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TECHNICAL MEMORANDUM
Utah Coal Regulatory Program

May 16, 2010

TO: Internal File

THRU: James D. Smith, Permit Supervisor, Team Lead
Daron Haddock, Coal Program Manager

FROM: Peter Hess, En Sci III, Engineering / Bonding PHH by SDS

RE: SURFACE DESIGN CHANGES, UtahAmerican Energy, Inc., Horse Canyon Mine / Permit Area "B" (Lila Canyon), C/007/0013, Task ID #3541

SUMMARY:

On April 6, 2010, the Division determined that seven deficiencies existed with the Task ID #3498, Surface Design Changes application.

Five of the identified deficiencies were relative to pillar design / barrier pillar considerations beneath the outcrop. The information needed to evaluate the deficiencies is contained in the approved BLM Resource Recovery and Protection Plan.

The Permittee provided the R2P2 information to the reviewing Division engineer on April 21, 2010.

The Permittee re-submitted a complete response to the Task ID #3498 deficiencies on May 3, 2010. The Division identified this application as Task ID #3541. It was received in the Price office on May 11, 2010.

OPERATION PLAN

SUBSIDENCE CONTROL PLAN

Regulatory Reference: 30 CFR 784.20, 817.121, 817.122; R645-301-521, -301-525, -301-724.

The following deficiency was identified during the Task ID # 3351 review:

1) **R645-301-525.420,** Measures to Prevent Subsidence;

"The Permittee must provide additional information relative to escarpment protection, including which escarpments are to be protected, why each escarpment requires protection and the engineering methods implemented to provide protection in those specific areas".

Analysis:

Subsidence Control Plan

Performance Standards For Subsidence Control

The Permittee's response dated March 2, 2010 is as follows; "the BLM requires escarpment protection and protection from unplanned breakouts. A 200' buffer, for escarpment protection, is shown on Plate 5-5 and identified as first mining only."

As determined elsewhere within the application (Chapter 3, Page 13), the 200-foot wide barrier, where only first mining is to take place is only intended to protect escarpments immediately above the coal seam (i.e., escarpments immediately above the 200 foot width of coal). The 200-foot barrier pillar is also to protect against unplanned holeouts (or breakouts) at the outcrop.

2) **R645-301-525.440, 525.450, 525.454,** the Permittee was asked to clearly describe what is meant by "first mining only" within the 200-foot barrier width.

The Task ID # 3498 application contained the following wording in the MRP, Chapter 5, section **525.453.** "An outcrop barrier of coal will be left to protect the escarpments at the outcrop. As per the R2P2 only first mining will be allowed within 200' of the outcrop. Mains, submains, and ventilation portals will be allowed within the outcrop."

This Division interpreted this text as meaning that the Permittee could develop pillars to the outcrop, with no secondary coal recovery occurring from those pillars.

Revised text received for section **525.453** (Chapter 5, page 45 of the MRP) on April 21, 2010 from Mr. Jay Marshall, prepared as part of the response to the Task ID # 3498 deficiencies, states the following: "An outcrop barrier of coal will be left to protect the escarpments at the outcrop. As per the R2P2 only first mining will be allowed to within 200' of the outcrop except for breakouts. Mains, submains, and ventilation portals will be allowed within the outcrop. The official response was received on May 11, 2010, and it states the same information.

The addition / insertion of the word to now clarifies that the Permittee must leave a minimum width of 200 feet of native material between the extreme right hand entry (when standing underground looking toward the face) and the outcrop. NO entries or coal pillars are to be driven or developed within this 200-foot width. No rib robbing is to occur within this barrier. The 200-foot width of native material may be Sunnyside coal, or it may be burned coal. It should be pointed out that burn coal has no structural integrity and it would not be effective in helping to protect any escarpment. Therefore, escarpment failures are still possible above the outcrop.

Since the entry nearest the outcrop can be no closer than 200 feet to the outcrop, the point of deepest penetration of the development should be no closer than 200 feet to the outcrop. The approved 200 foot minimum width coal barrier has addressed the previously identified deficiency under

3) **R645-301-525.440, 525.450, 525.454.** Description of Monitoring Method for Deepest Penetration

The three previously identified rules were established as the regulatory guidance to establish the minimum thickness of coal to be retained between the points of "first mining only" and the coal outcrop. The Division stated that the minimum thickness to be retained had to be sufficient to prevent break through to the outcrop by crushout.

