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DIVISION OF OIL, GAS AND MINING

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June 5, 1996

TO: Daron Haddock, Permit Supervisor *DRH*
FROM: Michael Suflita, Reclamation Hydrologist *MS*
RE: ~~RE~~ Review, Crandall Canyon No. 1 Mine, (Culvert to
Expand Surface Facilities), Genwal Coal Co., ACT/015/032,
Working File, Emery County, Utah.

Folder #2

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 is 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.

This document is a Technical Analysis of the significant revision request. It is limited in scope to the hydrology aspects of the request.

ANALYSIS

BASELINE ENVIRONMENTAL RESOURCE INFORMATION
Regulatory Reference: R645-301

HYDROLOGIC RESOURCE INFORMATION
Regulatory Ref.: R645-301-723 through 726, 728, 731.200



Analysis:

The addition of the 1200 ft. culvert and the addition of 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 10.0 acres, an 82% 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
- ◆ Probable Hydrologic Consequences determination: para. 728
- ◆ 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.

OPERATION PLAN

HYDROLOGIC INFORMATION

Regulatory Ref: R645-301-730, 740, & 750.

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, 731.220

Analysis:

The surface-water monitoring plan approved before the culvert project proposal is described beginning on page 7-47. Although this is an approved plan, it does not include any revisions due to the culvert installation. The period of time the culvert is under construction is critical to preventing sediment contributions to Crandall Creek. The stream is a high value fisheries stream and sediment must be actively prevented from entering it. To react to events would run the risk of killing the fish downstream.

Some, although not all, specific surface-water monitoring activities that are needed to evaluate the plan include:

- ◆Detailed descriptions of construction activities and associated actions and prohibited actions that will prevent sediment from entering the stream.
- ◆Comparison of water samples upstream and downstream of the construction site to determine relative turbidity and suspended solids. This will reflect the impact of construction activities.
- ◆An immediate action plan in terms of mitigation and of cessation of activities which caused any increase in turbidity and suspended solids.

An explanation of construction activities is provided on page 3-9 of the Biology section. Reference is made to an undefined "Appendix 3-" where more detailed plans are available. Reference is also made to the parameters to be tested after sampling on a daily basis. Given that Crandall Creek is a critical fisheries habitat, and given that the construction activities can (and routinely do) cause large sediment contributions in a momentary event, DOGM requires that the turbidity be monitored on a continuous basis. Such a requirement is allowed under R645-301-731, "The Division may require additional preventative, remedial, or monitoring measures to assure that material damage to the hydrologic balance outside the permit area is prevented." The plan proposal of a maximum 10% allowable turbidity increase is reasonable.

Findings:

The current surface-water monitoring plan does not meet the requirements of R645-301-731.220. In particular, para. 731.221 which requires "The plan will provide for the monitoring of parameters that relate to the suitability of the surface water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance as set forth in R645-301-731 as well as the effluent limitations found in R645-301-751." When preparing the plan, paragraphs 731 and 751 should be followed for specific requirements on earth-handling to meet these requirements. Additionally, R645-301-526.222 contains requirements relative to minimizing damage to fish and to minimizing suspended solids. These requirements should be included to the surface-water monitoring plan.

The surface-water monitoring plan must include continuous monitoring of turbidity and detailed measures to prevent the construction from causing sediment in the stream.

R645-301-732.300, 742.300, Diversions: General
R645-301-742.330, Diversions: Miscellaneous Flows
R645-301-720, Environmental Description

Analysis:

Discussions of the runoff control facilities on the proposed expanded pad are presented on page 7-68. They make reference to Plate 7-5D, however there is no such plate. Calculations are referenced in the text to be in Appendix 7-7, but this appendix contains other information. Per telephone conversation with the Operator, Plate 7-5 and the Addendum to Appendix 7-4 was used for the Technical Analysis. However, other difficulties soon became evident. Plate 7-5 contains no designators for the three undisturbed watersheds and the three pad areas referenced in the text. Further, there was no way to correlate calculations for watershed A or to pad area A. Similarly, culverts are described as being in certain locations, and they are not as described. In the Addition to Appendix 7-4 there are no Hydrograph Generation Program Output calculations for pad area A. Therefore, it is not possible to evaluate the proposal. Plate 7-5 lists the contour interval as 2 ft. while the contour is actually 10 ft.

