

# TECHNICAL MEMORANDUM

## Utah Coal Regulatory Program

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October 27, 2011

TO: Internal File

THRU: Daron Haddock, Coal Program Manager 

FROM: April A. Abate, Environmental Scientist III 

RE: Drainage Control Adjustments, Alton Coal Development, Coal Hollow Mine, C025/0005, Project #3935

### SUMMARY:

On September 30, 2011, Alton Coal Development (ACD), the Permittee submitted an amendment to address management of the alluvial groundwater upgradient of the mine pits. The management of groundwater during the winter and wetter weather months has been problematic at this site. This plan addresses a way to divert alluvial groundwater away from the mine pits and ultimately discharge the water to Lower Robinson Creek (LRC), an ephemeral channel that drains to Kanab Creek. This will minimize the volume of groundwater needing to be pumped from the mine pits into the sediment ponds.

In addition to the alluvial groundwater management plan, the submittal contains language referring to modifying the groundwater operational water monitoring parameters to include acidity for groundwater monitoring wells Y-38 and Y-61. This will address a concern the Division had regarding acidity being produced in groundwater monitoring wells screened in the coal seam. The Permittee has already applied for and received approval for a new discharge outfall location. A revised Utah Pollution Discharge Elimination System (UPDES) permit #UTG040027 adding the location of a new outfall ID 005 to allow for the upgradient alluvial groundwater discharge to Lower Robinson Creek has been included with this submittal.

### RECOMMENDATIONS:

Approval is not recommended at this time until the following deficiencies are addressed:

1. [R645-301.724.100]: The Permittee will need to update Tables 7-5 and 7-7A to reflect the new protocol for sampling wells Y-38 and Y-61 for acidity for a two-

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year time period until data can be reevaluated to determine if acidity is being produced in groundwater wells screened in the coal seam.

2. **[R645-301.728.333]:** Page 7-41 of Section 728.333 references a groundwater management contingency plan is found in Appendix 7-9. The information contained in this appendix outlines a detailed contingency plan for the management of groundwater from the coarse alluvial sediments identified in the eastern portions of the permit area. The management of higher magnitude groundwater inflows from the coarser alluvial material is presented as a very detailed step by step contingency plan to manage the inflows that are anticipated from this coarser alluvial material, including more details of implementing an engineered barrier - further discussed in Appendix 7-10. Although this plan focuses on the management of groundwater from the coarser alluvial sediments, the plan acknowledges that inflow from alluvial horizons into the mine openings is anticipated. In the interest of presenting clear and concise information, it would seem logical for the Permittee to combine the groundwater contingency plan found in Appendix 7-9 of the Mining and Reclamation Plan (MRP) with the new alluvial groundwater management plan instead of creating a separate Appendix 7-14. Chapter 7 Section 728.333 should then reference the alluvial groundwater management plan in the narrative.
3. **[R645-301.728]:** In the Probable Hydrologic Consequences (PHC) Section 728, Page 7-34 of the MRP the plan to construct an engineered barrier to manage alluvial groundwater from the coarser grained sediments found in the eastern portion of the permit area is discussed. The alluvial groundwater management plan to divert upgradient groundwater to a sump and eventually discharge to LRC away from mine pits should *also* be detailed in this section of the PHC. Please revise this section of the PHC to include/reference the implementation of the alluvial groundwater management plan.
4. **[R645.742.333]:** The Permittee will need to demonstrate in the alluvial groundwater management plan that the temporary upgradient trenches used to reroute groundwater to the sump collection system will meet the 2-year, 6-hour standard by providing an appropriately sized detailed cross-section of the proposed trench. The Permittee presented a conceptual diagram only as Figure 1 of their submittal. The Permittee will need to revise the diagram to show that the trenches will meet the design criteria outlined in Rule R645.742.333.
5. **[R645-301.744.100 & 200]:** All diverted alluvial groundwater from the trenches upgradient of the mine pits will route to a sump collection system, according to the plan submitted by the Permittee. No as-built drawings detailing the size of the

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sump and storage volume were provided. Please submit an updated as-built drawing of the sump showing the total storage volume.

6. **[R645-301-750]:** The Division is concerned that with operational sump collection system discharging groundwater to LRC could have the potential to significantly alter the ephemeral nature of LRC channel and cause a significant amount of erosion to the channel. A careful protocol should be designed so that the flow of discharged water is regulated and does not significantly alter the channel of LRC causing erosion from the introduction of large volumes of groundwater as a result of discharges from the sump. A carefully considered discharge protocol should be prepared in consideration of the ephemeral nature of LRC. Other erosion mitigation structures, such as the use of energy dissipaters into the LRC channel should also be evaluated in this protocol. Please include this protocol as part of the alluvial groundwater management appendix.

