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# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Norman H. Bangertter  
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801-538-5340

June 16, 1992

Mr. Richard Allison, Jr.  
Project Supervisor  
AMAX Coal Company, Belle Ayr Mine  
2273 Bishop Road  
P. O. Box 3005  
Gillette, Wyoming 82717-3005

Dear Mr. Allison:

Re: Deficiencies in Castle Gate Area Submittal, AMAX Coal Company, Castle Gate Mine, ACT/007/004, Folder #3, Carbon County, Utah

The Division has completed a review of your submittal received on May 1, 1992 and May 5, 1992, intended to satisfy the stipulation under Docket 91-001 for the Castle Gate Area. At this time your submittal is not considered adequate. As anticipated a number of deficiencies has been identified which must be addressed. The enclosed technical memos by Randy Harden, Rick Summers, Paul Baker and Priscilla Burton outline the deficiencies.

Please review the technical memos and respond to the deficiencies by September 4, 1992 as per our previously agreed upon schedule. If you have any questions, please call me or the appropriate member of my staff.

Sincerely,

A handwritten signature in cursive script that reads "Daron R. Haddock".

Daron R. Haddock  
Permit Supervisor

Enclosures

cc: R. Harden  
R. Summers  
P. Baker  
P. Burton

CASTGATE.DEF



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June 15, 1992

TO: Daron Haddock, Permit Supervisor

FROM: Rick P. Summers, Hydrologist *RS*

RE: Review Castle Gate Area Reclamation Plan (received May 1, 1992 and May 5, 1992), Castle Gate Mine, AMAX Coal Co., ACT/007/004-92A, Carbon County, Utah

## **SUMMARY:**

In accordance with Stipulation under Docket 91-001, AMAX Coal Company has submitted revised plans for the Castle Gate Area. These plans were received by the Division on May 1 and May 5, 1992.

Comments and completeness of the information within the text of this review is in regard only to those areas described in the Castle Gate Area. Determination of completeness of the response to the Division Order and Compliance of those requirements for approval cannot be made until such time that all of the required information has been submitted as required by the Division Order.

This review is specific to the Division Order #3 and #17 relative to the Castle Gate Area Reclamation designs and operational hydrology concerns. Hydrology issues involved in Division Order 21 regarding water monitoring are not addressed in this review. As per agreement with R. Allison (3/16/92, Division Offices), this issue will be addressed for the entire permit area upon completion of the response to the Division Order. Additionally, potential changes to the existing MRP material not related to reclamation plans and designs were not reviewed and cannot be considered to be approved amendments to the MRP.

## **Proposal:**

The application proposes to utilize or modify existing sedimentation ponds during the reclamation period to treat the majority of the reclamation area drainage. Areas that cannot report tho these ponds due to topographic or drainage plan constraints will utilize alternative sediment control measures to provide for sediment control and drainage treatment. The discussion is presented in Chapter 3, Section 3.3, item 6). Drainage designs and plans are

included to restore the site drainage in Chapter 3, Section 3.4, Appendix 3.4L, and Chapter 7.

The Operator has presented designs for permanent channels based upon the 100 yr. - 6 hr. precipitation design event. Two culverts are proposed to be retained following bond release to provide for School House and Barn Canyon discharge under the adjacent railroad right of way. These culverts have been demonstrated to pass the 100 yr. - 6 hr. precipitation event.

The presentation does not include plans demonstrating that the proposed sediment control measures are designed, constructed and maintained using the best technology currently available to prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area and minimize erosion to the extent possible. The plan should discuss and justify the concept that the "best technology currently available" is proposed with the alternative sediment control measures selected.

The application should present designs demonstrating that the sediment yields from the reclaimed area are minimized. Reference to other general reclamation plans in the MRP would be acceptable for the Castle Gate area alternative sediment controls. Locations of alternative controls structures should be depicted on an appropriate map as possible.

The use of the threshold of 5 fps for velocity to determine riprap protection must be justified. Soil/expected base material characterization should be used to determine the maximum permissible velocities for the channel materials and stability designs (refer to Barfield, Hann, 1981 for examples).

The MRP narrative needs to be revised to reflect the commitment and plan for development of the filter blanket for the reclamation channels. The Operator must commit to the collection of samples of material following excavation to grade for the channels for use in the design of the filter blanket. A general worst-case filter blanket design must be presented for calculation of filter blanket volumes and bonding estimates. That section needs to present general riprap specifications (depth, gradation, durability, etc.).

**Analysis:**

**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.***

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.*

The following review comments were itemized to facilitate Operator response to the Division's review. The comments are not identified as to the specific Division Order, but the content should make the intent obvious. The level of deficiencies in this submittal precluded a through technical analysis of the material. That analysis will be conducted following the Operator response to this review. The Operator is encouraged to contact me if additional clarification on these line items deficiencies is needed.

1. The operational map needs to depict the location of injection slurry/recovery wells, exploration holes, operational water lines (e.g. sewage, prep. circuit lines, culinary lines), and monitoring wells (e.g. piezometers on refuse pile). Exhibit 1.1 should depict water supply intakes downstream to Helper for the Price River. The reclamation map should depict the piezometers and any other monitoring wells that will be monitored during the reclamation period. These should be identified for removal upon termination of bond period. Reference rule R645-301-731.100
2. The permit area should include the underground area workings for the injection well facility.
3. Transfer and reclamation of wells. The MRP must include temporary and final sealing plans for all wells in the area. These plans are currently located in Section 3.10.
4. Exhibit 3.4.3 should be revised to define ASCA areas (shadow or boundary). Each ASCA area must be labeled and the narrative should discuss each ASCA in

terms of individual and cumulative area, runoff volume, treatment method(s), maintenance, installation (prior to reclamation redisturbance) and removal (upon meeting revegetation and water quality criteria, and bond release).

5. Plate 3.4.2A depicts an impoundment on top of refuse. This should be removed and the narrative and maps reflect the commitment to grade the refuse pile to ensure that water does not impound on the pile. The narrative should address and ensure compliance with R645-301-745.221, 746.212, and 746.222.
6. The inclusion of two narratives for the reclamation plan in Section 3.4 and Appendix 3.4L is confusing. The two sections should be incorporated into a single discussion with reference to calculations/appendix information as needed. The narrative used to discuss each phase for each structure should be consistent. For example, the ponds are referred to as "existing, existing-modified, reclamation, and reclamation-modified". The MRP should use specific language that defines period of use for each pond/structure design. The Operator should check the discussion in Section 3.4 and Appendix 3.4L. Suspect volume, design criteria conflicts may exist in two pond discussions.
7. On Plate 3.4.3, reclamation structures are described to be left "unless noted otherwise - U.N.O". The structures should all be identified by a specific identification label and the reference to U.N.O. changed to state specifically the period of intended use and removal for each structure. The reclamation narrative should include a discussion on the structures and the plate should be revised to depict the structure and period of use.
8. An error exists on Plate 3.4.3, culvert CGRC-2 is not depicted as continuing under the railroad/utility corridor right-of-way to the Price River.
9. The fate of drainage for reclamation channels that are currently shown terminating at railroad right-of-way needs to be addressed. The discharge from the permit area needs to be shown to be adequately dissipated and the direction of the drainage in the adjacent, existing drainage plan needs to be depicted.
10. Disturbed area and permit boundaries are inconsistent between several of the plates in the MRP. The boundaries should all be corrected to be consistent throughout the plan.

