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TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

February 29, 2012

TO: Internal File

THRU: April Abate, Environmental Scientist / Reclamation Geologist / Team Lead *(AAA)*
Steve Christensen, Environmental Scientist III, Task Manager *SKC* *2-29-2012*

FROM: Pete Hess, Environmental Scientist III / Engineering Review *PHA by SHS*

RE: ALLUVIAL GROUNDWATER MANAGEMENT PLAN, Alton Coal Development, LLC, Coal Hollow Mine, C/025/0005, Task ID 3998

SUMMARY:

The Coal Hollow Mine located near Alton, Kane County, Utah is the only operational surface mine in the State of Utah. The Mine recovers coal from the Smirl seam, which ranges in thickness from seven to 18 feet. A massive tropic shale overlies the coal seam, with a layer of alluvium lying on the surface to depths of 50 feet within the current permit area.

The overburden removal and coal recovery processes have encountered ground water inflows. The Permittee has submitted Task ID#3998, which is a proposed plan to control ground water inflows into the mine pits. The discharge of this water into surface waters or other flow paths will require compliance with UPDES discharge parameters. This review will address the adequacy of the Permittee's proposed plan.

TECHNICAL ANALYSIS:

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:

DIVERSIONS

The Permittee is proposing to capture and divert subsurface alluvial ground water flow by constructing open trenches at various locations throughout the property. Trench locations will be established by observing ground water inflows into the mining pits. According to the submitted plan, these trenches (temporary ditches) "will meet the minimum design criteria of the permanent diversion ditch 4". The location of the ditch 4 design criteria is not mentioned in the application. Several deficiencies have been identified. In accordance with the requirements of

R645-301-121.200; "The permit application will be clear and concise". The permit applicant must

- 1) include the minimum design criteria used in constructing the temporary diversion ditch 4 in the application;
- 2) **R645-301-742.313**; The Permittee must amend the application to Include a time frame and commitment for backfilling and reclaiming the temporary diversions;
- 3) **R645-301-742.311**; The Permittee must amend the application to contain a commitment to field identify the hazard created by the constructed temporary diversion ditches.

At this time the Division has no specific design characteristics, such as width, or depth, with the exception of a ditch gradient of 2%, as discussed. Figure 1 shows that the interception ditches will be cut to the depth required to intercept the surface of the tropic shale. The maximum depth of the trenches, as determined during the field visit of 2/22-23/2012 is 20 feet. This is the maximum digging depth of the onsite track hoe.

There is no mention of the volume of alluvial ground water flowing into the coal recovery pits, so it is impossible to develop a water collection system design adequate to accommodate the mining.

An alluvial deposit is spread over very nearly the entire coal recovery zone (See Drawing 6-9b- Location Map and Legend) with the exception of the Tropic Shale Ridge which divides the NE area of the permit (Sections 20 and 29). The alluvium varies in depth from 5 feet below the ground surface to up to 50 feet in depth, (See Volume 7, Coal Hollow MRP, **APPENDIX 7-1, Petersen Hydrologic, LLC Report**, Page 22, paragraph three). The submitted plan states the following; "it should be noted that as the mining progresses, it will be necessary to periodically relocate, enlarge, or construct additional intercept ditches to maximize..." The current submittal depicts five temporary diversions all of which are shown as located in the area of the excess spoil pile (See Drawing 5-3, Facilities and Structures).

The submitted plan (See Figure 1) shows a "typical" alluvial ground water intercept trench. The bottom of the trench is directly on top of the impermeable tropic shale. Figure 1 also depicts a "surface water excavation berm" on each side of the collection ditch to divert surface flows away from the interception diversion.

Although this review is not being performed by a professional hydro-geologist, it appears that Figure 1 shows the ground water moving through the entire depth of the alluvium. This reviewer believes that it is likely that the ground water flows through the lower 1/3 of the alluvial depth diminishing to zero where it breaks the surface. Therefore, in order to effectively collect all the alluvial flow and keep the mining pits as dry as possible, every length of interception ditch would have to be cut to the surface of the tropic shale. This is not possible with the current ditch design or available machinery. Based on the temporary diversion ditches depicted on Drawing 5-3, Facilities and Structures Layout, construction of the temporary diversion ditches will involve moving a lot of earth material.

bottom of the alluvium can reach a 50 foot depth in certain areas of the coal recovery area. In order to develop a 50 foot deep trench, the width of the ditch would have to be increased to at least double the digging machine width and the cut banks would have to be laid back in order to provide stability and control them.

