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

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April 15, 1993

TO: Daron Haddock, Permit Supervisor

FROM: Randy Harden, Senior Reclamation Engineer

RE: **Crandall Canyon and Remaining Areas, AMAX Coal Company, Castle Gate Mine, ACT/007/004-92E, Folder #2, Carbon County, Utah**

Summary:

This review incorporates deficiencies which have been found in the Mining and Reclamation Plan for the Crandall Canyon area and other deficiencies which have been found in the plan. Comments regarding this review are considered as deficiencies which are to be addressed under the *Remaining Areas* in accordance with the review schedule as stipulated under Docket 91-001.

This review constitutes an initial review of the existing information which currently exists in the Mining and Reclamation Plan for the Crandall Canyon area and general comments which need to be addressed in conjunction with proposed revisions to the plan under the *Remaining Areas*.

Analysis:

Division Order 2)

> ***R614-301-122. Permit Application Format and Contents.*** *The information contained within the permit must be organized to ensure that each Figure, Plate, Diagram, Analysis etc. that is referenced is included within the Permit Application. The language used in the permit application must accurately differentiate existing and proposed facilities, activities, treatments, etc. This information shall be provided on or before June 1, 1991.*

Proposal:

The existing plan currently has not incorporated all of the submittals which have been provided by the Operator and approved by the Division in conjunction with the Division Order.

Analysis:

As part of the deficiency response to the *Remaining Areas*, it is proposed that the Operator and the Division coordinate to incorporate all currently accepted information into the approved Mining and Reclamation Plan. With regard to form and format, this will allow a check to ensure that the table of contents and the references provided throughout the plan are complete and consistent.

Deficiencies:

1. The Operator shall meet with the Division to incorporate the sections of the approved information provided under the Division Order into the Mining and Reclamation Plan. The Operator shall bring their copy of the plan into the Division office and collate their plan along with the Division's file copy to ensure that all appropriate information has been successfully included in the plan and that both plans are complete and up-to-date.

Division Order 3)

R614-301-140. Maps and Plans. *The PERMITTEE shall submit to the DIVISION, a schedule for providing complete and accurate maps and drawings to depict the current existing conditions for all facilities, and proposed reclamation treatments. This schedule shall be provided on or before March 1, 1991.*

Proposal:

In accordance with the terms and conditions of the Stipulation (Settlement Agreement), the Operator has committed to a schedule for the submittal of the information required in this section of the Division Order.

Analysis:

The schedule submitted in conjunction with the Stipulation will be administered, revised, and completed under the terms and conditions of the Stipulation.

Deficiencies:

None.

Division Order 4)

R614-301-142. Maps and Plans. *The PERMITTEE has not provided maps and plans with the permit application which distinguish among each of the phases during which coal mining and reclamation operations were or will be conducted at any place within the life of operations. At a minimum, distinctions will be clearly shown among those portions of the life of operations in which coal mining and reclamation*

operations occurred: prior to August 3, 1977; after August 3, 1977, and prior to either May 3, 1978; after May 3, 1978 and prior to the approval of the State Program; and, after the estimated date of issuance of a permit by the Division under the State Program. The PERMITTEE must provide identification as to the date and the use of those areas and facilities within the permit area which have been incorporated into the underground mining activities. Those areas affected by previous mining operations (including cutslopes and outslopes of pads and roads) and used in conjunction with current underground coal mining facilities are to be included in the disturbed areas. This information shall be provided on or before March 1, 1991.

Proposal:

The current plan includes maps and drawings for the Crandall Canyon area in Section 3.7. Exhibit 3.7-2 shows the pre-disturbance site conditions.

Analysis:

Based on the information found on Exhibit 3.7-2, there are no pre-SMCRA mining disturbances within the Crandall Canyon Area. This exhibit also shows CGCC as the surface owner in Crandall Canyon. Is this correct?

In the text of the Mining and Reclamation Plan, the Operator has indicated that approval of the plan for the disturbed area within Crandall Canyon occurred in 1982. In context with the requirements of this section of the regulations, it can be assumed that these disturbances do not qualify for any of the terms or conditions allowed for under previously disturbed areas as defined in the coal rules and must meet the permanent program performance standards.

Section 3.7, page 1, states that copies of all permits are included in the correspondence addendum. This information was not found in the plan.

Deficiencies:

1. The Operator should eliminate reference to permit correspondence in the plan if this information has been removed, or, provide the reference information cited on page 1 of Section 3.7.