11. More narrative and reference to installation of the silt fencing is needed. Reference to a typical single-fence installation and fencing pattern (e.g. along contours) would be sufficient.
12. The plan views for Pond 12 (operational and reclamation) should depict the decant location (e.g. Exhibit 3.4.-9B and pg. 2 of 17 figure in Appendix 3.4L).
13. The Operator should check the drainages for CGRC-1, WS-U3, WS-U2 relative to drainage to Pond 12. It is not clear on the exhibit which drainages report to the pond. The diversion for CGWS-U3 appears to drain upslope.
14. The MRP needs to incorporate a design for diversions to route drainages to the ponds during the reclamation period. A single worst-case typical may be acceptable for all drainages. The berms to be used to direct the drainages should have a design.
15. The Operator needs to check that all operational diversions identified on the operational facilities map are accounted for in the reclamation plan. For example, diversions D6 , D1, and D7 are not reclaimed. The reclamation plate (3.4-3) also depicts (via contour information) several diversions that are not removed. These diversions have been identified on other plates as CFD-9, CGD-8, CGB-1, and CGB-2.
16. The operational facilities map needs to incorporate drainage control structures and delineate Alternative Sediment Control Areas. Current drainage maps do not incorporate the Unit Train Loadout area, the area from CGC-1 updrainage (raw water pond area), the truck scale area, the no. 3 belt line disturbance, and culvert CGC-4 is incorrectly depicted as continuing from the road to Pond 13 (Plate 3.4-2). That plate also depicts a diversion for CGWS-U5 that is not labelled. If that plate is to be used to comply with Division Order #3, it must delineate the disturbed area and permit area boundaries. The Operator must insure that the drainage labels used on the operational map correspond to design and text information in the MRP and that designs are included for all drainage structures used in the operational phase.
17. The MRP needs to be revised to account for the entire disturbed area in the vicinity of channel CGRD-5. The undisturbed portion of that drainage (barnhouse canyon) need a description of the increased flow from CGRD-8. A description of the flow depth and existing channel stability would be adequate for this reach.

18. The final disposition of culvert C-1 is unclear on the reclamation plate (3.4-3).
19. The MRP needs to address the no. 3 beltline area and structures reclamation plan. The removal of the structures and foundations and reclamation for the area needs to be addressed. The area needs to be referenced or depicted on Plate 3.4-3.
20. The Division suspects that some discrepancies exist between design volumes and details noted in the Section 3.4 narrative and the narrative in Appendix 3.4L. These may be due to the terminology used to identify the pond and period of intended use. The Operator is advised to edit these sections to ensure that all cited values are consistent and correct.
21. The MRP needs to incorporate a plan for the installation of filter blanket designs for reclamation channels (Appendix 3.4L).
22. The MRP needs to include or reference a sediment removal plan to be implemented during the reclamation phase. The plan should include: 1) stakes or survey to determine cleanout level, testing of the sediments, dewatering plan, and final disposal location.
23. The calculations in Appendix 3.4L need to verify and justify use of 5 fps velocity in the channel design for the existing/projected channel base materials.
24. The MRP contains redundant figures that could be eliminated and referenced (e.g. velocity against stone figures in Appendix 3.4L).
25. The Pond 13 calculations in the Appendix 3.4L need to identify contributory watersheds by a watershed identification label.
26. The Operator needs to ensure that all figures and calculation pages are labelled relative to the structure (e.g. stage-volume and stage-discharge curves for ponds should all be labelled as to the applicable pond and phase of use). The pages in Appendix 3.4L should be paginated or otherwise identified to facilitate written communication on the design work.
27. The plan for Pond 012-reclamation phase implies two inlets with only one design inlet presented in Appendix 3.4L. The Operator should clarify the design.

28. Riprap gradation curves needed for reclamation channels. The information can be referenced to other sections of the MRP if appropriate.
29. The Operator should define the Phase I drainage direction to the reclamation ponds more specifically on Map 3.4.3.
30. CGRD-10 is depicted as flowing uphill. Contour information is missing on Plate 3.4-3 for the embankment of Pond 013 that should be added to clarify the design.
31. In Appendix 3.4L, the summary page for contributing watersheds to diversions does not give information for CGRD-7, 8, and 10. The Operator should ensure these and all diversions are included in the summary.
32. The drainage for CGWS-9 needs to be addressed. The area is 29 acres with no designed drainage control for the 11 cfs from the area. Contrast this with CGWS-U1 with 20 acres and a designed channel (CGRD-1).
33. In reference to an unlabeled figure in Appendix 3.4L that partitions WS-U5 into subwatersheds 5a through d, the figure needs to be labelled and the extent of WS-5b is unclear as to the extent upslope to the undisturbed area to the east.
34. The reclamation timetable in Section 3.4.5 needs to be revised. Regarding removal of siltation ponds, the timetable states ponds will be removed "2 years after seeding". It should be revised to state removal will occur when revegetation and water quality criteria have been met, no sooner than 2 years following the last augmented seeding. The plan must also address regrading and reseeding requirements for the areas affected by pond removal.
35. There is a conflict in the text of the plan. Section 3.4.2 states that little contributory drainage exists to plant preparation ponds. This conflicts with the next page which states "drainage from haul road and associated affected area is run through either the refuse disposal or preparation plant pond system". This needs to be clarified. If disturbed area drainage reports to the process ponds, the area needs to be delineated and the ponds will need spillways as per impoundment and sedimentation pond rules (R645-301-742.220 and R645-301-743).
36. The cross-sections on Exhibits 3.4-9A and B needs to add the following elevations: 1) 10 yr. - 24 hr. runoff volume, and 2) maximum water elevation with spillway flowing at design head ( 25 yr. - 6 hr.).

37. Section 3.4-3(1)B should add a discussion defining period of use for "interim" and "final operational" stages to clarify period of use verses reclamation phases. Confusing is the definition of the interim stage as that "prepared to address the Division's more immediate concerns with drainage for the refuse pile". The section should be rewritten. The use of 5 fps for channel lining threshold should be justified in this section.
38. Section 3.4.31c needs a sediment removal plan including survey or stakes, dewatering, testing, and disposal area.
39. Section 3.4-4 discusses the reclamation plan but does not reference the information in other appendices (esp. Appendix 3.4L). The reclamation narratives should be consolidated and all other reclamation plans incorporated or referenced in that narrative as needed (e.g. unit train loadout and underground injection project).
40. An incorrect reference was found on page 15, Section 3.4.4 that refers to Exhibit 3.4.9 for grading topography. Exhibit 3.4.9a and b are sedimentation pond details. The same page also references Exhibit 3.4.9 for details for the sediment control measures for Phase I reclamation. These are details for sediment Ponds 11 and 12 and a typical silt fence detail.
41. Section 3.4.4 states "Phase I reclamation will also include removal of all roads and culverts, except as noted and establishment of permanent stream relocations." This section should specify the structures to be removed and to those to remain with specific identification labels. Post-mining land use requirements must be addressed for those structures that are to remain as permanent features.
42. The narrative in Section 6 of Section 3.4-4 states new silt fences may be installed if the sediment plug in old fence is stable. The plan should be revised to remove the silt fences from the site prior to bond release. Sediment wedges behind old fences should be contoured and seeded as necessary to conform to the reclamation topography.
43. Tables 3.4.1 (et. seq.) should be labeled as to appropriate phase of use (e.g. operational) and peak flows cited should give design storm return period and duration.

