

# TECHNICAL MEMORANDUM

## Utah Coal Regulatory Program

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May 5, 2005

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor

FROM: James D. Smith, Environmental Scientist, Team Lead

RE: Replacement of Volume 11 (RILDA Canyon Facilities), PacifiCorp, Deer Creek Mine, C/015/0018, Task ID #2195

### **SUMMARY:**

In 1997 the Permittee, PacifiCorp, received approval to expand its mining operations into the North Rilda Area in and adjacent to Rilda Canyon. In 1999, the Mill Fork Tract added 5,562 .82 acres to the Deer Creek Mine permit. Mining expansion into the North Rilda and Mill Fork tracts was anticipated early in the permitting process, and because of this, the North Rilda and Mill Fork areas were included in many of the baseline studies and on many of the mine permit maps prior to their incorporation into the MRP.

The Permittee evaluated long-term options to improve access to the coal reserves in the Mill Fork tract. Options considered were:

- Acquisition of Crandall Canyon Mine;
- New portal facilities in Mill Fork Canyon; and
- New portal facilities in Rilda Canyon.

The Permittee and Andalex Resources were unable to arrive at an agreement that would allow utilization of the Crandall Canyon Mine

From extensive investigation, including in-seam horizontal drilling, the Permittee selected new portals facilities in Rilda Canyon as the best option. Initially, the facilities were proposed in an area disturbed by previous mining operations; however, due to concerns related to culverting approximately 1,500 feet of the perennial stream, the Permittee chose to move the proposed facility site up canyon approximately 1/2 mile.

**TECHNICAL MEMO**

The proposed North Rilda Canyon Portal surface facilities will be located just below the intersection of the Right and Left forks of Rilda Canyon. The proposed Rilda Canyon facilities are designed to minimize surface disturbance, covering approximately 12.1 acres, 9.0 acres at the portal area with and 3.1 acres for soil storage further down the canyon.

Permittee's Action	Dated	DOGM's Action	Dated
Original <a href="#">submittal</a>	11/04/2003	Assigned Task # 1766	
		<a href="#">ACR</a> Determination-incomplete	12/29/2003
		<a href="#">Additional</a> ACR information	02/04/2004
Withdrawal of amendment	08/20/2004		
		<a href="#">Returned</a> to Permittee without TA	08/23/2004
<a href="#">Complete</a> revision submitted	09/02/2004	Assigned Task # 2032	
		<a href="#">Tech Memo</a>	10/13/2004
		<a href="#">ACR</a> Determination	10/21/2004
		<a href="#">TA</a>	10/21/2004
<a href="#">E-mail</a> requesting withdrawal of amendment.	12/07/2004		
		<a href="#">Returned</a> to Permittee	12/08/2004
New <a href="#">submittal</a>	12/17/2004	<a href="#">Assigned</a> Task # 2093	12/21/2004
		ACR Determination	02/28/2005
		Tech Memo	02/28/2005
		Deficiencies <a href="#">Letter</a>	03/01/2005
Response to Task # 2093	04/01/2005	Assigned Task # 2195	
		Tech Memo	05/05/2005

Underground access from the North Rilda Canyon Portal Facilities will be through two rock slopes through the Spring Canyon Member of the Star Point Sandstone. There will be two separate surface breakouts, one for a mine fan and another for intake access, located near the intersection of the Right and Left forks of Rilda Canyon. The slopes will connect with extensions of the 1<sup>st</sup> Right Submains in the Hiawatha Seam. Excavated material from the slopes, mainly sandstone, will be stored within the mine.

Surface facilities in Rilda Canyon include the existing mine fan in the Left Fork of the canyon. Surface related facilities at the proposed North Rilda Canyon Portal Facilities include a

bathhouse/office/warehouse, underground vehicle parking garage, fuel dock, water and sewer stations, rock dust silo, employee parking area, fan, sediment pond, covered and open storage area.

Coal will continue to be shipped through the existing Deer Creek mine workings to the portal in Deer Creek Canyon, from where it will be transported to the Huntington Power Plant coal storage area via the existing overland beltline. Surplus production, in excess of what the Huntington Plant requires, will continue to be trucked from the plant on state highway 31.

### **TECHNICAL ANALYSIS:**

## **GENERAL CONTENTS**

General Contents information is already in the Supplemental Volume, Legal and Financial and is not affected by this revision of Volume 11. A description of the permit is included with the Volume 11 revision in order to keep all permit amendment documents related to the proposed Rilda Canyon portal facilities together. Upon approval, the permit description will be inserted into its proper location of the Supplemental Volume, Legal and Financial Volume.

## **VIOLATION INFORMATION**

Regulatory Reference: 30 CFR 773.15(b); 30 CFR 773.23; 30 CFR 778.14; R645-300-132; R645-301-113

### **Analysis:**

NOV Information is in Appendix D of the Legal and Financial Volume. There, the Permittee lists all violation notices received by any coal mining and reclamation operation owned or controlled by either the applicant or by any person who owns or controls the applicant. NOV information in Appendix D covers the three-year period preceding April 12, 2005.

### **Findings:**

Information provided in Appendix D of the Legal and Financial Volume meets the minimum Violation Information requirements of the Coal Mining Rules.

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TECHNICAL MEMO

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## RESOURCE INFORMATION

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

## GEOLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR 784.22; R645-301-623, -301-724.

### **Analysis:**

Geologic information for the permit and adjacent areas has been collected since 1971. This information has come from exploratory drilling, field investigations, field sampling, surface geologic mapping, aerial photography, and underground mapping of mine workings (Hydrology, p. 6-1).

Geologic information in the current MRP (especially Volumes 8, 9, and 12) and this submittal of a new Volume 11 (North Rilda Canyon Portal Facilities) is sufficient to assist in determining the probable hydrologic consequences of the proposed North Rilda Canyon Portal Facilities operation upon the quality and quantity of surface and ground water in the permit and adjacent areas, including the extent to which surface- and ground-water monitoring is necessary. It is also sufficient for determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined; determining whether reclamation can be accomplished and whether the proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area; and preparing the subsidence control plan. Geologic information includes a description of the geology of the proposed permit and adjacent areas down to and including the stratum immediately below the lowest coal seam to be mined.