The submitted plan discusses piping the intercepted ground water volumes from the down gradient end of the collection ditch to a pipeline discharging to a "sump" (this will be referred to as a mine water pond). The volumes will be pumped with AC power being provided by portable generators.

SEDIMENT CONTROL MEASURES

The Task ID # 3998 application contains Figure 3, De-watering Sump Details. According to Figure 3, the discharged water volume from the "sump" to Robinson Creek will be pumped (See note, Figure 3, Plan View, De-watering Sump) at a discharge rate of 40 GPM (See last page of Alluvial Groundwater Pumping Protocol). The depicted outfall 005 is shown on Drawing 5-3 as being at least 130 feet from the discharge pump location.

Figure 3, De-watering Sump depicts a Stage-Storage Curve and a Storage Volume Computation for the proposed mine water pond. This information is not legible. The detail

drawing states that the required storage for a 10 year 24 hour event is 8,827 gallons. The Division is not clear as to why the runoff/treatment volume for a 10 year 24 hour event was used in calculating what treatment volume was necessary to treat a ground water inflow rate. There is no mention of how it was determined that adequate retention of the mine in-flow would be achieved. There is no maintenance plan submitted for cleanout of the sump; a sediment marker which would notify the Permittee when the sediment level reached the 60% and 100% cleanout elevations should be shown on the detail drawing.

submitted proposal contains an amended UPDES permit, which approves a new outfall location, 005, to Robinson Creek.

The application does not contain a hydrologic design which will eliminate erosion of Robinson Creek at the discharge point. This is a deficiency. In accordance with the requirements of

R645-301-742.423.2; Prevention of Erosion at Pipe / Culvert Inlets / Outlets, the Permittee must submit an approvable design to minimize the erosive effect of discharged water at UPDES outfall 005, based on the anticipated 40 GPM discharge rate, with the Task ID # 3998 response. A pump setup does not meet the requirements established under R645-301-731.121 to provide treatment for ground (mine) water discharges, as this method does not prevent, to the extent possible, using the best technology currently available, additional contributions of suspended solids to streamflow outside the permit area and otherwise prevent water pollution. The "pumping protocol" states that water discharges will be stopped "when the water elevation drops below approximately five feet of depth so as to minimize the potential for disturbing sediments on the floor of the sump during pumping" (See Page 17, **Alluvial Groundwater Pumping Protocol**, bullet statement #6).

The submitted design is inadequate in that it does not provide a means to sample the pond effluent (a decant pipe) to determine that the water volume within the pond has had adequate time to settle the suspended solids. When this is confirmed by Lab analysis, the treated volume can be discharged in accordance with the approved UPDES permit. Water volumes to be discharged must meet all effluent parameters prior to discharge (See page 17, paragraph A, Monitoring, Recording and Reporting Requirements of UPDES permit UTG040027 which is included in this application).

The Permittee must amend the pond design in the application to provide a means to sample the effluent prior to discharge. **The Permittee must confirm that the collected sample meets all effluent parameters required by the currently approved UPDES permit.** The water analyses must be performed by a State certified lab prior to discharge into the receiving waters.

The plan is deficient. In accordance with the requirements of

R645-301-751, Water Quality Standards and Effluent Limitations... and

R645-301-742.112, Discharges Will Meet Effluent Limits...

The Permittee will submit an adequate design with supporting storage volume / retention data for the proposed mine water treatment pond which clearly demonstrates

- 1) **R645-301-733.221**...That the capacity of the pond will provide adequate retention time to remove suspended solids below the established UPDES parameter level;
- 2) **R645-301-751**...That the effluent can be sampled for analytical purposes prior to discharge;
- 3) **R645-301-742.112**...That compliant effluent in the pond can be discharged to Robinson Creek through permanent spillways designed for the required discharge capacity.

DISCHARGE STRUCTURES

The discharging of treated water from an impoundment by a pump set-up has another draw-back; a pump requires either electrical or mechanical motivation to operate the pump. Power outages, winter temperatures or other problems can result in the pump being off-line for a variety of reasons. A vertical discharge / overflow pipe is the proven method of discharging water from an impoundment. The addition of an oil skimmer also removes that form of contamination.

