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**State of Utah**  
DEPARTMENT OF NATURAL RESOURCES

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**Technical Analysis and Findings**  
**Utah Coal Regulatory Program**

May 15, 2017

**PID:** C0150032  
**TaskID:** 5399  
**Mine Name:** CRANDALL CANYON MINE  
**Title:** RECLAMATION PLAN

**Environmental Resource Information**

**General**

*Analysis:*

Due to the tragic mine disaster of August 6, 2007, the Crandall Canyon Mine has been sealed. Water has gradually backed up in the mine and is now discharging from behind the portal seals. The discharge is under the authority of an approved UPDES permit. As of February 2009, the iron levels have exceeded permit compliance limits. In December 2009, a treatment facility designed to remove the iron was constructed in the "old loadout area" located directly below the mine portals.

At the present time (March 2017) it is uncertain whether or not long-term treatment of the mine discharge water will be required because naturally occurring chemical processes within the mine could potentially bring the iron content of the water to within compliance limits at some time in the future. This amended reclamation plan assumes that mine-water discharge will continue indefinitely but that no iron-removal treatment will be required at the time of reclamation.

Also, as a result of the Crandall Canyon Mine disaster, Genwal deeded a portion of the upper mine yard (Expansion Area) to Emery County. This area is now included as part of a permanent memorial to the deceased miners, owned and maintained by Emery County. As a result, this area is no longer included in the final reclamation plan for the mine.

This amendment is only for reclamation and does not change the approved Environmental Resources or Operations.

reinhardt

**Hydro Baseline Information**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Baseline Information.

Baseline information is summarized beginning on page 7-2 of the MRP. The permittee provides ground and surface water information.

aumarva

**Hydro Baseline Cumulative Impact Area**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Baseline Cumulative Impact Area Information.

The revised reclamation will take place within the existing baseline cumulative impact area.

aumarva

## Probable Hydrologic Consequences Determination

### Analysis:

The amendment does not meet the State of Utah R645 requirements for Probable Hydrologic Consequences (PHC) determination.

The Permittee provides a Probable Hydrologic Consequences plan in Appendix 7-15 in the MRP. However, several changes in the current Reclamation Plan amendment do not accurately reflect the narrative presented in Appendix 7-15.

On page 5 of the Reclamation Amendment, the Permittee states plans to leave in place and change the width of the Forest Service Road that runs east-west through the mine site in order to accommodate access to the Crandall Canyon Memorial.

The Permittee proposes to reroute the discharge collection pipelines from the East to the West end of the portal bench. The mine discharge will cascade down along a riprapped ramp constructed within the existing Portal Access Road. The cross-section for the cascading ramp is presented on 5-17D. Plate 7-5C of the MRP presents watershed information suggesting potential runoff contributions to the cascading ramp from WSDD-12, WSDD-8, WSUD-2, and WSUD-3 after shotcrete is removed above the portal road. The Permittee does not address probable hydrologic consequences from the permanent construction of the cascading ramp nor impacts to or from the watershed network.

Previously, the Reclamation Plan planned to restore the original stream channel morphology. However, in this Reclamation Plan Amendment, the Permittee proposes a new channel to be constructed for Crandall Creek upon Phase 2 reclamation. As discussed on Page 4, the Permittee plans to reconstruct the channel using more gentle slopes and at a higher elevation to provide for better overall stability of the slopes. The new channel is proposed to resemble the original channel and path. The Permittee must provide a narrative of implications for permanently altering the stream channel morphology, specify how channel will respond to increased flow from mine discharge contributions, and provide the calculations and design specifications for the newly constructed channel.

### Deficiencies Details:

The application does not meet the State of Utah R645 requirements for Probable Hydrologic Consequences Determination. The following deficiency must be addressed prior to final approval:

R645-301-728: The permittee must revise the PHC determination to reflect the proposed reclamation operation and the potential hydrologic impacts from altering the Crandall Creek morphology and flow; leaving in place portions of the Forest Service Road; and the development of the cascading ramp for mine discharge.

aumarva

## Hydro GroundWater Monitoring Plan

### Analysis:

The amendment meets the State of Utah R645 requirements for the Groundwater Monitoring Plan.