44. Table 3.4-4. appears to have errors when referenced to Map 3.4-2, dated 11/91. As an example only, no information is given for CGWS-d2E, CGWS-d3b, etc.
45. The narrative in Appendix 3.4L should be changed to clarify descriptions of ponds as "modified pond by D. Guy" and those modified for reclamation use.
46. Plate 3.4-3 should depict the water monitoring stations to be used during the bond period. These should include the existing stations, NPDES stations, piezometers and a new station at the inlet to each sediment pond.
47. The reclamation plan must address the acid-toxic material requirements in the backfilling and grading plan. The narrative should address rules R645-301-731.111, 121, R645-301-731.300, and R645-301-745.113.
48. The text states in Section 3.4-4 that Ponds 12A and 12 B will be retained during the reclamation period. This conflicts with the reclamation narrative and designs in Appendix 3.4L.

cc: R. Harden  
D. Haddock  
B. Richards  
CGATEREC.RS



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801-538-5340

May 25, 1992

TO: Daron Haddock, Permit Supervisor

FROM:  Priscilla Burton, Reclamation Soils Specialist

RE: Technical Deficiency Review of Castle Gate Prep Plant Reclamation Plans, Castle Gate. AMAX Coal Co. ACT/007/004. Folder #2. Carbon Co. Utah.

## SUMMARY:

A technical review conducted in October of 1990 pointed out a major deficiency with the reclamation plan for the Preparation Plant Refuse site. The issue is the depth of cover to be placed on the refuse. The following supporting evidence was requested: information concerning the physicochemical characteristics of the refuse, overburden, and proposed substitute topsoil material.

The present submittal (5/1/92 and 5/5/92) calls for 6 inches. Supporting documentation in the form of chemical analyses of the coal mine waste is provided in Appendix 8B. (The first three lifts of the Prep Plant Refuse site probably utilized 12 inches of substitute cover material in reclamation.)

## TECHNICAL ANALYSIS:

224. **Substitute Topsoil.** Where the applicant proposes to use selected overburden materials as a supplement or substitute for topsoil, the application will include results of analyses, trials, and tests as described under R645-301-232.100 through R645-301-232.600, R645-301-234, R645-301-242, and R645-301-243. The Division may also require the results of field-site trials or greenhouse tests as required under R645-301-233.

## Proposal:

*In situ* soils will be used as substitute topsoil for the Preparation Plant. Grading for overland drainage flow will provide the final seeding surface.

Eight samples were taken from the Preparation Plant (Appendix 8B). The

Page 2

ACT/007/004 Castle Gate Reclamation Plan

Technical Deficiencies

May 25, 1992

sample locations are no longer marked on Ex. 3.4-3 Reclamation Map, but were on this map in the June revision of Ex 3.4-3. Sample locations may be found on the Soil Survey map for Castle Gate.

Samples from location PP#3 and PP#4 were combined for analyses. Therefore, seven samples were analyzed from the 58 acre Preparation Plant (1 sample per 8.2 acres). All samples were composites taken from 0-4 feet.

Analysis:

A reference to the soils map and Chapter 8 appendix for the location and analysis of samples is required within the Castle Gate proposal. The texture of the Preparation Plant material is a sandy loam. The bulk densities reported are similar to those of a subsoil; this may create a difficult germination and growth medium.

The results indicate that at the majority of locations, the recommended level of coarse fragments is exceeded. Locations PP#6 and PP#7 have a high percentage of coarse fragments, but are within a tolerable range. The saturation percentages of samples PP#2 and PP#3/4 are reflective of the numerous macropores that exist in coarse material. This is confirmed by the moderate to low water holding capacities reported.

The organic carbon content lessens toward the northern end of the Preparation Plant. Sites PP#1 through PP#5 have greater than 5 ppm organic carbon. Overall the carbon to nitrogen ratio is quite high, 45:1 on the average.

The combination sample PP#3/#4 (at the location of the thickener) has a high Boron level, approaching the limit of acceptability. Attention should be paid to the Boron content of the soils which will remain as plant growth medium. The plan calls for retesting these soils prior to seeding. After testing results are known, prior to seeding, soil in areas that exceed the level of acceptability for Boron must be removed to the refuse site. Alternatively, four feet of non-toxic, non-acidic cover may be placed over the area of Boron accumulation.

In summation, the *in situ* soils of the Preparation Plant are very coarse to support plant germination and growth. The Division must require that at a minimum, a soil amendment is incorporated into the surface prior to seeding the *in situ* soils of the Preparation Plant. The amendments which are suggested are alfalfa hay (3T/ac) or composted/digested sewage sludge manure.

Deficiency:

1. The Division requires that a suitable soil amendment is incorporated into the surface prior to seeding of the Preparation Plant *in situ* soils.
2. The Castle Gate Preparation Plant reclamation submittal must reference the location of preparation plant soil sample analyses in the MRP's, Appendix 8B.

**553.252. Following final grading of the refuse pile, the coal mine waste will be covered with a minimum of four feet of the best available, nontoxic and noncombustible material, in a manner that does not impede drainage from the underdrains. The Division may allow less than four feet of cover material based on physical and chemical analyses which show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357.**

Proposal:

Page 16 of the MRP describes reclamation of the refuse site utilizing 6 inches of cover material. Supporting documentation is found in Appendix 8B. Sample locations are found on drawings in the Appendix of Sec 3.5 of the July 1990 submittal.

The seven Schoolhouse Canyon Refuse site samples were taken from the lifts where interim revegetation work has been completed. The lower three lifts were (probably) covered with one foot of cover in 1984 and 1985. Samples from the lifts were depth segregated.

Analysis:

AMAX Coal Company would like these analyses to serve as justification for the use of 6 inches of cover over the refuse during final reclamation. Consequently, the rooting depth would include refuse as substitute soil. The following discussion evaluates the qualities of wasterock (below 1' deep in the lower three lifts) for plant growth.

The textural class of the waste material is mainly loamy sand. The electrical conductivity of the material is between 3 and 4.0 mmhos/cm, within the acceptable range. Sodium Absorption Ratios range from 1.0 mmho/cm at location 3 to 10 mmhos/cm at

The Utah guideline for maximum selenium concentrations within the plant rooting profile is 0.1 ppm. The figures reported do not deviate significantly from this level, especially given the accuracy of the test (Scott Fisher, personal communication 1992).

Overall, the results of the sampling of the Schoolhouse Refuse indicate that the material is not suitable for substitute topsoil. As a result, the refuse must be covered with a minimum of two feet of suitable soil cover material. This amount of cover is one-half the amount required by regulation, in recognition of the fact that very little cover is available within the disturbed area. Alternative sources of cover material must be explored.

