

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 8, 2008

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TO: Internal File

THRU: James D. Smith, Permit Supervisor *DS 09/16/08*

FROM: Steve K. Christensen, Environmental Scientist/Hydrologist *SKC*

RE: Permit Area Expansion- 240 Acres, Canyon Fuel Company, LLC, Dugout Canyon Mine, C/007/0039, Task ID #3018 (Previous Task ID's #2873 and #2958)

SUMMARY:

On October 25, 2007, Canyon Fuel Company (the Permittee) provided the Division of Oil, Gas and Mining (the Division) with an application to expand their current permit area an additional 560 acres. The Division conducted a technical analysis of the application and sent the Permittee a list of deficiencies to be addressed prior to approval (Task ID #2873).

On April 18, 2008, the Division received the Permittee's response to the aforementioned deficiencies. The Division conducted another technical analysis (Task ID #2958) and a deficiency letter was sent to the Permittee on June 20th, 2008. On July 22, 2008, the Permittee provided a response to that analysis.

The proposed acreage to be added to the existing Dugout Mine permit area was changed from the original application. The initial permit expansion proposal of 560 acres was reduced to 240 acres. The 240 acres of additional permit area are located in Federal Coal Lease U-070674-027821. The 320 acres of State Lease ML-50582 (included in the initial application) has been removed from the proposed permit area expansion.

No additional surface disturbance is associated with this permit expansion application. Future surface disturbance associated with methane degasification wells will be addressed in subsequent permitting actions. The following analysis has been assigned a review number of Task ID #2958 for tracking purposes.

The hydrologic information provided in the Permit Area Expansion- 240 Acres submittal (the application) meets the requirements of the State of Utah R645-Coal Mining Rules. The application should be approved at this time.

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TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

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

CLIMATOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.18; R645-301-724.

Analysis:

The application meets the Climatological Resource Information requirements as required by R645-301-724. Climate data is provided in Appendix 4-1 of the approved MRP. The climate data includes a discussion of the climatological factors in the region of the existing permit area as well as the proposed expansion.

Findings:

The application meets the Climatological Resource Information requirements as required by R645-301-724.

GEOLOGIC RESOURCE INFORMATION

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

Analysis:

The application meets the Geologic Resource Information requirements as required by R645-301-724. The application contains updates to the plates depicting the geologic conditions within the proposed expansion area. Plate 6-1, *Geology of Dugout Canyon Mine Permit Area*, depicts the surficial geology within the proposed expansion area. Plate 6-4, *Rock Canyon Seam Overburden Thickness*, depicts the overburden above the Rock Canyon coal seam within the proposed expansion area.

Findings:

The application meets the Geologic Resource Information requirements as required by R645-301-724.

HYDROLOGIC RESOURCE INFORMATION

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

Analysis:

Baseline Information

The application meets the Hydrologic Resource Information requirements as provided for in R6450-301-724.

The initial permit expansion proposal of 560 acres (Task ID #2873, submitted October 25th, 2007) has been reduced to 240 acres. The 240 acres of additional permit area are located in Federal Coal Lease U-070674-027821. The 320 acres of State Lease ML-50582 (included in the initial application) has been removed from the proposed permit area expansion. The reduction in proposed expansion area has changed both the scope of the Division's technical analysis and consequently, the technical information required (Per State of Utah R645-Coal Mining Rules).

The removed 320 acres of State Lease ML-50582 encompassed a portion of the Cow Canyon Drainage located in T13 S, R13 E in Section 17. The previous mining plan had called for long-wall mining operations to proceed directly underneath the headwater region of the Cow Canyon drainage. As a result, several baseline deficiencies had been identified by the Division's previous technical analysis (Task ID #2873). With the removal of the 320-acre tract from the mine plan, the associated deficiencies relative to the Cow Canyon Drainage are no longer a concern at this time. Due to the overburden in the area of the Cow Canyon Drainage (in excess of 2,000 feet) and its location well outside the potential subsidence boundary (See Plate 5-7, Proposed Mine Sequence and Planned Subsidence Boundary), it is unlikely that the proposed mining activity under review would produce impacts to this drainage. Plate 7-1, Hydrologic Monitoring Stations, depicts the monitoring locations for both surface and ground water.