2. Surface ownership and maps showing surface ownership should be revised if necessary.

Division Order 13)

R614-301-340. Reclamation Plan. *The PERMITTEE must provide plans to protect reclaimed areas for a minimum 2-year period. The PERMITTEE will revise the*

MRP to show 1) seedbed preparation plans (i.e. deep ripping to 18-24 inches), 2) that seed and fertilizer will not be mixed in the hydroseeder, 3) plans for the use of the supplemental planting mix for ephemeral/intermittent drainages, including locations(shown on the reclamation maps) and timing of the planting operations, 4) the final revegetation plans (as identified in the July 1990 correspondence) for the cut and fill slopes associated with the Crandall Canyon access road, 5) Clear plans for the reclamation of Gravel Canyon. This information must be provided on or before March 1, 1991.

Proposal:

Final reclamation for the cut and fill slopes of the Crandall Canyon access road is not currently presented in the plan. Although reclamation drawings and plans currently exist in the plan for the mine facilities, the Operator has proposed to leave the mine access road in its current configuration.

Analysis:

Site specific revegetation plans for the Crandall Canyon area need to be updated and incorporated into the plan. This information should be addressed in a manner which coincides with the general information provided in the soils and vegetation chapters of the plan.

Reclamation plans need to address the backfilling, grading sediment control and revegetation plan for the mine access road.

Deficiencies:

2. Reclamation and revegetation plans need to be provided for the mine access road.

Division Order 17)

R614-301-550. Reclamation Design Criteria and Plans. *The permit application must include site specific plans that incorporate the design criteria for reclamation activities. These design criteria and plans shall include but not be limited to: phased reclamation treatments and designs throughout the permit liability period, designs for temporary and permanent surface features, including diversions, impoundments, sediment control structures, and other facilities which will require construction throughout the reclamation process; specific plans and details for all permanent facilities to remain as part of, or in conjunction with, post mining land use, including roads, utilities, and structures; and, maps and drawings which clearly show the areal and vertical extent of the existing facility areas and those areas throughout all phases of reclamation. This information shall be provided on or before June 1, 1991.*

Proposal:

The Operator has indicated in Section 3.7 that the land use for the area is undeveloped with light grazing and wildlife as the principle uses. The surface facilities will be removed and the two shafts will be backfilled with debris from the demolition of the structures and with shaft development muck. The Operator has stated that the hard-surfaced (gravel) access road from the state highway to the mine facilities will remain as permanent. The road area above the mine facilities will be reduced to a Class III condition, tying into the existing road system, up canyon. The Operator has indicated that the permanent road is needed for access to evaluate reclamation, continuance of the subsidence monitoring program, and to provide a corridor to upper canyon grazing areas, which will be leased again after reclamation is deemed successful.

Table 3.7-9 is labeled as Reclamation Materials Budget and Table 3.7-10 provides the Soil Mass Balance Calculations for the Crandall Canyon facilities area, based on the cross sections provided in the plan.

Design criteria for slope stability was conducted by Rollins, Brown and Gunnel, Inc. regarding the mine access road in Crandall Canyon. This analysis evaluated the existing slopes and stability conditions for the construction of the access road.

Analysis:

Information found in the plan, which discusses the post mining land use, fails to warrant the retention of the existing road, culverts, pad areas and ponds as part of the post mining land use. With the pre-mining land use as undeveloped, with light grazing and wildlife, no suitable justification for these structures has been provided. Without a suitable alternate post-mining land use, the area must be reclaimed to meet AOC requirements in accordance with the coal rules. Prior to mining activities, Crandall Canyon did have a jeep trail which afforded access to and partially beyond the mining facilities. Retention of a primitive road to access the canyon may be approved by the Division if the Operator can successfully demonstrate that retention of a primitive road is necessary to meet land use criteria. Retention of the improved access road to the site as currently constructed will not be approved by the Division.

Designs for and the sequence and timing of reclamation also needs to be revised. The Operator needs to provide for sediment control measure to be used for all phases of reclamation. The sequence and timing for the installation and removal of sediment ponds and/or alternate sediment control measures needs to be provided for all areas within Crandall Canyon including, but not limited to the access road, topsoil stockpile areas, the mine facilities area, and the upper road and water tank area. Adequate labeling and identification of temporary and permanent diversions should also be provided in the plans and on the drawings for all phases of reclamation.