Final reclamation is may not occur until the year 2015. In the intervening decade, a significant change in the pH, alkalinity and oxidation status of heavy metals may occur. Therefore, sampling of the refuse is recommended within a year prior to final covering and seeding of the School House Refuse site.

Deficiency:

1. The permanent disposal of refuse at the Castle Gate refuse site must be covered with a minimum of two feet of suitable substitute soil cover material.
2. The mining and reclamation plan must contain a commitment to resample the Schoolhouse Refuse site for a confirmation of its non-toxic, non-acidic characteristics within one year of the grading and seeding steps of final reclamation.

**RECOMMENDATIONS:**

The proposal to cover the refuse site at Castle Gate Preparation Plant with 6 inches of soil cover is not recommended for approval. The ability of the refuse to support plant growth is not supported by the chemical analyses. AMAX Coal Company must develop a plan to cover the refuse with a minimum of two feet of suitable substitute soil cover on the Refuse Disposal site. At the Preparation Plant, addition of a suitable soil amendment to the graded *in situ* soils is also requested.



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June 12, 1992

TO: Daron Haddock, Permit Supervisor

FROM: Randy Harden 

RE: Castle Gate Area Submittal, AMAX Coal Company, Castle Gate Mine, ACT/007/004-92B, Folder #2, Carbon County, Utah

## SUMMARY:

In accordance with the Stipulation under Docket 91-001, AMAX Coal Company has submitted revised plans for the Castle Gate Area. These plans were received by the Division on May 1, 1992, with supplemental information received on May 5, 1992. The following review is in consideration of the outstanding information as a result of the Division Order issued to AMAX and the information incorporated into those proposed changes to the mining and reclamation plan.

Comments and completeness of the information within the text of this review is in regard only to those areas described in Castle Gate Area unless noted otherwise in the comments. Determination of completeness of the response to the Division Order and compliance of those requirements for approval cannot be made until such time that all of the required information has been submitted as required by the Division Order.

## 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:

Information submitted for the Castle Gate Area is specific only to that section of the plan. A new table of contents for Section 3.4 of the plan has been provided.

**Analysis:**

With respect to Section 3.4 of the plan, the Operator has revised the plan. However, requirements of this section of the Division Order apply to the plan in its entirety.

The current cross reference to the coal mining rules is not in detail and not sufficiently detailed to locate information which is meant to address specific regulatory requirements. Many of the rules listed within the cross reference are listed as not applicable when they need to be addressed in the plan. This cross reference should be presented in the plan as part of the mid-term permit review process. However, organization of the plan with regard to consistent map numbering, table of contents, and referencing within the text of the plan is considered as part of this Division Order.

**Deficiencies:**

1. The organization and contents of the plan must be revised to comply with this section of the Division Order. A cross reference from the R645 rules to the Mining and Reclamation Plan must be provided which presents a detailed reference of the rules to the plan. This information should be provided with the information provided for the Remaining areas by December 1, 1992 as part of the Settlement Agreement.

**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. Comments regarding the adequacy of the information submitted, as required by this Division Order, are found under other sections of this review as they apply.

**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 outlopes 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 Operator has provided revised drawings for the Castle Gate Area. The Post Mining Reclamation Treatments Map, Exhibit 3.4-3 shows the proposed final contours of the area.

Plans for the area have been revised and are found in Section 3.4 of the Mining and Reclamation Plan and supporting appendices.

Exhibit 3.4-1 shows the location and the extent of the areas previously disturbed by mining (pre-SMCRA) and those portions of the previously disturbed area which are incorporated into the disturbed area boundary for current mining operations. This exhibit is also used to identify surface facilities within the Castle Gate Area.

**Analysis:**

Exhibit 3.4-1 shows the areas which were previously affected by mining operations (pre-SMCRA), and identifies those areas which lay within the disturbed area boundaries which are used in conjunction with current mining operations. In the text of the mining and reclamation plan, the Operator has indicated that essentially all of the disturbed area shown with the exception of drainage controls, occurred prior to 1977. In context with

the requirements of this section of the regulations, it can be assumed that these disturbances occurred prior to August 3, 1977.

It has been assumed that the boundary marked on the drawings as the permit boundary is synonymous with the disturbed area boundary. If this is the case, the legend on the drawings should indicate that. Disturbed area boundaries (permit boundaries) shown on Exhibits 3.4-1, 3.4-2A and 3.4-3 vary and are not consistent between these drawings. Exhibit 3.4-1 is an orthophoto and would be expected to vary to some extent from the other two exhibits and is at a different scale. However, Exhibits 3.4-2A and 3.4-3 are engineering contour drawings, and should represent boundary and contour information to within map accuracy standards.

Several conflicting areas regarding the disturbed area are found on both the operations map and the reclamation map. Mining and reclamation activities and disturbances are shown outside the disturbed area boundaries for each map, and, the disturbed area boundaries are not consistent between the drawings. These discrepancies regarding the disturbed area boundary include but are not limited to, the western extent of the disturbed area up to and including the gate, undisturbed diversions, cut and fill areas adjacent to roads, pads, and ditches used as part of the current mining operations, and drainages and diversions to be reconstructed as part of the reclamation plan.

Exhibit 3.4-2A and 3.4-3 do not appear to adequately show cutslopes and outslopes of pads, roads and diversions used in conjunction with current underground coal mining facilities. These areas include, but are not limited to the cutslope above diversion CGRD-8 (D-5), the cutslope above portions of the refuse area haul road, the road from the truck scale to the truck dump, and the berms and fill slopes along the existing road immediately to the east and west of the rail loadout area.

Other drawings which are used for engineering and hydrology design should include the disturbed area boundary, and that boundary should be consistent and not vary in geometry between drawings. Such engineered drawings found within the plan include, but are not limited to Exhibits 3.4-2, 3.4-2A, 3.4-3, 3.4-9A, and 3.4-9B.

Exhibit 3.10-1 shows the location of the underground injection and recovery wells associated with the coal preparation plan operations. This information was not incorporated into the information provided for the Castle Gate area. Although the information found in Section 3.10 of the mining and reclamation plan has not been completely reviewed by the Division at this time, it is apparent that the location and extent of the underground workings, which will be affected by underground injection of coal processing waste, should be included in the permit area boundary. This appears to be an oversight by both the Division and the Operator at the time of approval for the injection wells. Regardless, the plan must be changed to incorporate this area into the

permit area boundary and will require changes to the drawings as required by the Division Order.

**Deficiencies:**

1. Operation and reclamation maps showing the location and the extent of the disturbed area and permit area boundaries must be revised to consistently show the same permit and disturbed area boundaries. All maps contained within the mining and reclamation plan which are used to show location, elevation, design, and the extent of surface mining facilities must have clear and consistent boundaries for the disturbed areas. All surface mining activities to be conducted through all phases of the mining and reclamation operations must be included within the permit and the disturbed area boundaries.

**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:**

This Division Order was not specifically addressed as part of the Castle Gate Area submittal.