Beginning on page 7-5 of the MRP and continuing in Appendix 7-3, the Permittee discusses the groundwater systems within the permit and adjacent area (including the proposed 240-acre expansion). The discussion is based upon exploration drilling, baseline data and scientific literature. Based upon the information presented in the MRP, discharge of groundwater from the geologic formations overlying the mining areas occurs primarily from localized perched groundwater systems in the vicinity of the Dugout Canyon Mine. Waddell, et al., *Hydrology of the Price river Basin, Utah, With Emphasis on Selected coalfield Areas*, 1986, examined the groundwater systems located in the region of the Dugout Canyon Mine. The aforementioned study concluded that the perched systems in the Dugout Canyon Mine area demonstrated a lack of lateral continuity. Due to the relatively small nature of these perched systems, meaningful potentiometric surface maps are not possible.

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Surface Water

Beginning on page 7-23 of the application, the Permittee discusses the surface water located within the proposed permit expansion. A drainage (hereafter referred to as the unnamed tributary of Cow Canyon) is located within the proposed permit expansion in T 13 S, R 13 E, Section 17. The Permittee established a surface water monitoring point below the confluence of two small drainages in the unnamed tributary of Cow Canyon (Surface Water Monitoring Site 323, See Plate 7-1). Seasonal field data was collected in 2007. Flows ranged from 13 to 20.5 gallons per minute. The pH exhibited a range of 7.8 to 8.4. Conductivity values for the drainage ranged from 591 to 675 with temperature ranging from 11 to 14 degrees centigrade. Appendix 7-2 of the application provides the data obtained from this drainage.

During the baseline collection of the unnamed tributary of Cow Canyon, the Permittee made observations as to the nature of flow of this drainage. It was observed that the surface water in the fork below monitoring site 260 ran intermittently between spring site 260 and spring site 261 (See Plate 7-1). The application states, "This tributary appears to become perennial a short distance above site 261." On page 7-26 of the application, the Permittee commits to conducting further investigations as to the flow characteristics/nature of the unnamed tributary to Cow Canyon.

The Permittee has added site 323 to the operational surface water-monitoring program. No other surface water resources were identified within the proposed permit expansion area.

The Permittee provides the acquired field data from surface water monitoring site 323 in Appendix 7-2, *Groundwater Monitoring Data*. Appendix 7-2 of the approved MRP provides ground water data. The Permittee should amend the application so the surface water data is located in Appendix 7-7, *Surface Water Data*.

Groundwater

On page 7-19 of the application, the Permittee discusses the groundwater resources located within and adjacent to the proposed permit expansion. Two springs (260 and 260A, See Plate 7-1) have been identified within the boundaries of the proposed expansion area that could potentially be impacted by subsidence. Spring 260 has been monitored quarterly since 2000. Spring 260A is not part of the water-monitoring program. However, according to the application on page 8 of Appendix 7-3, both springs 260 and 260A appear to discharge from the same shallow groundwater system (Colton formation) as they are in close proximity to one another and discharge at similar elevations. It is reasonable to assume that mining induced impacts to these two springs would be similar. Attachment 7-1 of Appendix 7-3 provides data obtained from three sampling events of spring 260A. Field parameters were obtained at spring 260A and are tabulated in this attachment. The flow from spring 260A averaged 3.1 gallons per minute from

the three sampling events with an average of pH of 7.94. Average temperature for spring 260A was 7.2

Figure 2, *Probable Recharge Area for Springs 260 and 260A*, of Attachment 1 in Appendix 7-3 provides a figure depicting the likely recharge areas for the springs located within and adjacent to the proposed permit expansion. The Permittee discusses the probable areas of recharge to the springs beginning on page 7-19 of Appendix 7-3. Taking into account the existing geologic, hydro geologic and topographic information, the Permittee discusses the probability that the recharge area to the springs located in the proposed permit expansion is located south-southwest of the area.

The Division of Water Rights has identified two other springs within the proposed permit expansion that are located in the eastern portion of Section 17, T 13 S, R 13 E. The two springs identified by the Division of Water Rights were not located in the original spring and seep survey conducted by the Permittee. On September 3rd, 2008, Division and Dugout Mine representatives met with Mr. Gil Conover. Mr. Conover is the surface landowner of the 240-acre expansion. Mr. Conover located the two springs identified by the Division of Water Rights database. Although, no secondary mining is proposed in the 240-acre expansion, it was agreed that one of the Conover springs (Site 324) would be monitored. The monitoring will be done in order to provide baseline data in the event that long wall operations are ever conducted in the expansion area.