The permittee provides a groundwater monitoring plan for the site on page 7-29b of the MRP. Six spring locations are to be monitored quarterly for quantity and quality (SP36, SP-58, SP2-9, SP2-24, SP1-33, SP1-9). An additional eight springs will be sampled quarterly for quantity and field parameters only (SP-30, SP2-1, SP1-47, SP1-24, SP1-19, SP47A, SP1-3, SP1-22). Monitoring wells (MW-1) will be sampled for water-level and quality. The parameters listed meet the requirements pursuant to R645-301-731.211. The permittee provides a commitment to sample semi-annually (springs) and annually (wells) through reclamation until bonding is released.

aumarva

## Hydro SurfaceWater Monitoring Plan

*Analysis:*

The amendment meets the State of Utah R645 requirements for the Surface Water Monitoring Plan.

The permittee provides a surface water monitoring plan for the site on page 7-35 of the MRP with a commitment to monitor twelve streams until all surface areas are reclaimed. The parameters listed for monitoring meet the requirements pursuant to R645-301-731.211.

aumarva

## **Operation Plan**

### **Hydrologic Ground Water Monitoring**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Groundwater Monitoring.

On page 7-29b of the MRP the Permittee provides a groundwater monitoring plan for the site. There are 24 springs currently used for water monitoring (Table 7-10 of MRP). Following the 2007 mine collapse, monitoring of the 11 in-mine monitoring wells has been discontinued. All 24 spring sites are monitored quarterly for flow and field parameters. Nine sites also undergo operational laboratory sampling of parameters listed in Table 7-4 of MRP (SP-36, SP-58, SP2-24, SP2-9, SP1-33, SP1-33, LB-5A, SP-79, and Little Bear Spring). During the post-mining/reclamation period, water level and quality of the 24 springs will be collected annually until the termination of bonding.

aumarva

### **Hydro Surface Water Monitoring**

*Analysis:*

The amendment does not meet the State of Utah R645 requirements for Surface Water Monitoring.

On page 7-35 of the MRP the Permittee provides a surface water monitoring plan for the site. The stream monitoring locations are shown on Plate 7-16. Water quality samples will be collected from 12 streams quarterly per protocol outline in Table 7-10 of MRP. The parameters to be analyzed are presented in Table 7-4. During the post-operational period, the Permittee plans to monitor the inflow to the sedimentation pond and during high- and low-flow seasons, the Permittee will monitor and provide flow data from the sedimentation pond inflow as well as, and water quality samples from each station using parameters presented in Table 7-8. Monitoring will also occur at three locations (001, 002 and Pre-002) as part of the mine discharge treatment area.

During the post-operational reclamation period, the Permittee will construct a cascading ramp along the existing portal access road and develop a finishing wetland. The wetland outfall will be conveyed to Crandall Creek via DC-3 and UD-1. The Permittee must sample the wetland outfall before discharging into Crandall Creek.

On page 7-42 of the MRP, the Permittee cites Plate 7-7 to show the upper and lower stations from which surface-water data will be collected. However, Plate 7-7 does not present surface water monitoring locations.

The Permittee proposes to submit surface-water monitoring data to DOGM quarterly until the termination of the bonding period.

*Deficiencies Details:*

The application does not meet the State of Utah R645 requirements for Surface Water Monitoring. The following deficiencies must be addressed prior to final approval:

R645-301-731.220: The permittee must provide additional surface water monitoring at the inflow and outflow of the wetland treatment system before discharge into Crandall Creek.

R645-301-121.200: The Permittee must update the MRP to reflect the correct plate number for a map showing surface-water monitoring locations

R645-301-731.730; -751; -731.221: The Permittee must update Plate 7-7 to show the surface water locations to be used throughout the reclamation period, including outfalls from the cascading ramp and wetlands.

aumarva

## Hydrologic Transfer Wells

### Analysis:

The amendment meets the State of Utah R645 requirements for Transfer of Wells.

On page 7-43 and 7-52, the Permittee states that before final bond release, all exploratory and monitoring wells will be plugged and abandoned according to R645-301-631 and R645-301-748.

aumarva

## Hydrologic Gravity Discharge From Underground Mine

### Analysis:

The amendment does not meet the State of Utah R645 requirements for the Gravity Discharges from Underground Mines.