**Analysis:**

The requirements of this section of the Division Order apply to the plan in its entirety.

**Deficiencies:**

This information should be provided with the information provided for the Remaining areas on June 15, 1992 as part of the Settlement Agreement.

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:**

Existing hydrology information and reclamation operations are shown on Exhibits 3.4-2 and 3.4-2A respectively.

The Operator has stated that grading will be done in order to establish drainage and stabilize highwalls and cutslopes. The Operator states that the disturbed areas are to be graded to approximate the original contours by blending into the surrounding area and creating landforms which resemble the surrounding terrain. Cutslope areas which are left, resemble the cliffs in the surrounding topography and were analyzed for slope stability.

The Operator's plan states that during the grading process, berms and temporary diversions will be eliminated, grading will establish surface overland flow drainage where possible, culverts will be removed, sediment ponds will be removed, and paved surfaces will be removed prior to the placement of soil. The Operator will construct permanent stream channels and provide for alternative sediment control practices following reclamation construction.

Phases of reclamation are discussed in Section 3.4-4 of the proposal. Phase I activities include demolition, grading, soil preparation and soil amendments, and sediment control measures. Phase II activity is listed as removal of the sediment ponds, ditches and berms with seeding and mulching activities for these areas. Phase III work includes reclamation monitoring of water and vegetation.

The timing of the reclamation activities is provided in Section 3.4-5.

The Operator has indicated that the post mining land use for the Castle Gate Area is wildlife and grazing.

Analysis:

The Operator has indicated that there are no portals to seal at the Castle Gate. The Operator must incorporate the closure and sealing of the underground injection wells which are used in conjunction with the coal processing facility, and monitoring wells associated with the refuse disposal facility. Further the location, elevation and depth of these holes must be provided on appropriate drawings of the existing facilities. The text of the plan should be revised to incorporate these injection and monitoring holes into the operation and reclamation plans. Exhibit 3.10-1 and Chapter 3.10 provides some of the information required above, but was not incorporated or referenced into the text of Section 3.4.

No discussion of monitoring requirements for the School House Canyon refuse facility is discussed in the Mining and Reclamation Plan except as found in Appendix 3.4A. Because the information presented in Appendix 3.4A is a consultant's report, with recommendations supporting the requirements for monitoring for stability, it is considered only as a proposal by the consultant and is not considered a commitment by the Operator to conduct monitoring of the School House Canyon refuse facility. The operation and reclamation plan must have specific commitments and methodologies for the monitoring of the refuse facilities.

Associated with the recommended monitoring practices as found in Appendix 3.4A, Appendix 3.4C, is a follow-up report on the refuse pile stability by Horrocks and Carollo Engineers. Included with this report is monitoring information collected from 10-21-80 to 3-18-82. No additional monitoring information can be found within the text of the mining and reclamation plan, nor within the annual reports submitted to the Division. No commitment to monitor groundwater or materials placed in the refuse disposal facility is found in the plan. As stated in the consultant's report, this information is considered essential to the plan as part of the ongoing mining operations and assurance that reclamation of the facilities will meet the minimum performance standards as required for the structure. The monitoring plan should also set forth the frequency and timing for monitoring and submittal times for the data collected and any reports associated with the monitoring.

Designs provided in Appendix 3.4C, regarding the stability analysis for the School House Canyon Refuse Facility, indicate that the final configuration for the pile has a maximum elevation of 6550 feet, and the reclamation drawing provided show a maximum elevation of 6600 feet. This change in the geometry of the refuse pile is not adequately documented in the mining and reclamation plan. An increase in the final elevation of the refuse pile by 50 feet could have a significant effect of the factor of safety and the

stability of the refuse pile. Such a change in the final configuration cannot be approved without adequate supporting information demonstrating that the altered geometry of the refuse pile will maintain the minimum factor of safety as required by the regulations.

Contour information and the designs provided in the plan do not adequately depict the surface runoff and drainage from the refuse facilities. The top of the refuse facilities is shown to be flat with no drainage control or methodology to eliminate ponding or standing water on the top of the structure. Contour information and drainage control should be revised to show that an adequate slope will be provided to maintain drainage off of the top of the refuse facility. The slope of the top of the refuse pile should be sufficient to allow for any potential settling which may occur in the refuse material and could affect surface drainage and be moderate enough to promote overland flow with minimum erosion potential.

No drainage design or information was found within the text of the plan or on the drawings regarding the final configuration of the terraces left as part of the refuse disposal facility. Contour information as provided on the drawings does not adequately depict the location, size and shape of the terraces or what drainage designs or controls will be used to divert runoff.

Details of the unit train loadout are found on Exhibit 3.8-5, Unit Train Loadout, Elevation and Drainage Controls. This map was not incorporated by reference into the text of Chapter 3.4 of the plan and was not referenced as an exhibit associated with the Castle Gate Area. A detailed discussion of the unit train loadout facilities is discussed in Chapter 3.8 of the mining and reclamation plan. However, the maps and drawings related to the operations and the reclamation of this area are an integral part of the information provided in Chapter 3.4. The Operator may wish to integrate the information found in Chapter 3.8 into Chapter 3.4. At this time no detailed review by the Division of the information contained within Chapter 3.8 has been made. In the event that the information within Chapter 3.8 is not incorporated into Chapter 3.4, this information will be reviewed in conjunction with the review for the remaining areas as mentioned in the schedule for the Settlement.

Some structures are proposed to remain as part of the final reclamation configuration. These primarily include culverts which will remain to protect utility water lines within and adjacent to the disturbed area boundary, and culverts to remain to pass water beneath the adjacent railroad right-of-way. Additionally, the Operator has identified a utility corridor within the disturbed area boundary, which is adjacent to the railroad right-of-way. The culvert structures and the utility corridor associated with the buried waterlines in the property are not considered as an alternate post mining land use, but rather as reasonable structures to protect adjacent and existing facilities and utilities.

**Deficiencies:**

1. The Operator needs to locate all injection and monitoring wells associated with the Castle Gate Area on the surface facilities map for the Castle Gate area.
2. The Operator needs to provide updated text, detailed designs and drawings for the refuse disposal facilities to adequately address the measure used to maintain and monitor stability and surface drainage and runoff control.
3. Designs, maps and plans related to the Castle Gate area need to be incorporated into the text of that chapter and drawings and exhibits need to be adequately referenced, as appropriate, to identify, locate and describe all operational mining activities and proposed reclamation facilities associated with the Castle Gate area.

**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 3.4-4 of the mining and reclamation plan. The Operator has indicated that backfilling and grading will be done in order to establish overland flow drainage and approximate original contour. The Operator indicates that AOC is achieved by blending the spoil into the surrounding area and creating landforms which resemble the surrounding topography.

The cutslope areas to be retained are as analyzed by EarthFax in Appendix 3.4K and are as shown on Exhibit 3.4-3. In the conclusions of the slope stability analysis by EarthFax, a determination was made that based on the five "worst case" slopes

encountered in the Castle Gate area, that all five slopes are stable and that all exceed the required minimum factor of safety of 1.3. No buttressing of any of the cut or fill slopes is necessary for the purpose of slope stability. Slopes at cross sections A and C will require fill to develop adequate drainage. The lack of fill material in the general vicinity of cut slope area precludes the option of backfilling that slope to the top of the exposed cut.