Appendix 7-2, *Groundwater Monitoring Data*, provides a table of the field parameter values obtained during three sampling events in 2007 for springs 321 and 322. Springs 321 and 322 have been slated for operational monitoring by the Permittee.

Attachment 1 of Appendix 7-3 of the application provides additional groundwater baseline information for springs located outside the proposed permit expansion area that are located within the Cow Canyon Drainage located in T 13 S, R 13E, Section 16. Six springs (211, 211A, 213, 214, 300 and 301) were sampled in the late spring and early summer of 2007. Flow values for these springs were minimal (less than 3 gallons per minute).

Attachment 1 of Appendix 7-3 also provides additional baseline groundwater information for four springs (262, 262A, 263 and 263A) located within the watershed of the unnamed tributary to the Cow Canyon Drainage in T 13 S, R 13 E, Section 17. The springs were sampled in late spring early summer as well as in the fall of 2007.

Appendix 7-4, Figure 19 depicts a generalized geologic section of the Dugout permit area. Wells G95.5, G100.6 and G100.4 are located within the 2008 Dugout permit boundary.

A memo from professional geologist Alex Papp (Coalgeo, LLC) to Dugout Mine representative Vickie Miller (Attachment 1, Appendix 7-3) discusses the groundwater and

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geologic conditions located within the permit expansion area. It is the opinion of Mr. Papp that "the groundwater flowing at the springs located in the central part of Section 17, T13S, R13E originate from faults and/or major fractures. The geographical location of the springs, the significant amount of flow, the apparent thin alluvium/colluvium, the small restricted catchment area, and documented faults and/or major fractures within the vicinity leads me to this conclusion."

Baseline Cumulative Impact Area Information

The application meets the Baseline Cumulative Impact Area requirements as outlined in R645-301-725. The additional surface and groundwater monitoring data provided with the application will allow the Division to update the CHIA.

Probable Hydrologic Consequences Determination

The application meets the Probable Hydrologic Consequences Determination requirements as outlined in R645-301-728.

The initial permit expansion proposal of 560 acres (Task ID #2873, submitted October 25th, 2007) has been reduced to 240 acres. The 240 acres of additional permit area are located in Federal Coal Lease U-070674-027821. The 320 acres of State Lease ML-50582 (included in the initial application) has been removed from the proposed permit area expansion. The reduction in proposed expansion area has changed both the scope of the Division's technical analysis and consequently, the technical information required (Per State of Utah R645-Coal Mining Rules).

The removed 320 acres of State Lease ML-50582 encompassed a portion of the Cow Canyon Drainage located in T13 S, R13 E in Section 17. The previous mining plan had called for long-wall mining operations to proceed directly underneath the headwater region of the Cow Canyon drainage. As a result, several PHC deficiencies had been identified by the Division's previous technical analysis (Task ID #2873). With the removal of the 320-acre tract from the mine plan, the associated deficiencies relative to the Cow Canyon Drainage are no longer a concern at this time. Due to the overburden in the area of the Cow Canyon Drainage (in excess of 2,000 feet) and its location well outside the potential subsidence boundary (See Plate 5-7, Proposed Mine Sequence and Planned Subsidence Boundary), it is unlikely that the proposed mining activity under review would produce impacts to this drainage and the springs located within its watershed boundary.

The application provides an addendum to Appendix 7-3 of the approved MRP. Appendix 7-3 is a PHC document (*Probable Hydrologic Consequences of Coal Mining at Alkali Creek and Dugout Canyon Tracts and Recommendations for Surface and Ground-water Monitoring*) prepared by Mayo and Associates in February 1996.

On page 18 of Appendix 7-3, the Permittee discusses the possibility of mining related impacts to the unnamed tributary to Cow Canyon Drainage in T 13 S, R 13 E, Section 17. Plate 5-7 depicts the magnitude of subsidence in the area of the unnamed tributary to Cow Canyon Drainage as less than 1 foot. Overburden thickness in the area of the drainage exceeds 2,000 feet. Due to the minimal projected subsidence and the thick overburden, the potential for subsidence cracks to form at the surface is low. In addition, it is likely that a thick sequence of un-fractured rock strata will persist above long wall-mined areas after subsidence in the area is complete. Assuming a coal seam of 10 feet and a 50:1 upward fracture propagation height to mining height ratio, it's estimated that the fractures overlying longwall-mined areas would extend upward approximately 500 feet. Above this interval, rocks tend to bend rather than fracture. The potential for mining activity to impact the perched aquifer systems that provide baseflow to the springs located in the unnamed Cow Canyon tributary is also considered low. The abundant presence of low-permeability strata in overburden minimizes the potential for downward migration of surface water and/or groundwater into the deeper horizons. As a result, the potential for impacts to baseflow in the unnamed Cow Canyon tributary as a result of mining activities is considered low.