Geologic information includes the Star Point Sandstone, which is considered by some to be an aquifer, although water production from the Star Point Sandstone is typically from fractures in the rock rather from the rock matrix itself. Fractures in the Star Point Sandstone contribute a portion of the flow at Rilda Springs, but the bulk of the flow is from the alluvium in the Right and Left Forks of Rilda Canyon (Hydrology, p. 45).

The geologic description includes areal and structural geology of the permit and adjacent areas and how these may affect the occurrence, availability, movement, quantity, and quality of potentially impacted surface and ground water. The description is based on maps and plans provided as resource information for the mine plan. There is site-specific information. Geophysical studies and consultant's reports are in Volume 9 (Hydrology, p. 13).

At this time, the Division has not determined it necessary to require the collection, analysis, and description of additional geologic information to protect the hydrologic balance, to minimize or prevent subsidence, or to meet the performance standards.

The alluvium just above the confluence of the Left and Right Forks is being investigated for the possibility of moving the CVSSD water collection system above the proposed disturbed area. However, the current proposal does not rely on this relocation and the outcome of the geologic investigations at the Proposed Spring Collection area does not affect the feasibility of the Rilda Canyon Facilities project as proposed.

The Permittee has not requested that the Division waive requirements for borehole information or analysis. Several maps, including HM-9 in Volume 9 – Hydrology and map 600-1 in Volume 11 identify the locations of boreholes near Rilda Canyon from which geologic information and sampling was conducted.

Appendix A lists Existing Exploration Drillhole Completion Details for the North Rilda Permit Area. Energy West Mining Company collected samples of Star Point Sandstone from boreholes drilled from the 2<sup>nd</sup> Right development entries at cross-cuts #6 and #10, near where the rock slopes are planned. Analysis results are in Volume 11, Geology Appendix B. None of the samples are considered acid- and toxic-forming according to the specifications listed DOGM's "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining". Excavated material, mainly sandstone, from slope development will be stored within the mine.

(Volume 12 - Geology Appendix A lists average values for proximate analysis, fusion temperatures, and ash analyses for Hiawatha and Blind Canyon coal. Volume 12 – Geology Appendix B of tabulates basic information for boreholes for the Mill Fork Extension, which includes boreholes in and adjacent to Rilda Canyon: one representative lithologic log is included. Several additional logs are in Volume 8 – Geology, and all logs are available at the Energy West office in Huntington, Utah. Energy West collected exploration drilling and in-mine samples of roof and floor for the Blind Canyon and Hiawatha Seams for the North Rilda and Mill Fork extensions of the Deer Creek Mine, including Rilda Canyon and adjacent areas. Appendix C of the Geology Section of Volume 12 contains a table of the results of these chemical analyses up to 1999 and analysis results for the 2001 drilling program. Additional analyses results are in Volume 8 - Geology.)

Information on thickness and engineering properties of clays or soft rock in the stratum immediately above and below each coal seam to be mined is not in the MRP, including the Volume 11 submittal. Standard room-and-pillar mining methods are to be used for development of entries and in some areas where longwall mining cannot be done (Engineering, p. 21). Rock mechanics and roof control studies by the Permittee, its contractors, and the former Bureau of Mines have been extensive. Rock strength, entry stress distribution, abutment loads, and roof

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TECHNICAL MEMO

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support design are consistently evaluated. All data are continually processed for efficient layout and design of the Deer Creek Mine (MRP – Part 3, page 17.)

**Findings:**

Geological Resource Information is adequate to meet the requirements of this section of the Coal Mining Rules.

**HYDROLOGIC RESOURCE INFORMATION**

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

**Analysis:**

**Baseline Information**

*Ground-Water Information*

Section R645-301-721 contains a description of the ownership of existing wells, springs, and other groundwater resources, including seasonal quality and quantity of groundwater and usage. Quality and quantity data sufficient to demonstrate seasonal variation and water usage are in Volume 9, the Annual Reports, and the Division's database. Locations are on map HM-1 in Volume 9. Additional ground-water information is in Volume 9.

The alluvium just above the confluence of the Left and Right Forks is being investigated for the possibility of moving the CVSSD water collection system above the proposed disturbed area. However, the current proposal does not rely on this relocation and the outcome of the geologic investigations at the Proposed Spring Collection area does not affect the feasibility of the Rilda Canyon Facilities project as proposed.

*Surface-Water Information*

Section R645-301-721 includes a description of all surface water bodies. Quality and quantity data sufficient to demonstrate seasonal variation and water usage are in Volume 9, the Annual Reports, and the Division's database. Locations are on map HM-1 in Volume 9. There are no discharges into any surface-water body in the proposed permit and adjacent areas. Additional surface-water information is in Volume 9.

*Supplemental information*

To evaluate and document the geomorphology characteristics of Rilda Creek, the Permittee retained EarthFax Engineering to conduct a field geomorphology investigation of Rilda Creek from above the forks to below the proposed location of the sediment pond. The objectives were to establish permanent benchmarks and cross sections along Rilda Canyon; survey channel cross sections and gradients at the established locations (in accordance with USFS guidelines) and plot the surveyed cross section and profile data; collect information and classify the stream sections in accordance with the Rosgen procedure; gather information concerning stream bed materials, evaluate piezometer data collected previously by the Permittee (supplemented by field observations); calculate flood-flow magnitudes based on regional regression equations; and - based on field observations and data collected by Mt. Nebo Scientific - plot various streambank zones on a plan map of the canyon. A complete discussion related to the geomorphology characteristics of Rilda Creek refer to Volume 11, Hydrology Appendix C.

UDWR conducted biological organism and habitat study of Rilda Creek. The Division asked representatives of the UDWR Southeastern Region to participate in an on-site meeting, discuss the impacts of this project on the biota within Rilda Canyon, and aid in the development of a comprehensive EA. During this and subsequent meetings it was decided that UDWR would conduct pre and post-disturbance evaluations of macroinvertebrate populations and identify resident fish populations in Rilda Creek. The "Preliminary Report on Surveys Conducted to Determine Potential Impacts of Rilda Surface Facility Development in Rilda Canyon During 2004" in Volume 11, Biology Appendix C marks the completion of the predisturbance work. This report includes details on macroinvertebrate and fish sampling methodologies and a limited results section. When the final report is completed, a copy will be included.

