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TECHNICAL MEMORANDUM
Utah Coal Regulatory Program

October 25, 2010

TO: Internal File

THRU: Priscilla Burton, Team Lead

FROM: James D. Smith, Environmental Scientist III JDS 27 Oct 2010

RE: IBC, Canyon Fuel Company, Skyline Mine, Skyline Mine, Permit # C007/0005, Task ID # 3615

SUMMARY:

The Division received the application for this IBC to the Skyline Mine permit on September 16, 2010. The IBC, located north of the Winter Quarter Canyon graben, adds approximately 320 acres to the area approved for underground mining activities. In order to maximize coal recovery, the Permittee has determined that the longwall panels must be laid out east-west rather than north-south as presently shown in the MRP. This change requires the addition of the 320-acre IBC

CFC does not currently hold the private lease necessary for the IBC but is actively pursuing it and recognizes that the Division cannot approve this amendment until the lease is obtained and the MRP Right-of-Entry information updated. The Division has accepted this amendment for technical review in the anticipation that the lease will be secured.

The amendment includes modifications to the groundwater, surface water, aquatic wildlife, vegetation, and subsidence monitoring plans. No surface disturbance is planned with this modification.

The planned extraction thickness for all panels is approximately 10 ft. Proposed longwall panels 11L and 12L are overlain by the perennial stream in Woods Canyon. The stream in Woods Canyon flows from west to east and is oriented approximately parallel to the long axis of the panels. Tributaries to Woods Canyon transversely overlie adjacent panels 8L, 9L, 10L, and 13L.

Overburden thins to the east as the surface elevation drops. Without the IBC addition, the east end of panel 11L would be under approximately 600 ft of cover, but the proposed IBC addition would leave only 500 ft under the stream in Woods Canyon. Agapito Associates, Inc.

(AAI) conducted a study (Appendix Volume A-1, Volume 2: Woods Canyon Subsidence Study) indicating that longwall mining can be conducted with 475 ft of overburden.

In Woods Canyon, the Permittee installed nine piezometers (WC-1 through WC-9) along the stream and added spring 36-1 to the monitoring plan in 2008. Data for the piezometers and spring for the 3rd and 4th quarters 2008; 2nd, 3rd, and 4th quarters 2009; and 2nd quarter 2010 are in the Division's database. The Permittee extended surface-water monitoring on the stream into the IBC area in 2010 with surface-monitoring site CS-25; no data for that site are in the database yet, but water-quality data have been collected upstream and downstream of the IBC since 2003 at CS-21 and CS-19.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

GEOLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR 784.22; R645-301-623, -301-724.

Analysis:

AAI used geology from the Woods Canyon and nearby James and Burnout Canyon areas in creating the surface subsidence model for the proposed longwall mining operation. AAI used the information in the USFS subsidence studies of James and Burnout Canyons to calibrate the parameters used to model Woods Canyon surface deformation and subsidence. AAI's report is in Appendix Volume A-1, Volume 2: Woods Canyon Subsidence Study.

AAI's review of selected borehole logs in the Woods Canyon area indicated that the overburden is composed of approximately 90% or more sandstone and siltstone and that claystone and shale are limited; this compares to approximately 75% in James and Burnout Canyons. Copies of the logs are in the Appendix to the AAI report. Parameters for coal, overburden, floor, and gob characteristics came from a previous AAI barrier pillar analysis at the Skyline Mine. Actual cover depths over the modeled area were applied.

AAI concluded that the predicted subsidence index values for longwall mining under Woods Canyon are less than or similar to corresponding calibrated values in Burnout and James Canyons, and as both Burnout and James Canyon streamflows were unaffected, the Woods

Canyon stream is likely to respond in a similar manner. AAI recommended that panel 11L not be extended beyond 475 ft of cover; although the risk of extending to 475 feet of cover will probably entail greater risk to the Woods Canyon drainage, it should provide adequate depth of cover against the disruption of the stream. AAI used this criterion to conclude that all panels in this area could be mined to the eastern limit of the reserve as long as they do not undermine drainages where cover is less than 475 ft. AAI opines that the steep gradient of Woods Canyon will tend to accommodate strains without excessive pool and cascade formation. AAI recommends locating the center of the panels beneath the stream, as much as feasible, to help mitigate the effects of subsidence on the stream.

Findings:

Geologic Resource Information is sufficient to meet the requirements of the Utah Coal Mining Rules.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

Analysis:

Sampling and Analysis

Surface and ground-water monitoring will be done according to Table 2.3.7-1, 2.3.7-2, and 2.3.7-3 (p. 2-44a). Tables 2.3.7-1 and 2.3.7-3 have been updated to include the new monitoring sites; there was no change to the parameters, so Table 2.3.7-2 was not modified..

