0013

Route to JWC ✓
TPB ✓ Dorren ✓
RH —
Orig to file —
007/004 #2

AMAX COAL WEST, INC.

A Subsidiary of AMAX Coal Industries, Inc.

AMAX

November 1, 1993

RECEIVED
NOV 04 1993
DIVISION OF
OIL, GAS & MINING

Mr. James Carter
Division of Oil, Gas & Mining
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Dear Jim:

The enclosed documents are from Section 3.3 and Section 3.4 of the revised Castle Gate mining and reclamation plan. As you recall, in our September 27 meeting, we agreed to revise these sections of the Mining and Reclamation Plan to add language which would allow Amax time to perform the construction necessary to upgrade the facilities according to the revised Mining and Reclamation Plan. The changes in these sections are noted by highlighting the text where the revisions occur. The revisions allow Amax until August 31, 1994 to complete the necessary construction unless reclamation has commenced.

Unless the Division has objections to the new wording, this is the text which will be published for public comment.

As soon as the closure of the Division Order is completed, Amax will copy all of the documents necessary for public review and comment.

Sincerely,

Richard H. Allison, Jr.
njt

Richard H. Allison, Jr., P.E.
Project Supervisor

RHA:njt

Enclosures

165 South Union Boulevard, Suite 1000 • Lakewood, Colorado 80228 • Tel. 303-980-2300 • FAX 303-980-2303

SECTION 3.3

HARDSCRABBLE CANYON

TABLE OF CONTENTS

Page No.

3.3 HARDSCRABBLE CANYON 3.3-1

3.3-1 General 3.3-1

3.3-2 Description of Facilities 3.3-1

3.3-3 Environmental Protection 3.3-3

3.3-3(1) Storm Runoff Calculations 3.3-4
3.3-3(2) Diversion Structures 3.3-5
3.3-3(3) Culverts 3.3-5
3.3-3(4) Sedimentation Ponds 3.3-6
3.3-3(4).1 Pond 007 . . . . . 3.3-7
3.3-3(4).2 Pond 008 . . . . . 3.3-10
3.3-3(4).3 Pond 009 . . . . . 3.3-13
3.3-3(5) Sanitary Facilities 3.3-17
3.3-3(6) Alternative Sediment Controls (ASC) 3.3-17
3.3-3(7) Pond Embankment Stability Analyses 3.3-18
3.3-3(7).1 General 3.3-18
3.3-3(7).2 Pond 007 . . . . . 3.3-19
3.3-3(7).3 Pond 008 . . . . . 3.3-20
3.3-3(7).4 Pond 009 . . . . . 3.3-21

3.3-4 Reclamation Plan 3.3-23

3.3-4(1) Reclamation Work 3.3-23
3.3-4(2) Reclamation Hydrology 3.3-26
3.3-4(3) Alternative Sediment Control Measures 3.3-29

3.3-5 Reclamation Timetable 3.3-34

▒ - Denotes a revision to the April 1993 permit amendments

3.3-3(2) Diversion Structures

Diversion structures within the Hardscrabble Canyon area include drainage ditches and culverts to convey storm runoff from disturbed and undisturbed areas, and berms to contain disturbed-area drainage. These diversion structures are located on Exhibit 3.3-3.

The dimensions of the existing diversion ditches and berms were measured in the field, however most ditches are considered oversized. When calculating the required dimensions of the ditches, a minimum ditch size was determined. The minimum ditch required sizes are presented on Table 3.3-2. The cross sections approximate either a trapezoidal or triangular shape.

The capacity of existing diversion ditches was determined by calculating the depth of flow based on a minimum ditch slope. The maximum flow velocity was calculated based on the maximum ditch slope. Ditch slopes were measured from a contour map of the Hardscrabble Canyon area with a scale of 1 inch = 100 feet. Riprap sizing was calculated based on the maximum flow velocity using methods described in Chapter 7. A summary of the required riprap protection is contained in Table 3.3-2. All ditch calculations are contained in Appendix 3.3B.

3.3-3(3) Culverts

Eleven culverts were installed in the Hardscrabble Canyon area to divert storm runoff from the disturbed and undisturbed drainage areas. These culverts are identified on Exhibit 3.3-3.

The adequacy of the existing culverts to pass the design flow rate was determined using the methods defined in Chapter VII. Table 3.3-4 summarizes the culvert sizing calculations. All existing culverts will adequately pass the 10-year 6-hour storm. Culvert calculations are presented in Appendix 3.3B.