### **Baseline Cumulative Impact Area Information**

The proposed Rilda Canyon facilities will be within the existing Deer Creek Mine permit area boundary and the East Mountain CIA. Supplemental information on biological organisms and habitat and stream geomorphology will be included in information used to update the East Mountain CHIA.

### **Probable Hydrologic Consequences (PHC) Determination**

Section 728 of the Hydrology section of the Volume 11 submittal contains the PHC Determination for the Rilda Canyon portal facilities and adjacent areas. This PHC Determination section is based on hydrologic, geologic, geomorphologic, biologic, and other information collected for initial permitting and during subsequent operation of the Deer Creek Mine, and the PHC section restates much of this information. The required PHC findings are addressed, although the statements may be scattered through the text, often outside the PHC determination. Statements of the specific findings that are required by the Coal Mining Rules

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TECHNICAL MEMO

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could be more explicit, but the PHC determination in Volume 11 for the Rilda Canyon portal facilities meets the requirements of the R645 Coal Rules.

During periods of high runoff changes in quality are insignificant; however, in low flow conditions some degradation is likely due to the fact that the mine discharge waters are higher in TDS than the surface waters (Section 728, Hydrologic Balance-Surface Water System).

Little impact to spring flow may actually occur unless geologic conditions change as a result of mining. Total elimination of flow from alluvium and other sources to the NEWUSSD springs is one potential impact. Subsidence could potentially result in cracking or fracturing of the geologic strata above the mine workings, and local recharge crossing these areas could be lost from the spring recharge system ((Section 728, Spring Impacts, Overall Impact Potential)). Ground water intercepted by mine workings in the permit area is from storage and any decrease in the natural discharge of the ground-water system is considered to be minor (Section 728, C. INTERCEPTION OF GROUNDWATER BY MINE WORKINGS). Impacts to water quality are negligible and may be slightly beneficial (Groundwater System). The potential for mining activities in the North Rilda Area to impact Little Bear Spring is believed to be minimal (Section 728, E. MILL FORK STATE LEASE ML-48258 ACCESS (HIAWATHA SEAM)). The potential for depletion of ground water in fluvial-sandstone channel systems, faults and fractures, and structural low areas is covered in Section 728, Depletion of Storage). If necessary to eliminate water infiltration beneath the right fork of Rilda Creek or from water-bearing faults related to Little Bear Spring, the Permittee will use grouting to control ground-water flow into the mine (Section 728, Little Bear Spring Mitigation; Section 731.800). Ground-water storage might be depleted (Hydrology, p. 60).

Impacts to surface water due to the underground operations of Deer Creek - North Rilda area will be minor, both in terms of quality and quantity (Section 728, Surface Water System). Subsidence should not cause significant impacts to the surface water system (Section 728, Hydrologic Balance-Surface Water System). Due to the type of mining and no surface disturbance, surface water impacts are limited (Section 728, Surface Water System). Alteration of Rilda Creek morphology; increased sediment, salinity, and flow; interference with the NEWUSSD springs; and alteration of the biologic community are concerns with the proposed Rilda Canyon Portal Facilities (Section 728, Hydrologic Balance-Surface Water System).

Mining within the North Rilda area will have negligible impact on the regional hydrologic balance but there could be some possible local impact. There is possible mining-related impact on the hydrologic balance due to: subsidence of the perched aquifer systems, mining in the NEWUSSD Springs area, and interception of ground water by mine workings, mining below the Right Fork of Rilda Canyon, and access to Mill Fork (state lease ML-48258) through the Hiawatha Seam (Section 728, Hydrologic Balance-Groundwater).

The alluvium just above the confluence of the Left and Right Forks is being investigated for the possibility of moving the CVSSD water collection system above the proposed disturbed area; however, the current proposal does not rely on this relocation and the outcome of the geologic investigations at the Proposed Spring Collection area does not affect the feasibility of the Rilda Canyon Facilities project as proposed. The PHC mentions this study and the possible move, but there are no PHC determination findings for this relocation.

The discussion in Volume 11, Section 527 states that during winter months, snow removal will be required along the entire length of Emery County Road #306 up Rilda Canyon. Snow removal is the responsibility of the Emery County Road Department, but the Permittee may need to clear snow from the road with its own equipment. The Permittee will use a deicing product as specified by Emery County on the county portion of the road to make the road safe for mine personnel and other local traffic. The deicing product will be stored at the Deer Creek portal facilities; none will be stored at the Rilda Canyon portal facilities, and no salt will be used within the disturbed areas of the Rilda Canyon portal facilities.

The USFS has commented that there is only a brief discussion of using salt on Emery County Road 306 between Highway 31 and the portal facilities area, with no mention of impacts to the creek. Although clearing the road is the responsibility of the county and is not a permitted activity - and is done without regard to the permit boundary, the Permittee has stated in the MRP that it may need to clear snow from this road and when doing so intends to "use a deicing product". Even if it is acting as surrogate for the county; the Permittee clearly is asserting some control over how much deicer (as far as the Division knows this will be a mixture of salt and sand) goes on the road and therefore has the ability to influence the impacts in the stream. Even if the Permittee were not to be directly involved in snow removal, the presence of mine facilities in the canyon will result in more traffic and more frequent snow removal by the county. The Permittee needs to describe expected impacts to the creek due to using the deicing product on the road.

Map 700-6 (Volume 11 Appendix Volume Hydrology - Appendix B) shows that development workings of the Hiawatha Seam (3rd Right) advanced to within approximately 200 feet of the coal seam outcrop in Huntington Canyon. The Permittee states that water intercepted by mining in North Rilda and water utilized for dust suppression migrated down dip to the east and accumulated and/or infiltrated into the Star Point Sandstone. Map 700-6 shows the structural contours of the Hiawatha Seam under North Rilda, the area of water accumulation, and the section of outcrop to be monitored for increased discharge. The Permittee states that no springs or seeps occurred prior to mining along the contact of the Hiawatha Seam and the Star Point Sandstone. Vegetation along the boundary between the upper member of the Star Point Sandstone and the Mancos Shale indicated there were several damp zones in side canyons in Rilda Canyon. These zones were not altered during the North Rilda mining.