Section 3.4-4 of the plan further states that the reclamation of the Castle Gate Plant area will take place over the area which was the old town site of Castle Gate. Old utilities, foundations and debris may be uncovered during the grading operation. This may result in the alteration of the contours shown on Map 3.4-3 by as many as two contour intervals [4 feet] in order to keep from uncovering the old town site.

**Analysis:**

The Operator has not requested a variance for any structures or facilities to be left upon completion of reclamation or as part of an alternative postmining land use. In order to demonstrate compliance with AOC requirements the Operator has conducted stability analysis of the slopes to be left for final reclamation, and has found those slopes to be designed to have a static factor of safety of 1.3 or greater. Cutslopes associated with roads and pads within the Castle Gate Area have been proposed to be left in some areas and are included in the stability analysis previously described.

In accordance with R645-301-553.130, disturbed areas must be graded and backfilled to 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. Backfilled portions of the area are in general, graded to the most moderate slope possible. The steepest backfilled slopes are designed to be no greater than 2h:1v (26.6° slope angle).

Cut slope areas are not clearly defined on the drawings and cross sections provided in the mining and reclamation plan. Only two small areas shown on Exhibit 3.4-3 have been identified as cut slope areas to remain. Several areas within the disturbed area boundary are found to be at slopes greater than 2h:1v, but are not identified as cut slopes to remain. These slopes, if they are backfilled, would exceed the angle of repose and the maximum backfilled slope as proposed by the Operator as 2h:1v.

It is also apparent from the orthophoto and from site visits that there are areas within the disturbed area boundary which have not been substantially disturbed by current or previous mining activities. These natural slopes within the disturbed area

boundary appear, in some areas, to be steeper than the 2h:1v maximum backfill slopes as proposed by the Operator. If the Operator were to carefully locate and delineate those areas on the reclamation maps, some of the areas greater than 2h:1v could be accounted for as natural slopes. Additionally, the reclamation treatments for these areas could also differ substantially from those required for regraded areas. Documentation of these natural areas within the disturbed area boundaries could greatly influence the reclamation treatments proposed by the Operator and could potentially reduce reclamation costs.

Portions of the refuse haul road and the adjoining diversion ditch along the road are shown to be outside of the permit area boundary. Additionally, the cut slope of the haul road is not accurately depicted for the haul road. The main access road from the truck scale to the truck dump does not incorporate the cut slopes associated with the construction of that road. The reclamation drawing for those same areas does not depict the same disturbed area boundary and based on the appearance of the drawing, does not incorporate all of the cut slope areas into the disturbed area boundaries.

Several areas, based solely on the information indicated on the operation and reclamation exhibits, show discrepancies in the permit (disturbed) area boundary and in the adjoining areas in which cut and fill slopes are associated with the current facilities. Examples include, but are not limited to the following:

1. The reconstructed Pond 12 shows disturbance and construction of the pond embankment during reclamation outside of the permit and disturbed area boundary. In comparison with the operations drawings, it also appears that the construction of the pond embankment would encroach on the adjacent railroad tracks.
2. The geometry of the disturbed area at the unit train loadout is dissimilar between the operations map and the reclamation map.
3. The permit area and disturbed area shown on the operations map extends significantly further than the area shown on the reclamation drawing for the areas extending to the southeast of the raw water pond.
4. Disturbed areas associated with diversions have not been identified as disturbed areas, and in some cases reclamation contours indicate that the diversions have been left unreclaimed. In particular, these diversions include D-1 and D-6 as shown on Exhibit 3.4-2.

The operation and reclamation plan is not clear and specific regarding the backfilling and grading operations. In Appendix 3.4K, part 4.7, it has been indicated that a maximum slope for fill materials is 2h:1v based on a range of the angle of repose for various materials which may be encountered during reclamation. Numerous areas on Exhibit 3.4-3 are found to be in excess of this maximum slope of 2h:1v. These areas are not identified as cut slopes which are proposed to remain as part of the post mining configuration.

Information regarding the cut slopes must also be expanded in the plan to incorporate other reclamation treatments that are proposed in the plan. To date the current plan discusses the soiling, vegetation, and sediment control treatments for the backfilled areas. More precise information needs to be incorporated into the plan regarding these activities for the cut slope areas. Additionally, the Operator needs to discuss how these cut slope areas will be addressed for vegetative cover and diversity in regard to bond release. Discussion of these cut slope areas needs to be provided in the plan in conjunction with vegetation monitoring and the criteria used to measure the disturbed area for density and diversity.

The plan lacks specificity on the methods and treatments used during backfilling and grading to achieve the proposed reclamation contours. The Operator has indicated that no topsoil materials will be placed over the Castle Gate Area with the exception of the refuse pile. No description of the placement of fill material to ensure proper compaction or placement is found as part of the plan. No description of cultivation or preparation of the surface of the regraded areas is found within the plan which adequately describes how such backfilling and grading will be accomplished. In those areas where the slopes exceed 2h:1v, the Operator has proposed no suitable method for the cultivation of the surface of the area as preparation for revegetation. In such areas, loosening or ripping the surface would limit the slope to less than 2h:1v based on the constraints of the angle of repose for such materials. Surface preparation, by loosening or cultivating both cut and fill areas within the disturbed area, must be considered by the Operator and incorporated into the text of the plan. Those areas in which no cultivation, ripping or surface preparation will be accomplished, and where no substitute material will be used for or as topsoil placement

Cut slopes associated with the mine facilities from the thickener overflow ponds to the truck dump need to be backfilled to meet the general requirements for backfilling and grading and to meet AOC requirements. No constraints such as the amount of backfill material available within the site or geometric constraints which would limit or exclude these cut areas from being completely backfilled. These areas need to be

backfilled at a 2h:1v slope or more moderate slope to achieve AOC and eliminate these cut slopes.

Although the Operator has indicated that remnant of the old town of Castle Gate and old mining facilities underlie portions of the areas to be graded and that contours may vary as a result of allowing some of these buried facilities to remain covered, it is not considered conclusive that there is insufficient material to allow for complete elimination of cut slopes in many of the areas associated with the existing Castle Gate area. The area identified by section C would be considered as typical of a cut slope area that could be completely mitigated to blend in with the surrounding area. Although the stability analysis indicates that this area is stable, this stability can mostly be attributed to the sandstone member at the base of the cut slope. The upper two thirds of this slope appears to be colluvial materials. Reduction of the cut slope by backfilling of this slope appears to be reasonable and conforms with the requirements for backfilling and grading to meet AOC requirements.

The cutslope area at section C and the thickener ponds would also appear to be a likely candidate for the permanent disposal of spoils which are found not be suitable as growth materials for the site. Additionally, this area could be used as a landfill area to accumulate non-coal waste materials encountered during demolition as well as from facilities uncovered during grading operations of the old preparation plant and town site.