Exhibit 3.7-5 shows portions of the Crandall Canyon facilities, primarily the surface mine facilities. However, no as-built drawings for the road and surface disturbances to the west of those found on Exhibit 3.7-5 could be found in the plan. As-built information was only found for the main access road on the recently submitted (1990) drainage details map, but was at a scale of 1"=200' and details are not sufficiently large enough to show contour details. Adequate maps of the currently existing facilities must be provided for all disturbed areas within Crandall Canyon which delineate the disturbed area boundaries. These maps shall be in sufficient detail for use as base reference maps for reclamation design work including backfilling and grading and surface drainage.

Deficiencies:

1. Maps showing cross sections and profiles for the Crandall Canyon area are not certified.

2. Operation and reclamation maps and drawings need to clearly locate and number as appropriate all diversions, culverts, and other structures in which design calculations are provided. The reclamation drawings must clearly indicate the location and identification of structures and facilities to be used through all phases of reclamation, including temporary and permanent sediment control structures and diversions.

3. No specific variance for the retention of structures for the Crandall Canyon area was found in the current permit. Accordingly, all structures and facilities within the Crandall Canyon area must be reclaimed and the areas returned to AOC requirements. Reclamation designs must show the elimination of the access road to the mine facilities, all pad areas, and restoration of the stream channel including removal of all culverts and engineered structures.

4. Cross sections of the existing and reclaimed areas do not show the disturbed area boundaries, delineate adjacent natural slopes, or provide sufficient detail as to indicate the structure or type of materials which are to be left on slopes greater than 2h:1v. Revised cross sections or contour maps at a suitable scale must be provided to clearly indicate the final grading of all facilities within the Crandall Canyon area.

5. A map delineating the disturbed area for the mine access road and for the road, water tank site and the drain field located to the west of the main Crandall Canyon facilities could not be found in the plan. Maps showing all disturbed area boundaries must be provided for the existing "as-built" surface facilities and for the reclamation drawings.

Division Order 18)

> ***R614-301.553. Backfilling and Grading.*** *Backfilling and grading design criteria must be described in the permit application. Disturbed areas must be backfilled and graded to: achieve the approximate original contour, except as provided in R614-301-553.600 through R614-301-553.642; eliminate all highwalls, spoil piles, and depressions, except as provided in R614-301-552.100 (small depressions); R614-301-553.620 (previously mined highwalls); and in R614-301-553.650 (retention of highwalls); achieve a postmining slope that does not exceed either the angle of repose or such lesser slope as is necessary to achieve a minimum long-term static safety factor of 1.3 and to prevent slides; minimize erosion and water pollution both on and off the site; and, support the approved postmining land use. Information within the plan does not specifically address the above requirements. This information shall be provided on or before June 1, 1991.*

Proposal:

Information regarding backfilling and grading is found in Section 3.7-5 of the Mining and Reclamation Plan.

The Operator has indicated that approximately 34% of the materials removed during shaft construction will be returned to the shafts. The remaining portion of the shaft muck will be graded and used to backfill any toe of slope cuts. Reinforced concrete will be placed over the filled shafts. At least 2 feet of materials will be spread over the caps.

Analysis:

The Operator has indicated that there will be a surplus of materials as a result of mine development waste from shaft excavation. This excess material needs to be addressed in accordance with the requirements for mine development waste. In the event that there is excess materials upon re-design of the surface facilities to meet AOC requirements, the Operator will need to describe the location and the final disposition of these materials in accordance with the requirements for excess spoils and mine development waste.

The current reclamation plan indicates that several cut slope areas will remain. In fact, little backfilling or grading is currently shown on the cross section information or on Exhibit 3.7-9. Backfilling of cut slopes derived from development of the mine facilities area have not been adequately backfilled and AOC requirements have not been met.

A Post Mining Reclamation Treatment Map(s) needs to be provided to clearly depict all cut slope areas to remain within the disturbed area boundaries. Backfilling and grading plans must be sufficient to meet AOC requirements.

Current backfilling and grading plans and the mass balance calculations do not adequately address AOC requirements nor do they provide adequate backfilling and grading of the disturbed areas.

Swell factors used in Table 3.7-9 inadequately provide for backfilling of the two mine shafts. The initial swell factor used to determine the amount of material removed from the shafts during development appears to be reasonable with a calculated swell factor of 50%. However an additional swell factor of 30% was provided when returning the material to the shafts as backfill. Swell factors for returning the shaft muck as backfill should be approximately 15-20% of the bank volume of the shaft muck as it was compacted into and placed around the shafts for the pad areas. This would indicate that approximately 37,500 bank yd3 of material will be required to backfill the total shaft volume of 44,800 yd3.

