



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

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December 27, 1996

TO: Daron Haddock, Permit Supervisor

FROM: Steven M. Johnson, Reclamation Hydrologist *SMJ*

RE: Sowbelly As-Built, Castle Gate Mine, Amax Coal Company, ACT/007/004 Phase I, Folder #2, Carbon County, Utah

**SYNOPSIS**

Amax Coal Company completed regrading and seeding reclamation in the fall of 1995 for the Sowbelly Canyon permit area. They have requested Phase I bond release and have submitted as-builts for the regrading, sediment control and diversion in the canyon. This replaces the October 23, 1996, memorandum under the same title, including additional findings.

On October 22, 1996, the Division and a representative from OSM joined Johnny Pappas in a Phase I inspection of Sowbelly Canyon. This inspection began at 10:00 a.m. and lasted until 12:00 noon. Grading and establishment of the drainage and sediment control systems were the major components of the inspection.

This memorandum provides the analysis of hydrology from the as-builts and the inspection in determining if release of Phase I bond is appropriate.

**ANALYSIS**

**RECLAMATION PLAN**

**HYDROLOGIC INFORMATION**

Regulatory Reference: R645-301-760

**Analysis:**

Section 3.2-5(4) covers the reclamation alternate sediment control measures that will be implemented in the reclamation of this canyon. This section was permitted prior to reclamation activities in 1995. Section 3.2-5(4) refers to Appendix 3.2I for sediment control as-builts. Appendix 3.2I shows USLE calculations that demonstrate that the alternate sediment

control measures are adequate to treat reclaimed areas. First, Amax Coal says that the amount of sediment from the undisturbed area is greater than the disturbed areas; therefore, the sediment is controlled on the reclaimed areas. Second, Amax Coal says that an analysis which uses predisturbed assumptions on the disturbed areas results in only a slightly lower sediment production. Finally, the data shows that sediment production per acre is less from the reclaimed areas than the sediment production from undisturbed areas.

Section 3.2-10 discusses the reclamation as-builts. This section discusses the reclamation activities performed in 1995. This section also describes the use of mulch as sediment in the reclaimed areas.

Appendix 3.2G is the reclamation as-built, hydrology calculations. In this section the channel configurations are shown. All channels are shown to be built to design and certified by a professional engineer, except SBRD-8. This channel was only slightly modified in order to leave a more natural, stable channel; therefore the engineer certified that the channel was stable and capable of conveying the required storm runoff, rather than certifying the designs.

During the summer of 1996, the reclamation channels withstood several thunderstorms including one storm that produced nearly one inch of rainfall. There is some evidence that flow was conveyed in some of the channels but there were no signs of channel destabilization. Flow was minimal in the channels to the point that two automated samplers in the main channel (one upstream portions of the reclamation area, one downstream of the reclamation area) collected no data.

Sediment control is currently met by surface roughening and vegetation. Vegetation is not at a level that is in itself adequate for sediment control but when combined with the surface roughening sediment control and runoff control is adequate. Further, the roughening has enhanced the potential for vegetation which will continue to act as long term sediment control.

The groundwater table is deep below the surface and is not readily effected by the surface. Further, the materials left on the surface will produce little leachate that will cause negative effects to the quality of the groundwater. Though some of the material is high in sodium, it has been buried at least four feet below the surface which will moderate the amount of leachate that reaches the aquifer. Finally, this aquifer has minimal economic value so slightly increased dissolved solids will not bring a need for remediation.

All mine opening have been adequately sealed to avoid discharges into the mine workings.

**Findings:**

The reclamation hydrologic designs for Sowbelly Canyon are complete and field

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inspection shows that the ditches are stable. Sediment control is adequate in surface roughening and vegetation. No surface water quality impacts are anticipated but in the case that increase sediment loads are discovered remediation is expected to be inexpensive and effective.

Reclamation of Sowbelly Canyon has not and is not expected to cause groundwater pollution. The Division expects that remedial work will be very unlikely.

Water monitoring will continue for at least a ten year period. This monitoring will likely show any changes in water quality caused by the reclamation of Sowbelly Canyon.

### **RECOMMENDATION**

The hydrologic design and construction in Sowbelly Canyon have produced stable channels. Sediment control will be met in the short through roughening and vegetation, and long terms by vegetation.

CC: Pam Grubaugh-Littig  
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