**Deficiencies:**

1. Drawings of the Castle Gate Area need to be revised to show the disturbed area boundaries so that the location and extent of cut slopes remaining as part of the regrading plan can be evaluated. Cut slope areas and undisturbed areas within the disturbed area boundary to remain as part of the final surface configuration must be identified in order to determine whether or not these cut slopes will meet AOC requirements. Principally, this can be show by delineating those areas which are to be regraded within the disturbed area boundary and discussing reclamation treatments for those areas. Secondly the location and the descriptions of the cut slope areas and the natural areas found within the disturbed area boundary would also be discussed in the plan and identified on the drawings.
2. Drawings of the Castle Gate area need to be revised to reduce fill areas to the maximum design slope of 2h:1v. Cut slope areas need to be backfilled to moderate slopes in those areas where the configuration of the area allows in order to meet AOC requirements.

3. Detailed information needs to be presented in the plan for any additional reclamation treatments for cut slope areas to remain on final reclamation. This information must address methods for monitoring and evaluating vegetation cover and diversity for the entire disturbed area, including the cut slopes. Additionally, slopes found within the disturbed area which are natural slopes need to be identified and specific treatments for those areas should be described in the plan. Further, many slopes and areas within the disturbed area boundary have been previously disturbed but have to some extent been naturally revegetated. The Operator should discuss in the text of the plan methodologies used to evaluate these areas and proposed reclamation treatments where required. (This information has been proposed to be submitted in conjunction with the vegetation and soils section of the mining and reclamation plan.)

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 remaining operation and any other reasonably available spoil shall be used to backfill the area. Reasonably available spoil in the immediate vicinity of the remaining 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:

Discussion of previously mined areas is found in Section 3.4-2 of the plan and is indicated on Exhibit 3.4-1. Within the permit area, two mines, the old preparation plant facilities, and the historic town of Castle Gate.

**Analysis:**

While much of the mining activity within and adjacent to the permit area is historic, essentially all of the mining operations as they exist, with the exception of the unit train loadout facilities, are part of an ongoing mining operation which was active prior to, and continued operation through, the implementation of SMCRA. The unit train loadout area was added to the permit as a minor permit modification.

No "highwalls" exist within the Castle Gate area. Mining operations within this area consist of coal preparation and loadout facilities. No underground mining operations are proposed within this area.

There are however, cutslopes found within the Castle Gate area. The Division has determined that, in some cases, cut slope areas can remain when they are found to be stable, compatible with the post mining land use and meet AOC requirements. Refer to comments under Division Order #18.

Exhibit 3.4-1 does not conform closely to the disturbed area boundaries shown on other drawings within the mining and reclamation plan. However the general location and the extent of the disturbed areas and those areas which have been previously disturbed within the permit area are considered to be sufficient to meet the requirements of the regulations.

**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:**

Bonding information previously found in Section 3.4 has been eliminated from the plan.

**Analysis:**

It is anticipated that the bonding information previously provided for the Castle Gate Area will be incorporated into the final plan and that calculations will be provided on or before the due date for the submittal of all remaining areas. Mass balance calculations, especially in regard to Gravel Canyon, cannot be completed until all topsoil distribution requirements are determined for the entire permit area.

**Deficiencies:**

1. The Operator will need to provide revised bonding calculations in conjunction with the Remaining Areas.

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ACT/007/004-92B  
June 12, 1992

## **RECOMMENDATIONS:**

Several of the deficiencies described within this review have already been discussed with the Operator and the Operator's consultant. Prior to completion of this review meetings were held with EarthFax, on June 3, 1992, with Richard Allison of AMAX and Bill Hendricks of EarthFax, on June 8, 1992, and a field visit to the site on June 9, 1992 to discuss and evaluate the proposed plans and drawings.

In general, resolution of most of the issues discussed in this review have been resolved and will be incorporated into the resubmittal for the Castle Gate area by September 9, 1992 as agreed in the schedule for Settlement Agreement.

Deficiencies found within the review of the Castle Gate Area are considered minor in respect to the total reclamation plan concept submitted for the area. Overall, the revised proposal by the Operator is a considerable improvement over the information previously found in the mining and reclamation plan. Deficiencies found within the scope of this review should be submitted by the Operator as early as possible, but, no later than the deadline for the completion of all the information required under the Settlement Agreement.

cc: BTEAM



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

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TO: Daron Haddock, Permit Supervisor

FROM: Paul Baker, Reclamation Biologist 

DATE: May 27, 1992

RE: Castle Gate Prep Plant Reclamation Plan, Amax Coal Co., Castle Gate Mine, Folder #2, ACT/007/004, Carbon County, Utah

## SUMMARY

Amax has revised the mining and reclamation plan for the Castle Gate Preparation Plant area. Much of the revegetation plan is contained in Chapter 9.

In a meeting on May 20, 1992, with Mickey Steward of Amax, I discussed seedbed preparation, seeding, and mulching methodology for the Hardscrabble Canyon area. Based on this meeting, I expect the revegetation plans to be revised to include new soil roughening techniques, planting methods, and mulching technologies. If this occurs, some of the comments in this memorandum may become obsolete.

## ANALYSIS

R645-301-321

### Vegetation Information

#### Proposal:

Two reference areas are described in Chapter 9 for the Castle Gate area. They are in mixed brush and riparian vegetative types.

The mixed brush reference area had 41% vegetative cover, primarily from Agropyron sp., but with substantial contributions from sagebrush, Utah serviceberry, and fourwing saltbush.

The riparian reference area had 56% vegetative cover. More cover was provided from downy brome than any other species. Other species mentioned include narrowleaf cottonwood, virgin's bower, Gambel oak, skunkbush sumac, and rose.

**Analysis:**

Appendix 9-B contains the detailed information needed for this section of the plan, but it is still missing. Memoranda from Lynn Kunzler acknowledge that the Division once had a copy of this appendix, but it has not yet been located. The search is continuing.

Since most of the vegetation in the mixed brush reference area was identified as "Agropyron sp." and since the seed mix needs to reflect as closely as possible the species already at the site, this grass needs to be identified.

Revegetation of the refuse pile in Schoolhouse Canyon occurred in 1985 and possibly one more time before then. Page 64 of Chapter 9 of the MRP states that reclamation sites will be monitored for cover, density, and frequency during each of the first three years to determine if supplemental planting and seeding is needed and at years 5, 7, and 9 using the same random sampling and statistical analysis techniques used in the original reference area sampling. This information would be valuable in evaluating the seed mix that was used to see if some changes to the currently proposed seed mix should be made. The seed mix appears to have been mix 3 from the old Price River Coal MRP. The evaluation information will be requested at the next inspection.

**Deficiencies:**

1. If Appendix 9-B is found, it must be included in the MRP.
2. Amax must identify the dominant grass in the mixed brush reference area.

**R645-301-341**

**Revegetation Plan**

**Proposal:**

Seeding and mulching will occur in week 74 of reclamation, after October 1, according to page 18 of the revised section 3.4. Chapter 9 page 52 says that planting of the ephemeral/intermittent drainage planting mixes will occur in the spring, mid to late April.

Seed mix 1 will be used for the majority of the area at the prep plant. Mix 2, a riparian mix consisting of both seed and transplants, will be used near the Price River.

