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December 20, 1995

TO: Daron Haddock

FROM: Michael Suflita, Reclamation Hydrologist

RE: ~~Draft~~ Review, Crandall Canyon, Castle Gate Mine, ACT/007/004,  
 Working File, Carbon County, Utah

**SYNOPSIS**

On April 20, 1995 DOGM received a Permit Change Application for the subject mine. This was in response to Division Order 94A. On June 28, 1995 the Division responded with a Technical analysis. On September 15, 1995 DOGM received the operator's revisions. This document is a Technical Analysis of these latest revisions.

The Castle Gate Mine is currently not operating. The Willow Creek Mine is due East of the Castle Gate Mine and work has begun to operate Willow Creek. The two mines are intended to connect underground in order to use the existing Castle Gate Mine air shafts (20ft. and 26ft.diameter) in Crandall Canyon. This review is limited to those elements of the proposed plan which affect Crandall Canyon.

**ANALYSIS**

**ENVIRONMENTAL RESOURCE INFORMATION**

**Reg. Ref: R645-301-411, Environmental Description**

Paragraph 3.7-4(8) Cultural, Historical, and Archaeological Sites and Exhibit 3.7-2 describes current and past studies indicating no significant sites. This is consistent with Chapter 5 of the original plan. Paragraph 3.7-5(2)(1) Premining land Use along with Exhibits 3.7-1 & -2 describe the premining land usage of wildlife habitat, grazing, and recreation as the same as the postmining land use.

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### **R645-301-760, Reclamation**

Page 3.7-21, Paragraph 3.7-5(2)(2), indicates "Although the current reclamation plan requires that all of the permanent structures be removed, with the exceptions noted above, Cyprus Plateau reserves the right to re-evaluate retaining the main access road (P-1) at the time of final reclamation (Phase II)." The plan has been approved with removal of the main access road being part of the reclamation. In order to leave the road in the future, the applicant would have to submit an application for Permit Change to consider such action.

February 20th, 1996 revisions to page 3.7-31 have removed all references to retaining the main access road.

### **FINDINGS**

The requirements of R645-301-760 have been met. This includes especially "762 Roads. A road not to be retained for use under an approved postmining land use will be reclaimed immediately after it is no longer needed for coal mining and reclamation uses, ....."

### **R645-301-720. Environmental Description.**

Generally the cross-sections and maps describe the required parameters. However, there are some confusing discrepancies. Page 3.7-15 indicates, "The *ground* water monitoring station for Crandall Canyon, designated as B-22 (was B-43), was monitored quarterly and was included in the monitoring plan submitted to all regulatory authorities during 1978. Surface water monitoring has occurred within the same time frames. The Crandall stations are B-25 and B-26 (see Exhibit 7-3)." On Exhibit 7-3, B-22 is designated as "B-22 *SPRING* MONITORING STATION".

Page 7-8, under Regional Aquifer System, indicates "The low permeability of the Blackhawk Formation has been verified by testing three *wells* within the mine plan area (MC-205, MC-206, and MC-207, see Exhibit 7-2 for location)". Exhibit 7-2 shows MC-207 also designated as B-43.

Adding to the confusion is a discrepancy in locations of sites B-22 and B-43. Exhibit 7-2 shows MC-207 (B-43) near the center of the SE quarter of Section 28, which is in the disturbed area. Figure 7-3 shows B-22 near the North quarter corner of Section 27, which is near the mouth of Crandall Canyon. The two locations are separated by

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about one mile.

Field inspection on 12/04/95 showed a sign reading "Water Monitoring Point B-22" is physically located near the mouth of Crandall Canyon and designates a spring in the bottom of Crandall Creek.

February 20th, 1996 revisions to page 3.7-15 make it sufficiently clear as to the location and correct reference for Spring Monitoring Station B-22.

### FINDINGS

The requirements of R645-301-722.300, to provide the "Elevations and locations of monitoring stations used to gather baseline data on water quality and quantity..." have been met.

### HYDROLOGIC RESOURCE INFORMATION

#### Reg. Ref: R645-301-724, Baseline Information

Section 7.1, Groundwater Hydrology describes existing wells and springs, and provides a detailed description of the geology and groundwater aquifers. The discussion provides a description of the regional aquifer, mine area aquifer, and alluvial aquifers. The groundwater quality and effects of mine operation on groundwater are also presented. Tables 7-1 through 7-3 detail the regional aquifer conductivity, seepage rates into the mine, and groundwater recharge. Section 7.2, Surface Water Hydrology describes surface water regime including flows, runoff calculations, sedimentation pond design, diversion ditch design, and culvert design. Tables 7-4 through 7-10 detail the watersheds, design rainfall events, exhibits for sediment calculations, and rip-rap designs for the mine area.