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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, -300-148, -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 indicated in their amendment cover letter that groundwater monitoring wells Y-38 and Y-61 will be monitored for acidity based on a request made by the Division. This monitoring period is to extend for a two-year time period until data can be reevaluated to determine if acidity is being produced in groundwater wells screened in the coal seam.

**Findings:**

[R645-301.724.100]: The Permittee will need to update Tables 7-5 and 7-7A to reflect the new protocol for sampling wells Y-38 and Y-61 for acidity for a two-year time period until data can be reevaluated to determine if acidity is being produced in groundwater wells screened in the coal seam.

**Water-Quality Standards and Effluent Limitations**

The Permittee has received approval from the Utah Division of Water Quality to include a new permitted outfall location intended for the discharge of upgradient alluvial groundwater. The location of the new outfall is listed as outfall location 005 and has the same effluent limitations applied to it as all other outfall locations in the permit. The outfall is located at the beginning of the temporary diversion of Lower Robinson Creek and will remain in place once the diversion has been reclaimed and LRC has been restored to its natural channel configuration.

**Findings:**

A copy of the revised UPDES permit UTG040027 is included in Appendix 7-12. Water quality and discharge rates will be monitored in accordance with the UPDES permit. It should be noted

that the UPDES permit expires in April 2013. At that time, the Permittee will need to submit a current copy of the UPDES permit to the Division. No further action is recommended at this time.

### **Groundwater Monitoring Plan**

The alluvial groundwater management plan submitted by the Permittee proposes to intercept alluvial groundwater by excavating trenches upgradient of the mine pits perpendicular to groundwater flow. Each trench will be constructed such that there will be a slight gradient to allow water to flow and collect at a downgradient end of the trench. Water would then be allowed to settle and the water will then be piped to a sump located near the UPDES outfall. Water will then be transferred from the sump location to the discharge outfall. The Permittee indicates that a sump construction and pumping protocol will be designed to minimize any disturbance of sediment and allow for suspended solids to settle before discharging to LRC.

Section 728.333 Flooding or Stream Flow Alteration of the MRP acknowledges that shallow alluvial groundwater interception was anticipated in the original permit application based on hydrologic studies that were performed prior to mining inception. On page 7-42 of the MRP, the plan acknowledges that there is heterogeneity in the alluvial sediments that influence the transmission rates of groundwater that could be intercepted by the mine pits. In general two zones of alluvial sediments have been identified: a coarse alluvium zone predominately located in the eastern portion of the permit area and concentrated in the northwest  $\frac{1}{4}$  of Section 29 T39S R5W. This coarse alluvium has been estimated to produce several hundred gallons per minute in the wetter areas, whereas the dryer western part of the permit boundary which predominately consists of the finer alluvial sediments is estimated to produce on the order of tens of gallons per minute. Table 7-9 presents an inflow estimate measured in spring of 2011 from intercept trench in Pit 2 located in the northeast  $\frac{1}{4}$  of Section 30 T39S R5W. The results of this study indicated that alluvial groundwater was discharging at a rate of 13.4 gallons per minute (gpm) or 19,296 gallons per day.

### **Findings:**

[R645-301.728.333]: Page 7-41 of Section 728.333 references a groundwater management contingency plan is found in Appendix 7-9. The information contained in this Appendix outlines a detailed contingency plan for the management of groundwater from the coarse alluvial sediments identified in the eastern portions of the permit area. The management of higher magnitude groundwater inflows from the coarser alluvial material is presented as a very detailed step by step contingency plan to manage the inflows that are anticipated from this coarser alluvial material included more details of implemented an engineered barrier further discussed in Appendix 7-10. Although this plan focuses on the management of groundwater from the courser alluvial sediments, the plan acknowledges that inflows from alluvial horizons into the mine openings are anticipated. In the interest of presenting clear and concise

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information, it would seem logical for the Permittee to combine the groundwater contingency plan found in Appendix 7-9 of the MRP with the new alluvial groundwater management plan instead of creating a separate Appendix 7-14. Chapter 7 Section 728.333 should then reference the alluvial groundwater management plan in the narrative.