The Permittee discusses the groundwater discharge from the Crandall Canyon Mine portals in Appendix 7-15 Probable Hydrologic Consequences of the MRP. However, in Chapter 7 of the MRP (page 7-43), the Permittee states there is no gravity discharge from the surface entries.

### Deficiencies Details:

The application does not meet the State of Utah R645 requirements for Gravity Discharges from Underground Mines. The following deficiency must be addressed prior to final approval:

R645-301-731.521: The Permittee must update the MRP, page 7-43 with up-to-date information reflecting the presence of gravity discharges at the site.

aumarva

## Hydrologic Diversion General

### Analysis:

The amendment does not meet the State of Utah R645 requirements for Diversions- General.

The Reclamation Plan Amendment presents a detailed map of Phase I and Phase II reclamation on 5-16 and 5-17. In the MRP, Appendix 7-4 Crandall Canyon Mine Sedimentation and Drainage Control Plan, and Appendix 7-5 Crandall Creek Flow Calculations, the Permittee discusses detailed design information for sediment control measures and drainages, including the 18" under drain system, and 72" culvert. Several new temporary and permanent diversions will be constructed to aid reclamation activities that are not discussed in the MRP. The Permittee does not provide design plans for several diversions including, but not limited to: DC-1, DC-2, DC-3, MD-1, MD-2, the new section of 72" culvert, and the 24" culvert. The Permittee must ensure all culvert are appropriately sized, and provide design plans, including descriptions, cross-sections, and calculations.

In the MRP, design criteria are provided for RD-1. RD-1 refers to the 72" culvert. In the revised amendment, the 72" culvert is referenced as MD-1. On revised Figures 5-16 and 5-17, the legend and map are not consistent. The Permittee must clarify and update the MRP and Amendment.

The Reclamation Amendment cites Figure 5-14 as showing details of the portal drain collection system. Figure 5-14 is not provided by the Permittee.

Figure 5-15 in the Reclamation Amendment shows the portal drain collection system draining to the east. However, the plan outlined in the Amendment has the mine water draining to the west through an open channel and finishing wetland. The Permittee must update this Figure to reflect the narrative in the amendment.

*Deficiencies Details:*

The application does not meet the State of Utah R645 requirements for Diversions. The following deficiency must be addressed prior to final approval.

R645-301-731: The Permittee must provide design plans, including calculations, maps and descriptions that describe each permanent and temporary diversions proposed to be used during the reclamation process.

R645-301-121.200: The permittee must provide clear and concise information that is consistent with the MRP and the Reclamation Amendment. Specifically clarify the use of RD-1 and MD-1.

The permittee must also provide Figure 5-14. The Permittee must clarify Figure 5-15 to reflect the narrative presented in the Reclamation Amendment.

aumarva

## **Hydrologic Diversion Perennial and Intermitten**

*Analysis:*

The amendment does not meet the State of Utah R645 requirements for Diversions- Perennial and Intermittent Streams.

Crandall Creek is a perennial stream. In the MRP, the permittee provides information for a stream buffer zone. The MRP also provides reclamation plans for diverting the stream channel temporarily as the 72" culvert is removed and Crandall Creek is returned to its original channel morphology. However, in this Reclamation Amendment, the Permittee proposes changes to this process by introducing new sections of culvert to aid in the removal and disposal process. In the new Reclamation Amendment, the permittee does not propose to return Crandall Creek to its original stream morphology. The Permittee proposes to construct a new channel at a higher elevation, citing . The Permittee does not provide sufficient narrative and/or design plans that discuss how Crandall Creek will be protected during this reclamation.

*Deficiencies Details:*

The application does not meet the State of Utah R645 requirements for Diversions: Perennial and Intermittent Streams. The following deficiency must be addressed prior to final approval:

R645-301-731, -740, -742.300: The Permittee must provide the detailed design drawing, and design calculations for each diversion and culvert that will be constructed and installed during reclamation.

R645-301-742.313; The Permittee must provide information regarding the new stream channel construction, including the natural riparian vegetation to promote the enhancement of the aquatic habitat. Also, provide the design capacity of the new channel and temporary diversions with constructions adequate for a 10-year 6-hour precipitation event for a temporary diversion, or a 100-year 6-hour precipitation for a permanent diversion.

aumarva

## **Hydrologic Diversion Misc. Flows**

*Analysis:*

The application meets the State of Utah R645 requirements for Diversions: Miscellaneous Flows.