The above-described information has been previously reviewed as part of past Technical Analysis and appears to be adequate to meet regulatory requirements for this review for Crandall Canyon Reclamation.

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## RECLAMATION PLAN

### HYDROLOGIC INFORMATION

#### **Reg. Ref: R645-301-731.510, Discharges Into an Underground Mine**

There are no discharges into an underground mine in Crandall Canyon.

#### **Reg. Ref: R645-301-731.520, Gravity Discharges from Underground Mines**

Page 7-19 of the original plan submittal and pg. 3.7-37 of the reclamation submittal both explain the prospect of water flow in the shafts due to intersecting aquifers. The amount is expected to be about 13 gpm with an upper figure of 50 gpm. This water will enter the mine and eventually reach an equilibrium with possible outflow from the mine. This would be similar to the Aberdeen and Adit No. 1 mines and appears to be typical.

#### **Reg. Ref: R645-301-751 Water Quality Standards and Effluent Limitations.**

Page 3.7-52 describes continuous monitoring of the spring at B-22 and lists the 16 parameters which will be monitored for compliance to R645-300-145 and R645-301-731. Further, three surface water monitoring points, one above the disturbed area site and two below it, are also described. Four additional parameters will be monitored at these sites. In all cases DOGM would be notified and corrective action taken in the event analysis showed non-compliance with permit conditions. This is appropriate, except that the requirement is for compliance with U.S. Environmental Protection Agency standards as set forth in 40 CFR Part 434. As long as permit conditions meet that standard, this is acceptable.

#### **Reg. Ref: R645-301-732.300 & -742-300, Diversions, General.**

Pg 3.7-34 and Exhibits 3.7-7A, B, C, & D describe reclaiming the canyon to its approximate original contour and to reflect the general shape & condition of the original canyon. Included is reclamation of all diversion ditches used during operations. An enhancement is the pond left at the site of sediment pond 014 which will benefit wildlife with a water source.

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**Reg. Ref: R645-301-742.320, Diversions of Perennial and Intermittent Streams**

**Reg. Ref: R645-301-742.330, Diversions of Miscellaneous Flows**

Pg. 3.7-39 details the design of reclamation channels and associated riprap. The appropriate 100-yr, 6-hr precipitation event was used for permanent diversions on the permanent & intermittent streams and the 10-yr, 6-hr event was used for permanent diversions on the ephemeral streams. Pg 3.7-41 describes Reclamation Culvert Design. These are appropriate designs for the site.

**Reg. Ref: R645-301-731.600, Stream Buffer Zones**

From Exhibit 3.7-7A, B, & C and Backfilling and Grading described on pg. 3.7-32, it is evident that reclamation activities will definitely take place within 100 ft. Of Crandall Creek. This is inevitable due to the narrow canyon and the disturbed area configuration. However, it is still necessary that the Division authorize such activities only upon finding as described in R645-301-731.600. The permittee needs to provide the necessary information to render such a finding. The required stream buffer zones could not be found in the narrative, on the drawings, or in the field.

A February 20th, 1996 letter to DOGM correctly indicates that Stream Buffer Zone issues were resolved in a January 24, 1996 meeting between AMAX Coal Co, and DOGM. They had been previously addressed in the original Technical Analysis, however, they were inadvertently raised again. Further, the Permittee has committed to erect Buffer Zone signs in Crandall Canyon as soon as the ground is no longer frozen.

**FINDINGS**

The requirements of R645-301-731.600 have been met. Especially paragraph 620 which stipulates that, "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".

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**Reg. Ref: R645-301-732 & -742, Sediment Control Measures**

**Reg. Ref: R645-301-732.100 & -742.200, Siltation Structures**

Appendix 3.7J shows the design and inspection of the siltation ponds by a Registered Professional Engineer. Pg 3.7-32 describes working from the upper end of the canyon down to the mouth during reclamation. This is appropriate for the site. The upper sedimentation pond, Pond 015, will be removed during reclamation as described on pg. 3.7-43. It is apparent from the narrowness of the canyon and location of the pond that it would be impractical to retain it until two years after the last augmented seeding as required in R645-301-763.100. The alternate sediment control measures described on pg. 3.7-43 are appropriate to use on the reclaimed pond site. They are close to the Roughen, Mulch, & Vegetate method recommended by the Division. Therefore, the removal of the pond with reclamation is deemed appropriate.

