

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

May 21, 2007

TO: Internal File

THRU: Pamela Grubaugh-Littig, Permit Supervisor 

FROM: SKC Steve Christensen Environmental Scientist II

RE: Full Extraction Pillar Splitting - 14th West Panel, Consolidation Coal Company, Emery Deep Mine, Task ID #2807

SUMMARY:

On April 20th, 2007 the Division of Oil, Gas and Mining (the Division) received an application from CONSOL Energy Company (the Permittee) outlining the full extraction of the 14th west panel at the Emery Deep Mine. The application applies only to the 14th west panel. On April 11th, 2007, the Division provided conditional approval for full extraction mining within the 14th west panel. Per the conditions of that approval, the Permittee has subsequently provided the Division with an application containing additional information relative to full extraction mining (planned subsidence) within the 14th west panel. Upon subsequent review of the April 20th application, Division staff identified outstanding issues/deficiencies that needed to be addressed prior to Division approval. On May 18th, the Permittee provided the Division with a redline strikeout copy of the affected pages and portions of the MRP. The 14th west panel is located in T22S R63 NE1/4 S29. An ephemeral drainage to Quitcupah Creek is contained within the area of the 14th west panel.

The following is a hydrologic technical analysis as it relates to the State of Utah R645-Coal Mining Rules.

The proposed full extraction of the 14th west panel has addressed the hydrologic regulations as outlined in the aforementioned rules and should be adopted upon the following condition:

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- Upon approval of the 160 acre IBC on April 09, 2007 (Division Task ID# 2761-1st North Federal Boundary Addition), the Permittee agreed to provide the Division a revision/update to the hydrologic analyses within the MRP by July 2nd, 2007. As the updated information is unavailable at the time of this permitting action, the Division reserves the right to revisit potential hydrological consequences and/or mitigation measures upon review of the updated hydrologic information.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

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

HYDROLOGIC RESOURCE INFORMATION

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

Analysis:

Modeling

The application meets the Environmental Resource Information requirements for Modeling as provided in R645-301-726. Per conversations with John Gefferth, Environmental Engineer with Consolidation Coal Company, a MODFLO model is currently being developed. On page 168 of the submittal, the Permittee commits to providing the Division with the MODFLO modeling results and calculations when they are completed.

Probable Hydrologic Consequences Determination

The application meets the Environmental Resource Information requirements for Probable Hydrologic Consequences Determination (PHC) as provided in R645-301-728.

Beginning in Chapter VI on page 161, the Permittee discusses the probable hydrologic consequences of full extraction mining. The Permittee states, "with the exception of moderate sodium concentrations, analytical data obtained from the local rock and mine-water discharges indicate that no significant potential exists for the contamination of surface and ground water in the permit and adjacent areas by acid- or toxic-forming materials.

Increases in sediment yield from disturbed areas will be minimal as no surface disturbance is planned with the full extraction of the 14th west panel.

Water removed from the mine will be discharged to Quitchupah Creek, increasing the flow of this receiving stream. The PHC discusses that the Ferron Sandstone aquifer does provide base flow to Christiansen Wash and Quitchupah Creek within the permit area and adjacent areas. It is assumed that there will be a local decrease to base flow for these drainages as a result of full extraction mining, however; due to several factors that affect the flow of these drainages (such as direct irrigation return flow of water originating in Muddy Creek, discharge from the Emery Mine and overland flow from precipitation runoff), the magnitude of these impacts is difficult to quantify. The impacts will likely be minimal as a result of mining the 14th and 15th west panel. Due to the cone of depression induced in the Upper Ferron Sandstone aquifer by previous mining activity, in all likelihood, the sandstone unit has already been partially dewatered.

The PHC provides a thorough discussion of the hydrogeologic setting. The Permittee discusses the Ferron Sandstone layers in detail including discussion as to the recharge and discharge areas of the geologic unit.