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TECHNICAL MEMO

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Based on the observations just described, the Permittee believes there is a buffer zone between the abandoned mine workings and the outcrop adequate to prevent the formation of an unpermitted ground-water discharge. Quantity of water discharged to the abandoned mine workings will be monitored and reported quarterly. If changes to the hydrologic balance are detected, the Permittee will immediately eliminate discharge to the abandoned workings and institute the alternative plan, which will include disposing of the collected runoff and gray water through the established mine dewatering system and discharging the water at the approved UPDES discharge location in Deer Creek Canyon (Volume 11, Section 728, Hydrologic Balance-Groundwater, F. RUNOFF AND GRAY WATER DISPOSAL - ABANDON MINE WORKINGS).

Except for a small portion of the site below the runoff collection system will drain directly to the sediment pond, grading and paving will be sloped to the north away from the receiving stream and drain to the runoff collection system to minimize potential impacts (Section 728, Hydrologic Balance-Surface Water System, B. INCREASED SEDIMENT PRODUCTION TO RILDA CREEK).

**Findings:**

Hydrologic Resource Information is not considered adequate to meet the requirements of this section. Before the Division can approve this amendment the Permittee must provide the following information in accordance with:

**R645-301-728**, The USFS has commented that there is only a brief discussion of using salt on county road C#306 between Highway 31 and the portal facilities area, with no mention of impacts to the creek. Even though clearing the road is the responsibility of the county and is not a permitted activity - and will be done without regard to the permit boundary, the Permittee has stated in the MRP that they may need to clear snow from this road with their own equipment and intend to "use a deicing product". Even if it is acting as surrogate for the county, the Permittee clearly is asserting some control over how much deicer goes on the road, and they therefore will have the ability to influence the impacts of snow removal on the stream. The Permittee is responsible to minimize impacts to water quality within and adjacent to the permit area. Even if the Permittee were not to become directly involved in snow removal, the presence of mine facilities in the canyon will result in more traffic and more frequent snow removal by the county. The Permittee needs to describe expected impacts to the creek due to clearing snow from the road, whether done by the county or themselves.

# 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:

#### General

The Permittee has submitted a plan to minimize disturbance to the hydrologic balance, to prevent material damage, and to support approved post-mining land use (Volume 11, Section 731). The Rilda Canyon portal facilities monitoring plan is summarized in Volume 11, Section 731.200. Appendix A of Volume 9 contains the complete water-monitoring plan for the Permittee's mines. Water quality of Rilda Creek will be protected from potential impacts associated with the Rilda Canyon Portal Facilities through a combination sediment control structures and revegetation (Volume 11, Section 731.600). Sediment control methods include, but are not limited to: retaining sediment within disturbed areas; diverting runoff away from disturbed areas; diverting runoff using protected channels or pipes through disturbed areas so as not to cause additional erosion; using straw dikes, riprap, check dams, mulches, vegetative sediment filters, dugout ponds and other measures that reduce overland flow velocities, reduce runoff volumes or trap sediment (Volume 11, Section 741). Handling earth materials, groundwater discharges, and runoff in a manner that minimizes the potential for pollution will protect surface water quality (Volume 11, Section 731.120).

Three sources of ground water moving through Rilda Canyon are described in Volume 11, Section 721, A., 8, Aquifer Characteristics. This information comes from Volume 9 - Hydrologic Support Information: Rilda Canyon Pump Test and from the Permittee's personnel communication with governmental agencies.

#### Ground Water Monitoring

Monitoring of the described ground-water resources will proceed through mining and continue during reclamation until bond release. Appendix A in Volume 9 - Hydrologic Section, Monitoring gives the details of the monitoring. Equipment and structures used in conjunction with monitoring the quality and quantity of ground water on- and off-site will be properly installed, maintained, operated, and will be removed by the Permittee when approved by the Division. Data will be submitted in an electronic format to the Division's Coal Water-Quality

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**TECHNICAL MEMO**

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Database quarterly for each monitoring location. Monitoring submittals will include analytical results from each sample taken during the quarter. When the analysis of any groundwater sample indicates noncompliance with the permit conditions, the Permittee will promptly notify the Division and immediately take actions provided for in R645-300-145 and R645-301-731 (Volume 11, Section 731.200).

### **Surface Water Monitoring**

Surface water-monitoring stations will continue to be monitored quarterly (when accessible), one sample at low flow and high flow during the first or second week of the quarter throughout the operational phase of the mine. Parameters analyzed, locations of all surface-monitoring sites, and sampling schedules can be found in Appendix A of Volume 9 - Hydrologic Section. Long-term monitoring sites in Rilda Canyon have been equipped with Parshall style flumes to facilitate monitoring. Monitoring equipment and structures used in conjunction with monitoring the quality and quantity of surface water on- and off-site will be properly installed, maintained, operated, and will be removed by the Permittee when approved by the Division.

Surface water will be monitored and data will be submitted in an electronic format to the Division's Coal Water-Quality Database quarterly for each monitoring location. Monitoring submittals will include analytical results from each sample taken during the quarter. When the analysis of any surface water sample indicates noncompliance with the permit conditions, the Permittee will promptly notify the Division and immediately take actions provided for in R645-300-145 and R645-301-731. For point source discharges, monitoring will be conducted in accordance with 40 CRF Parts 122 and 123, R645-301-751 and as required by the Utah Division of Environmental Health for NPDES permit (Volume 11, Section 731.200).

Monitoring will continue until the release of the reclamation bond or until an earlier date to be determined after appropriate consultation with local, state, and federal agencies ( Volume 11, Section 726, Hydrologic Balance-Surface Water System, F, Surface Monitoring Plan).

### **Acid- and Toxic-Forming Materials and Underground Development Waste**

Chemical analyses for the Blind Canyon and Hiawatha coal seams within the permit area are available from drill cores from Energy West drill holes and run-of-mine coal sampling; reference is made to Volume 8 - Geology and Volume 12 – Geology Appendix A. Data on sulfur for the Blind Canyon and Hiawatha Seams are available from drill cores and run-of-mine coal samples; reference is made to Volume 8 and Volume 12 Section 624.230 (Volume 11, Section 624.330).