The text indicates that "due to the gentle slopes of the pad areas (approximately 2%), riprap will not be required in the drainage ditches." While this is true for most of the ditches, Drainage Ditch DD-14 has an average slope of nearly 32%. Similarly, a portion of DD-13, just downstream of C-11, has a 33% slope. As such they must have protection, such as riprap or be put into a culvert. On Plate 7-5 there is a section of land within the disturbed area uphill of the west half of DD-13. This is a steep area of about 66% slope with no apparent purpose in the proposed expansion. It would appear more appropriate for the disturbed area boundary to follow the alignment of DD-13. On Plate 7-5 there is a V-shaped drainage area on the South side of the proposed pad extension which concentrates its flow into DD-13. This is a natural stream channel. As such, it is likely to wash out the ditch and carry runoff and sediment onto the disturbed area.

The Addendum to Appendix 7-4 used the 10yr-24hr storm to design the ditches for the undisturbed watersheds and operations pad areas. This is an appropriate design.

Findings:

The requirements of R645-301-720 have not been met. Particularly paragraph 722 which requires "... maps to adequately represent the existing land surface configuration of proposed disturbed areas and the proposed permit area...".

The requirements of R645-301-732.300 and 742.300 have not been met. In particular, para 742.100 which requires, "Minimize erosion to the extent possible", "Diverting runoff away from disturbed areas.", and "Diverting runoff using protected channels or pipes through disturbed areas so as not to cause additional erosion."

The design methods used are appropriate and conform to R645-301-742.323.

Diversions: Perennial and Intermittent Streams, 742.320

Analysis:

The culvert capacity was calculated using the SCS, Type B method as presented in Addendum to Appendix 7-7. The resulting 431 cfs was confirmed by DOGM calculations. The 100 yr- 6 hr event was used which conforms to R645-301-742.323 requirements and to the DOGM position paper on the subject. It is noteworthy that this site has the fortunate situation where the 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. The result of that is the culvert can pass the design flow, 431 cfs, plus an additional 200 cfs.

Findings:

The requirements of R645-301-742.330 have been met. This portion of the plan is approved with Entrance Type B as shown in Addendum to Appendix 7-7. The Operator is cautioned to be certain the culvert inlet type used for design is the one installed in the field. As shown on the nomograph, other inlet types could substantially reduce culvert capacity.

The Division would recommend that a trashrack be installed upstream of the culvert inlet. Substantial quantities of trees and wood debris are present along the entire stream and they should be kept from entering the culvert.

Stream Buffer Zones, 731.600
Operation Plan, 520

Analysis:

The revised plan indicates buffer zones will be maintained above and below the culvert. See pg. 7-53. This is appropriate for regulatory compliance. However, there is a notable discrepancy between the underground buffer zones delineated on Plate 5-2 of the old plan (Rev. date 1/17/95, Rcvd date 6/23/95) and the revised Plate 5-2 (Rev. date 2/28/96, Rcvd date 5/8/96). The discrepancy is the old plate shows the underground stream buffer zone extending into Section 2, State Lease ML-21568, while the new plate shows the underground buffer zone stopping at the east line of Section 2. Such a change would result in the loss of approximately 2900 ft. of buffer zone, accompanied by no secondary mining, beneath Crandall Creek. Such a loss would have a severe negative impact on the stream due to subsidence.

This discrepancy may be an oversight in Plate preparation, and if so, should be corrected. If it is a proposed change in the MRP, it needs to be accompanied by complete justification of such action.

The subsidence plan, as described beginning on page 5-13, does not have any revisions due to the culvert project. Thus it is unclear whether the intent is to revise the underground mining as indicated on the revised Plate 5-2.