During reclamation sedimentation pond 014, the lower pond, is to be modified as shown on Exhibit 3.7-7B and left as a permanent impoundment. Because this provides a water source for wildlife, this is considered to be a beneficial enhancement. As such, the sediment pond is approved by the Division for retention as a permanent impoundment as provided for in R645-301-763.200.

**Reg. Ref: R645-300-742.230, Other Treatment Facilities**

There are no other treatment facilities in Crandall Canyon.

**Reg. Ref: R645-301-742.240, Exemptions**

No exemptions are requested.

**Reg. Ref: R645-301-744 Discharge Structures**

Both sediment ponds have provision for preventing stream erosion. Pond 015 Primary spillway empties through a culvert into Crandall Creek, with the outlet being next to the Hilfiker wall a few feet upstream of CCC-7. The emergency spillway is rip-rap lined and empties into Crandall Creek. See Exhibit 3.7-9B. Pond 014 has an 18" culvert for a primary spillway and it empties through the Hilfiker into the creek. The emergency spillway is a 24" culvert that feeds a 36" culvert which, in turn, empties into the creek. See Exhibit 3.7-9A.

Pg. 3.7-12 & 13 along with Appendix 3.7H describes the design of the three diversion culverts carrying the main flow in Crandall Creek. The 100-yr, 24-hr storm event was used which is appropriate for temporary and permanent diversions. Rip-rap is

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appropriately designed also. It has been observed in the field that erosion is not a problem with these culverts after several years of operation.

Pg. 3.7-17 & 18 along with appendices 3.7-E & F describe the design of the culverts and diversion ditches throughout the remainder of the project. The 10-yr, 24-hr storm event was used which is appropriate for temporary and permanent diversions. Rip-rap is appropriately designed also. It has been observed that erosion is not a problem with these culverts after several years of operation.

**Reg. Ref: R645-301-733 & 743, Impoundments**

See comments above under Discharge Structures

**R645-301-760, Reclamation & -742.313, Diversion**

Page 3.7-30, Phase II-Reclamation of the Facilities Pad Access Road, does not include topsoil and seeding, which is included in the Phase I- Reclamation of Leach Field and Facilities Area on the same page.

**FINDINGS**

To be resolved after discussion with Paul Baker.

**R645-301-760, Reclamation & -742.313, Diversion**

Page 3.7-30, under Phase I, indicates "Reclamation activities will include removal of all.....culverts... .", and under Phase II, indicates "This will include the removal of all culverts ..... ." Similarly, on page 3.7-12, under Backfilling and Grading it states,"All culverts and associated inlets works will be removed." These are consistent with the comments from DOGM in the first Technical Analysis (TA).

However, on page 3.7-39 it indicates, "Culverts used during mine operation to route undisturbed area runoff under the facilities pad area will be sealed and abandoned, or removed." Similarly, on page 3.7-41, under Reclamation Culvert Design, it indicates that, "The existing culverts will be removed where possible or sealed and abandoned in-place during reclamation activities." These last two statements conflict with the previous two statements and with the previous TA analysis.

Exhibit 3.7-7C shows the former CCC-24 as remaining in place and carrying full stream flow after reclamation. It is not clear why these are included as the plan was approved with the road being gone and all culverts removed.

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February 20, 1996 revisions to pages 3.7-39 and -42 explicitly remove all culverts during reclamation.

### FINDINGS

The plan is now in conformance with the requirements of R645-301-760. Specifically, "761. General Requirements.... the Operator will ensure that all temporary structures are removed and reclaimed...". Further, the requirements of -742.313 are met where it is required that "Temporary diversions will be removed when no longer needed to achieve the purpos for which they were authorized."

### R645-301-731, Operation Plan, General Requirements, and R645-301-727, Alternative Water Source Information, and R645-301-731.800 Water Rights and Replacement.

Page 3.7-37 indicates, "Finally, Amax Coal Company has 1.7 cfs (763gpm) of water right on the Price River to mitigate the minor reduction in yield of the drainage Basin". This is also mentioned on page 7-24 of the original plan submission.

### FINDINGS

R645-301-731.800, The Permittee has committed to provide 1.7 cfs from their water right should it be determined that mining impacts water flows.

### Recommendations

Based on the Permittee having corrected outstanding deficiencies, the Mine Reclamation Plan is approved.