Volume 12 – Geology Appendix C contains a table of analyses for acid- and toxic-forming or alkalinity-producing materials above and below the coal seams to be mined. Volume 11, Geology Appendix B includes analyses of acid- and toxic-forming or alkalinity-producing

materials related to the Upper Member of the Star Point Sandstone: this is representative of the underground development waste that will be generated during construction of the rock slopes (Volume 11, Section 624.320).

### **Transfer of Wells**

In section R645-301-731.400, the Permittee commits that before final release of bond, exploratory or monitoring wells will be sealed in a safe and environmentally sound manner in accordance with 8645-301-631, R645-301-738, and R645-301-765. Wells will be transferred to another party for further use only with the prior approval of the Division, and the conditions of such transfer will comply with Utah and local laws. The Permittee will remain responsible for the proper management of the well until bond release in accordance with R645-301-529 R645-301-551, R645-301-631, R645-301-738, and R645-301-765.

### **Discharges Into An Underground Mine**

Discharges into an underground mine are discussed in Section 731.500 of Volume 11. To minimize disturbance to the hydrologic balance of the Rilda Canyon drainage system, the Permittee proposes to construct the Rilda Canyon Portal Facilities with a runoff water collection system located east of the facility area. Disturbed area runoff and washdown/gray water will report to a 26,000-gallon tank designed to remove sediment. Water will be pumped from this tank to the abandoned 2nd Right workings through a drill hole in the Star Point Sandstone. In the mine, the water will flow down dip to the east to abandoned longwall panels (Volume 11, Appendix B, Drawing 700-6). The pumps will be controlled automatically to minimize the water level in the tank.

If decanting of the sedimentation pond is necessary, excess water will be pumped either back to the runoff collection system or disposed of at the Deer Creek Waste Rock Facility. If the site receives a storm greater than the capacity of the collection tank and pumping system and sediment pond decanting system, discharge from the sediment pond will be routed through the principal and emergency spillways (Volume 11 Appendix Volume - Hydrology: Appendix B).

The Permittee believes there is a buffer zone between the abandoned mine workings and the outcrop that is adequate to prevent the formation of an unpermitted ground-water discharge. Quantity of water discharged to the abandoned mine workings will be monitored and reported quarterly. Discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining (Section R645-301-751, Water Quality Standards and Effluent Limitations). If changes to the hydrologic balance are detected, the Permittee will immediately eliminate discharge to the abandoned workings and institute the alternative plan, which will include disposing of the collected runoff and gray water through the established mine dewatering system and discharging the water at the approved UPDES discharge location in Deer

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**TECHNICAL MEMO**

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Creek Canyon (Volume 11, Section 728, Hydrologic Balance-Groundwater, F. RUNOFF AND GRAY WATER DISPOSAL - ABANDON MINE WORKINGS).

MSHA approval to pump water into the mine has not been obtained at this time. The Permittee states that when MSHA approval is obtained, documentation will be in Volume 11, Engineering Appendix B.

### **Gravity Discharges From Underground Mines**

For the Rilda Canyon portal facilities, a gravity discharge from the underground mines is addressed under Section 645-301-731.520 of Volume 11. Construction and operation of the Rilda Canyon Portal Facilities will center on two rock slopes and surface breakouts for a mine-fan portal and an intake, access portal. The slopes will extend through the Spring Canyon Member of the Star Point Sandstone to intercept the Hiawatha Coal Seam. Dip of the Hiawatha Seam will prevent mine water from discharging through the portals.

Water intercepted during development of the rock slopes will be collected and diverted through the mine dewatering system and if necessary discharged at the approved UPDES outfall in Deer Creek Canyon. After completion of the rock slopes, if groundwater production continues, ground water will collected and discharge through the mine dewatering system or diverted to the portal facilities collection basin and discharged to the abandoned mine workings. If needed, seals will be installed to prevent post-mine gravity discharge.

### **Water-Quality Standards And Effluent Limitations**

Gray water and most runoff will be collected and pumped underground into abandoned areas of the mine. If the initial collection and pumping system fails, the sedimentation pond is designed to fully contain runoff from a 10-year, 24-hour storm event (Volume 11, Section 731.500). Runoff from the topsoil piles and outslopes of the road and sedimentation pond will be treated by alternate sediment control methods (Volume 11, Hydrology Appendix B, Section 2.11; Plate 700-1).

Section F in the PHC states that quantity of water discharged into the abandoned workings will be monitored and reported quarterly. If changes are detected to the hydrologic balance, the Permittee will immediately eliminate discharge to the abandoned mine workings and institute the alternative plan, which will include disposing of the collected runoff and gray water through the established mine dewatering system and discharging the water at the approved UPD S discharge location in Deer Creek Canyon.

Because the Rilda Canyon portal facilities are on USFS land, there can be no UPDES permit and no point source discharge at this location. The sedimentation pond is designed for total containment of the 10-year, 24-hour event. If decanting of the pond is necessary, excess

water will be pumped either back to the runoff collection system or disposed of at the Deer Creek Waste Rock Facility. However, the pond is designed with both a principal and an emergency spillway. Flow from these spillways will go into undisturbed diversion ditch UD-9, which empties into Rilda Creek (Volume 11, Hydrology Appendix B, Sections 3-1 b and 3.4 g; Maps 700-1 and 700-3). If the site receives a storm greater than the capacity of the collection tank and pumping system and sediment pond decanting system, discharge from the sediment pond will be routed through the principal and emergency spillways (Volume 11 Appendix Volume - Hydrology: Appendix B). The Permittee states such a discharge from the sediment pond would constitute an emergency situation and comply with Utah DWQ storm water regulations (Section R645-301-751, Water Quality Standards and Effluent Limitations).

As currently designed, it does not appear there will be any non-point source discharge either, with all drainage from the road and pad areas reporting to the tank and then being pumped into the mine, with any excess being fully contained in the sedimentation pond. Discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434 (Section R645-301-751 in both Volume 11 and Volume 12,). UPDES information is in Appendix B of Volume 9.

#### **Diversions: General**

In Section R645-301-732.300, the Permittee commits that construction and maintenance of all diversions will comply with the requirements of R645-301-742.100 and R645-301-742.300. Calculations of runoff volumes and designs for ditches, culverts, or other diversions are in Volume 11, Hydrology Appendix B. Diversions are designed to safely pass a 10-year, 24-hour design event rather than the smaller 10-year, 6-hour event required by the Coal Mining Rules (Volume 11, Hydrology Appendix B, 2.1).

