



Norman H. Bangerter

Governor

Dee C. Hansen

Executive Director

Dianne R. Nielson, Ph.D.

Division Director

355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
801-538-5340

TO: Daron Haddock, Permit Supervisor

FROM: Paul Baker, Reclamation Biologist 

DATE: February 2, 1993

RE: Review of Castle Gate Mining and Reclamation Plan Section 3.7, Crandall Canyon, AMAX Coal Co., Castle Gate Mine, Folder #2, ACT/007/004, Carbon County, Utah

## SUMMARY

The referenced section of the Castle Gate Mining and Reclamation Plan has been reviewed, primarily for consistency with the revised Chapter IX which is still pending final approval.

The seed and planting mixes shown in this section need to be changed to agree with Chapter IX. Reference areas have been established for Crandall Canyon, but the plan is not clear on exactly which reclaimed areas will be compared with which reference areas. Woody species density standards for success which were established in consultation with the Division of Wildlife Resources need to be included in the plan.

## ANALYSIS

### Proposal and Discussion:

The numbering system for the seed (species) mixes has been changed in the new Chapter IX compared to the current plan. Species list 2 should be used for the majority of the area and species list 3 for riparian areas. As with other areas at the mine, the plan should discuss or show on a map where the riparian species mix will be used.

In addition to species list 3, some effort needs to be made to establish conifers on the north-facing slopes. This has been discussed with AMAX personnel, but the need may not have been made clear. Planting list #1 on page 60 of the current plan is recommended. AMAX might base conifer plantings on species that have survived and survival rates along the access road.

Most of the area will be mulched with hydromulch at the rate of 2000 lbs per acre.

The plan states that areas not accessible to hydromulch will be tacked with nylon netting; the plan does not state what kind of mulch will be used. However, the new Chapter IX says that areas inaccessible to hydromulching will be mulched with straw or other appropriate material and tacked with nylon netting.

The new Chapter IX states that revegetation success for SMCRA areas will be measured in accordance with 356.100 through 233. Reference areas for SMCRA areas such as Crandall Canyon are supposed to be identified in the specific section giving the reclamation plans for those areas.

The existing plan says that the Castle Gate Mixed Brush, Crandall Conifer, Crandall Riparian Bottom, and Barn Canyon Grass-Sage Reference Areas will be used for Crandall Canyon. Chapter 9 of the existing plan also contains some baseline information for the Crandall Canyon Pinyon Juniper Reference Area, but this reference area is not shown in Table 9.5 on page 32 as being used for comparison to any area. The new Chapter IX does not detail which reference areas will be compared to which reclaimed sites to determine reclamation success. Since the new Chapter IX says that this information is included in the specific section giving the reclamation plans for those areas, Section 3.7 needs to show which reference areas will be compared to which reclaimed areas.

The postmining land uses are grazing and wildlife. Because of the wildlife land use, the Division is required to establish minimum tree and shrub stocking rate standards for success in consultation with state wildlife management agencies. The following standards are based on the consultation, baseline data from reference areas that appear to correspond to areas that will be reclaimed, and on the reclamation plan:

Reclaimed Area	Standard (number per acre)
North-facing slopes	389 trees, 2500 shrubs
South-facing slopes	2000 shrubs
Areas planted with species list 3 (Riparian)	810 combined trees and shrubs
Leach Field	2275 shrubs

These standards need to be included in the plan.

According to the baseline data in the plan, the Crandall Conifer Reference Area on a north-facing slope contains 389 trees and 5244 shrubs per acre, but most of the shrubs are Oregon grape and are not upright shrubs that might be used by wildlife. Therefore, the shrub standard for this area was set at approximately the same level as the baseline data for "normal" shrubs. The Crandall Canyon Pinyon Juniper Reference Area on a south-facing slope contains 82 trees and 1074 shrubs per acre. Trees will not be reestablished, so it is felt that the number of shrubs that can be supported is greater than

what currently exists. The riparian area contains 82 trees and 164 shrubs per acre, but 900 trees and shrubs will be planted per acre. Wildlife Resources felt that the riparian area standard should probably be about 2000 trees and shrubs per acre based on the type of community that should be supported in a stream bottom, but the standard was set at 810 considering the reclamation plan and that there would be some mortality and some natural recruitment. The leach field area was apparently a grass-sage vegetative type, but baseline data for this specific location was not found in the plan. The standard for success is an average of shrub densities for the Barn Canyon and Sowbelly Grass Sage Reference areas.

**Deficiencies:**

1. The seed/planting mixes need to be changed to correspond with the new Chapter IX. Species list 2 should be used for most of the area, and species list 3 should be used for riparian areas. The plan needs to show either on a map or in the text where these mixes will be used. A conifer planting mix should be used in conjunction with species list 2 for north-facing slopes, but the seed mix alone is sufficient for the south-facing slopes.
2. This section of the plan needs to show which reference areas (or other standard for success) will be compared to which reclaimed areas to show successful revegetation.
3. Woody species density standards for success that were established in consultation with Wildlife Resources need to be included in the plan.

**RECOMMENDATIONS**

The Crandall Canyon reclamation plan needs to be revised to reflect recent changes in Chapter IX, and it also needs to specify revegetation standards for success.