

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

October 31, 2012

TO: Internal File

THRU: Steve Christensen, Lead *SK*

FROM: James Owen, Engineer *JO*

RE: Crandall Phase I Bond Release East Mtn, Utah American Energy, Crandall Canyon Mine, C/015/0032, Task ID #4193

SUMMARY:

On September 14, 2012, the Utah Division of Oil Gas & Mining received an application for an amendment to the Mining & Reclamation Plan (MRP) of the Crandall Canyon Mine. The application seeks approval for Phase I Bond Release of areas on East Mountain. The area has been reclaimed pursuant to R645-301-880.310 and is located in Emery County, Utah. Phase I reclamation began in the fall of 2007. The reclamation included backfilling and grading to AOC, drainage control, and was completed in September of 2011. The area of Phase I bond release contains approximately 9.5 acres.

On August 6, 2007, a seismic event occurred at the Crandall Canyon Mine, trapping miners underground. As part of the emergency efforts to rescue the trapped miners a total of seven boreholes were drilled from the surface to the underground workings below. This required constructing access roads. The drill sites were within the DOGM permit area. The seven drill holes were drilled between August 7 and August 30 in 2007. The drilling project involved constructing access roads on Forest Service land (in a designated road-less area), and continued construction of an additional mile of road across SITLA land.

The access road followed the top of the ridge line of East Mountain and gradually moves down to the face of East mounting using switchbacks. Map #1 provides drill site locations as they relate to the contours. The road crossed back and forth the property boundary between the Forest Service and SITLA. As a result, some of the drill sites are located on Forest Service land, some on SITLA land, and some on both.

On September 5, 2007 a meeting was held involving representatives from DOGM, SITLA, BLM, Forest Service, and Genwal Resources. At that time it was decided that DOGM

would be the lead agency for coordinating the reclamation efforts as required by the various agencies pertaining to their specific areas of responsibility.

During the Phase I bond release inspection conducted on October 10, 2012, it was determined that the drill pads and interconnecting roadwork were restored to approximate original contour and were properly roughened. The operator explained that the reclamation effort included one track hoe pulling material from the out slopes and casting it to another hoe which, in turn cast it to the upper part of the cut slope. The dozer also worked to help spread the material. Stability of the reclaimed pads was achieved by compacting the backfill in 18"-24" lifts using a sheeps-foot mechanical compactor and/or wheel-roll compaction.

The backfilled material contained sufficient moisture to optimize compaction. The backfill material was the original native material which contains a large proportion of boulder sized material which will help promote a high factor of stability (>1.3) to the compacted slopes. After the backfilling and grading operations was complete the site was roughened with pocks similar in size and spacing as those placed in the previously reclaimed pad areas.

A slope failure that occurred in 2011 was also inspected. The slope failure was classified as a circular arc rotational slip. The operator complied with DOGM's requirement to attempt to stabilize the slope through sediment control measures and vegetation establishment efforts. Annual monitoring was requested at various points within the failure as a method of tracking future failures and success of stabilization. Monitoring was taking place during the inspection. Additional excelsior logs were installed on the slide area. The excelsior logs were placed to retain water to help re-establish vegetation for the purpose of long term stability of the slope failure. A total of 29 ten foot excelsior logs were installed in 9 rows approximately 15 feet apart on the contour. The logs were staked in place. Eight small pine trees were transplanted at the top of the slide area to help the long term stabilization. Russian thistle was removed from the disturbed area.

This memo addresses the application's compliance with the engineering (R645-301-500) and bonding (R645-301-800) sections of the Utah Coal Mining Rules. Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules. No deficiencies were identified.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

**BACKFILLING, GRADING, AND APPROXIMATE ORIGINAL
CONTOUR RESTORATION**

Regulatory Reference: 30 CFR Sec. 784.15, 785.15, 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, 301-537, -301-542, 301-552, -301-553, -301-731, -301-732, -301-733, -301-764.

Analysis:

In 2007, Scamp Excavation did as much reclamation as possible in other areas that did not require waiting for the plugging operations to finish. At the top of the mountain, immediately before dropping down the escarpment to the drill sites, two road segments were reclaimed.

Reclamation consisted of pulling material from the sides of the road, which was primarily topsoil, and re-grading the sites to approximate original contour. The areas were roughened and reseeded. During the rescue attempt MSHA had sent off a number of explosive shots. The areas where these shots had been set off had small craters associated with the explosive activities. These areas were reclaimed by regrading and reseeding.

