

#3881
OK

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 8, 2011

TO: Internal File *1027*

THRU: Steve Christensen, Permit Supervisor *YLL*

FROM: James Owen, Engineer *jeo*

RE: Revised Reclamation Plan DO-10A, Genwal Resources, Inc., Crandall Canyon Mine, C/015/0032, Task #3881

SUMMARY:

On July 28, 2011, the Division received an application for an amendment to the Mining and Reclamation Plan (MRP) of Genwal Resource's Crandall Canyon Mine. The amendment was submitted as per Division requirements under Division Order DO-10A. The amendment assumes:

1) That water will continue to discharge indefinitely from the mine, but will not need perpetual treatment for iron. Therefore, the plan assumes the existing treatment facility will be removed during final reclamation and the "old load-out area" (a.k.a., the highwall area) where the current treatment facility is located, will be reclaimed by backfilling to approximate original contour. This is the assumption of the currently approved reclamation plan. However, the amended plan now addresses the seep water which currently emanates from the highwall sandstone ledge and proposes a back-drain system to ensure slope stability of the reclaimed backfilled slope in this area.

2) The plan has been modified to show that the upper portion of the pad fill now associated with the Emery County Crandall Canyon Memorial will be left in place.

Applicant's Historical Note:

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. However, as of February, 2009, the iron levels exceeded permit compliance limits. In December, 2009, a treatment facility designed to remove the iron was constructed in the "old load-out area" located

directly below the mine portals. At the present time, 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 scenario is currently being addresses under Division Order D0- 10A and is a matter of on-going legal discussion between the company and the Division. Until this issue is resolved, this present reclamation plan assumes that mine-water discharge will continue indefinitely but that no iron removal treatment will be required at the time of reclamation.

Division Disclaimer:

By reviewing and approving or denying this application, the Division makes no assumptions, conclusions, or decisions that address its official standing or opinion about the need for continual treatment of the water being discharged or the costs associated with perpetual/on-going treatment. The review and findings within this document address only the adequacy of the submittal based on the applicant's assumption that water will continue discharging indefinitely but not need treatment. Therefore, in the event the Board of Oil, Gas & Mining, or that legal issues surrounding DO-10A, require further reclamation details or additional bonding, those findings/decisions will supersede any findings/decisions within this document.

This technical analysis addresses the application's compliance with the engineering (R645-301-500) and bonding (R645-301-800) sections of the Utah Coal Mining Rules. During the review the following deficiencies were identified:

- **R645-301.513.500.** For completeness and verification, the applicant must add labels or text descriptions to reclamation Figures 5-14(b) and 5-15(a) in such a way as to indicate the distance from the opening of each portal to the outby edge of each seal, or limit of backfill.
- **R645-301.531.** Division records indicate that the maximum water discharge has historically been in excess of 1000 gpm. The applicant must provide additional explanation and information to demonstrate why structures designed for a maximum discharge of 700 gpm will be adequate. Also Figure 13, which is referenced on page 41 of Appendix 7-4 is incorrectly labeled as Figure 14.
- **R645-301.830.110.** The applicant must update the text within the addendum for Appendix 5-20 to include current details of bond amount posted and reclamation cost. According to Division records, the Permittee currently has three separate bonds posted totaling an amount of \$2,328,000.00 and the current reclamation costs is \$2,278,000.00 inflation adjusted though 2015.
- **R645-301.830.140.** The applicant must update the unit costs used to estimate culvert removal, material removal and revegetation to current dollars. Acceptable sources include 2011 R.S. Means *Heavy Construction Cost* data manual; Nielson Construction

Company cost details, and other sources as approved by the Division. Unit costs should then be used to update the corresponding pages within the bonding spreadsheets in the MRP. Note: The Division expects the dollar amount of the decrease will be in excess of the applicant's estimated **\$105,391** as unit costs have increased.

- **R645-301.830.140.** Estimates must be provided for the cost associated with installing the back-drain collection and piping system. The cost estimates should then be added as a specific line item within the Earthwork section of the bond calculation spreadsheets.