In the Reclamation Amendment, the Permittee plans to make UD-1 a permanent installment. The MRP provides justification for keeping UD-1 as a permanent diversion on page 39 of Appendix A with . design plans and calculations supporting peak flows for a 100 year, 6 hour precipitation event.

aumarva

## **Hydrologic Siltation Sedimentation**

*Analysis:*

The application meets the State of Utah R645 requirements for Siltation Structures: Sedimentation Ponds.

The design and construction of the sediment pond is discussed in section 7.42.22 of the MRP. The Permittee provides sediment control measures that will, according to the Reclamation Plan, suffice to provide complete sediment control during

all phases of the reclamation process until the 72" culvert is removed below the Memorial facility and the temporary 24" bypass removal begins. Upon final reclamation, silt fences will be installed across the entire length of the downstream, east end of the sediment pond embankment to filter any sediment resulting from the removal of the pond. Additional silt fences will be installed in Crandall Creek below the culvert to provide additional sediment control. The Permittee proposes to adequately divert runoff to the sediment pond during all reclamation activities.

aumarva

## Hydrologic Discharge Structures

### Analysis:

The application does not meet the State of Utah R645 requirements for Discharge Structures.

In the revised amendment the Permittee proposes to construct a new stream channel for Crandall Creek that will be riprap armored. The Permittee must provide design criteria for this channel, including the riprap.

The Permittee proposes an open channel to divert mine drainage within the existing roadway grade and will be rip-rapped. The Permittee must provide design criteria for the riprap.

### Deficiencies Details:

The application does not meet the State of Utah R645 requirements for Discharge Structures. The following deficiency must be addressed prior to final approval:

R645-301-731; -744: The Permittee must provide all design criteria for the reconstructed Crandall Creek channel, and the open channel for the mine discharge.

aumarva

## Reclamation Plan

### PostMining Land Use

#### Analysis:

The amendment does not meet the State of Utah R645-301-411 requirements for land use information. It is noted in the cover letter that a portion of the upper mine yard was deeded to the County for a Miners Memorial. However, the MRP is not modified to reflect such change in the Post-Mining Land Use Section in Chapter 4.

#### Deficiencies Details:

The amendment does not meet the State of Utah R645-301-412 requirements for postmining land use. The Permittee must address the change in post-mining land use of the portion of the mine yard that will no longer be reclaimed. See Chapter 4.

ireinhart

## WildLife Protection

### Analysis:

The amendment does not meet the State of Utah R645-301-342 requirements for a fish and wildlife plan for the reclamation and postmining phase of operation.

The amendment does not amend Chapter 3 to address impacts from perpetual discharge into Crandall Creek on Fish and Wildlife.

### Deficiencies Details:

The amendment does not meet the State of Utah R645-301-342 requirements for wildlife protection and enhancement. The following deficiency must be addressed prior to final approval:

R645-301-342: The Permittee must provide a fish and wildlife plan for the reclamation and postmining phase of operation and include enhancement measures that will be used during the reclamation and postmining phase of operation to develop aquatic and terrestrial habitat.

The plan must be updated to include the perpetual discharge of mine water into Crandall Creek and how it will impact fish and wildlife.

Ireinhardt

## Approximate Original Contour Restoration

### Analysis:

The reclamation and restoration of the South Hillside Slopes is explained succinctly and adequately, although it is questionable whether the cutslope located within the Genwall Fee area due south of the memorial trailhead is included in the reclamation plan.

### Deficiencies Details:

The application does not meet the State of Utah R645 requirements for Approximate Original Contour Restoration. The following deficiency must be addressed prior to final approval:

R645-301-553.110, R645-301-553.130 - Please amend narrative in Appendix 5-22 to clarify whether the cutslope located on Genwall Fee area due south of memorial trailhead will be reclaimed and restored to AOC.

jeatchel

## Backfill and Grading General

### Analysis:

The narrative on page 12 of Appendix 5-22 describes plans to reclaim the Old Loadout Area by backfilling with a dozer in 18 to 24 inch lifts, even though the recommendations given by the geotechnical consultant in Appendix 5-28 were to accomplish this using lifts not to exceed 12 inches thick.