Fertilizer may be mechanically or hydraulically broadcast prior to seeding. The seed will then be applied using a hydroseeder or drilled where accessible. In areas inaccessible to the hydroseeder or drill, the seed will be broadcast by mechanical means.

Seeded areas will be mulched with hydromulch at the rate of 2000 pounds per acre. Areas inaccessible to the hydromulch will be mulched with straw at the rate of 2000 pounds per acre and tacked with nylon or other suitable netting.

No irrigation is planned, and no pests or diseases are anticipated. A plan to control diseases or pests will be developed with the Division if a problem arises.

Reclamation sites will be monitored for cover, density, and frequency during the first three years to determine if supplemental planting and seeding is needed. Sites will be checked again at 5, 7, and 9 years to find problems affecting the density of the cover vegetation. Analyses at these defined intervals will be through the use of the same random sampling and statistical analysis techniques used in the original reference area sampling.

There are apparently no field trials or greenhouse studies at the Castle Gate Preparation Plant.

#### **Analysis:**

The plan does not discuss timing of transplanting other than for ephemeral and intermittent drainages, but the Price River is not ephemeral or intermittent. Depending on the type of materials to be planted, planting should probably be conducted during the dormant season, either fall or early spring.

The riparian reference area contains 1127 shrubs and 17 trees per acre, but Amax only proposes to plant 900 trees and shrubs per acre and not include seed of any trees or shrubs. Some additional provisions will need to be made to meet the tree and shrub density standard. The amount of woods rose should probably be increased to about 500 per acre, and skunkbush sumac and Gambel oak could be added. Willows could possibly be reduced since they are not mentioned in the text as a major species in the riparian area. Another possibility would be to seed some of the tree and shrub species.

The plan needs to further discuss the types of transplant materials that will be used, i.e. bare root stock, containerized plants, cuttings, etc. If cuttings are used, some of the materials may be available on the site, but a nursery will need to know at least one and probably two years before reclamation begins what materials will be needed.

Seed mix 1 is a diverse mixture that should work well at the site. It contains two wheatgrasses, thickspike and western, but it is not known if either of these is the species that dominates the reference area. When information from deficiency 2 under R645-301-321 is received, this seed mixture should be evaluated to determine if a different

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wheatgrass should be used.

Seed of Utah serviceberry is available commercially, and this species should be used in place of Saskatoon serviceberry since the reference area contained A. utahensis.

Seed and planting mix 2 is also a diverse mixture that is appropriate for a riparian area. Seed of Geranium viscosissimum is not generally available commercially and could be simply deleted from the mixture.

Even where species used in revegetation are the same as those in the immediate area, slight variations in genotypes and physiology can cause revegetation failure. This is especially true for shrubs. The Utah Crop Improvement Association has begun a program of verifying seed origin where seed collection locations are documented, especially for wildland shrubs. This program is not yet well established but should be soon and will become more established as demand for this type of seed increases. Other possibilities for obtaining this kind of seed include making special collections on site and only buying seed from a similar location as the mine and labelled with the county and elevation of collection as per Utah State law for tree and shrub seed. Most nurseries recognize the need for using adapted ecotypes in plantings, and source information is commonly available for nursery stock. Nurseries will also contract collectors to gather seed from a specific site and grow those plant materials to a transplant stage. In order to have a diverse, permanent and effective vegetative cover, adapted ecotypes need to be used.

Surface roughening techniques have been discussed with Amax personnel, and a proposal is anticipated. Slopes, especially those steeper than 3h:1v, should be left in a roughened condition that will not be substantially disturbed by seeding and mulching operations. Included in the surface preparation techniques should be rock piles that will provide microclimates suitable for seed germination and establishment and provide wildlife habitat enhancement.

The seeding methods proposed are adequate. Drill seeding should not be performed where surface roughening techniques have been used to prepare the soil on steep slopes. Broadcast seed needs to be placed in good contact with the soil by raking or another means.

The most current recommendations are to use at least 1.5 tons per acre of straw or, preferably, hay mulch instead of wood fiber hydromulch. These mulches last longer and control erosion better than hydromulch. Synthetic mulches may be available; Amax is expected to provide information about them.

The plan needs to contain a contingency plan to irrigate seedlings in case of

drought. Transplants will need to be protected at the first sign of wildlife degradation.

The monitoring procedures proposed should be adequate.

The plan calls for placing only 6" of topsoil on the refuse pile and justifies this by stating that the refuse materials are not toxic. Priscilla Burton discussed in her soils memorandum the suitability of the refuse material for use as a substitute soil and required that the refuse be covered with at least two feet of suitable substitute soil cover material. Any attempt to justify less soil cover than this would need to be accompanied by data from reclamation at similar sites or test plots which show that revegetation can be accomplished using less soil material.

**Deficiencies:**

1. The plan must discuss when transplanting operations will be performed on perennial streams.
2. The planting list or seed mix in mix 2 for riparian areas must be revised to include enough trees and shrubs to make it possible to achieve the standard for success for the riparian reference area. Addition of skunkbush sumac and Gambel oak and more Wood's rose to the planting mix are recommended.
3. The plan must detail the types of transplant materials that will be used in the riparian area, i.e. bare root stock, containerized stock, etc.
4. Seed mixture 1 must be revised, if necessary, according to the results of identification of the dominant wheatgrass in the Castle Gate Mixed Brush reference area. Utah serviceberry must be substituted for Saskatoon serviceberry in seed mix 1.
5. The Applicant must show how seed and transplants of adapted ecotypes, especially of shrubs, will be obtained that will provide a diverse, permanent, and effective vegetative cover.
6. Amax must include a plan to roughen slopes, especially those steeper than 3h:1v, through methods such as gouging, pitting, or terracing. Seeding operations must not destroy these roughening features. Included in this plan must be methods to establish rock piles both for plant establishment and for wildlife enhancement.

7. The plan must include methods to place broadcast seed in good contact with the soil, such as through raking.
8. Mulching methods must be changed to reflect the best technology currently available for erosion and sediment control and for seedling establishment. Straw or hay applied at the rate of 1.5 to 2 tons per acre and anchored by netting, crimping, or application of a chemical tackifier appears to be the best available method.
9. The plan must contain contingency plans for irrigating transplants in case of drought. Transplants must be protected at the first sign of wildlife degradation.

**R645-301-342**

**Fish and Wildlife**

**Proposal:**

Several high country ponds were created during the drilling program of 1970-1977. They catch seeps for grazing animals and are probably used by wildlife.

Species to be used in final reclamation were selected based partially on their nutritional value for wildlife.

**Analysis:**

Amax should consult with the Division of Wildlife Resources to determine if other wildlife habitat enhancement measures are practicable or needed for this area. The plan should provide evidence and results of this consultation.

**Deficiencies:**

1. Amax must include in the plan wildlife enhancement measures for the postmining phase of operations or must make a statement as to why these measures are not practicable. Consultation with the Division of Wildlife Resources is highly recommended.

**RECOMMENDATIONS**

Approval of the reclamation plan for the Castle Gate Preparation Plant area is not recommended until issues discussed above are resolved.