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TECHNICAL ANALYSIS:

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:

An amended version of Appendix 5-22 (Crandall Canyon Mine Site Reclamation Plan) was included with the application. In short, Appendix 5-22 is the mine's details the applicant's plan for the reclamation of the lands within the proposed permit area, showing how the applicant will comply with the regulatory program and the environmental protection performance standards.

As a result of the 2007 mine disaster, Genwal has 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 not long included in the final reclamation for the mine. The excess volume of fill material was originally determined to be 61,532 cubic yards. Much of the fill material will not remain in place, therefore, the amount of fill material to be removed and hauled away during final reclamation has been reduced by 16,069 cubic yards, from 61,532 cubic yards to 45,463 cubic yards.

The changes to Appendix 5-22 include details for the backfilling and grading details of the portal area, drainage descriptions (back-drain) and the removal and disposal information that relates to the Crandall Canyon Memorial. Previously approved information in the plan includes a detailed timetable for the completion of each major step in the reclamation plan excluding year details, soil stabilization, and grading, with contour maps and cross sections that show the anticipated final surface configuration of the proposed permit area, a plan for revegetation appropriate cross sections and maps, of the measures to be used to seal mine openings

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

BACKFILLING, GRADING & APPROXIMATE ORIGINAL CONTOUR RESTORATION

Regulatory Reference: 30 CFR Sec. 784.15, 785.16, 817.102, 817.107, 817.133; R645-301-234, -301-412, -301-413, -301-512, -301-531, -301-533, -301-553, -301-536, -301-542, -301-731, -301-732, -301-733, -301-764, 30 CFR Sec. 785.15, 817.102, 817.107; R645-301-234, -301-537, -301-552, -301-553, -302-230, -302-231, -302-232, -302-233.

Analysis:

The Utah Coal Rules require that disturbed areas shall be backfilled and graded to: achieve the approximate original contour; eliminate all highwalls, spoil piles, and depressions; achieve a postmining slope that does not exceed either the angle of repose or such lesser slope as is necessary to achieve a minimum long term static safety factor of 1.3 and to prevent slides; minimize erosion and water pollution both on and off the site; and, support the approved postmining land use.

After the disaster, the mine portals were sealed. A system of collection pipes was also installed at the portals to collect and handle the mine discharge water which began to build up behind the seals. The mine-water is presently discharging at an average rate of about 500 gallons per minute, and this volume of discharge is expected to continue in the future. Figure 5-14 within the application shows the details of the portal drain collection system. Presently, water from the four portals is collected into a common pipe which is directed down the hillside and ultimately discharges into the main bypass culvert at an approved UPDES outfall point. There is also a small amount of seepage water collected in a French drain outside one of the old portals from the old part of the mine (which is sealed off underground), which also reports to the main discharge pipe. All of the collection system is installed either within the portals inside the steel canopies, or else buried along and within the portal bench. This discharge piping daylight from the buried installation and continues overland down the hillside in an exposed 12" diameter pipe to the UPDES outfall where it enters the natural flow of Crandall Creek.

Of particular note is also a small amount of water which seems to be infiltrating into the Star Point Sandstone behind the mine portal seals and is seeping out to the surface through the underlying porous sandstone ledge located directly above the Old Load-out Area. The applicant claims the water flows at a rate of about 3 gpm. The amended version of the reclamation plan acknowledges that the water will continue to discharge from the mine (i.e., from the portal collection pipes, the old works French drain, and the saturated sandstone ledge) at current flow rates indefinitely into the future. The company proposes to address the long-term discharge of mine-water in the following manner: 1) backfill the portals, leaving the existing collection piping system in place, 2) replace the existing exposed overland drainpipe (running down the hillside to the UPDES outfall) with an approved armored (rip-rapped) open channel, and 3) collect the seepage from the sandstone ledge with a drain-rock/drainpipe system as part of backfilling the sandstone ledge area below the portals. These elements are discussed individually as follows:

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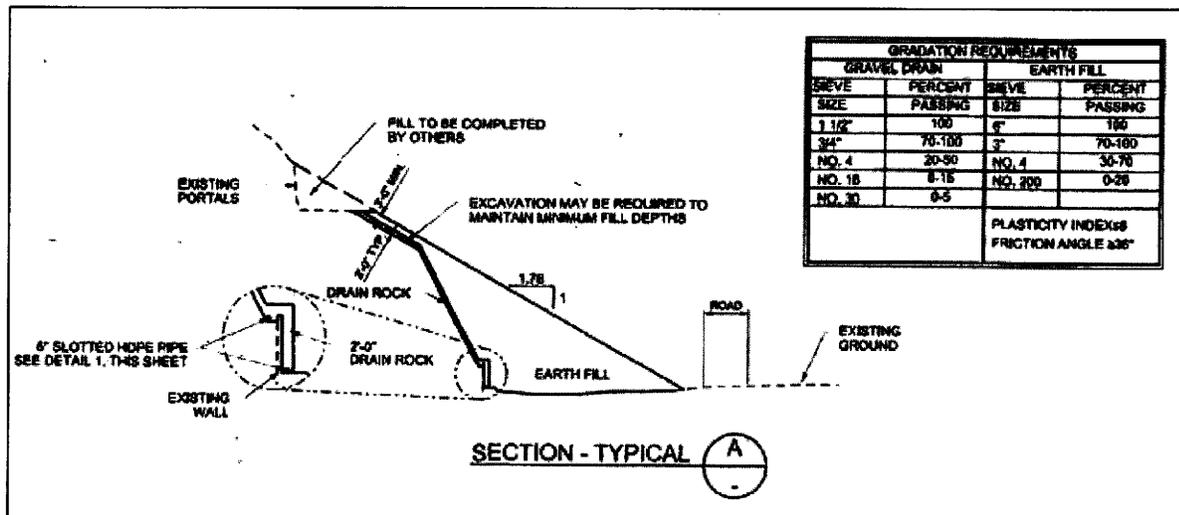
- 1) The existing collection system utilizes 10" heavy-wall PVC pipe extending back through the seals in all four portals. Additional 4" pipes also collect seepage water outside the seals which is contained behind low check dams constructed within the portals. All piping is buried and was installed with plans to be part of a permanent post-reclamation discharge system. Upon reclamation, after the steel portal canopies have been removed, the portals will be completely backfilled as described below, leaving only the stub of pipe exiting to the re-contoured surface at its present location. Figure 5-14 shows details of the existing pipe collection system.
- 2) Presently, the discharge water is conveyed down from the portals over the hillside through a 12" PVC pipeline. This line then empties into an existing CMP culvert located under the roadway which then leads to the main bypass culvert at an approved UPDES monitoring point. Upon final reclamation, the PVC pipe will be replaced with an overland open channel. In this area, the sandstone bedrock lies very close to the surface, and forms natural outcrop ledges in much of the immediate and surrounding vicinity. With a minor amount of work, debris and weathered material can be removed to expose the competent bedrock below and thereby create a permanent non-erosive channel for the discharge water course. In those areas where the weathered material is thicker, such as below the Forest Service Road, the channel would be lined with suitable rip-rap armor. Details of this channel can be found in Appendix 7-4, and also in Plates 5-16 and 5-17. There would be no other flow in this channel other than the continuous 450 gpm (average) mine discharge flow.
- 3) Upon final reclamation, the sandstone ledge below the portals (a.k.a. Old Load-out Area) will be backfilled to approximate original contour. As explained above, due to the porous nature of this sandstone, it is now conveying a small but constant amount of mine water (approx. 3 gpm) from behind the seals to the ledge outcrop below the portals. The seepage conduit appears to be localized and can easily be contained during final reclamation. The applicant states that this will be done by installing a drain system between the ledge-rock and the backfilled slope which will collect the seepage water into a single discharge pipe. This will then be directed to join the main stream of discharge water, so that all discharge enters into the Crandall Creek at a common point. The details of this back-drain collection system are explained in detail in Figure 5-15 and Appendix 5-28.