Additionally, the geotechnical consultant cited in Appendix 5-28 recommended that the rock drain installed behind the backfill be constructed in lifts not to exceed 8 inches. The challenges inherent in concurrently constructing a backfilled slope with an associated rock drain clearly illustrate the complicated nature of the proposed reclamation plan for this part of the mine. Whether the slope and rock drain are able to be constructed as proposed is dubious. Further, the rock drain must perform as proposed or there is risk the backfilled slope may become saturated and possibly fail.

### Deficiencies Details:

The application does not meet the State of Utah R645 requirements for General Backfilling and Grading. The following deficiency must be addressed prior to final approval:

R645-301-553.520, R645-301-553.530 - Please amend narrative in Appendix 5-22 to agree with recommendations given by geotechnical consultant in Appendix 5-28. Also include some clarification that addresses how the proposed plan is safe from contingencies i.e. should the flow behind the backfill suddenly increase dramatically, and/or should the 6-inch perforated drainpipes fill with sediment thereby rendering the drains useless.

jeatchel

## Mine Openings

### Analysis:

The amendment does not meet the State of Utah R645 requirements for Mine Openings. R645-301-551. R645-301-542.710

In Appendix 5-22 Section 3 Seal and Backfill Portals, the Operator describes how the portals will be sealed in the future. In Section 4 the Operator states that due to the 2007 mine disaster the portals were sealed. In Section 5.42.71 of the MRP the Operator states when no longer needed all portals will be sealed and backfilled.

The Operator needs to be consistent and up to date in the text regarding the portal closures.. The Operator needs to update the text in the MRP and Appendix 5-22 to indicate that all portals have been sealed but not backfilled.

The Operator must provide as built of the portal seals.

*Deficiencies Details:*

The amendment does not meet the State of Utah R645 requirements for Mine Openings. R645-301-551, R645-301-542.710

R645-301-551, -542.710: The Operator needs to be consistent and up to date. The Operator needs to update the text in the MRP and Appendix 5-22 to indicate that all portals have been sealed but not backfilled. The Operator must provide as-builts of the portal seals.

wwestern

## Topsoil and Subsoil

*Analysis:*

**Analysis:**

The application does not meet the requirements of R645-301-241, plans for redistribution of soils, because the revised Appendix 5-22 conflicts with plans outlined in the MRP Chapter 2, Section 2.42, pages 2-10 through 2-12.

Appendix 5-22 does not recognize that on the south slope of the Expansion area, the topsoil was left in place and protected by geotextile fabric (p. 2-11 and Figure 8D). Appendix 5-22 removes the reclamation plan envisioned for this topsoil slope and adds terraces, which conflicts with information in Chapter 2 (pg 2-12). Appendix 5-22 incorrectly refers to buried subsoil in Section 18, where Chapter 2 refers to buried topsoil in Section 2.42 and Figure 8D.

Appendix 5-22 Sec. 18 describes placement of 12 inches of topsoil on the North and South Slope expansion area (p. 20), which is approximately 2.5 acres (Figure 8D). However, topsoil for reclamation of both these areas is buried in situ (MRP p. 2-12 and Figure 8D). There is currently 12,912 CY of soil salvaged and stockpiled in four stockpiles (p. 2-11). This topsoil is allocated as described on page 2-10. This revision removes the overland open channel and wetland area from topsoil replacement. The overland channel and wetlands will span approximately 2.0 acres (Figure 8D).

Appendix 5-22 describes the 1.82 acres as a portion of the upper mine yard (upper end of the Expansion Area). Comparing Figure 8C (Chapter 2) with Figure 1 (App 5-22), once can see that the 1.82 acres coincide with areas that were previously determined to not require topsoil replacement. These areas are identified on Figure 8C as the Undisturbed Area Culvert Inlet, the USFS Trailhead, and a portion of the South Slope Area. Section 2.42 lists 6.41 acres to be topsoiled and 8.6 acres that will not be topsoiled within the 13.6 acre facilities (+ 1.4 acre topsoil storage) surface disturbance.

Appendix 5-22 Sec. 10 describes the construction of wetlands. Limited details are provided. The overland channel and wetland banks could be stabilized and reinforced with riparian vegetation and bio-engineering.