### **Probable Hydrologic Consequences Determination**

The Probably Hydrologic Consequences section of the MRP is found in Section 728 of the MRP. The information contained within this section acknowledges that:

1. Direct interception of water-bearing strata in the proposed mining areas (i.e. the mine pits);
2. When groundwater flow paths through mine openings are interrupted, groundwater flow in down-gradient areas could be diminished;
3. Where mine openings intercept permeable strata, groundwater resources in upgradient areas could be diminished.

Page 7-26 points out that no significant groundwater resources such as springs, seeps or other resources are found in the alluvial material (the one exception being an area of seepage near the inlet of the LRC temporary diversion). In addition, the western portions of the permit area consist of finer grained alluvial sediments where shallow groundwater is lost to evapotranspiration and does not contribute appreciably to the overall hydrologic balance in the area.

Now that mining operations have been in effect for the past year, the Division has observed that in the western portions of the permit area, the alluvial horizon does saturate when it comes into contact with rain and snowmelt. However, the water from these sources does eventually dry up in the warmer/drier months and there is no evidence that a significant source of groundwater originating from higher elevation, upgradient groundwater areas is continuously recharging the western portion of the permit area.

The Permittee discusses minimizing long-term impacts to the alluvial groundwater system from the draining of alluvial groundwater by implementing mitigation measures such as an engineered low-permeability barrier near Pit 15 (Appendix 7-10) and the use of low permeability backfill material originating from the Tropic shale sediments.

### **Findings:**

[R645-301.728]: In the Probable Hydrologic Consequences Section 728, Page 7-34 of the MRP the plan to construct an engineered barrier to manage alluvial groundwater from the coarser grained sediments found in the eastern portion of the permit area is discussed. The

alluvial groundwater management plan to divert upgradient groundwater to a sump and eventually discharge to LRC away from mine pits should *also* be detailed in this section of the PHC. Please revise this section of the PHC to include the implementation of the alluvial groundwater management plan.

#### **Diversions: Miscellaneous Flows**

The diversion of alluvial groundwater falls into the category of Diversion of Miscellaneous Flows under regulations 742.330 of the Utah Coal Rules. As such, the temporary diversions that will be used to trench upgradient alluvial groundwater will need to meet the performance standards outlined in the Utah Coal Rules R645-301.742.312 and 313. As stated in rule 742.333 diversions for miscellaneous flow must be designed so that the combination of channel, bank and floodplain configuration is adequate to pass safely the peak runoff of a 2-year, 6 hour precipitation event.

#### **Findings:**

**[R645.742.333]:** The Permittee will need to demonstrate in the alluvial groundwater management plan that the temporary upgradient trenches used to reroute groundwater to the sump collection system will meet the 2-year, 6-hour standard by providing an appropriately sized detailed cross-section of the proposed trench. The Permittee presented a conceptual diagram only as Figure 1 of their submittal. The Permittee will need to revise the diagram to show that the trenches will meet the design criteria outlined in Rule R645.742.333.

#### **Discharge Structures**

All diverted alluvial groundwater from the trenches upgradient of the mine pits will route to a sump collection system, according to the plan submitted by the Permittee. No as-built drawings detailing the size of the sump and storage volume were provided. Please submit an updated as-built drawing of the sump showing the total storage volume.

#### **Findings:**

**[R645-301.744.100 & 200]:** All diverted alluvial groundwater from the trenches upgradient of the mine pits will route to a sump collection system, according to the plan submitted by the Permittee. No as-built drawings detailing the size of the sump and storage volume were provided. Please submit an updated as-built drawing of the sump showing the total storage volume.

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**Performance Standards**

Section 750 of the Utah Coal Rules are a series of performance standards that are designed to minimize the disturbance to the hydrologic balance within the permit and adjacent areas and to prevent material damage to the hydrologic balance outside the permit are. This includes complying with water quality and effluent limitation in the UPDES permit, and minimizing the diminution or degradation of the groundwater quality and refraining from significantly altering the normal flow of water in a drainage channel.

**Findings:**

[R645-301-750]: The Division is concerned that with operational sump collection system discharging groundwater to LRC could have the potential to significantly alter the ephemeral nature of LRC channel and cause a significant amount of erosion to the channel. A careful protocol should be designed so that the flow of discharged water is regulated and does not significantly alter the channel of LRC causing erosion from the introduction of large volumes of groundwater as a result of discharges from the sump. A carefully considered discharge protocol should be prepared in consideration of the ephemeral nature of LRC. Other erosion mitigation structures, such as the use of energy dissipaters into the LRC channel should also be evaluated in this protocol. Please include this protocol as part of the alluvial groundwater management appendix.

**RECOMMENDATIONS:**

Approval is not recommended at this time until the above deficiencies are addressed.