Baseline Information

EarthFax Engineering Inc. conducted a stream-channel survey in Woods Canyon on September 2, 2010. The purpose of the survey was to map stream channels with perennial flow and create stream profiles in anticipation of future underground mining activities. The survey points are shown on Plate 1. Plate 2 shows the stream profile based on the GPS elevation data and Table 1 summarizes the 2010 data. This survey extends the 2003 – 2004 profile data (also collected by EarthFax) east into the IBC.

The Permittee added surface-monitoring site CS-25 along the stream, spring 36-1, and nine piezometers (WC-1 through WC-9) adjacent to the stream to monitor ground-water conditions in the IBC area. The Permittee also added Subsidence Hydrologic Monitoring Points (NL-series). Drawing 2.3.6-1 shows the locations of surface and ground water monitoring sites. Drawing 2.3.6-2 shows locations for the NL-sites. Fig. 2.3.7-1 (on page 38a) shows the

piezometer locations. Data for the piezometers and spring for the 3rd and 4th quarters 2008; 2nd, 3rd, and 4th quarters 2009; and 2nd quarter 2010 are in the Division's database.

The Permittee added stream-monitoring site CS-25 in 2010 to monitor immediately downstream of the IBC, but data have not yet been collected. The Permittee has collected water-quality data on the stream in Woods Canyon at CS-21 at the upstream edge of the IBC and at CS-19, located approximately two miles downstream of the IBC.

Modeling

AAI created a surface subsidence model based on information from the nearby James and Burnout Canyon areas and applied it to model surface deformation and subsidence at the proposed longwall mining operation in Woods Canyon. AAI used the information in the USFS subsidence studies of James and Burnout Canyons to calibrate the parameters used to model Woods Canyon AAI's report is in Appendix Volume A-1, Volume 2: Woods Canyon Subsidence Study. Parameters for coal, overburden, floor, and gob characteristics came from a previous AAI barrier pillar analysis at the Skyline Mine. Actual cover depth over the modeled area was applied.

Empirical regional surface-water damage criteria were used to account for subsidence processes that occur in the overburden. Potential development of flowpaths between the stream and the mine is dependent on depth of cover and overburden material properties.

AAI concluded that the predicted subsidence index values for longwall mining under Woods Canyon are less than or similar to corresponding calibrated values in Burnout and James Canyon, and as both Burnout and James Canyon streamflows were unaffected, the Woods Canyon stream is likely to respond in a similar manner. AAI recommended that panel 11L not be extended beyond 475 ft of cover; although the risk of extending from 600 to 475 ft of cover will probably entail greater risk to the Woods Canyon drainage, 475 ft should provide adequate depth of cover against the disruption of the stream. AAI used this criterion to conclude that all panels in this area could be mined to the eastern limit of the reserve as long as they do not undermine areas where there is less than 475 ft of cover under a stream. AAI opines that the steep gradient of the stream will tend to accommodate strain due to subsidence without excessive pool and cascade formation. AAI recommends locating the center of the panels beneath the stream, as much as feasible, to help mitigate the effects of subsidence on the stream.

Probable Hydrologic Consequences Determination

The PHC determination has not been updated.

The AAI study predicts up to 6 feet of subsidence, with the formation of pools and cascades along Woods Canyon creek. The Permittee needs to determine the probability of impacts from mining beneath Woods Canyon and the resultant subsidence on the sediment yield of the Woods Canyon drainage, water quality parameters, flooding or streamflow alteration, ground-water and surface-water availability, whether there may be contamination, diminution or interruption of state-appropriated water supply, and any other probable impacts.

As per AAI's recommendation, to the extent feasible, panel layout should minimize impacts to the stream by centering panel 11L beneath the stream in Woods Canyon.

Groundwater Monitoring Plan

The Permittee added spring 36-1 and nine piezometers (WC-1 through WC-9) adjacent to the stream in Woods Canyon to monitor ground-water conditions in the IBC area. Drawing 2.3.6-1 shows the locations of spring 36-1 and Fig. 2.3.7-1 (on page 38a) shows the piezometers locations. Data from the piezometers and 36-1 are in the Division's database.

Surface-Water Monitoring Plan

The Permittee added surface-monitoring site CS-25 along the stream in Woods Canyon in 2008, and also Subsidence Hydrologic Monitoring Points (NL-series). Drawing 2.3.6-1 shows the location of surface-monitoring site CS-25, and the NL-sites are on Drawing 2.3.6-2. The Permittee has not yet provided data from CS-25, but the Permittee has collected water-quality data from CS-21 (upstream of the IBC) and CS-19 (approximately two mikes downstream of the IBC) since 2003 and the data are in the Division's database.

Macroinvertebrate monitoring site locations are shown on Drawing 2.8.1-1.