No supporting information indicating that the volume of concrete and asphalt paving, building foundations, and concrete retaining walls would total 10,067 yd3. This estimate appears to be high in comparison to the structures which currently exist within the mine facilities area. Mass balance calculations should account for any shortfall of materials to be used for filling the two shafts, especially for the those facilities or materials which currently do not exists at the mine site.

Reclamation cross sections do not adequately account for the amount of material required for backfilling of the two shafts. Table 3.7-10 accounts for surface grading only, and based on the summary calculations, only about 283 yd3 of cut material would be available for backfilling the two shafts. Grading plans must be revised to account for material to be used as shaft fill and to meet AOC requirements.

Backfilling and grading design and supporting calculations must be provided in sufficient detail to demonstrate that the site will be regraded to meet AOC requirements. Current cross sections do not delineate disturbed area boundaries and consequently do not project natural slopes adjacent to these disturbed area boundaries. Based on the current proposed design for Crandall Canyon, AOC requirements have not been met. Stability analysis for reclaimed slopes at the mine facilities area and the reclaimed slopes of the access road will also need to be provided. The current stability study for the access road does provide some reference information for stability analysis but does not include any site specific analysis for reclaimed slopes.

The probable hydrologic consequences involved in backfilling the two mine shafts has not been addressed in the plan. Information should be presented in the plan to locate and identify and water bearing zones or structures encountered during shaft development. If such water bearing zones exists, the Operator will need to discuss potential changes in ground water quality, changes in flow patterns, piezometric surfaces. Analysis based on the above information should be applied to determine the potential for

saturation and stability of the fill materials placed in the shafts. Monitoring of the shafts may also be needed to ensure stability of the backfilled material in the shafts.

Although considerations and some potential problems may need to be resolved regarding backfilling of the two mine shafts, allowing the shafts to remain with only concrete caps is not considered a viable reclamation alternative.

The Operator has also stated in the plan that the concrete caps placed over the shafts after backfilling will be covered with 2 feet of material. A minimum of 4 feet of material should be placed over these and all concrete structures left in-place. Two feet of cover does not allow for adequate root penetration and soil moisture retention for revegetation. Four feet of material must be placed over these concrete caps to allow a suitable depth for plant growth.

Deficiencies:

1. Backfilling and grading of the Crandall Canyon mine facilities must be re-designed to adequately demonstrate AOC requirements of the pre-mining land use. This shall include the elimination of all structures and facilities including the improved mine access road, culverts, ponds, pad areas, and provide sufficient mass balance calculations for backfilling of the two mine shafts in conjunction with surface grading and backfilling operations.

2. Hydrologic impacts regarding groundwater and potential effects on groundwater and stability of the backfilled material in the shafts must be presented in the plan.

3. Cover material over the concrete shaft caps must be increased from 2 feet to 4 feet in order to allow for revegetation.

Division Order 19)

R614-301-553.500. Previously Mined Areas. *The PERMITTEE shall demonstrate in writing, that the volume of all reasonably available spoil material is insufficient to completely backfill the reaffected or enlarged highwalls to be retained throughout the mine facilities. The PERMITTEE must also demonstrate that the remaining highwalls shall be eliminated to the maximum extent technically practical in accordance with the following criteria: (1) All spoil generated by the remining operation and any other reasonably available spoil shall be used to backfill the area. Reasonably available spoil in the immediate vicinity of the remining operation shall be included within the permit area. (2) The backfill will be graded to a slope which is compatible with the approved postmining land use and which provides adequate drainage and long term stability. (3) Any highwall remnant shall be stable and not pose a hazard to the public health and safety or to the environment. The*

PERMITTEE shall demonstrate, to the satisfaction of the regulatory authority (DIVISION), that the highwall remnant is stable. (4) Spoil placed on the outslope during previous mining operations shall not be disturbed if such disturbances will cause instability of the remaining spoil or otherwise increase the hazard to the public health and safety or to the environment. This information shall be provided on or before June 1, 1991.

Proposal:

The requirement of this condition of the Division Order are not considered applicable to the Crandall Canyon mine facilities area.

Analysis:

No previously mined areas exist within the disturbed area boundaries for the Crandall Canyon mine facilities.

Deficiencies:

None.

