



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801
801-538-5340
801-359-3940 (Fax)
801-538-7223 (TDD)

June 24, 1997

TO: File

THRU: Daron Haddock, Permit Supervisor *NORTH*

FROM: Michael Suflita, Reclamation Hydrologist *MS*

RE: Crandall Canyon Expansion, Genwal Resources, Inc., Crandall Canyon Mine, ACT/015/032-96-1, File #2, Emery County, Utah

SYNOPSIS

On January 7, 1996 Genwal submitted a major permit modification request to allow for installation of a 6 ft. diameter culvert that would be 1200 ft. long. The purpose was to expand the currently limited surface facilities in Crandall Canyon. On March 14, 1996 Genwal submitted the updated plates associated with the culvert and expansion as they were not finished for the original submittal.

On July 5, 1996 DOGM completed a TA for the revised Mining & Reclamation Plan (MRP). Genwal Resources responded with a revised MRP on April 24, 1997. The application was determined to be administratively complete on June 11, 1996. This was followed by numerous personnel changes at Genwal which resulted in several changes in their approach to the project. The culvert length was increased to 1400 ft. and the project was expedited to try and accommodate construction during the 1997 season. In addition, new information on Colorado River Cutthroat Trout being present in Crandall Creek raised the sensitivity and visibility of the project.

This document is a Technical Analysis of the above-mentioned April 24, 1997 MRP. It is limited in scope to the hydrology aspects of the request.

BASELINE

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-720.

Analysis:

The addition of the 1400 ft. culvert and the addition of over 73,000 cu. yd. of fill material do constitute a significant revision to the permit. The surface area is increased from 5.55 acres to 12.78 acres, a 130% increase. There are also significant additions and revisions of machinery, equipment, and facilities used in the mining operations.

The original plan, dated 12/23/94 Revised 10/1/95, contains the baseline data that are relevant to the proposed culvert and expansion. The baseline data in the following areas have been reviewed and determined to be unchanged from the original Technical Analysis and approval:

- ◆ Sampling and Analysis: para. 723
- ◆ Baseline Information: para. 724
- ◆ Baseline Cumulative Impact Area Information: para 725
- ◆ Modeling: para 726
- ◆ Groundwater Monitoring Plan: para.731.210
- ◆ Surface-water Monitoring Plan: para. 731.220

Findings:

The Baseline hydrologic information used to establish the original mining application are applicable to the culvert and expansion. As such, the requirements of R645-301-723 through 726, 728, and 732.200 have been met.

Probable Hydrologic Consequences Determination, Regulatory Reference: R645-301-728

Analysis:

Appendix 7-15, PROBABLE HYDROLOGIC CONSEQUENCES DETERMINATION contains the relevant information. Related information is also contained in Appendices 7-50, CONSTRUCTION SEQUENCE-72" CULVERT and APPENDIX 5-22, CRANDALL CANYON MINE SITE RECLAMATION PLAN. Included is a description of

the short-term effects caused by the culvert construction project and plans to mitigate those effects. Basically there will be an increased sediment load to the stream during construction which will be controlled by multiple straw bales and silt fences. These will be placed at the downstream end of the construction site and in Crandall Creek. The two silt fences in the stream are of a higher order than is customary for such projects and is expected to be adequate under the flows expected during construction. The plan also contains a commitment to clean the sediment traps as needed to maintain efficiency.

The construction plan includes a detailed description of an under drain, enclosed in gravel and filter fabric, located below the main culvert. This under drain will handle low stream flows during construction and greatly reduce sediment migration into the stream. The sediment pond will still be used and will be enlarged to handle the increased operations area size.

The stream channel and adjacent side slopes will be buried in-situ (without topsoil removal) during the life of the project and will be reclaimed when the mine is closed. The plans, as described in the above appendices, include a description of the several areas and reclamation sequences for each area. Most areas will be handled with standard methods which include backfill and regrading, topsoil replacement, and seeding and mulching. The south slope of Crandall Creek is rather steep and presents the greatest challenge to reclamation. The stream channel also is a reclamation challenge. Existing soils will be left in place in both areas. A fabric isolator and soil marker is used to keep from damaging the in-situ soils during reclamation. The stream channel and banks are reclaimed in a similar manner. The reclamation phase also includes straw bales and silt fences as described above.

The culvert project is believed to not impact the hydrologic balance and ground-water or surface-water availability. Except for the construction and reclamation periods described above, the sediment yield from the disturbed areas should not be affected. No acid-forming or toxic-forming materials are involved in the project.

Findings:

The plan fulfills the requirements of this section of the regulations.