Page 7-53, Section 7.31.6 Stream Buffer Zones indicates, "For additional information concerning stream buffer zone protection see Chapter 3." No information could be found in Ch. 3 on buffer zones. The Operator is requested to provide any missing information.

Due to the inherent nature of the culvert project it will be necessary for the Division to specifically authorize operations closer than 100 ft. to, or through, a stream. This cannot be done until the information outlined in paragraph 731.600 has been completely and accurately presented.

Finding:

The requirements of R645-301-731.600 have not been met. In particular, para. 731.611 "Coal mining and reclamation operations will not adversely affect the water quantity and quality or other environmental resources of the stream."

The requirements of R645-301-520 have not been met. The requirement of para. 521.142 is that "maps and/or cross sections will clearly indicate ...the location and extent of areas in which...measures will be taken to prevent, control, or minimize subsidence and subsidence-related damage." Paragraph 525.100 requires "a subsidence control plan which will contain....a detailed description of the subsidence control measures that will be taken to prevent or minimize subsidence.... including, but not limited to: leaving areas in which no coal is removed, including a description of the overlying area to be protected by leaving the coal in place."

Sediment Control Measures, 732, 742

Siltation Structures: Sedimentation Ponds, 732.200, 742.220

Analysis:

The piezometer installed in the side of the sedimentation pond described in the old plan is not mentioned as being part of the revised plan. Reference page 7-50 and compare old Plate 7-4 to new Plate 7-3. The revised pond still has the same elevation difference to the creek (about 32 ft.) and the canyon is not filled above the culvert outlet. Thus, the potential for subsidence still exists.

The revised plan indicates, "The eventual discharge from the emergency spillway will be to the energy dissipator at the downstream end of the Crandall Creek bypass culvert." An examination of Plates 7-3, 7-5, 5-3, and other related plates, shows no such connection. This appears to be an error in the text or the plates.

The sediment pond has been enlarged and redesigned to accommodate the larger pad area with the culvert project. See pg. 7-57. 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.

Page 7-57 indicates Plate 7-3 contains watershed boundaries associated with the revised pond, while the revised plate 7-3 contains sediment pond details. Finally, there are numerous problems with Plate 7-5, Crandall Canyon Mine Drainage Map which are discussed under **R645-301-732.300, 742.300, Diversions: General. and R645-301-720, Environmental Description.**

Findings:

The requirements of R645-301-742.221.37 have not been met. It will be necessary to continue the quarterly piezometer measurements and weekly visual monitoring under the new plan as has been done under the old plan.

The requirements of R645-301-720 have not been met. The text and plates are not consistent with regard to the sedimentation pond emergency spillway discharge.

The requirements of R645-301-732.200 have not been met. Although the basic design of the sedimentation pond is presented, the several significant inconsistencies between plates and text make it impossible to tell if it is done correctly and completely.

Siltation Structures: Exemptions, 742.240

Analysis:

Comments relative to this section have already been submitted to the Operator under the Midterm Review of this mine. They should be consulted for appropriate action.

Findings:

See Midterm Review of this mine.

Discharge Structures, 744

Analysis:

The energy dissipator design provides for an exit velocity less than the natural stream velocity for the same event. This is a good design and should minimize sediment contributions as required.

The Addendum to Appendix 7-7, pg. 17, contains the notation "All gabion baskets to be attached to adjacent baskets with hog rings or other appropriate wire fasteners. " Hog rings are inadequate for the energy dissipator to perform under the design conditions. The gabions would be dislodged and washed out if held together with such tenuous fasteners. Further, gabion manufacturers have requirements for much more substantial fastening between adjacent gabions. Usually these involve spiral lacing of minimum gage wires. The Operator should consult the Hilfiker Art Weld Gabions Construction Guide, Beckart Gabion Installation Guide, and other gabion manufacturer instructions.

The sediment pond primary and emergency spillways outlet system has been redesigned to handle the extended pad area and additional undisturbed areas. The required 25-year, 6-hour event was used in the design.

Findings:

The requirements of R645-301-744 have not been met. The discharge from the culvert into the energy dissipator, as the plan describes, will not perform to "reduce erosion to prevent deepening or enlargement of stream channels...".