Because of the mine-water which is now occurring behind the seals in the portals, there are several seeps which issue from the porous sandstone ledge located between the portal bench and the old load-out area below. Much of this seep water now appears to be coming from under the existing belt transfer (a.k.a., crusher) building, although other areas along the face of the ledge contribute seep flow as well. In order to properly handle this seepage on a permanent basis, a back-drain system will be installed at the interface of the sandstone ledge and the earthen

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reclamation backfill material. This back-drain system is described in greater detail in the geotechnical stability analysis prepared by RB&G Engineering, which was included with the application in Appendix 5-28. The back-drain would consist of a 2' thick layer of drain-rock placed against the entire height and width of the ledge, between the rock ledge and the backfill material. Historical measurements of the seep (collected at the base of the ledge at the retaining wall) show an average flow rate of 3 gpm, with a maximum flow of about 5 gpm. Engineering analysis indicates that only a couple of inches of drain-rock is needed to adequately carry this small flow, but a 24" contact layer has been specified in order to facilitate ease of placement and containment during construction as the backfill is constructed layer-by-layer from the base to the top of the ledge. In addition to the drain-rock layer the back-drain will also include a number of perforated drainpipes installed within the drain-rock layer.

Two 6" diameter pipelines will be installed horizontally at the base of the ledge; one at the base of the existing retaining wall, and the other along the top of the retaining wall. The retaining wall is a massive reinforced concrete structure, measuring 12" thick and about 8' high in this area. This wall will be left in place at the toe of the ledge to add increased structural stability to the backfilled slope and drain system. A third perforated drain pipe will extend vertically from the horizontal drainpipes up to the location of the base of the existing (but to be removed during reclamation) crusher/ transfer building. As mentioned earlier, it is from this area from whence much of the seepage water emanates. Therefore, a vertical pipe extending up to this location will provide added assurance that the seep-water can be adequately collected and routed to discharge. This vertical pipe will connect to the upper horizontal pipe atop the retaining wall. The two horizontal collection pipes will then join together and exit from behind the backfilled area and discharge the collected seep water directly into the mine-water discharge channel MD-1 (see Item 4) near the inlet to the culvert MC-1 under the road. Figure 5-15 and Appendix 5-28 show details of the under-drain system.



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Within Appendix 5-28, further details of the drain rock system were included. The consultant states that subsurface investigations to determine the properties of the materials within the existing hillside were not performed. For purposes of the analysis, it was assumed that the existing hillside is stable and that the critical failure surface will be contained within the added fill section. During the analyses, the bedrock materials within the existing hillside were assumed to have a unit weight of 150 pcf, an internal friction angle of 0 degrees and a cohesion value of 5000 psf.

It was assumed that granular fill materials will be available to construct the fill and that the fill material will have a total unit weight of about 135 pcf, internal friction angle of 36 degrees, and 10 psf cohesion. The 2002 USGS Seismic Hazard Deaggregation feature of the USGS web site was used to determine the mapped probabilistic peak ground acceleration (PGA) value for this site. The mapped PGA value is 0.169 for an event having a 10% probability of exceedance in 50 years. The consultant believes that the seismic event corresponding to this probability of exceedance is appropriate for this project. Stability analyses were performed using pseudo-static methods with acceleration equal to one half the mapped PGA value.

It was further assumed that the existing road through the bottom of the canyon will remain after rehabilitation is complete. In order to leave the road at the present alignment, a fill slope of about 1.76H: 1V (Horizontal: Vertical) will be required. **Stability analyses indicate that this slope will have a factor of safety against failure of about 1.33 provided that the fill materials used have strength parameters at least as great as those assumed.** Pseudo-static seismic stability analysis resulted in a factor of safety of 1.12. Figures illustrating the slope stability analyses are attached to the report along with a drawing showing plan and cross section views.