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:

The original plan, dated 12/23/94 Revised 10/1/95, contains several sections that are relevant to the proposed culvert and expansion. The plan sections in the following areas have been reviewed and determined to be unchanged from the original Technical Analysis and approval:

- ◆ Discharges into an Underground Mine: para. 731.510
- ◆ Gravity Discharges from Underground Mines: para. 731.520
- ◆ Water Quality Standards and Effluent Limitations: para. 751
- ◆ Siltation Structures: Other Treatment Facilities, 742.230
- ◆ Impoundments, 733, 743

Findings:

The Operation Plan hydrologic information used to establish the original mining application are applicable to the culvert and expansion. As such, the requirements of the above-listed paragraphs have been met.

Surface-water Monitoring Plan, R645-301-731.220

Analysis:

As part of the Surface-water Monitoring Plan, the July 5, 1996 Technical Analysis by the Division required the Operator to provide, "Detailed descriptions of construction activities.....that will prevent sediment from entering the stream." These are provided in Appendix 7-50, CONSTRUCTION SEQUENCE- 72" CULVERT. This appendix provides detailed descriptions for constructing the following:

- Silt fences along the construction site and in the stream to catch sediment.
- An in-stream drain system to divert the stream and reduce sediment during construction and reclamation.
- An energy dissipator at the culvert outlet.
- The 72" corrugated metal culvert, with due consideration to operations and sequences to reduce sediment contributions to the stream.
- The Operations Pad, which is the main purpose of this project, and enlargement of the sediment pond.

The sequence includes leaving the stream channel and south canyon slope topsoil in place and isolating them with a geotextile and marker soil layer to preserve the morphology during the life of the culvert project. This will greatly facilitate reclamation also. **The requirements imposed by the Division have been met with the sequence presented in Appendix 7-50.**

As part of the Surface-water Monitoring Plan, the July 5, 1996 Technical Analysis by the Division required the Operator to provide, "Comparison of water samples upstream and downstream of the construction site to determine relative turbidity and suspended solids." This requirement was based on Crandall Creek being defined as a "critical fisheries habitat".

Considerable effort has been exerted by the U.S. Forest Service, Utah Division of Wildlife, Bureau of Land Management, Utah Water Rights, and Utah Division of Oil, Gas, and Mining to come to a consensus on how to handle the fish in Crandall Creek. The details of that plan are contained in Appendix 3-12, CRANDALL CREEK/ COLORADO CUTTHROAT TROUT MITIGATION PLANS. That plan is evaluated elsewhere in this Technical Analysis. Sufficient to point out here is that the plan makes the previous requirement for comparison of water samples upstream and downstream of the construction site unnecessary. **That requirement is rescinded.**

The Surface-water Monitoring Plan in the original mining application is applicable to the culvert and expansion.

Findings:

The plan fulfills the requirements of this section of the regulations.

Diversions: General, R645-301-732.300, 742.300

Analysis:

Page 7-46 and especially Appendix 7-4, CRANDALL CANYON MINE SEDIMENTATION AND DRAINAGE CONTROL PLAN contain a complete description of the temporary and permanent diversions. The main culvert, which is the primary feature of this permit modification, is appropriately designed for a 100-year, 6-hour storm (para. 742.323). All other culverts and ditches are designed for the required (para. 742.323) 10-year, 6-hour storm. In addition, they have been checked and will pass the 10-year, 24-hour storm which is more stringent. It's noteworthy that this site has the fortunate situation where the main culvert inlet has an inherent safety factor. That is, the culvert inlet has a total of 18 ft. of vertical rise before spilling onto the operations pad and the design flow requires only 6.6 ft. of rise. The result of that is the culvert can pass the design flow plus an additional flow.

Although not a regulatory requirement, the Operator has included two 36-inch risers in the main culvert to facilitate maintenance and clean out.

The main culvert is fitted with two trash racks, one at and one above the inlet. Other culverts will also have trash racks and the commitment is made to inspect regularly and maintain to prevent plugging. Reference para. 742.423.3. Culverts and riprap are provided in those locations where erosion would be a problem due to steep slopes and erosive soils.

All designs are prepared by a Registered Professional Engineer, as required.

Findings:

The plan fulfills the requirements of this section of the regulations.

Stream Buffer Zone, R645-301-731.600

Analysis:

Section 7.31.6, Stream Buffer Zones covers this topic. The plan outlines the areas that will be maintained as a buffer zone and have the required signs.

Findings:

The plan fulfills the requirements of this section of the regulations.

Sediment Control Measures, R645-301-732, 742

Siltation Structures: Sedimentation Ponds, R645-301-732.200, 742.200

Analysis:

Design for the new sediment pond is contained in Appendix 7-4, CRANDALL CANYON MINE SEDIMENTATION AND DRAINAGE CONTROL PLAN. Plates 7-5 and 7-3 show construction details. As required by the Division, the piezometer installed in the side of the old sedimentation pond has been retained in the new pond.