On page 18 of the Update to the Probable Hydrologic Consequences of Coal Mining at the Dugout Mine in Appendix 7-3 (PHC Update), the Permittee discusses the potential for decreasing spring flows in the permit expansion area as a result of coal mining activity. Based on the subsidence impact boundary depicted on Plate 5-7 (based on a calculated 30 degree angle of draw), the potential for impacts to springs 261, 262, 262A, 263 and 263A appears minimal. However, mining activity in the 240-acre expansion area could decrease flows at or alter the discharge for springs 260 and 260A. Based upon Figure 2 of Attachment 1 of Appendix 7-3, the recharge area to these springs is located to the south/southeast and overlies a small portion of one proposed longwall panel. However, impacts to these springs are expected to be minimal and short lived. The recharge area to these springs is more than 2,000 feet above the projected mine workings. The springs appear to discharge from the Colton formation. The Colton formation contains interbedded sandstones, siltstones and shales. If the Colton formation in this area were to be fractured or cracked by subsidence, the composition of the formation would lend itself to heal relatively quickly as the clays expanded.

Based on the previous discussion, the potential for mining related impacts to the two water rights identified on Plate 7-2 are considered low due to the depth of cover (>2000 feet) and the low-permeability rock strata located above the coal seam. However, based upon a field visit with Mr. Gil Conover (surface land owner of the 240-acre lease expansion), the two springs were located. In order to more accurately assess whether mining has produced impacts to these water sources, the Permittee will begin water monitoring on one of them. Due to the close proximity to each other, it was determined that monitoring one of the two springs would suffice.

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Sampling and Analysis

The application meets the Sampling and Analysis requirements as outlined in R645-301-723. On page 7-4 of the approved MRP, the Permittee states "All water samples collected for use in this MRP have been analyzed according to methods in either the 'Standard Methods for the Examination of Water and Wastewater' or 40 CFR parts 136 and 434".

Findings:

The application meets the requirements for Hydrologic Resource Information as required by the State of Utah R-645 Coal Mining Rules.

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:

Subsurface Water Resource Maps

The application meets the Maps, Plans and Cross Sections requirements for Subsurface Water Resource Maps as required by R645-301-722.100. The previous technical analysis by the Division (Task ID #2958) identified a deficiency regarding Figure 7-1. Figure 7-1, *General Hydrostratigraphic Cross Section*, was not found in the preceding application. Figure 7-1 was included the July 2008 submittal by the Permittee.

Findings:

The application meets the requirements for Maps, Plans and Cross Sections of Resource Information as required by R645-301-722, -731.

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, -300-148, -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 and Surface Water Monitoring

The application meets the Ground and Surface Water Monitoring requirements as required in R645-301-731.

The Permittee has added two additional groundwater-monitoring points (springs 321 and 322) as well as a surface water-monitoring site on the unnamed tributary to Cow Canyon (Site 323). The additional groundwater monitoring sites have been added to Table 7-4, *Groundwater Monitoring Program*. The addition of surface water monitoring site 323 has been added to Table 7-5, *Surface Water Monitoring Program*.

Findings:

The application meets the Ground and Surface Water Monitoring requirements as required in R645-301-731.

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

The application meets the Maps, Plans and Cross Sections requirements for Subsurface Water Resource Maps as required by R645-301-722.100, -731.

The previous technical analysis by the Division (Task ID #2958) identified a in the preceding application. Plate 7-1, *Hydrologic Monitoring Stations*, did not depict Spring #322 as being actively monitored. Plate 7-1 has been revised and now depicts Spring #322 as an actively monitored groundwater site.

Findings:

The application meets the Monitoring and Sampling Location Maps requirement as required in R645-301-731.

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RECOMMENDATIONS:

The application should be approved at this time

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