*Deficiencies Details:*

The application does not meet the requirements for redistribution of soils, prior to approval, please provide the following, in accordance with:

R645-301-241, Reconcile the details of re-exposure of buried topsoil in the South Expansion area described in Chapter 2 with reclamation plans described in Sections 17 & 18 of Appendix 5-22. Ensure adequate volume of stockpiled topsoil is available for the North and South slope reclamation plans that are described in Appendix 5-22 and update Section 2.44 in accordance with the new reclamation plan.

R645-301-233.100, The application varies from the current reclamation plan as it does not re-expose the buried Crandall Creek channel or the topsoil protected in-situ on the South Slope. Rather it describes terraced 2h:1v slopes and reconstruction of the Crandall Creek above the original grade. The application should explain why this is the preferred alternative and describe the characteristics of the fill to be used as substitute topsoil, if any.

R645-301-242.320, Describe the plans for stabilization of the banks of the overland open channel and wetland area.

pburton

## Road System Retention

*Analysis:*

The amendment does not meet the State of Utah R645 requirements for Road System Retention. Operator did not meet

the requirements of R645.640.

In addition to modifying Appendix 5-22 for the postmining road, the Operator must also amend Section 5.42.60 in the MRP. The modification is needed so that the MRP is consistent.

The Division understands that the main access road will be retained to access the Crandall Canyon Memorial. According to the approved plan all pavement on lands administrated by the United States Forest Service must be removed.

The Operator can add text to the MRP indicating that future negotiations between the USFS, Emery County and the Operator could result in modifying the reclamation plan to accommodate the Crandall Caynon Memorial.

*Deficiencies Details:*

The amendment does not meet the State of Utah R645 requirements for Road System Retention. The following deficiency must be addressed prior to final approval.

R645-301-540: The Permittee must update Section 5.42.60 Roads so that the MRP and Appendix 5-22 are consistent.

wwestern

## Hydrological Information Reclamation Plan

*Analysis:*

The amendment does not meet the R645 requirements for the Hydrologic Reclamation Plan.

The Permittee proposes, upon final reclamation, to replace the PVC discharge collection pipeline with an overland open channel or cascading ramp to run down the existing portal access roadway into a new, permanent wetland area. Cross-sections and maps for the cascading ramp are provided in Figure 5-16, 5-17, and 5-17D. The discharge flow is then proposed to enter a wetland treatment system. The Reclamation Amendment states that the wetlands will be designed and constructed utilizing professionals familiar with wetlands and reference material such as 'Utah's Wetland Workbook: A Guide to Proper Wetlands Management and Development.' This information is not sufficient. The Permittee does not provide a narrative, design plans, or maps describing the proposed wetland treatment system. The Permittee plans to deviate from the original reclamation plan and not restore Crandall Creek to its original channel morphology. The Permittee states on page 4 that a new channel will be constructed for the creek to allow for more stable slopes (2H:1V). The new channel will be higher in elevation than the original channel and have a gentler slope. The Permittee does not provide sufficient narrative, plans, and calculations to explain why the original channel will not be restored.

*Deficiencies Details:*

The amendment does not meet the State of Utah R645 requirements for Hydrologic Reclamation Plan. The following deficiency must be addressed prior to final approval:

R645-301-731; -761: The Permittee must provide a detailed plan, including maps, cross-sections, descriptions, and calculations for the wetland treatment system.

R645-301-512.100: The permittee must provide cross sections, maps, plans and engineering designs for the wetland system that are certified by a qualified, registered, professional engineer, geologist, or a land surveyor.

R645-301-742.313, -301-540: The permittee must provide sufficient narrative, maps, cross-sections, and engineering designs for the reconstructed Crandall Creek in order to support the decision to not restore the channel to original channel morphology.

aumarva

## Revegetation General Requirements

*Analysis:*

The amendment does not meet the State of Utah R645-301-341 requirements for the revegetation plan.

The amendment does not amend the existing revegetation plan located in Chapter 3. Chapter 3 must be updated to reflect the permanent discharge from the portals into Crandall Creek.

*Deficiencies Details:*

The amendment does not meet the State of Utah R645-301-341 requirements for the revegetation plan. The following deficiency must be addressed prior to final approval:

R645-301-341: The Permittee must update the revegetation plan in Chapter 3 to include reclamation of Crandall Creek and the associated impacts from perpetual discharge.

ireinhart

### **Stabilization of Surface Areas**

*Analysis:*

**Analysis:**

The application does not meet the requirements of R645-301-244, plans stabilization of soils, because the revised Appendix 5-22 conflicts with plans outlined in the MRP Chapter 2, Section 2.44, page 2-14.