There is no discussion of what the Permittee expects the ground water inflows to be to the collection ditches; the Division does not understand how a ground water handling system can be designed without knowing this critical value.

The purpose of the sump (mine water pond) is to allow settling of suspended solids to the point that the UPDES parameter for TSS can be met prior to discharge of the mine water to Robinson Creek via the new outfall, UPDES 005. A copy of the current UPDES permit for the Coal Hollow Mine (dated September 26, 2011) contains a description of the new outfall as follows; "up-gradient alluvial groundwater discharged from a collection sump to Lower Robinson Creek, Latitude 37 degrees 24 minutes 5.04N, and Longitude 112 degrees, 27 minutes 20.91 W". Therefore, a new UPDES outfall has been permitted for this point source discharge.

The application also states that when mining occurs in other portions of the permit area, discharge to the Sink Valley Wash may occur (through an approved UPDES outfall). This will require an additional permitting action.

It is imperative that the control of the alluvial ground water flows into the mining area be accomplished, not only to help in the coal recovery, but to stabilize the backfill and the reclamation of the mine pits. The alluvial flows should be diverted around the mining area.

Page 68 of the Master Technical Analysis for the Coal Hollow Mine states the following; "the Applicant (ACD) commits to using techniques such as bentonite or clay filled cut-off walls to minimize in-flows".

Page 69....."keeping water out of the pits is a priority of mine operation."

Page 70, Overburden Removal in pits 13, 14, and 15...**The Applicant states that excavation of the alluvial sediments (on the eastern edge of the permit boundary) will proceed incrementally with caution. If coarse, water bearing alluvial sediments are encountered, the equipment operators will stop overburden removal and cover the exposed gravels with available impermeable alluvial material (Tropic shale) to, if possible, halt ground water inflow**". This commitment is unacceptable, as the Division does not understand how the cycling of heavy equipment performing the removal of overburden material can be performed "with caution."

The Division would like the Permittee to define what is meant by "impermeable alluvial material". The Permittee must explain where the source for this material is located, and how it will be transported to the location for placement to stop the ground water inflow.

Page 70; "A hydrogeologist will be called to the site to assess the conditions;" Section 728.333, page 7-28.

The permit application contains several commitments to describe how alluvial ground flows would be handled in the event water emanating from the mine pit highwalls is encountered. The submitted application is an attempt to address minimal inflows which will only increase as the mining progresses to the east and south; therefore **it is inadequate**.

CASING AND SEALING OF WELLS

The approved mining and reclamation plan discusses the requirements necessary when reclaiming a well, whether it be a water well, or a ground water monitoring well. There are no new wells proposed as part of the Task ID # 3998 submittal. The Division will require that, should new wells be required by the alluvial ground water management plan mentioned below, that any such wells will be plugged and reclaimed in accordance with **R645-301-765, Permanent Casing and Sealing of Wells**.

Findings:

The following deficiencies have been identified in Task ID # 3998, **Alluvial Groundwater Management Plan**;

- 1) **R645-301-733.221**...That the capacity of the pond will provide adequate retention time to remove suspended solids below the established UPDES parameter level
- 2) **R645-301-751**...That the effluent can be adequately sampled for analytical purposes;
- 3) **R645-301-742.112**...That compliant effluent in the pond can be discharged to Robinson Creek through permanent spillways designed for the required discharge capacity.

- 4) **R645-301-121.200**; “The permit application will be clear and concise”. The permit applicant must
- a. include the minimum design criteria used in constructing the temporary diversion ditch 4 in the application;
 - b. **R645-301-742.313**; The Permittee must amend the application to Include a time frame and commitment for backfilling and reclaiming the temporary diversions;
 - c. **R645-301-742.311**; The Permittee must amend the application to contain a commitment to field identify the hazard created by the constructed temporary diversion ditches.
 - d. **R645-301-742.423.2; Prevention of Erosion at Pipe / Culvert Inlets / Outlets**, the Permittee must submit an approvable design to minimize the erosive effect of discharged water at UPDES outfall 005, based on the anticipated 40 GPM discharge rate, with the Task ID # 3998 response.

Conclusion and Recommendation

This reviewer does not feel that the construction of ground water interception ditches is an acceptable way to handle the inflow volume now being received. The water collection and discharge system proposed by the Permittee is inadequate.