The slope of each culvert, and the size of existing riprap at the outlet was measured in the field. Calculations were performed to determine the exit velocities at each culvert and the minimum required riprap to resist channel erosion. Required riprap sizes for all culverts

are presented on Table 3.3-4. Culvert flow velocity computations are presented in Appendix 3.3B. The riprap below culverts HCC-2,4,6,7,9, and 10 will upgraded by August 31, 1994, unless permanent reclamation has commenced, to meet the current design requirements.

3.3-3(4) Sedimentation Ponds

Sedimentation Ponds 007, 008, and 009 are located in Hardscrabble Canyon and control the storm runoff from the disturbed drainage areas and portions of the undisturbed drainage area at the site. The sediment ponds, (007, 008, 009) were reconstructed in September-October of 1991 and resurveyed by a Professional Engineer. Horizontal and vertical control bench marks were not available, so initial coordinates and elevations were assumed, relative to an assumed elevation of the dam. The topography and cross sections for Ponds 007, 008 and 009 are contained on Exhibits 11.4, 11.5 and 11.6, respectively. A description of the construction methods and the as-built pond survey certifications are contained in Appendix 3.3G.

The ponds have been evaluated to determine if they meet the size requirements of R645-301-742.221.33 (UDOGM, 1992), which stipulates that the ponds be capable of containing or treating the 10-year 24-hour precipitation event. According to Miller et al (1973), the 10-year 24-hour design storm for the Hardscrabble Canyon area is 1.9 inches.

Curve numbers for the undisturbed drainage areas contributing to the ponds were estimated from vegetation data presented on Exhibit 9-2, and by field observations. The approximate area covered by each vegetative group was estimated from Exhibit 9-2. Cover densities for each vegetative group were estimated from information presented in Chapter IX. Cover densities of 39, 48, 50, and 70 percent were assumed for the grass/sage, mixed brush, pinion/juniper, and conifer vegetative groups, respectively. Curve numbers ranging from 68 to 75 were estimated for the undisturbed drainage areas which contribute to the sedimentation ponds. Curve number calculations are presented in Appendix 3.3A.
A description of the construction methods and the as-built pond survey certification are contained in Appendix 3.3G.

The performance of the emergency spillway was evaluated in the event the primary spillway becomes inoperative. The 25-year 6-hour storm was routed through the emergency spillway assuming that the pond was initially full of water to the elevation of the emergency spillway when the storm occurred. A stage-discharge curve was calculated by SEDCAD for the emergency spillway. The SEDCAD input and output is contained in Appendix 3.3A. From the final (emergency spillway only) analysis of the 25-year 6-hour storm event, the maximum discharge out of the emergency spillway is 3.86 cfs with a maximum flow elevation of 100.4 (0.6 foot below the minimum embankment elevation).

The emergency spillway was evaluated to determine the necessity of riprap on the outlet slope. With a channel slope of 0.34 ft/ft, a Manning's roughness coefficient of 0.038 and a maximum discharge rate of 3.86 cfs during the 25-year 6-hour storm (emergency spillway only outflow), the flow velocity was calculated to be 5.63 feet per second (fps). An average riprap diameter of less than 5 inches is required for this flow velocity.

The 36-inch slotted CMP inlet to Pond 007 was evaluated to determine the adequacy of the existing riprap during the 25-year 6-hour storm event. The calculations for the inlet channel are presented in Appendix 3.3A. The resulting flow velocity of 7.91 fps requires an average riprap size of approximately 6 inches. The existing average riprap size of 15 inches is adequate for the culvert outlet.

The outlet of the primary spillway, will be relocated to discharge to the main stream channel diversion. The relocation of the spillway outlet will be accomplished by August 31, 1994, unless permanent reclamation of the mine in the main canyon has commenced. The outlet was evaluated to determine the riprap sizing. With an approximate culvert slope of 4.7% and a peak discharge rate of 4.8 cfs during the 25-year 6-hour storm, the exit velocity was calculated to be 6.4 fps. An average riprap diameter of 1 inch is adequate for this flow velocity. The flow velocity and riprap sizing calculations are presented in Appendix 3.3A.