Findings:

The proposed amendment does not meet the requirements of the Utah Coal Mining Rules. Before the Division can approve this amendment, the Permittee must update the PHC in accordance with:

R645-301-728, The AAI study predicts up to 6 feet of subsidence, with the formation of pools and cascades along Woods Canyon creek. The thinnest cover will be in the IBC area. The Permittee needs to determine the probability of hydrologic impacts from mining beneath Woods Canyon and the resultant subsidence – in particular in IBC - on the sediment yield of the Woods Canyon drainage; water quality parameters; flooding or streamflow alteration; ground-water and surface-water availability; whether there may be contamination, diminution or interruption of state-appropriated water supply; and any other probable impacts.

MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

Analysis:

Monitoring and Sampling Location Maps

The Permittee added spring 36-1 and nine piezometers (WC-1 through WC-9) adjacent to the stream in Woods Canyon to monitor ground-water conditions in the IBC area. Drawing 2.3.6-1 shows the locations of spring 36-1 and Fig. 2.3.7-1 (on page 38a) shows the locations of the piezometers.

The Permittee has added surface-monitoring site CS-25 along the stream in Woods Canyon, at the downstream edge of the IBC, and also Subsidence Hydrologic Monitoring Points (NL-series). Drawing 2.3.6-1 shows the location of surface-monitoring site CS-25 and the NL-sites are on Drawing 2.3.6-2.

Findings:

Maps, Plans, and Cross Sections of Resource Information are sufficient to meet the requirements of the Utah Coal Mining Rules.

OPERATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

Analysis:

Groundwater Monitoring

The Permittee added spring 36-1 and nine piezometers (WC-1 through WC-9) adjacent to the Woods Canyon stream to monitor ground-water conditions in the IBC area.

Drawing 2.3.6-1 shows the locations of spring 36-1 and Fig. 2.3.7-1 (on page 38a) shows the piezometers locations.

Surface Water Monitoring

The Permittee has added surface-monitoring site CS-25 along the Woods Canyon stream, and also Subsidence Hydrologic Monitoring Points (NL-series).

Drawing 2.3.6-1 shows the location of surface-monitoring site CS-25; the NL-sites are on Drawing 2.3.6-2. Macroinvertebrate monitoring site locations are shown on Drawing 2.8.1-1.

Acid- and Toxic-Forming Materials and Underground Development Waste

There will be no surface disturbance in the IBC area.

Water-Quality Standards and Effluent Limitations

There will be no discharges into the Woods Canyon stream.

Diversions: General

There will be no diversions associated with the IBC area.

Stream Buffer Zones

Piezometers have been placed within 100 feet of the Woods Canyon stream (Fig. 2.3.7-1 on page 38a). The Division did not approve this disturbance within the stream buffer zone.

Sediment Control Measures

There will be no surface disturbance in the IBC area. The IBC amendment does not require any change to or addition to information on Sediment Control Measures, Discharge Structures, Ponds, Impoundments, Banks, Dams, or Embankments.

Findings:

The Hydrologic Operation Monitoring plan is sufficient to meet the requirements of the Utah Coal Mining Rules.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Analysis:

Monitoring and Sampling Location Maps

Locations of surface-monitoring site CS-25 and spring 36-1 have been added to Drawing 2.3.6-1. The Permittee has also added Subsidence Hydrologic Monitoring Points (NL-series) along the stream in Woods Canyon, as shown on Drawing 2.3.6-2. Fig. 2.3.7-1 on page 38a shows the locations for piezometers WC-1 through WC-9. Macroinvertebrate monitoring site locations are shown on Drawing 2.8.1-1.

Certification Requirements

The Permittee commits to meet certification requirements when clean copies are submitted at final approval.

Findings:

On condition of submitting certified maps and plans with clean copies for final approval, the Permittee has met the requirements for Maps, Plans, and Cross Sections Of Mining Operations.

RECLAMATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Analysis:

Hydrologic Reclamation Plan

The current MRP commits to monitoring at all water-monitoring points throughout the post-mining period and until reclamation is determined successful by the Division.

Findings:

The Permittee's Hydrologic Reclamation Plan is sufficient to meet the requirements 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:

Reclamation Monitoring and Sampling Location Maps

Drawing 2.3.6-1 shows water-monitoring locations. Fig. 2.3.7-1 (on page 38a) shows the piezometers locations in Woods Canyon. The NL-sites are on Drawing 2.3.6-2. Macroinvertebrate monitoring site locations are shown on Drawing 2.8.1-1.

Certification Requirements

The Permittee commits to meet certification requirements when clean copies are submitted at final approval.

Findings:

Maps, Plans, and Cross Sections of Reclamation Operations are sufficient to meet the requirements of the Utah Coal Mining Rules.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

Regulatory Reference: 30 CFR Sec. 784.14; R645-301-730.

Analysis:

The proposed IBC is within the current CIA. The Division will update information in the CHIA as needed.

Findings:

A new CHIA determination is not required by this action.

RECOMMENDATIONS:

The Division should not approve this amendment until the PHC is updated to include the Woods Canyon IBC.

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