The consultant states that water was observed seeping from the existing slope. In order to prevent the fill materials from becoming saturated, it was recommended that a drainage layer be installed between the existing slope and the fill. The drainage layer should consist of clean well graded gravel and should be 2 feet thick measured perpendicular to the existing slope. The drain gravel layer should have at least 3 feet of cover to protect against frost and to inhibit infiltration of surface water. Slotted collection pipes should be placed within the drainage layer at the locations indicated on the plan sheet to collect the water and carry it outside the embankment. Details of the recommended drainage system were provided in the attached plan sheets.

Seepage from the hillside has been measured and recorded over the last 12 months. It has been reported that the measured seepage rates average about 3 gallons per minute and have not exceeded 5 gallons per minute. The drainage system shown on the drawings has been designed to carry at least 50 gallons per minute; however, the drainage system is intended to collect and channel only the water seeping from the existing hillside. If it is desired to place water collected

from within the mine into the drainage system, larger pipes and thicker drainage layers will be required.

The soils used to construct the embankment must meet the gradation requirements and Atterberg limits shown on the attached plan sheet. The soils should be moisture conditioned to within 2 percent of the optimum moisture content and then spread in loose lifts not exceeding 12 inches thick. Each lift should be compacted to at least 95 percent of the maximum dry density-Optimum moisture content and dry density should be determined by the standard Proctor test (ASTM D 698). One to two density tests should be performed for each lift of fill to verify field compaction. If lifts are compacted with a smooth drum roller or otherwise become smooth or dry the top 2 inches of the lifts should be scarified prior to placing the subsequent lift.

Gravel drain material used to construct the drainage system should be compacted. In order to compact against the existing slope, hand operated compaction equipment such as jumping jacks and/or walk behind rollers will likely be necessary. The consultant recommends that gravel drain material to be compacted with hand equipment be placed in lifts not exceeding 8 inches in thickness. Each lift should be compacted with a minimum of 4 passes of the compaction equipment.

Once the portals have been sealed and backfilled (see Figure 5-14), reclamation work can then commence on the Portal Area. This work consists of backfilling the cuts to approximate original contour, placing topsoil on the backfilled area and seeding the top soiled area. Since the Portal Area (and the associated access road) is on a slope, this work will be done in short segments starting at the eastern-most (upper-most) portion of the area and working westward across the portal area then down the access road to the Shop Area. Fill material from the Expansion Area will be utilized to backfill and reclaim the highwall area. The fill material will contain rock fragments of all sizes, including a significant amount of 6" to 8" rock fragments. These rocks will assist in providing slope stability and aid revegetation by helping to retain moisture. The fill material will be topped with 12" of topsoil material to promote plant growth.

Appendix 5-27 was included with the application to provide the Division with information on the agreement between the applicant and Emery County in terms of ownership of the Crandall Canyon Memorial area. 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 not long included in the final reclamation for the mine. The areas that will not be reclaimed include the road easement, forest service trailhead parking area, memorial parking area, and the memorial deeded land.

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

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MINE OPENINGS

Regulatory Reference: 30 CFR Sec. 817.13, 817.14, 817.15; R645-301-513, -301-529, -301-551, -301-631, -301-748, -301-765, -301-748.

Analysis:

According to the Utah Coal Mining Rules, each portal must be sealed and backfilled as required by the Division and consistent with the requirements of 30 CFR Section 75.1711. The application states that the four portals on the north side are: bathroom entrance, intake air entry, belt entry and fan (return air) entry. The three portals on the south side are the intake, belt and fan entries. The seals will be constructed approximately 25-35 feet inby from the portal openings and will be built according to MSHA regulations. Equipment necessary for sealing would be a cement mixer and hand tools. After finishing the construction of the seals, the 25 to 35 feet of entry from the portals to the seals will be backfilled with additional fill material from the Expansion Area.