According to R645-301-742.221.34 (Utah Division of Oil, Gas and Mining, 1990) a non-clogging dewatering device must be installed in the pond. Because the pond is incised into the existing topography, a permanently installed decant system would not drain by

The emergency spillway was evaluated to determine the necessity of riprap on the outlet slope. With a channel slope of 0.44 ft/ft, a Manning's roughness coefficient of 0.035 and a maximum discharge rate of 3.89 cfs during the 25-year 6-hour storm (emergency spillway only outflow), the flow velocity was calculated to be 6.05 fps. An average riprap diameter of less than 6 inches is required for this flow velocity.

Both the inlet channel and 36-inch slotted CMP inlet to Pond 008 were evaluated to determine the adequacy of the existing riprap and inlet capacity during the 25-year 6-hour storm event. The calculations for the pond inlets are presented in Appendix 3.3A.

Based on the site topography, it is estimated that the 36-inch slotted CMP carries approximately 80% of the runoff to the pond, and the trapezoidal inlet channel carries the other 20%. Assuming a peak flow rate of 4.25 cfs and a culvert slope of 33%, the peak exit velocity at the downstream end of the culvert is 11.71 fps. The existing average riprap size of 24 inches is adequate for the culvert outlet.

The trapezoidal inlet channel receives a peak flow of 1.06 cfs. Assuming a uniform channel slope of 31.9% and a manning's roughness coefficient of 0.041, the peak flow velocity in the channel is 2.7 fps. A velocity of 5 fps or less is considered non-erosional and, although riprap exists at this location, it is not required.

The outlet of the primary spillway, will be relocated to discharge to the main stream channel diversion. The relocation of the spillway outlet will be accomplished by August 31, 1994, unless permanent reclamation of the mine in the main canyon has commenced The outlet was evaluated to determine the riprap sizing. With an approximate culvert slope of 11.1% and a peak discharge rate of 4.36 cfs during the 25-year 6-hour storm, the exit velocity was calculated to be 8.47 fps. Based on this flow velocity and a flow depth of 0.44 feet, the average riprap size required at the culvert outlet is approximately 8 inches. The flow velocity and riprap sizing calculations are presented in Appendix 3.3A.

In accordance with R645-301-742.221.34 (Utah Division of Oil, Gas and Mining, 1990), a non-clogging dewatering device is installed in Pond 008. The flowline of the dewatering device (decant) is at elevation 93.3. Refer to Exhibit 11.5 for a drawing of the

the stage-capacity curve contained in Appendix 3.3A, the capacity of the upper pond at the principle overflow elevation is 4,236 cubic feet (0.097 acre-feet), and the capacity of the lower pond is 26,374 cubic feet (0.61 acre-feet). The total volume of ponds 009A and 009B at the principle overflow, therefore, is 30,610 cubic feet (0.70 acre-feet). Thus, regardless of the amount of sediment in the ponds 009A and 009B, they will not contain the 10-year 24-hour storm event based on the assumptions made in this analysis.

R645-301-742.221.33 requires that siltation structures contain or treat the 10-year 24-hour precipitation event. Treatment of the storm runoff is not feasible because of the short detention time associated with small ponds. Thus, Pond 009 (009A and 009B) does not meet the technical standards outlined in R645-301-742.221.33 based on the assumptions used in this storm-runoff analysis. However, Pond 009 has been in existence for over ten years and has never discharged effluent which did not meet the NPDES water quality standards.

In order to demonstrate that Pond 009 meets the criteria of R645-301-742.221.33, Castle Gate Coal will evaluate the performance of the pond system by measuring the amount of precipitation over a 24 hour period for each significant storm and the corresponding quantity of water accumulated in the pond after these storm events. The demonstration will last through the year 1994 in order to gather enough data to establish a composite curve number for use in calculating the runoff volume for a 10-year 24-hour storm event. The procedure for this demonstration is as follows:

1. Utilize the existing sediment marker to monitor sediment volumes.

2. Set a staff gage in both Pond 009A and 009B for the purpose of measuring the peak stage during precipitation events. The gage will be calibrated to the stage-capacity curve shown in Appendix 3.3A.

3. Set a rain gage near Pond 009 for the purpose of measuring precipitation.

4. The runoff staff gage, sediment marker, and rain gage will be read after each storm that produces measurable precipitation. The information will be recorded and submitted to UDOGM in the Annual Report.

5. While water is stored in the pond, the staff gage will be read on a daily basis in order to establish a volume at the beginning and end of a storm event. Once water has seeped and/or evaporated from the pond, the elevation of the sediment in the pond will be recorded.