In addition, the revised PHC provides a thorough discussion as to the mine water discharge calculations that were performed in an effort to estimate future mine water discharge rates, taking into account full extraction mining. Two methods were utilized in an attempt to provide this estimate: the Freeze and Cherry equation and the Hantush equation. The Freeze and Cherry equation assumes that the mine acts as an infinitely long tunnel in a homogenous, isotropic porous medium. The Hantush equation assumes that the aquifer is homogenous, isotropic, pumped at a constant rate and is applied to large underground openings. The equations were utilized in an effort to provide estimates of the vertical mine-water inflow. By utilizing measured mine water discharge rates (See Figure VI-20A. Average Mine Water Discharge by Year), and assuming that water discharged from the mine during the shutdown period between 1991 and 2001 was equal to the amount of predominantly horizontal inflow to the mine, the Permittee estimated a value of 0.40 cfs for in-mine water usage. This value was calculated by taking the difference between average mine water discharges during the shutdown period (1991-2001) and the period following where mining resumed with two continuous miners (2002-2005). The Hantush equation estimates produced a much better correlation with measured mine-water discharge rates (See Table VI-23A). Calibrating the Hantush equation with measured discharge rates derived hydraulic conductivity rates for the aquifer. Based on the Hantush equation, and accounting for mine-water inflow and usage as discussed above, the Permittee has predicted mine-water discharge rates through the period of the current mine plan (2013). The results are summarized in Table VI-23B with an average predicted discharge rate of 1.50 cfs. The Division finds that these calculations and inherent assumptions are reasonable in predicting mine water discharge rates.

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Findings:

The information provided meets the hydrology requirements for Hydrologic Resource Information as provided in the R645-State of Utah 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 Environmental Resource Information requirements for Subsurface Water Resource maps as provided in R645-301-722.100. Plate VI-4 depicts the potentiometric surface of the Upper Ferron Aquifer. Plate VI-5 depicts the potentiometric surface of the Lower Ferron Aquifer. Plate VI-8 depicts the cumulative drawdown of the Upper Ferron Aquifer from 1979 to 1995. Figure 1 of Appendix V-4 depicts the pre-subsidence survey information in the area of the 14th and 15th west panels. No groundwater wells are located within the area of the panels.

Surface Water Resource Maps

The application meets the Environmental Resource Information requirements for Surface Water Resource maps as provided in R645-301-722.200. Plate VI-1, Location Map Surface Water Stations, depicts the surface water features within the approved permit area as well as in the area of the 14th west panel. Plate VI-2/VI-2A, Geology of the General Mine Area, depicts the results of the spring and seep survey. The locations of the springs within and adjacent to the permit area are depicted as well as the sites that have been slated for quarterly monitoring. Plate VI-3, Ground Water Monitoring Well and Surface Water Monitoring Site Location Map, provides the locations for the monitoring well and surface water monitoring points within and adjacent to the permit area (including the 14th and 15th west panels). Plate V-5, Subsidence Monitoring Points and Buffer Zones, depicts the buffer zones that will be established on perennial surface water features within the permit area. As required by the MRP on page 37 of Chapter V, the Permittee has provided an update to the pre-subsidence survey originally produced in 1980 by Valley Engineering. The updated pre-subsidence survey (hereafter referred to as the "report"), Pre-Subsidence Survey Prior To Full Extraction At the 14th and 15th West Panels April 2007, was submitted as Appendix V-4 of Chapter V. EarthFax Engineering, Midvale Utah, produced the report. It was noted within the report that the newly updated pre-subsidence survey supercedes the original 1980 Valley Engineering report.

Figure 1 of Appendix V-4 depicts the 14th and 15th west panels within the Emery Mine permit area. Several ephemeral and intermittent drainages are located within the 14th and 15th west panel orientation. In addition, a buried 8" water line is located directly adjacent to a road that has been designated as "light duty, hard or improved surface". The water line is connected to the Town of Emery's water tower. The water is utilized at the mine-site for culinary purposes. Number 30 as depicted on Figure 1 corresponds to a former pond embankment. In the 1980 Valley Engineering report, site number 30 was identified as a functioning pond utilized for irrigation diversion purposes. The embankment is no longer functioning. According to the report, the center portion of the embankment has been eroded away. A photo of the former embankment is provided within the report.

The Permittee is required by the approved MRP to establish the gradients of all irrigation canals and ditches prior to full extraction. Surveying the ditches and irrigation network will provide the data necessary to determine whether mining related impacts due to subsidence has impacted these structures. Per this permitting action, the Permittee surveyed the ditches and irrigation network with and adjacent to the 14th and 15th west panels. The ditches are labeled with capital letters on Figure 1 (ditches A thru E). The corresponding elevation data is provided in Table 1.