#### **Diversions: Perennial and Intermittent Streams**

The creek in Rilda Canyon is intermittent above the NEWUA ground-water capture system and perennial below. The proposal does not include any culverting or other diversion of the Rilda Canyon stream.

Separate drainage systems will be provided at the Rilda Canyon Portal Facility for undisturbed and disturbed collection systems. The undisturbed system will collect water above the portal site and from side slopes adjacent to the site and will convey it past the disturbed area into Rilda Creek. The disturbed system will collect runoff from portal area, parking lots, storage areas and bathhouse area and will convey it to abandoned sections of the mine. Any excess will report to the sedimentation pond (Section R645-301-742.230).

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TECHNICAL MEMO

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### **Diversions: Miscellaneous Flows**

Undisturbed ephemeral drainages at the Rilda Canyon portal facilities, on the south-facing slope of North Rilda Ridge, will report to Rilda Creek through a series of culverts passing beneath the facility (Volume 11, Section R645-301-742.330).

### **Stream Buffer Zones**

No land within 100 feet of a perennial stream or an intermittent stream will be disturbed by coal mining and reclamation operations unless the Division specifically authorizes coal mining and reclamation operations closer to or through such a stream (Section 645-301-731.600). The area not to be disturbed will be designated as a buffer zone, and the operator will mark it as specified in R645-301-521.260.

Mine construction and operations will be within 100 feet of Rilda Creek, a perennial stream, but there is no plan to divert it. Signs will be installed to indicate the area beyond which no disturbance shall take place. Water quality of Rilda Creek will be protected from potential impacts associated with the Rilda Canyon Portal Facilities through a combination of sediment control structures and revegetation. Interim revegetation is described in section R645-301-300 Biology and the drainage and sediment control plan is in Volume 11 Appendix Volume - Hydrology Appendix B.

Disturbance will be held to the minimum required to allow construction of the mine entries, bathhouse pad, parking and ancillary facilities on relatively flat areas. To minimize potential impacts, all grading and paving will be sloped to the north away from the receiving stream and drain to the runoff collection system or the sedimentation pond. Trees and existing vegetation will be left as feasible. All disturbed surfaces will be revegetated immediately after completion of the construction phase (Volume 11, Section R645-301-728, B).

When the MRP was amended for underground access to the North Rilda and Mill Fork tracts, a stream buffer zone was established to protect the alluvial/colluvial system of the Right Fork of Rilda Canyon. It was based on the extent of the riparian zone and the angle of draw from the Hiawatha Seam, the lowest seam to be mined (Section 645-301-731.600).

Wellhead protection for the NEWUSSD springs is covered in Volume 11, Section R645-301-728, Hydrologic Balance-Groundwater, B and in Volume 9.

### **Sediment Control Measures**

The Rilda Canyon Portal Facility is near the Rilda Canyon Springs and in an area previously disturbed by coal mining activities. Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-

732, R645-301-742 and R645-301-760 (Section R645-301-752). Drainage and sediment control for the Rilda Canyon Portal Facilities has been designed to conform to the recommendations of the Forest Service and the North Energy Water Users Association and the Utah Coal Mining Rules (Volume 11, Hydrology Appendix B). Volume 11, Hydrology Appendix B contains designs for construction and maintenance of the sediment controls for the Rilda Canyon Portal Facilities. Silt fences at ASCAs will be removed after vegetation is established and approved by the Division (Volume 11, Hydrology Appendix B, Section 2.11).

### **Siltation Structures: General**

Siltation structures will be constructed and maintained to comply with R645-301-742.214. Any siltation structure that impounds water will be constructed and maintained to comply with R645-301-512.240, R645-301-514.300, R645-301-515.200, R645-301-533.100 through R645-301-533.600, 8645-301-733.220 through R645-301-733.224, and R645-301-743 (Section 732.100).

Siltation structures for an area will be constructed before beginning any coal mining and reclamation operations in that area and, upon construction, will be certified by a qualified registered professional engineer to be constructed as designed and as approved in the reclamation plan (Section 742.212).

Details concerning design, construction and maintenance of sediment control measures, siltation structures, sedimentation pond, and impoundments are in Volume 11, Hydrology Appendix B: Drainage and Sediment Control Plan.

### **Siltation Structures: Sedimentation Ponds**

A temporary sediment pond will be constructed below the proposed surface facilities. It is designed to contain runoff from a 10-year, 24-hour event, with principal and emergency spillways that each will safely discharge runoff from a 25-year, 6-hour event (Volume 11, Hydrology Appendix B, 3.4). Sedimentation pond designs will be in compliance with the requirements of R645-301-356.300, -356.400, 513.200, 742.200 through 742.240, and -763 (Volume 11, Section R645-301-732.200) and will comply with -742.220 and qualifying criteria of the MSHA, 30 CFR 77.216(a) (Volume 11, Section R645-301-742.222). Analyses utilized to determine the size and hydraulics related to the construction and operation of the sedimentation pond are in Volume 11, Hydrology Appendix B: Drainage and Sediment Control Plan.

If decanting of the sedimentation pond is necessary, excess water will be pumped either back to the runoff collection system or disposed of at the Deer Creek Waste Rock Facility. If the site receives a storm greater than the capacity of the collection tank and pumping system and sediment pond decanting system, discharge from the sediment pond will be routed through the principal and emergency spillways (Volume 11 Appendix Volume - Hydrology: Appendix B).

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TECHNICAL MEMO

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The Permittee states such a discharge from the sediment pond would constitute an emergency situation and comply with Utah DWQ storm water regulations (Section R645-301-751, Water Quality Standards and Effluent Limitations).

According to Sections 732.200, 733, and 743 of Volume 11, no permanent structures - including sediment ponds - are planned for the Rilda Canyon Portal Facilities. Volume 11, Hydrology Appendix B, Section 3.5 describes construction of a temporary pond to be used during construction and a permanent (life-of-mine) sedimentation pond for mine operation: there will be no truly permanent impoundment or sedimentation pond at the Rilda Canyon facilities.