Appendix 5-22 includes mulch (wood fiber and hay/straw) and tackifier applied to the seed bed in the portal area (Sec. 5), the shop area (Sec. 11), the old loadout area (Sec. 14), North and South slope of the expansion area (Sec. 21), the stream banks (Sec. 23), topsoil stockpile locations (Sec. 25), and in Phase 2 removal of the pond (Sec. 26). Appendix 5-22 describes placement of silt fence to protect topsoil from entering the reconstructed Crandall Creek (Sec. 22 and Dwg 5-16) and the mine water discharge channel (Sec. 10). Appendix 5-22 describes the use of terracing and 2h:1v slopes on the South Slope Expansion Area and eliminates the reestablishment of the original slope and re-exposure of in-situ stored topsoil and use of PAM to enhance stability and water infiltration on the un-covered soils.. Drawing 5-16 illustrates the terraces on the South Slope.

*Deficiencies Details:*

The application does not meet the requirements for stabilization of soils, prior to approval, provide the following in accordance with:

R645-301-244, Resolve conflicts between Appendix 5-22 and Chapter 2, Section 2.44 with regard to the use of wood fiber mulch and hay/straw on slopes of 2h:1v (50%) or less and the use of polyacrilimide (PAM) to stabilize re-exposed in-situ topsoil.

pburton

### **Maps Reclamation Final Surface Configuration**

*Analysis:*

The proposal to drain the north portals to the east via the MD-1 channel as illustrated in Figures 5-15 and 5-15a doesn't coincide with the most recent proposal to drain portals to the west into a wetlands area via a cascading ramp.

*Deficiencies Details:*

The application does not meet the State of Utah R645 requirements for Maps of Final Surface Configuration. The following deficiency must be addressed prior to final approval:

R645-301-121.200, R645-301-121.300 - Please amend or remove Figures 5-15 and 5-15a as they appear to be outdated and contradict the most current reclamation scheme illustrated in Plates 5-16 and 5-17.

jeatchel

### **Maps Reclamation Monitoring and Sample Locations**

*Analysis:*

The amendment does not meet the State of Utah R645 requirements for Reclamation Monitoring and Sampling Location Maps.

The Permittee must provide an updated monitoring location map to include monitoring sites during Phase 1 reclamation and Phase 2 reclamation. New sites will include inflows and outflows from wetland.

*Deficiencies Details:*

The application does not meet the State of Utah R645 requirements for Reclamation Monitoring and Sampling Location Maps. The following deficiency must be addressed prior to final approval:

R645-301-731.200 The permittee must provide a map that depicts the locations of the monitoring plan to be implemented during the reclamation phase.

aumarva

**Bonding Determination of Amount**

*Analysis:*

The Crandall Reclamation Plan Task #5399 is deficient and does not meet the State of Utah R645 requirements for Determination of Bond Amount. The Permittee is responsible to provide detailed estimated cost sheets to support the reclamation cost estimate. No estimated cost bond sheets were submitted with the application for permit processing. The application permit states that the application requires or includes soil removal, storage or placement, it requires or includes vegetation monitoring, removal or revegetation activities, and it requires or includes construction, modification, or removal of surface facilities. No red lined cost details were included in the application.

*Deficiencies Details:*

The Crandall Reclamation Plan, Task #5399 is deficient and does not meet the State of Utah R645 requirements for Determination of Bond Amount. The Permittee is responsible to provide detailed estimated cost sheets to support the reclamation cost estimate. No estimated cost bond sheets were submitted with the application for permit processing. The application permit states that the application requires or includes soil removal, storage or placement, it requires or includes vegetation monitoring, removal or revegetation activities, and it requires or includes construction, modification, or removal of surface facilities but no red lined cost details were included in the application.

The Crandall Reclamation Plan Task #5399 is deficient and does not meet the State of Utah R645 requirements for Determination of Bond Amount because the permittee did not provide detailed costs for reclamation. The permittee must submit red lined bond sheets, detailing all cost bonding calculations, updates and changes to demolition, revegetation, earthwork and totals workbooks.

bwiser