III bond release for 57.44 acres in Hardscrabble and Sowbelly Canyons, which includes the road access, but not the reclaimed substations (0.72 and 1.84 acres in Hardscrabble and Sowbelly, respectively), is recommended for approval.

Earthwork at the Hardscrabble site was completed during the years 1984, 1985, and 1993 through 1999. Phase I bond release was approved for Goose Island (8.79 acres) in 1985. Phase I bond release was approved for Hardscrabble No. 3 and No. 4 Mine areas (27.7 acres) on February 14, 2001. Phase II bond release for most of the Hardscrabble No. 3 and No.4 Mine areas and for Sowbelly of the Castle Gate Mine was approved in November 2002.

Adit #1 was reclaimed in 2002 and has received phase I bond release from the Division. Phase I Bond release for the substation areas of Hardscrabble and Sowbelly (reclaimed in 2002) was granted in 2005.

TECHNICAL ANALYSIS:

TOPSOIL AND SUBSOIL

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

Analysis:

Redistribution

Information concerning the redistribution of topsoil and subsoil was reviewed in the Division's Phase I Bond Release Decision Document dated November 29, 2000. According to the technical review, final soil placement depth averaged 24 inches. Coal debris, coal refuse and any acid- and/or toxic-forming material exposed or excavated during reclamation was covered with four feet of overburden material and substitute soils.

Findings:

The information provided meets the requirements for bond release.

STABILIZATION OF SURFACE AREAS

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

Analysis:

All sites have stable ephemeral channels with well established vegetation and rocks contributing to stability.

Access to Hardscrabble is through a locked gate. A road remains in Hardscrabble to support the post mining land use of grazing and recreation.

Access to Sowbelly used to be through a locked gate, but the site is so popular for ATV users, that the gate was constantly vandalized. The gate is now left open and that situation appears to be working better for the Permittee. A road was not retained in Sowbelly Canyon. However, the ephemeral channel is being used as an ATV trail. The site gets heavy use by recreational ATV riders.

Appendix 2 of the Application for Phase III Bond Release provides a comparison of the sediment yield in tons/acre/year for the reclaimed slopes under existing conditions to the reclaimed slope assuming reference area cover. The comparison was run using the Revised Universal Soil Loss Equation by EarthFax Engineering, Inc. EarthFax found that sediment yield from the Sowbelly reclaimed site was 0.70 tons/ac/yr, (below the estimated 0.78 tons/ac/yr for the undisturbed) and sediment yield from the Hardscrabble site was 0.02 tons/ac/yr (below the undisturbed of 0.06 tons/ac/yr). This can also be described as between 13 tons/yr from the 19.16 acre Sowbelly area and 0.76 tons/yr from the 38.28 acres Hardscrabble area.

In 2004, EarthFax found that sediment yield from the reclaimed site varied from 0.51 tons/ac/yr down to 0.16 tons/ac/yr depending upon the extent of gouging or an average of 9.0 tons/yr sediment from the entire site as compared to a projected 21.5 tons/yr for the control which was described as the same site with no gouging and a vegetation cover equivalent to that of the reference area.

The assumptions built into the 2012 model were different from that in 2004.* The current values are as follows:

- The soil erodibility factor (K) for the control (an undisturbed site) was 0.05, based upon the information provided for surface soils on the NRCS Web Soil Survey. (In contrast, in the 2004 model, the undisturbed soil K = 0.27.)
- The K factor for the reclaimed land was 0.15, based upon the information provided for subsoils on the NRCS Web Soil survey site. (The 2004 disturbed soil K = 0.30.)
- The reclaimed soils had 10.25% and 7.25% organic matter in Sowbelly and Hardscrabble Canyons, respectively, based upon the vegetation monitoring. (In 2004, the assumption was 0% organic matter for disturbed soils.)
- Sowbelly slopes were assumed to be 63% (1.75h:1v) for undisturbed and 100% (1h:1v) for reclaimed areas. Hardscrabble slopes were assumed to be 12% (10h:1v) in both undisturbed and disturbed. (In 2004, the slope for both disturbed and undisturbed was assumed to be 30% (3.5 h:1 v.)
- The very fine sand and permeability was not stated. (In 2004 it was stated as 5% very fine sand fraction and moderate to rapid permeability for the reclaimed.)

The K factor is based upon soil texture and may change due to disturbance and reduced organic matter content. The K factor used in 2012 created a more competitive comparison between disturbed and undisturbed soils, because the undisturbed K was one fifth its previous value (5 times less susceptible to runoff), while the disturbed was only half the previous value (only 2 times less susceptible to runoff).

The slope values should not change over time. However the slope values used in 2004 for Sowbelly were more competitive (more steep) than those assigned in 2004. Slope

assignments in Hardscrabble were less competitive (less steep) than in 2004, but were kept constant in the undisturbed and disturbed comparison.

Whether this model demonstrates erosion control depends upon the acceptable soil loss tolerance value for the soils of the site. The Natural Resources Conservation Service (formerly the Soil Conservation Service) identified the soil loss tolerance value for the Pathead and Curecanti soils as 1 ton/acre/year in Table 12 of the 1988 Soil Survey of Carbon Area. The consultant's 2012 prediction of 0.02 to 0.70 tons/acre/year falls below this soil loss tolerance value.

*Tasks 2738 and 2739 in November 2004 provide the comparison values.

Findings:

The Permittee has adequately applied best management practices to control erosion and prevent sediments from leaving the site.

RECOMMENDATIONS:

Phase III bond release approval is recommended.

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