Although all of these do not apply to a full-containment pond, the Permittee commits that the pond will be as close as possible to the disturbed area and out of perennial streams and be designed, constructed, and maintained to provide adequate sediment storage volume; provide adequate detention time to allow the effluent from the ponds to meet Utah and federal effluent limitations; provide a nonclogging dewatering device adequate to maintain the detention time required under R645-301-742.221.32; minimize, to the extent possible, short circuiting; provide periodic sediment removal sufficient to maintain adequate volume for the design event; ensure against excessive settlement; be free of sod, large roots, frozen so and acid- or toxic-forming coal processing waste; and be compacted properly (v11, Section 732.221.2 through 732.221.39).

#### **Siltation Structures: Other Treatment Facilities**

There is no Other Treatment Facility planned for the Rilda Canyon portals. A large tank is planned as part of the sediment control; however, this is not an Other Treatment Facility as defined in the Coal Mining Rules because it will not have a point source discharge.

Domestic waste or *black water* will be held on site in a holding tank then transported to a treatment facility (Volume 11, Section 742.230).

#### **Siltation Structures: Exemptions**

All disturbed areas at the Rilda Canyon facilities that do not report to the sedimentation pond will be treated with ASCAs. The Permittee does not identify any areas for exemption to the requirements of R645-301-742.200 and -763.

#### **Discharge Structures**

Section R645-301-744 states that discharge from the sedimentation pond, temporary impoundments, and diversions will be controlled by energy dissipators, riprap channels, and - where necessary - other devices. Discharge structures will be designed according to standard engineering design procedures.

Discharge structures will be located, maintained, constructed and reclaimed to comply with R645-301-733, -734, -743, -745 and -760 (Volume 11, Section 753).

The culvert outlet from the sedimentation pond will be equipped with an adequately sized riprap apron to slow the combined flow sufficiently to prevent erosion of the downstream channel (Volume 11, Hydrology Appendix B Section 3.4 i)). Riprap or other protection such as culverts or concrete will be placed at all sedimentation pond inlets and outlets to prevent scouring. Riprap will consist of substantial, non-slaking rock material of adequate size (Volume 11, Hydrology Appendix B Section 3.1 f)). Culverts with designed flows that exceed 5 ft/sec will have riprap outlet structures designed for the specified storm event. Figure 11 shows culvert outlet design.

### **Impoundments**

Impoundments will be located, maintained, constructed and reclaimed to comply with R645-301-733 -734, -743, -745 and -760 (Volume 11, Section 753). Design and construction specifications for the Rilda Canyon portal facilities sedimentation pond are discussed in Volume 11, Hydrology Appendix B, Sections 3.1 and 3.4; Figures 6-9; and Tables 15-18; and on Plate 700-3.

Reclamation of the clay liner for the sedimentation pond is discussed in Volume 11, Sections 533 and 553, which are referred to in Section 533 as the locations for the pond design. Construction and reclamation of the clay liner is also discussed in Volume 11, Hydrology Appendix B, Section 4.4.

Section R645-301-521.180 discusses the tank, located on the east side of the parking lot area, that will provide sediment control for the Rilda Canyon portal facilities.. The tank will be divided into two compartments, a 7,541-gallon Tank #1 for gray water (boot wash, showers, floor drains, etc.) and an 18,506-gallon Tank #2 for washdown and precipitation runoff. The tanks and pumps will be housed in 30-foot x 60-foot pre-engineered building.

Tank #1 will be pumped directly into an abandoned area of the underground mine workings, which dip to the east away from any potential public water source in Rilda Canyon. The waterline into the mine will be installed by drilling approximately 800 feet through the Star Point Sandstone to the abandoned workings of the 2nd Right longwall panel. The drill hole will be cased with steel or HDPE pipe.

Tank #2 will overflow into Tank #1 and be pumped into the mine. If the runoff a storm event is larger than Tank #2 can contain, the water will overflow into the emergency spillway and be piped to the sedimentation pond.

### **Ponds, Impoundments, Banks, Dams, and Embankments**

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TECHNICAL MEMO

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No permanent structures are planned for the Rilda Canyon Portal Facilities. There will be no banks, dams, or embankments. Temporary impoundments for the Rilda Canyon portal facilities will be located, maintained, constructed and reclaimed to comply with R645-301-733 - 734, -743, -745 and -760 (Volume 11, Section 753).. Design and construction specifications for the Rilda Canyon portal facilities sedimentation pond are provided in Volume 11, Hydrology Appendix B and on Plate 700-3.

Volume 11, Sections 521.180, 532, 728, and 731.500 discuss the 26,000-gallon runoff-collection tank that will provide sediment control for the Rilda Canyon portal facilities. If runoff is larger than the tank can contain, water will overflow into the emergency spillway and be piped to the sedimentation pond.

### **Water Replacement**

The Permittee commits to replace any State-appropriated water supply that is contaminated, diminished or interrupted by Underground Coal Mining And Reclamation Activities conducted after October 24, 1992, if the affected water supply was in existence before the date the Division received the permit application for the activities causing the loss, contamination or interruption. The baseline hydrologic and geologic information required in R645-301-700 will be used to determine the impact of mining activities upon the water supply (Section 731.530).

Rilda Springs is an important source of water for the communities served by NEWUSSD. The Permittee monitors the stream and springs in Rilda Canyon for potential mining related impacts (Section 728, Hydrologic Balance-Groundwater, B-Mitigation). In 1993, the Permittee and NEWUSSD agreed upon mitigation plan that included construction of a slow sand water treatment plant with a 0.5 million-gallon storage reservoir. Construction of the plant and reservoir was completed and the plant brought on-line in November 1994.

To alleviate concerns with the proposed Rilda Canyon Portal Facilities, the Permittee and NEWUSSD are investigating re-location of the Rilda Canyon Springs collection system from their current location to the mouth of the right fork of Rilda Canyon above the portal facilities. The proposed collection system study is shown on Maps 700-1 and 500-2 (Section 728, Hydrologic Balance-Groundwater, E). The Permittee submitted an investigation plan to the Division outlining hydrologic objectives of the site investigation in Volume 11, Hydrology Appendix D. The current proposal does not rely on this relocation, and the outcome of the geologic investigations at the Proposed Spring Collection area does not affect the feasibility of the Rilda Canyon Facilities project as proposed.

## **Findings:**

Operation Hydrologic Information is sufficient to meet the requirements of the Coal Mining Rules.

