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TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

January 20, 2010

TO: Internal File

THRU: April A. Abate, Hydrologist, Team Lead AAA 2-1-10

FROM: James Owen, Reclamation Engineer JO

RE: Crandall Canyon – Phase I Bond Release Application, Willow Creek Mine, C/007/0038, Task ID #3453

SUMMARY:

On Nov 30, 2009, the Division of Oil, Gas and Mining received an application for Phase I Bond Release (32.96 acres) for the Crandall Canyon tract of the Willow Creek Mine from Plateau Mining Corporation. Two access shafts were backfilled as part of the reclamation activities. Shaft settlement was detected in the No.1 shaft in 2004 and addressed by further backfill in 2005. In November 2006, settlement of the backfill in the No.2 shaft was discovered. Shaft re-work occurred in 2008, including bentonite utilization.

All reclamation-engineering requirements for a complete application have been addressed in the Phase I Bond Release application. However, the following minor text editing deficiencies should be addressed prior to final approval of Phase I Bond Release of Crandall Canyon:

(R-645-301-553.520) The first sentence of the second paragraph on page 3.7X-7, states that "The as-built reclamation topography is compatible with the approved post-mining land use, and provides adequate drainage and long term stability as required by R645-301-553.522." This compliance reference should be changed to R645-301-553.520, as (R645-301-553.522) does not exist.

(R645-301-551) Section 3.7-5(3)(2), which begins on page 3.7X-5 and ends on page 3.7X-6, should contain language that indicates that the permanent closure measures have been designed to prevent access to the mine workings by people, livestock, fish and wildlife, and machinery and to keep acid or other toxic drainage from entering ground or surface waters, as per R645-301-551, for application completeness.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

APPROXIMATE ORIGINAL CONTOUR RESTORATION

Regulatory Reference: 30 CFR Sec. 784.15, 785.16, 817.102, 817.107, 817.133; R645-301-234, -301-412, -301-413, -301-512, -301-531, -301-533, -301-553, -301-536, -301-542, -301-731, -301-732, -301-733, -301-764.

Analysis:

Steep canyon side slopes and a relatively broad canyon bottom characterize the natural topography of Crandall Canyon. According to R645-301.533.130, reclamation slopes shall not exceed the angel of repose and shall have a minimum long-tem static safety factor of 1.3. Reclamation soil characteristics were used to identify the angle of repose for sandy loam to loamy sand with 5 to 15% clay and 5 to 75% rock, as well as for loose, dry sand. For slopes up to 36 degrees (1.4:1 slope), a critical safety factor of 1.4 would apply at static conditions.

Findings:

The application package contains adequate details, cross sections and area maps pertaining to approximate original contour restoration. However, a site inspection would need to be completed to determine if the reported reclamation topography matches approximate original contours.

BACKFILLING AND GRADING

Regulatory Reference: 30 CFR Sec. 785.15, 817.102, 817.107; R645-301-234, -301-537, -301-552, -301-553, -302-230, -302-231, -302-232, -302-233.

Analysis:

The engineering issues related to reclamation of the walls, roads, shafts, and utilities are discussed in Section 3.7-5(3)(3) of the application. Reclamation slopes are reported to be concaves in cross-section and do not exceed a slope of 2:1 except in very small areas, as per R645-301-553. It is reported that no slopes exceed the maximum safe angle of repose, and a 36-degree slope would have a critical safety factor of 1.4 under static conditions. Additionally, no acid forming or toxic materials were encountered during reclamation

Findings:

The first sentence of the second paragraph on page 3.7X-7, states that "The as-built reclamation topography is compatible with the approved post-mining land use, and provides adequate drainage and long term stability as required by R645-301-553.522." This compliance reference should be changed to R645-301-553.520, as (R645-301-553.522) does not exist.

MINE OPENINGS

Regulatory Reference: 30 CFR Sec. 817.13, 817.14, 817.15; R645-301-513, -301-529, -301-551, -301-631, -301-748, -301-765, -301-748.

Analysis:

As per R645-513.500, R-645-529, and the two existing shafts have been backfilled, or otherwise properly managed consistent with MSHA, 30 CFR 75.1711. Both shaft experiences some settlement following initial backfilling. Initial backfill (obtained excess cut material generated by the Utah Department of Transportation) was used to address settlement. Both shafts were backfilled in excess volumes to accommodate future settlement. A 2-foot thick later of bentonite was placed in the No.2 shaft to minimize the potential for water to rise in the shaft. Monitoring indicated that backfill in the No.2 shaft settled 1.4 feet in the period from September 2008 to August 2009. Settlement is generally most rapid immediately following backfilling, and both shaft were backfilled in excess, the shaft are currently considered stable.

Findings:

Section 3.7-5(3)(2), which begins on page 3.7X-5 and ends on page 3.7X-6, should contain language that indicates that the permanent closure measures have been designed to prevent access to the mine workings by people, livestock, fish and wildlife, and machinery and to keep acid or other toxic drainage from entering ground or surface waters, as per R645-301-551, for application completeness.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

Analysis:

The application package included as built reclamation topography, cross sections, channel profiles, reclamation treatments areas, and watershed maps. All maps are certified adequately.

Findings:

Maps, plans, and cross sections of reclamation operations meet the Coal Mining Rules requirements.

RECOMMENDATIONS:

A site visit is required before approval of Phase I bond release can be granted. Due to weather conditions, the site was inaccessible at the time of this review. The site visit will be conducted in a timely matter as weather conditions permit. All reclamation-engineering requirements for a complete application have been addressed in the Phase I Bond Release application. However, the following minor text-editing deficiencies should be addressed prior to final approval of Phase I Bond Release of Crandall Canyon:

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(R645-301-551) Section 3.7-5(3)(2), which begins on page 3.7X-5 and ends on page 3.7X-6, should contain language that indicates that the "*permanent closure measures have been designed to prevent access to the mine workings by people, livestock, fish and wildlife, and machinery and to keep acid or other toxic drainage from entering ground or surface waters*", as per R645-301-551, for application completeness.