6. Pond discharges will be sampled to evaluate compliance with NPDES requirements.

7. At the end of the data gathering period, the information will be evaluated to determine the relationship between a 10-year 24-hour precipitation event and the corresponding peak stage in the pond. If it rains 1.9 inches or more in a 24 hour period and the peak stage is equal to or less than the corresponding elevation of the principle overflow in Pond 009B, then the study will have unquestionably demonstrated pond compliance with R645-301-742.221.33. If all recorded precipitation events are less than the 10-year 24-hour storm of 1.9 inches, then equations 7.2-1 and 7.2-2 from Chapter VII will be used to extrapolate a curve number corresponding to the 10-year 24-hour precipitation event. Using the composite curve number, the required capacity of Pond 009 will be calculated.

If the pond discharges as the result of a 10-year 24-hour or lesser storm event and the effluent meets NPDES requirements, then the pond will be deemed in compliance with R645-301-742.221.33. If the results of the study indicate that Pond 009 is undersized for the area draining to it and the effluent does not meet NPDES requirements, several corrective actions are available. The area contributing to Pond 009 could be reduced, the pond could be enlarged, or alternate sediment controls could be used to reduce sediment load to the pond. These calculations will be performed using the curve number determined from the demonstration study explained above.

If permanent reclamation of the main canyon section of the mine site has commenced by August 31, 1994, then the procedure described above to verify the size of Pond 009 will not be necessary.

The 25-year 6-hour storm event (1.6 inches of precipitation (Miller, et. al., 1973)) was used to determine the adequacy of the principle overflow. In addition, a calculation was performed, assuming that the principle overflow was plugged, to determine the adequacy of the emergency spillway. The computation of the runoff volume from the disturbed watershed

TABLE 3.3-4

CASTLE GATE HARDSCRABBLE CANYON OPERATIONS HYDROLOGY CULVERT SUMMARY

OPERATIONS CULVERT	SIZE (all CMP)	INLET TYPE	SLOPE (%)	PEAK FLOW[a] (cfs)	PEAK VELOCITY (fps)	RIPRAP REQUIRED D_{50} (in)
HCC-1	42"	MITERED	4	0.78	3.29	2.5
HCC-2	72"	HEADWALL	9	18.75	10.58	9[b]
HCC-3	32"	PROJECTING	10	3.12	7.14	5
HCC-4	2x60"	PROJECTING	6	21.87	9.84	8.5[b]
HCC-5	24"	MITERED	6	2.03	5.45	5.5
HCC-6	9'4"x 6'3"	PROJECTING	4	30.43	9.20	7[b]
HCC-7	24"	PROJECTING	6	3.95	6.62	4[b]
HCC-8	24"	PROJECTING	10	0.33	3.77	3
HCC-9	36"	SLOTTED DRAIN	19	3.69	9.25	8[b]
HCC-10	36"	SLOTTED DRAIN	30	4.19	11.28	12[b]
HCC-11	36"	SLOTTED DRAIN	5	4.03	5.95	2.5

[a] Based on Peak Flow from 10 Year - 6 Hour storm event
[b] Riprap will be upgraded by August 31, 1994, unless permanent reclamation has commenced.

SECTION 3.4

CASTLE GATE PREPARATION PLANT AND REFUSE DISPOSAL FACILITY

TABLE OF CONTENTS

Page No.

3.4 CASTLE GATE PREPARATION PLANT AND REFUSE DISPOSAL FACILITY 3.4-1

3.4-1 General 3.4-1

3.4-2 Description of the Facility 3.4-1

3.4-3 Environmental Protection: Drainage Controls and Sanitary Facilities 3.4-4

3.4-3(1) Drainage Controls 3.4-4
3.4-3(2) Storm Runoff Calculations 3.4-4
3.4-3(3) Diversion Structures 3.4-5
3.4-3(4) Sedimentation Ponds 3.4-9
3.4-3(4).1 Pond 011 . . . . . 3.4-10
3.4-3(4).2 Ponds 012A and 012B 3.4-12
3.4-3(4).3 Pond 013 . . . . . 3.4-15
3.4-3(5) Pond Embankment Stability Analyses 3.4-18
3.4-3(5).1 General 3.4-18
3.4-3(5).2 Pond 011 . . . . . 3.4-19
3.4-3(5).3 Pond 012A 3.4-20
3.4-3(5).4 Pond 012B 3.4-21
3.4-3(5).5 Pond 013 . . . . . 3.4-21
3.4-3(6) Sanitary Facilities 3.4-22
3.4-3(7) Alternative Sediment Controls 3.4-22

3.4-4 Reclamation Plan 3.4-22

3.4-4(1) Reclamation Work 3.4-22
3.4-4(2) Reclamation Hydrology 3.4-27
3.4-4(3) Reclamation Sedimentation Ponds 3.4-31
3.4-4(4) Reclamation Alternative Sediment Controls 3.4-37

3.4-5 Reclamation Timetable 3.4-41

▒ - denotes a revision to the June 14, 1993 submittal.