Findings:

The information provided meets the hydrology requirements for Hydrologic Resource Information as provided in the R645-State of Utah Coal Mining Rules.

OPERATION PLAN

SUBSIDENCE CONTROL PLAN

Regulatory Reference: 30 CFR 784.20, 817.121, 817.122; R645-301-521, -301-525, -301-731.

Analysis:

Subsidence Control Plan

The application meets the Operational Plan requirements for Subsidence Control Plan as provided in R645-301-525.120, -525.480

Section V.B of the MRP discusses subsidence monitoring. Page 36 of the MRP outlines the steps and elements of the proposed subsidence-monitoring plan. The plan calls for the establishment of a series of reference points to be established outside the theoretical angle of draw. Item 1A on page 36 calls for a mine representative to inspect monthly the areas designated as "full extraction" on Plate V-5. The monthly inspections will continue until the survey

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monitoring points below indicate that there is no subsidence occurring. A record of the monthly inspections will be produced and forwarded to the Division. A copy of the inspection will also be kept at the mine office.

In addition, the Permittee has committed to establish pre-mining elevations and gradients of any irrigation ditches and pond embankments within the angle of draw. The Permittee will also monitor these areas by visual inspection and post-subsidence ground survey to establish the effects of subsidence. The Permittee has committed to providing the Division with a quarterly subsidence mitigation report that describes the surface mitigation projects and their status broke down by surface landowner. The Permittee updated their existing pre-subsidence survey. The survey identifies structures (e.g. buildings, corrals, roads), fences, utilities (e.g. power, telephone, gas, water lines and water wells) as well as surface drainages (e.g. natural channels, irrigation ditches).

Subsidence Mitigation

The application meets the Operational Plan requirements for Subsidence Mitigation as outlined in R645-301-525.480 relative to hydrology. Subsidence mitigation efforts are discussed on pages 39-42 of Chapter V of the approved MRP. Pages 41 and 42 of the approved MRP generally discuss timetables and how the Permittee will work with landowners and the Division regarding mitigation efforts. On page 39 of Chapter V of the approved MRP, the Permittee discusses the mitigation process relative to subsidence damage to structures and State appropriated water supplies. The Permittee commits to "restore, rehabilitate or remove and replace, to the extent technologically and economically feasible, each materially damaged structure, feature or value".

Page 41 in Chapter V of the MRP discusses subsidence mitigation. The Permittee states, "If subsidence occurs which prevents flow through a ditch that is used each summer, then it will be necessary to repair the ditch as soon as practical even though future subsidence may necessitate further work". In addition, the mine has been designed to preclude subsidence in areas occupied by perennial streams. The Permittee has produced a plan to prevent subsidence from affecting Quitchupah Creek, Christiansen Wash and the alluvial valley floor area on the west side of the permit area by establishing buffer zones in these areas. Plate V-5, Subsidence Monitoring Points and Buffer Zones, depicts a stream buffer zone extending the full length of Christiansen Wash in the areas where full extraction mining will take place. Additionally, a buffer zone has been established in the alluvial valley floor area around Quitchupah Creek. The overburden depth and the angle of draw were used to determine the buffer zone dimensions. The buffer zone for Quitchupah Creek and Christiansen Wash includes an additional standoff distance of 100 ft. on either side.

The Permittee provides a commitment to “repair or replace any adversely affected State appropriated water supplies that are contaminated, diminished or interrupted” as required by R645-301-731.530 on page 41 of Chapter V of the MRP.

The Permittee provides further clarification on subsidence mitigation on page 39 of the MRP. The Permittee commits to “mitigate the damage in accordance with R645-301-525.500” and that “the mitigation process will be performed in accordance with R645-301-731.530, R645-301-525.520 and R645-301-525.530”. R645-301-731.530 calls for the prompt replacement of any state appropriated water supply that is contaminated, diminished or interrupted by underground coal mining and reclamation activities. R645-301-525.520 and R645-301-525.530 deal with the mitigation of any structures that are impacted by mining activity

Findings:

The information provided meets the hydrology requirements for Subsidence Control Plan and Mitigation as provided in the R645-State of Utah Coal Mining Rules.

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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:

General

The application meets the Operational Plan requirements for General Hydrologic information as provided in R645-301-731.