A more substantial reclamation effort involved the SITLA road. The operator decided that a stretch of this road was dangerous for future use (such as continued access to the drill hole reclamation sites) because of obstructed visibility where it topped over the crest. This same stretch was also determined to be unstable since it would hold the large snowdrifts in the winter which would then saturate the un-compacted out slopes of the road in the spring melt. The consensus solution to the potential failure was to realign this stretch to eliminate the hazards and provide a roadway for future use.

Using track hoes, the out slopes were pulled back up into the road cut and approximate original contour was re-established. The area was roughened and reseeded. Work also proceeded on the remainder of the access road, involving both the SITLA and Forest Service sections. This included pulling material from the out slopes and placing it against the bank of the in slopes. In this manner, the out slopes and in slopes were both made less steep and were determined to be stable. Water bars were installed to direct runoff, and Excelsior logs were installed at the outlet sections of the water

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The first pad to be reclaimed was Pad #3 which is the lowermost site. Using two track hoes and a dozer, material was pulled from the out slopes, with the lower hoe casting material to the upper hoe which, in turn cast it to the upper part of the cut slope. The dozer also worked to help spread the material. The site was restored to approximate original contour and was then roughened (pocked) in preparation for applying seed mix.

Reclamation work then progressed up to pad #4. Reclamation followed a pattern similar to pad #3, regrading to approximate original contour, pocking, and reseeding. Reclamation also included the road segment from pad #4. Reclamation then began on pad # 5, which is the uppermost pad, using the same techniques as on the lower pads. The crews then moved to pad # 7, which was an extension of pad #2, and reclaimed it as well. Finally the spur road leading into pad #5 was reclaimed.

All permanently reclaimed areas were reseeded with a final seed mix, and a matting of wood straw was applied. As part of the interim reclamation water bars were also installed along the access road. In 2007, 3.99 acres had been reclaimed, leaving 3.92 acres to be reclaimed in later.

In 2008 a final written approved reclamation plan was approved by DOGM. The approved written reclamation plan was used for the remainder of the work. The remainder of work to be done was essentially a continuation of the work that has already been done, using the techniques that have already been verbally agreed to, and which have meet with approval of all the agencies. The following areas were reclaimed and/or stabilized in 2008:

- Drill pad #2 and its access road
- Drill pad #6 and its access road
- The "Oops" Road
- The remainder of the access road from the ledge to the top of the mountain
- The SITLA road
- The Forest Service road

The primary focus of the 2008 construction season was the full reclallation of the drill pads and interconnecting roadwork. Upon consultation with the respective regulatory agencies, it was agreed that both the Forest Service and SITLA access road segments would not be reclaimed during the 2008 construction season. The road segments remained open to: (1) access the reclaimed drill pad areas in order to evaluate/monitor the success of the reclatnation effort and (2) based on the findings of the evaluation, provide access for machinery that may be required for additional earth work.

The application states that Pads 2 and 6 were reclaimed during the summer of 2008. The out slope from pad #2 was pulled down and used as backfill for pad #6. Some of the out slope

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material below pad #6 was pulled back up to the pad, but most of this out slope material was loaded by backhoes into rock trucks and hauled back up the hill to be used as backfill for both pads #2 and #6. Reclamation of the pads 2 and 6 and the "oops" road areas was done to re-establish approximate original contour. Stability of the reclaimed pads was achieved by compacting the backfill in 18"-24" lifts using a sheeps-foot mechanical compactor and/or wheel-roll compaction

Because the reclamation was done in early summer, the backfilled material contained sufficient moisture to optimize compaction. The backfill material was the original native material which contains a large proportion of boulder sized material which will help promote a high factor of stability (>1.3) to the compacted slopes. After the backfilling and grading operations was complete the site was roughened with pocks similar in size and spacing as those placed in the previously reclaimed pad areas.

In the spring of 2011 a slope failure occurred on SITLA land, just below pad #6. The slide crossed the "oops" road and the access road below. During a DOGM inspection, it was determined that the slope failure observed could be classified as a circular arc rotational slip. The failure appeared to remain partially unrestrained which could lead to additional slope failure along the rupture surface.