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES

Regulatory Reference: 30 CFR Sec. 701.5, 784.24, 817.150, 817.151; R645-100-200, -301-513, -301-521, -301-527, -301-534, -301-537, -301-732.

Analysis:

The Forest Service/Emery County road from the trailhead/turnaround will be reclaimed according to the Special Use Permit. As stipulated in the existing Forest Service special use permit (8126189) covering the road, during final reclamation the width of the asphalt road surface within the permit area will be reduced from a 27 foot sub grade and 22 foot running surface to a 20 foot sub grade and 14 foot running surface. Asphalt removed from the permit area as part of this road narrowing will be taken to an approved RCRA disposal site.

The reclaimed area will be top soiled and revegetated. The Forest Service indicated that it prefers to have the asphalt totally removed from the road surface upon final reclamation. This position differs from the stipulations of the existing Forest Service Special Use Permit that requires that a 14' asphalt running surface be left in place upon final reclamation. Genwal

commits to reclaiming the road through the mine site to any standard desired by the Forest Service/Emery County at the time of final reclamation. At the present time, however, it is difficult for Genwal to commit to a reclamation standard for the road that is contrary to the existing Forest Service Special Use Permit. Since the road now provides permanent access to the Crandall Canyon Memorial, which is owned by Emery County, the final disposition of the reclamation requirements regarding pavement removal may be determined in the future depending on discussions between the agencies involved.

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

Analysis:

Figures 14(a) depicts the portal area existing drain piping. Figures 14(b) and 14(c) depict the drain piping that will exist in the portal area after reclamation. Figures 15(a) and 15(b) depict the "old load-out area" reclamation plan, including the drain rock system and portal drainage piping system. Plate 5-3 was included to provide information on Surface Facilities, Plates 5-16 and 5-17 depict phases I and II, respectively, of the reclamation process. Plates 5-17A, 5-17B and 5-17C provide cross sections of the reclamation areas. All maps and plates have been properly certified.

Findings:

Contents and information provided are not sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules. The following deficiency was identified:

- **R645-301.513.500.** For completeness and verification, the applicant must add labels or text descriptions to reclamation Figures 5-14(b) and 5-15(a) in such a way as to indicate the distance from the opening of each portal to the outby edge of each seal, or limit of backfill.

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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:

The applicant states that during the first phase of reclamation, provisions will be made to permanently handle the approximate 500 -700 gallon per minute flow of mine water from the sealed north side portals. The flow is presently carried by a buried pipe from the portal area, beneath the road and dumped directly into a riser pipe to the main canyon culvert. Upon Phase I reclamation, the existing pipe will be replaced with a rip-rapped ditch down the steep slope, into an 18" diameter cmp culvert beneath the U.S. Forest Service Road, and again into a rip-rapped ditch to the reclaimed main channel. The ditch has been designated MD-1, and the culvert is designated MC-1, as shown on Plate 5-16 and 5-17. As indicated on Plate 5-16, culvert MC-1 will be extended beyond reclaimed ditch RD- I, allowing RD- I to flow over the culvert without mixing the 2 flows at least until Phase II reclamation. At that time both flows will go directly to the reclaimed main channel as shown on Plate 5- 17.

Ditch MD-I and culvert MC-I are therefore considered permanent features of the reclaimed mine site. These structures are sized to safely convey the maximum expected mine water discharge of 700 gpm (1.56 cfs), although the present discharge is considerably less (approx. 500 gpm). The proposed rip-rap size of 12" D₅₀ will also provide more than adequate protection against erosion for the maximum expected flow. Rip-rap will be installed at a minimum depth of 1.5 D₅₀ (18"), and placed on a bedding layer of -2" gravel to a depth of 0.75 D₅₀ (9").

Findings:

Contents and information provided are not sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules. The following deficiency was identified:

- **R645-301.531.** Division records indicate that the maximum water discharge has historically been in excess of 1000 gpm. The applicant must provide additional explanation and information to demonstrate why structures designed for a maximum discharge of 700 gpm will be adequate. Also Figure 13, which is referenced on page 41 of Appendix 7-4 is incorrectly labeled as Figure 14.