Division Order 21)

R614-301-731. Operation Plan. General Requirements. *The operational plan must be specific to the local hydrologic conditions and will contain steps to be taken during coal mining and reclamation operation through bond release. The PERMITTEE needs to correct the MRP to include monitoring plans specific to ground water and surface water during reclamation through bond release. These monitoring plans should reflect the requirements of R614-301-731.200, and must reflect the language of R614-301-731.212, R614-301-731.233, R614-301-731.214, and R614-301-731-224. The PERMITTEE shall submit a reclamation plan for all phases of reclamation indicating how the relevant requirements for R614-301-730. through R614-301-760. will be met. This shall be required on or before June 1, 1991.*

Proposal:

No comments regarding the above division order are part of this review.

Division Order 25)

R614-301-800. Bonding and Insurance. *The PERMITTEE shall provide to the DIVISION, the Certificate of Liability Insurance Form which is incorporated into the Reclamation Agreement. Bonding calculations do not include the following information: a map specifying each area of land for which bond will be posted; mass*

balance calculations presented in sufficient detail to show backfilling and grading requirements for distribution and disposal of excess spoil and mine development waste, backfilling to meet AOC requirements, subsoil, topsoil and substitute topsoil distribution and quantities for each sub area of the permit; calculations for determination of quantities, equipment selection and productivity used in determining the bond amount which reflect the quantities determined in the mass balance calculations; determination of Phase I and Phase II reclamation activities including a map showing those facilities to be constructed and/or removed during each phase of reclamation. This information shall be required on or before June 1, 1991.

Proposal:

Similar to the other sections in the plan, bonding information previously found in Section 3.7-5(4) has been eliminated and provided in Section 3.1.

Analysis:

Bonding information previously provided for each section has been incorporated into Section 3.1 of the plan.

Reclamation costs associated with the reclamation planned for the Crandall Canyon area and all other areas must be factored into the bond amount until such time as Phase I bond release is accomplished and approved by the Division. Until such time, the reclamation costs associated for the work planned must be incorporated into the bond amount. Bond cannot be reduced and adjusted by reclamation work accomplished without following bond release criteria. Costs associated with each phase of reclamation should be segregated and identifiable to ease in the implementation of phased bond release for each separate area.

The Operator has committed to provide revised bonding calculations in conjunction with the submittal of information for the remaining areas as required in the Settlement Agreement.

Bonding costs and cost information shall, at a minimum, provide for quantities, equipment selection, and productivity for each reclamation activity. Bonding calculation must be based on the reclamation plan as proposed by the Operator and approved by the Division. Current reclamation cost estimate information found in the plan is not current due to numerous changes in the reclamation plan as a result of the Division Order and subsequent information provided by the Operator under the Settlement Agreement.

Bonding costs need to be broken down into logical sub-areas, into each phase of reclamation activity, and provide ongoing monitoring and mitigation costs throughout the reclamation liability period. Concise cost information and details directly related to the

sequence and timing of reclamation for all sub areas of the mining operations will allow greater ease in bond adjustment and phased bond release.

Cost estimates or lump sum bids for reclamation work by contractors are not considered as adequate by the Division in submittal of adequate information in order to determine the bond amount. Estimation will be determined by the Division in consideration of the quantity takeoffs, equipment selection and productivity calculations based on the approved reclamation design. Costs will be based on suitable costs used in the Contractor's Rental Rates Bluebook and by Means Cost Data where applicable.

Costs associated with reclamation work which has already been completed by the Operator, but, which has not undergone formal request for and approval of phased bond release must be included in the reclamation cost estimate and will be factored into the required bond amount.

The amount of the performance bond may change upon submission of evidence to the Division providing that the permittee's method of operation or other circumstances changes the estimated cost for the Division to reclaim the bonded area. Bond adjustments which involve undisturbed land or revision of the cost estimate of reclamation are not considered bond release subject to procedures of R645-301-880.

Deficiencies:

1. Reclamation cost information for all permitted areas must be provided by the Operator which reflects those changes to the operation and reclamation plan that have occurred under the Settlement Agreement and in accordance with the requirements of part 25 of the Division Order. Determination of the required bond amount by the Division will be based on, but not limited to, the detailed estimated cost, with supporting calculations for the estimates, submitted by the Operator.

RECOMMENDATIONS:

Deficiencies found as part of this initial review of the Crandall Canyon area will be provided by the Operator in conjunction of the submittal of information for the Remaining Areas as indicated in the schedule in the Settlement Agreement. Additional comments and deficiencies may be found as a result of a more detailed technical review following submittal of the information required under this initial deficiency review.

cc: B-TEAM
CRANDALL.JRH