Chapter VI of the approved MRP discusses the hydrologic resources within the 14th and 15th west panel areas; including ground and surface water information, water uses, water rights as well as the probable hydrologic consequences of full extraction mining within the permit area.

The coal to be mined is located within the upper portion of the Ferron Sandstone. The Permittee discusses the recharge and discharge areas of the Upper Ferron Sandstone layer and indicates that the dewatering of the Emery Mine represents the largest anthropogenic discharge of groundwater from this geologic unit.

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Groundwater Monitoring

The application meets the Operational Plan requirements for Groundwater monitoring as provided in R645-301-731.210. The Permittee does not propose any additional ground water monitoring within the 14th and 15th west area. Plate VI-3 of the approved MRP depicts the ground water monitoring wells within the area immediately adjacent to the 14th and 15th west panels. The current monitoring of ground water wells in the vicinity of the 14th and 15th west panels should provide sufficient data to identify mining related impacts.

Surface Water Monitoring

The application meets the Operational Plan requirements for Surface Water monitoring as provided in R645-301-731.220. The Permittee does not propose any additional surface water monitoring within the 14th and 15th west panels. The current surface water-monitoring program is sufficient to identify potential mining related impacts to surface hydrology.

State Appropriated Water Rights

The application meets the Operational Plan requirements for State Appropriated water supply as provided in R645-301-731.530. In Chapter VI, 1 of 2, the Permittee provides a comprehensive list of water right information within the permit area.

Stream Buffer Zones

The application meets the Operational Plan requirements for Stream Buffer Zones as required in R645-301-600. The Permittee has produced a plan to mitigate the effects of subsidence on Quitchupah Creek, Christiansen Wash and the alluvial valley floor area on the west side of the permit area by establishing buffer zones in these areas. Plate V-5, Subsidence Monitoring Points and Buffer Zones, depicts a stream buffer zone extending the full length of Christiansen Wash in the areas where full extraction mining will take place. Additionally, a buffer zone has been established in the alluvial valley floor area around Quitchupah Creek. The overburden depth and the angle of draw were used to determine the buffer zone dimensions. The buffer zone for Quitchupah Creek and Christiansen Wash includes an additional standoff distance of 100 ft. on either side.

Water-Quality Standards And Effluent Limitations

The application meets the Operational Plan requirements for Water Quality Standards and Effluent Limitations as provided for in R645-301-722.2. The Permittee operates under a UPDES discharge permit issued by the Utah Division of Water Quality and controls discharges from the mine to be consistent with that permit.

Acid- and Toxic-Forming Materials and Underground Development Waste

The application meets the Operational Plan requirements for Acid- and Toxic- Forming Materials and Underground Development Waste as provided in R645-301-731.300. The Permittee discusses the potential for acid- or toxic-forming materials in the revised PHC document on page 161.

Information concerning acid-and toxic-forming materials in rock at the Emery Mine is presented in Sections V.A.4 through V.A.6 of the MRP. The pH of roof and floor materials ranges from 5.0 to 9.1, with the acid-base potential indicating a net base potential. The alkaline nature of the system is further indicated by the fact that the pH of ground water in the area is typically in the range of 7.0 to 9.5 (see Section V.A.2.7).

Findings:

The information provided meets the hydrology requirements for Hydrologic Information as provided in the R645-State of Utah Coal Mining Rules.

RECLAMATION PLAN

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

Analysis:

The application meets the Reclamation Plan requirements for General Requirements as provided in R645-301-760. The proposed full extraction of the 14th and 15th west panels does not propose any new surface disturbances as a result of mining. As such, no additional land reclamation will be required.

Findings:

The information provided meets the hydrology requirements for Reclamation Plan as provided in the R645-State of Utah Coal Mining Rules.

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CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

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

Analysis:

The application meets the Reclamation Plan requirements for General Hydrologic information as provided in R645-301-731. Page 10 of the Chapter XIII submittal discusses the cumulative hydrologic impact assessment. The proposed IBC area lies within the existing cumulative hydrologic impact assessment area associated with the Emery mine.

Findings:

The information provided meets the hydrology requirements for Cumulative Hydrologic Impact Assessment as provided in the R645-State of Utah Coal Mining Rules.

RECOMMENDATIONS:

Per the condition cited in the summary on page 1, the submittal should be approved at this time.

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