A combination of saturation along with the weight of winter snow pack was determined to be the most likely cause of the initial failure and would be the most likely cause of additional failure. The slope could not be stabilized through earthwork, bolting, or other physical ground control methods. The original cut-slope was simply too steep and was not designed to the emergency status during its construction. DOGM's recommendations were to attempt to stabilize the slope through sediment control measures and vegetation establishment efforts. If vegetation can be established the slope may stabilize completely. Annual monitoring was requested at various points within the failure as a method of tracking future failures and success of stabilization. Photos will also be required as a part of monitoring. A GPS waypoint was taken at the head of the slide.

The toe of the slide is adjacent to a seep that emanates up slope, east of the slide. The slide is approximately 50' wide by 250' long. It does not appear that the slide has moved since the initial movement in 2011. In 2011, eighteen excelsior logs were installed in three rows of 6 logs above the head of the slide.

In August and September of 2012, according to DOGM requirements additional excelsior logs were installed on the slide area. The excelsior logs were placed to retain water to help re-establish vegetation for the purpose of long term stability of the slope failure. A total of 29 ten foot excelsior logs were installed in 9 rows approximately 15 feet apart on the contour. The logs were staked in place. Eight small pine trees were transplanted at the top of the slide area to help the long term stabilization. Russian thistle was removed from the disturbed area.

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Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

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:

No reclamation work could be done on the pads and connector roads until the drill holes had been plugged as required by BLM and SITLA. The drilling company was contacted about the plugging work in early September of 2007. On October 4, the drilling company began work but due to weather delays and equipment problems, plugging operations did not actually begin until October 12. Hole plugging work was completed by October 15.

Plugging operations were inspected and verified by designated representatives of DOGM (acting on behalf of SITLA) and BLM. Immediately after the holes were plugged and the drilling company had moved off the site, reclamation of the pads began.

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES

Regulatory Reference: 30 CFR Sec. 701.5, 784.24, 817.150, 817.151; R645-100-200, -301-513, -301-521, -301-527, -301-534, -301-537, -301-732.

Analysis:

The access roads associated with the drill sites which were not to be retained under an approved postmining land use were reclaimed in accordance with the approved reclamation plan as soon as was practicable after they were no longer needed for reclamation operations.

This reclamation included; reshaping cut and fill slopes as necessary to be compatible with the postmining land use and to complement the natural drainage pattern of the surrounding terrain; protecting the natural drainage patterns by installing dikes or cross drains as necessary to

control surface runoff and erosion; and, scarifying or ripping the roadbed, replacing topsoil or substitute material and re-vegetating disturbed surfaces.

This includes the access roads to the drill pads, the "oops" road, the access road from the ledge to the top of the mountain, the SITLA road, and the Forest Service Road.

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

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:

Map #1 and #2 were included with the application to depict the post-mining contours and the road and drill-pad locations. As-built final topography and post mining contour topographic maps are include on plates 1, 2, and 3 of Attachment 13 in the approved MRP.

An inspection of the site through DOGM staff has determined that the area has been returned to approximate original contour and that pre-contour conditions have been met as much as is feasible.

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

BONDING AND INSURANCE REQUIREMENTS

Regulatory Reference: 30 CFR Sec. 800; R645-301-800, et seq.

Analysis:

The Phase I bond release application is for Sureties ISM-2952, ISM-2953, and ISB-2954.

A summary of the bonds and requested relinquishment is as follows:

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| BOND | Amount | Released | Remaining |
|--------------|------------------|------------------|------------------|
| ISM-2952 | \$286,196 | \$171,718 | \$114,478 |
| ISM-2953 | \$ 95,279 | \$ 57,167 | \$ 38,112 |
| ISB-2954 | \$ 25,800 | \$ 15,480 | \$ 10,320 |
| TOTAL | \$407,275 | \$244,365 | \$162,910 |

The amount requested for relinquishment is 60% of the total posted bond. This is in accordance with The Division tech directive # 006, which states that DOGM shall review, revise and approve the recalculated bond amount as necessary in order to determine the amount of bond to be retained and the amount of bond to be released. If it is determined that the current bond amount is inadequate and the remaining costs exceed what is currently held by the Division, the Division may require an increase to the bonding sum rather than a partial reduction of the dollar value of the bond. It may be possible to release partial liability on lands reclaimed without actually reducing the dollar sum. Phase I bond release shall in no case exceed 60% of the bond for the applicable area.

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

RECOMMENDATIONS:

Approval is recommended at this time