A summary of riprap and filter blanket volumes for permanent School House Canyon channels is presented in Table 3.4-22. Approximately 101,000 cubic feet of riprap (7,100 tons) and 58,800 cubic feet of filter material (3,800 tons) will be required to construct these channels. The riprap and filter blanket gradation designs for diversion CGRD-3a are presented in Appendix 3.4J. Methodologies used to develop these design gradations are explained in Chapter VII.

Only one culvert in the School House Canyon refuse area will be used throughout the current and final operation phases of the mine. As shown on Exhibit 3.4-2, culvert CGC-4 conveys runoff from diversion CGD-19 under the Refuse Haul Road to Pond 013. Design calculations indicate that the smallest nominal diameter CMP culvert to convey the design flow under the road is 36 inches. An 18 inch diameter high density polyethylene (HDPE) culvert extension is also required to eliminate scour of the steep slope alongside the haul road. The culvert extension will terminate at the 60% sediment cleanout level in Pond 013 (elevation 6245.5, as shown on Exhibit 11.10). A thirty inch diameter half-round CMP culvert will act as a non-erodible pond inlet lining and transport the flow from the outlet of the HDPE pipe to a point ten feet beyond the edge of the base of the pond. Any scouring of the sediment in the base of the pond will not affect the stability of the embankment or inslopes of the pond. During substantial rainfall events, the water in the pond will dissipate the energy from the flow of culvert CGC-4, thereby preventing erosion. Both the culvert and the extension are designed to pass the 100-year 6-hour storm event, in accordance with R645-301-746.212. Tables 3.4-23, 3.4-24, and 3.4-25 summarize the design parameters associated with this culvert. This three component culvert system will be installed by August 31, 1994, unless permanent reclamation of the Refuse Area and Preparation Plant has commenced. Currently, a single 24 inch CMP culvert conveys water beneath the Refuse Haul road and discharges the runoff at the top of the slope above Pond 013.

3.4-3(4) Sedimentation Ponds

Sedimentation Ponds 011, 012A, 012B, and 013 are located in the Castle Gate area and control the storm runoff from the disturbed drainage areas at the site. Survey of Pond 013 was conducted in April 1990 by Bruce Ware (Registered Land Surveyor) of Price, Utah. Horizontal and vertical control bench marks were not available for the survey, so

TABLE 3.4-24

**CASTLE GATE SCHOOL HOUSE CANYON REFUSE AREA
SUMMARY OF CULVERT CAPACITY**

CULVERT	SIZE AND TYPE	INLET TYPE	AVAILABLE HEADWATER OVER TOP (FT)	DRAINAGE BASINS (EXHIBIT 3.4-2C)	PEAK FLOW (cfs)
CGC-4	36" CMP with 18" HDPE Extension[a]	Project	2.5	CGWS-D2B, D2C, D2D, D2E	34.20

[a] The 36" CMP culvert and 18" HDPE culvert extension will be installed by August 31, 1994, unless permanent reclamation of the Preparation Plant or Refuse Pile has commenced.

TABLE 3.4-25

CASTLE GATE SCHOOL HOUSE CANYON REFUSE AREA CULVERT SUMMARY

CULVERT	SIZE AND TYPE	OUTLET SLOPE (%)	PEAK FLOW[a] (cfs)	PEAK VELOCITY[a] (fps)	REQUIRED D_{50} (in)
CGC-4	36" CMP with 18" HDPE Extension[c]	60	34.20	53.4	None[b]

(a) See Appendix 3.4J for details.

(b) Erosion protection of the pond slope is provided by a 30" half-round CMP culvert from the outlet of the HDPE pipe to ten feet beyond the edge of the base of the pond. See Appendix 3.4J for details.

(c) The 36" CMP culvert and 18" HDPE culvert extension will be installed by August 31, 1994, unless permanent reclamation of the Preparation Plant or Refuse Pile has commenced.