# **RECLAMATION PLAN**

## **GENERAL REQUIREMENTS**

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

## **Analysis:**

Before abandoning a permit area or seeking bond release, the Permittee will ensure that all temporary structures are removed and reclaimed, and that all sedimentation ponds, diversions, impoundments and treatment facilities meet the requirements of R645-301 and R645-302 for permanent structures, have been maintained properly, and meet the requirements of the approved reclamation plan for permanent structures and impoundments. The Permittee will renovate such structures if necessary to meet the requirements of R645-301 and R645-302 and to conform to the approved reclamation plan. According to Sections 732.200, 733, and 743 of Volume 11, no permanent structures - including sediment ponds - are planned for the Rilda Canyon Portal Facilities. Information related to the reclamation plan for the Rilda Canyon Portal Facilities is in v11, Section 540 and Hydrology Appendix B.

## **HYDROLOGIC INFORMATION**

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

## **Analysis:**

### **Hydrologic Reclamation Plan**

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TECHNICAL MEMO

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The Rilda Canyon portal facilities hydrologic reclamation plan is in Volume 11, Hydrology Appendix B, Sections 4.1 – 4.4. All slopes will be compatible with the postmining land use of the area and will provide adequate drainage. Because the subdrainage areas in the reclaimed area are ephemeral and rarely receive flow, the drainage systems through the site will be armored with rock but not designed as a riprapped channel. Final surface configuration will channel any drainage that may occur from undisturbed areas through the reclaimed armored channels. Drainage will then be conveyed to road culverts that are piped to Rilda Creek. Silt fences or straw bales will be located in the reclaimed drainage to treat and control sedimentation (Section 553.100).

Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-763 (Volume 11, Section 752). Before abandoning the permit area or seeking bond release, the Permittee will ensure that all temporary structures are removed and reclaimed (Section 760). The road and culverts will be removed during final reclamation from the site and the Forest Development Trail will be re-established (Section 543).

All permanent sedimentation ponds, diversions, impoundments and treatment facilities meet the requirements of R645-301 and R645-302 for permanent structures, have been maintained properly, and meet the requirements of the approved reclamation plan for permanent structures and impoundments (Volume 11, Section 760). According to Sections 732.200, 733, and 743 of Volume 11, no permanent structures are planned for the Rilda Canyon Portal Facilities.

### *Monitoring*

Surface water-monitoring stations (Appendix A) will continue to be monitored quarterly (when accessible) throughout the operational phase of the mine. Post-mining monitoring of surface water will continue at representative stations determined with the aid and approval of DOGM. Representative surface water stations will be monitored biannually during high and low flow conditions. Monitoring will continue until the release of the reclamation bond or until an earlier date to be determined after appropriate consultation with local, state, and federal agencies (Volume 11, Section 728, Hydrologic Balance-Surface Water System, F).

Monitoring of the described ground-water resources will proceed through mining and continue during reclamation until bond release. Removal of the Rilda Canyon piezometers will be approved by the Division in conjunction with the Utah State Division of Water Rights (Volume 11, Section 731.200).

### *Casing and Sealing of Boreholes and Wells*

All wells will be managed to comply with R645-301-748 and R645-301-765 (Volume 11, Section 755). Each water well will be cased, sealed, or otherwise managed, as approved by the Division (Volume 11, Sections 551, 631, 731.400, and 755). Plans are to backfill or seal exploration holes or boreholes to prevent acid or toxic drainage from entering water resources, minimize disturbance in the permit and adjacent areas of the permit area. Boreholes will be filled from total depth to the surface with type II portland cement. If circulation cannot be maintained while filling, the borehole will be filled with bentonite chips to within 5 feet of the top, then a cement surface plug with a permanent identification marker will be placed on the top of the hole (Volume 11, Section 631).

## **CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT (CHIA)**

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

### **Analysis:**

The Rilda Canyon portal facilities submittal is a significant revision, so the CHIA needs to be reviewed and updated if necessary.

### **Findings:**

The Division is updating the CHIA to include the South Crandall Lease, Crandall Canyon IBC, and Rilda Canyon portal facilities.

## **REQUIREMENTS FOR PERMITS FOR SPECIAL CATEGORIES OF MINING**

### **OPERATIONS IN ALLUVIAL VALLEY FLOORS**

Regulatory Reference: 30 CFR Sec. 822; R645-302-324.

### **Analysis:**

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TECHNICAL MEMO

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Based on information provided in the application, there might be an alluvial valley holding Rilda Creek in the bottomlands of Rilda Canyon (see the Tech Memo by Priscilla Burton for additional information.). The extent of the alluvium is shown on Dwg. 200-1 as map unit A. These streamlaid deposits in the bottomlands have historically been the source of irrigation and culinary water in Emery County. A description of the significance of the alluvial aquifer and ground-water collection system to the community downstream is given in Section R645-301-721, A., 8.

Characteristics of the alluvial aquifer are described in several sections of Volumes 9, 9A, and 9B. The likelihood of causing material damage to the quantity or quality of surface or ground waters supplying the alluvial valley floor and particularly the NEWUSSD water collection system, is discussed in the PHC (Section R645-301-728), in particular under the headings Hydrologic Balance-Surface Water System, E. INTERFERENCE TO RILDA SPRINGS (QUALITY), and Hydrologic Balance-Groundwater, B. MINING IN THE RILDA CANYON AREA-NEWUSSD SPRINGS. Environmental monitoring, including pre- and post-disturbance evaluations of macroinvertebrate populations and identify resident fish populations, is to be done during and after mining to ensure protection and preservation of the hydrologic functions of the alluvium (Volume 9, Appendix A and Volume 11, Section R645-301-731.200 and Section R645-301-721, B. EXISTING SURFACE RESOURCES, 1. REGIONAL AND PERMIT AREA SURFACE WATER HYDROLOGY, North Rilda Permit Area Watershed Characteristics, *Biological Organisms and Their Habitat Within Rilda Canyon*).

**Findings:**

For the points covered in this Tech Memo, the information regarding Operations in Alluvial Valley Floors is sufficient to meet the requirements of the R645 Coal Rules. (See the Tech Memo by Priscilla Burton for additional comments.)

**RECOMMENDATIONS:**

The application is not recommended for approval at this time.