BONDING AND INSURANCE REQUIREMENTS

Regulatory Reference: 30 CFR Sec. 800; R645-301-800, et seq.

Analysis:

According to Division records, the Permittee currently has three separate bonds posted totaling an amount of \$2,328,000.00

The applicant requests a decrease in the total direct reclamation costs by **\$105,391** as a result of leaving the upper fill material in place as a part of the Emery County Crandall Canyon Memorial. The applicant justifies the decrease as per the following:

1. Demolition: By leaving the memorial area in place, the upper 248' of the 72" bypass culvert will remain in place. Therefore, the total length of bypass culvert to be removed will be reduced from 1400' down to 1152'. The present demolition cost to remove this culvert is $\$48,902/1400' = \$34.93/\text{ft}$. Also, the present cost to remove the bedding material is $\$145,670/1400' = \$104.05/\text{ft}$. Therefore, by leaving 248' of bypass culvert under the memorial area, the reclamation cost should be reduced by $248 \text{ feet} \times \$138.98/\text{ft} = \mathbf{\$34,467}$.
2. Earthwork: Under the original plan a total of 66,096 loose yards of excess fill material would have to be hauled off-site for disposal in an approved landfill. According to computer generated volumes, by leaving the memorial area in place, the volume of excess material required to be hauled off will be reduced by 16,069 yards. Based on the currently approved Division bonding estimates (Feb 3, 2006) the unit cost of hauling and disposing of this material is \$3.46 per yd. Therefore the amended plan should reduce the direct reclamation cost by $16,069 \text{ yards} \times \$3.46/\text{yd} = \mathbf{\$55,598}$.
3. Revegetation: Presently, the revegetation cost for 6 acres is $\$50,524/6 \text{ acres} = \$8,421 \text{ per acre}$. By leaving the memorial area in place the total reclaimed area required to be revegetated is reduced by 1.82 acres. Therefore, the reclamation cost will be reduced by $\$8,421/\text{ac} \times 1.82 \text{ acres} = \mathbf{\$15,326}$.

Therefore the total direct reclamation costs resulting from the amendment should be reduced by $(\mathbf{\$34,467} + \mathbf{\$55,598} + \mathbf{\$15,326}) = \mathbf{\$105,391}$ as a result of leaving the upper fill material in place as part of the Emery County Crandall Canyon Memorial.

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The applicant states that there may be some additional reclamation costs associated with the installation of the back-drain collection piping system for the ledge seepage, but this cost is expected to be substantially less than the \$105,391 cost reduction which has resulted from leaving the Crandall Canyon Memorial facilities in place. Therefore the existing reclamation bond of \$2,062,000 (posted June, 2008 and inflation-adjusted through 2011) should be sufficient to cover the incidental cost associated with the back-drain system.

Findings:

Contents and information provided are not sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules. The following deficiencies were identified:

- **R645-301.830.110.** The applicant must update the text within the addendum for Appendix 5-20 to include current details of bond amount posted and reclamation cost. According to Division records, the Permittee currently has three separate bonds posted totaling an amount of \$2,328,000.00 and the current reclamation costs is \$2,278,000.00 inflation adjusted though 2015.
- **R645-301.830.140.** The applicant must update the unit costs used to estimate culvert removal, material removal and revegetation to current dollars. Acceptable sources include 2011 R.S. Means *Heavy Construction Cost* data manual; Nielson Construction Company cost details, and other sources as approved by the Division. Unit costs should then be used to update the corresponding pages within the bonding spreadsheets in the MRP. Note: The Division expects the dollar amount of the decrease will be in excess of the applicant's estimated \$105,391 as unit costs have increased.
- **R645-301.830.140.** Estimates must be provided for the cost associated with installing the back-drain collection and piping system. The cost estimates should then be added as a specific line item within the Earthwork section of the bond calculation spreadsheets.

RECOMMENDATIONS:

The application is not recommended for approval at this time.