The Permittee has clarified, by providing the appropriate R2P2 information, that the minimum thickness of the coal barrier to be retained is 200 feet.

4) **R645-301-525.440, 525.450, 525.454,** Pillar Designs within the 200 Foot Barrier; The Permittee has addressed this deficiency. As is noted above, no pillars will be developed within the 200-foot barrier width, unless pillars must be developed between multiple entries to develop breakouts approved by the various government agencies for ventilation enhancement.

Any pillars which are developed by driving two or more entries for a breakout will likely reflect the 80 foot X 100 foot centers shown on Page 4-6 of the approved R2P2, Typical Submain / Typical Main entry layouts, (See Figure 4.3.2).

5) **R645-301-525.440, 525.450, 525.454**; "The Permittee, in consultation with the BLM, must determine which single method will be used to determine barrier pillar width and load bearing capacity for the barrier pillar designs, which will be implemented in the Lila Canyon Mine."

Once again, the approved R2P2 provided the following information, which is felt to be adequate to address the identified deficiency. Page 4-5, section 4.3.2-Longwall Development Mining, paragraph three, states the following; "Main and submain entries will be protected by permanent barrier pillars generally 200-300 feet wide. Exact barrier pillar dimensions will be determined and modified as necessary site-specific mining experience is gained. Under some conditions barrier pillars of 500 feet or greater may be required. The barrier pillars will be sized using geotechnical information derived from the "Geotechnical Testing Study" completed by Dr. Ben Seegmiller, site specific mine experience, and the methods suggested in the Bureau of Mines Circular IC-9427. Mine experience will play a major role in barrier pillar sizing. Generally barrier pillars will be designed for site-specific locations and will increase with increased depth and closeness to known major faults.

The US Bureau of Mines Circular # IC9427, Practical Design Methods for Barrier Pillars discusses nine different methods developed and used by both government regulatory agencies and mining companies over decades of practical experience. Initially, the Lila Canyon application suggested that one or more of these methods would be used to determine barrier pillar widths for the Lila Canyon Mine. The USBM circular elaborates the fact that many of the early methods did not account for coal seam thickness, or the varying compressive strengths of the coal providing the support. Also, some of the barrier design methods were developed from anthracite mines, which have very different geologic structure than do the bituminous mines of both the eastern and western United States. Last of all, overburden depths were not always considered by the empirical formulas developed.

The Permittee has stated that it does not want to be limited to one single method of barrier pillar design. The Division has two concerns:

1) that the design method(s) to be used is or are adequate to support the amount of overburden over the barrier;
2) that the coal resource is effectively recovered without endangering those involved in the extraction process.

For the barrier pillars beneath the outcrop, "only first mining" is to occur. No slabbing or retreat mining will occur with the 200-foot width. The Division recommends that once a barrier pillar width is determined, using the best technology available at the time, that no secondary mining within the dimensions of that barrier be allowed (i.e., slabbing, splitting or fender recovery).

The Permittee has indicated that the method to be used to develop the size of the barrier pillars at Lila Canyon will be ARMPS or the "Analysis of Retreat Mining Pillar Stability". This is a computer modeling software application, which was developed by the National Institute for Occupational Health and Safety.

The ARMPS software will determine if the pillar stability factors will be adequate to protect the escarpments above the outcrop. Factors of 1.5 or more have been shown to adequately support the overburden and prevent subsidence of the escarpment. This experience has been confirmed at the C.W. Mining Bear Canyon Mine.

The Division accepts the ARMPS software engineering method as an acceptable way to design barrier pillars at the Lila Canyon Mine. Adequate design confirmation must be based upon monitoring and documentation of in-mine conditions in the entries adjacent to the barriers.

Findings:

The provided information is adequate to address the deficiencies aired in the review identified as Task ID #3498.

RECOMMENDATION:

The Division should conditionally approve the Surface Design Changes application, pending posting of the additional bond amount required by the review identified as Task ID #3498.

At that time, final approval should be given.

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