The new sediment pond has been enlarged and redesigned to accommodate the larger pad area with the culvert project. The revised pond extends out on top of the new culvert and thus is above a perennial stream. The calculations used for the pond design include a 10-yr, 24-hr event for the pond and a 25-yr, 6-hr event for the spillway which are the correct regulatory designs. Reference R645-301-742.221.33 and .223. The concrete cutoff at the spillway inlet is an appropriate design. Ditches and culverts conveying water to the pond are appropriately sized.

Findings:

The plan fulfills the requirements of this section of the regulations.

Discharge Structures, R645-301-744

Analysis:

There is an energy dissipator on the culvert outlet which appears to be adequately designed. The energy dissipator has an apron and sloped sides with riprap of adequate size for the expected design flows. There is also a layer of two-inch rock below the riprap which will further protect the stream from erosion. The energy dissipator design provides for an exit velocity less than the natural stream velocity for the design flows. This is a good design and should minimize sediment contributions as required.

Findings:

The plan fulfills the requirements of this section of the regulations.

RECLAMATION PLAN

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.

Diversions: General, R645-301-732.300, 742-300

Analysis:

The July 5, 1996 Technical Analysis by the Division required the Operator to provide:

- ◆ Construction aspects during the culvert expansion project to accommodate future reclamation,
- ◆ Specific objectives and construction sequencing during the reclamation phase,
- ◆ Specific objectives and methods to control sediment in the stream during reclamation construction,
- ◆ Stream diversion methods, if used during reclamation,
- ◆ Objectives and methods for accomplishing restoration of the stream channel and steep side slopes,

Appendix 5-22, CRANDALL CANYON MINE SITE RECLAMATION PLAN provides the specific details of reclamation of the culvert project and the entire mine site. Related information is also contained in Appendix 7-50, CONSTRUCTION SEQUENCE-72" CULVERT. Plates 5-16 and 5-17 also show the reclaimed site. Included in the reclamation plan are the designation of eight specific areas and a reclamation sequence for each. Six of the eight areas are reclaimed in typical fashion involving:

- Structure removal
- Asphalt paving removal
- Backfilling, regrading, and recontouring to Approximate Original Contour (AOC)
- Topsoil distribution

-Seeding and mulching

Two of the areas, the Stream Channel and South Side of the canyon, require special treatments such as removal of the culvert and under drain, and revitalizing the in-situ soils. These appendices satisfy the above Division requirements.

The reclamation plan includes removal of all culverts except two, one at the upper end and one at the lower end of the site. The two that are left are needed to carry runoff under the Forest Service road. That road is left in place to sustain the postmining land use of recreation.

The plan is explicit in methods of construction, restoration of approximate original contour, and revegetating the site. This is expected to "restore or approximate the premining characteristics of the original stream channel including the natural riparian vegetation" as required under paragraph 742.313.

The July 5, 1996 Technical Analysis by the Division required that, "the turbidity be monitored on a continuous basis during reclamation". This requirement was based on Crandall Creek being defined as a "critical fisheries habitat".

Considerable effort has been exerted by the U.S. Forest Service, Utah Division of Wildlife, Bureau of Land Management, Utah Water Rights, and Utah Division of Oil, Gas, and Mining to come to a consensus on how to handle the fish in Crandall Creek. The details of that plan are contained in Appendix 3-12, CRANDALL CREEK/ COLORADO CUTTHROAT TROUT MITIGATION PLANS. That plan is evaluated elsewhere in this Technical Analysis. Sufficient to point out here is that the plan makes the previous requirement for continuous turbidity monitoring unnecessary. **That requirement is rescinded.**

Findings:

The plan fulfills the requirements of this section of the regulations

Siltation Structures, R645-301-763

Analysis:

The Reclamation Plan in Appendix 5-22, CRANDALL CANYON MINE SITE

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RECLAMATION PLAN and Appendix 7-4, CRANDALL CANYON MINE SEDIMENTATION AND DRAINAGE CONTROL PLAN describes the sequence and methods of handling sediment runoff during the critical period when the vegetation is being reestablished. Included are silt fences along both sides of the stream the entire length of the site to minimize localized runoff. The sediment pond is retained during the first phase of reclamation and removed during Phase Two. During reclamation all areas are regraded and revegetated as required. Included is a timetable which shows the timely removal of the pond.

Findings:

The plan fulfills the requirements of this section of the regulations

RECOMMENDATION

The request for major permit modification to the Crandall Canyon No. 1 Mine has been accompanied by a revised Mining and Reclamation Plan. It appears that the plan conforms to all the applicable regulatory requirements. Therefore, from a hydrology standpoint, the request can be approved.

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