The requirements of R645-301-742.312 have also not been met. "The diversion and its appurtenant structures will be designed, located, constructed maintained, and used to: Be stable." The attachment of gabions to each other are is not adequate as presented in the plan.

RECLAMATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: R645-301-760

Analysis:

The following paragraphs have been reviewed and compared to the Reclamation section starting on pg. 7-72. The plan does not mention these paragraph topics and therefore they all are not conforming to their respective paragraphs.

Discharges Into an Underground Mine, 731.510

Gravity Discharges From an Underground Mine, 731.520

Water-quality Standards and Effluent Limitations, 751

Stream Buffer Zones, 731.600

Finding:

The Reclamation plan does not conform to respective paragraphs listed above.

Diversions: General, 732.300, 742.300

Analysis:

The Final Reclamation plan outlined on pages 7-72 to 7-74 and shown on Plates 5-16 and 5-17 describes the Applicants methods to reclaim Crandall Canyon. Plate 5-16 is designated Reclamation (Phase I) and Plate 5-17 (Phase II). However, there are not any corresponding Phase I & II descriptions in the narrative. While the reclamation of the sedimentation pond is covered, there is no indication as to the timing of its removal.

There are several aspects of the canyon which make a detailed and comprehensive reclamation plan essential. These include the high value of the stream as a fisheries habitat, and steep canyon sides (66% to 83%) with the attendant difficulties in reclaiming such slopes. The old and unrevised plan is rather general in nature. It is therefore difficult to establish the actual nature and scope of the reclamation plan, and there is no mention of the culvert expansion. With the culvert project being a major revision to the plan, a substantial revision to the reclamation aspects is also necessary. One example is the statement that "Backfilling and grading will be done according to the original timetable as originally submitted." Finally, the last paragraph on pg. 7-74 is confusing as to intent and meaning.

The Applicant has sent three letters to DOGM which describe the expansion and they contain some reclamation descriptions. They are dated January 17, 1996, March 14, 1996, and March 27, 1996. These letters are correspondence and, as such, are not actually part of the Mining and Reclamation Plan. The reclamation portions of the letters are rather abbreviated, being only two paragraphs long. Finally, the Applicant and DOGM have discussed several methods to achieve successful reclamation and none of them are currently in the plan.

In its present form the Final Reclamation plan is incomplete. Some, although not all, specific reclamation-related activities needed to evaluate the plan include:

- ◆ 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,

Given that Crandall Creek is a critical fisheries habitat, and given that the construction activities can (and routinely do) cause large sediment contributions in a momentary event, DOGM requires that the turbidity be monitored on a continuous basis during reclamation construction activities. Such a requirement is allowed under R645-301-731, "The Division may require additional preventative, remedial, or monitoring measures to assure that material damage to the hydrologic balance outside the permit area is prevented." The plan proposal of a maximum 10% allowable turbidity increase is reasonable.

Findings:

The plan does not meet the requirements of R645-301-742.313. Specifically, " A permanent diversion or a stream channel reclaimed after the removal of a temporary diversion will be designed and constructed so as to restore or approximate the premining characteristics of the original stream channel including the natural riparian vegetation to promote the recovery and the enhancement of the aquatic habitat."

Also see R6450301-740, especially 742.120 for further requirements on reclamation of sedimentation ponds.

Siltation Structures, 763

Analysis:

The plan does not describe the sequence and methods of handling sediment runoff during the critical period when the vegetation is being reestablished. One possible scenario is to return the site to its approximate pre-culvert configuration, retaining the smaller sedimentation pond to collect water from the site north of the road. Other plans could be devised, but the point is that vegetation be established before complete removal of the pond.

Findings:

The plan does not meet the requirements of R645-301-763. There is no description to explain how the "siltation structures will be maintained until removal is authorized by the Division and the disturbed area has been stabilized and revegetated".

RECOMMENDATION

The request for significant revision to add the culvert in Crandall Canyon is refused. Upon completing the above-noted deficiencies in the plan, the request will be reconsidered.