



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

Michael O. Leavitt
 Governor
 Ted Stewart
 Executive Director
 James W. Carter
 Division Director

355 West North Temple
 3 Triad Center, Suite 350
 Salt Lake City, Utah 84180-1203
 801-538-5340
 801-359-3940 (Fax)
 801-538-5319 (TDD)

May 1, 1995

TO: Daron Haddock, Permit Supervisor

FROM: Sharon Falvey, Senior Reclamation Hydrologist *SJF*

RE: Response to Forest Service LBA #9 and Longwall Mining, Genwal Resources Inc., Crandall Canyon Mine, ACT/015/032-94F and 95 C, Submitted April 13, 1995 and Revised April 11, 1995, Folder #2, Emery County, Utah.

SUMMARY

The following analysis discusses the Permittee's response to the Forest Service ("F.S.") comments received by the Division on March 20, 1995 and March 22, 1995. The F.S. concerns arose in response to the February 15, 1995, LBA #9 stipulation (Amendment 94-F) and additional revisions dated March 2, 1995. The Permittee submitted pages 3-8, 3-9, 3-17, 3-18, 3-35, 3-36 and 3-37 on April 13, 1995; revised April 11, 1995 to address the F.S. concerns. Other information includes a calculation for potential subsidence under perennial streams with less than 400 feet of overburden however, this information was not submitted in a format to be inserted into the plan.

The Permittee was also requested to respond to the State Trust Lands concerns identified in the Divisions March 28, 1995 memo. The State Trust Lands concerns resulted from the Longwall mining plan 95 C, and were addressed in the April 18, 1995 memo from Wayne Western. The Permittee was also requested to respond to a letter from the F.S. regarding 95 C. These concerns were addressed by the Permittee and presented in a format that is not incorporated into the plan and are not required to be incorporated. The analysis of the responses to the F.S. concerns are discussed below.

Recommended changes to the Technical Analysis ("T.A.") are identified and itemized below using redline and strikeout. These changes should be incorporated into H:LBARES.GEN.

ANALYSIS

**Page 3-8, Section 3.22.22, 5th paragraph and
 Page 3-17, 3rd paragraph**

Genwal must immediately notify the F.S. whenever the flow of a seep or spring changes, other than variations which directly correlate with precipitation changes.

They cannot wait until a determination of the cause has been made.

Analysis:

The Permittee has amended page 3-8 to indicate that, "If during the monitoring of the springs, it is determined that the flow rate has decreased (and that the decrease is not associated with verified climatic changes) at any seep or spring in the area, Genwal would notify the Division of Wildlife Resources, the Division of Oil Gas and Mining and the U.S. Forest Service. If it is proven that mining operations and activities have impacted the seep or spring then Genwal will begin working on an acceptable mitigation plan involving the use of guzzlers or other approved methods."

Finding:

The Operator has met the requirements of the F.S. and minimum requirements of this section.

Page 3-17, 2nd Paragraph and Page 3-35, 2nd paragraph

Genwal must conduct spring and fall macroinvertebrate studies every three years. They have only committed to do surveys until the year 2000, but they plan to be mining until at least the year 2005.

Analysis:

The Permittee has identified that additional aquatic macroinvertebrate studies have been performed in 1994. The Applicant agrees to conduct additional aquatic macro invertebrate studies in the spring and fall of 1997 (as agreed to by the Price Office of the F.S.). Thereafter, Genwal will conduct additional monitoring in the spring and fall of 2000 and every three years thereafter for the life of the mine (unless the study data indicate a different schedule).

Findings:

The Operator has met the request of the F.S. and has provided a measure to monitor affects of mining on the aquatic community.

Section 5.25.

The potential for subsidence under perennial streams must be discussed and calculations shown for roof support between pillars where there is less than 400 feet of overburden.

SUBSIDENCE CONTROL PLAN

Regulatory Reference: 30 CFR Sec. 784.20, 817.121, 817.122; R645-301-521, -301-525, -301-724.

Operator's Response:

Perennial streams within the permit area are protected from subsidence by Genwal's commitment to only conduct first mining under perennial streams and their associated buffer zones. As stipulated by the Price office of the U.S. Forest Service, a factor safety of 2.5 will be used under perennial streams with cover less than 1000 feet and a safety factor of 2.0 will be used in areas of more than 1000 feet of cover.

Thus, these data show that Genwal is protecting the perennial streams by their mine plans and commitments to the factors of safety required by the Price Office of the U.S. Forest Service.

In determining the factor of safety for the mine roof, with cover of 400 feet or less (the potential for failure of the roof which may lead to subsequent subsidence under a perennial stream), several factors need to be understood. They are:

- A. With depth, pillar stresses are greater. Therefore, with reduced amounts of overburden pillar, stresses become less and are not factors in roof failure (i.e., with less depth the pillars are not going to "push" their way through the immediate overburden units).
- B. With decreased overburden depths the potential for compressive failures decrease and the potential for tensile failures increase.
- C. The type (sandstone, shale, mudstone, etc.) and associated strength of the overburden which comprises the roof (immediately overlying the coal) has a significant role in determining the potential for failure.
- D. The width of the entry, length of the beam from pillar to pillar is a critical factor.

To determine the factor of safety for a self-supporting roof which does not utilize artificial support (roof-bolts), the equation for a simply supported beam is used.

If the immediate roof is eight inches thick sandstone roof the safety factor is 3.8 and increases to 57.6 for a ten foot thick sandstone roof.

Analysis:

The Operator assumed that the immediate roof consists of a single sandstone bed but did not give any justification. Usually the immediate roof consists of several beds.

When the immediate roof is composed of more than one bed upper less rigid beds will be

partly supported by the bottom bed, increasing the load on the bottom bed. To determine where bed separation will occur and what the load on the bottom bed will be the Operator should use the following equation:

$$q_1 = \frac{E_1 d_1^3 (\gamma_1 d_1 + \gamma_2 d_2 + \gamma_3 d_3 + \dots + \gamma_n d_n)}{E_1 d_1^3 + E_2 d_2^3 + E_3 d_3^3 + \dots + E_n d_n^3}$$

where:

n = number of beds comprising the immediate roof with bed 1 the bottom bed

q = intensity of the transverse load

E = modulus of elasticity

d = depth or thickness of beam or plate

γ = unit weight

The beam equations are not valid for intersections. The Operator needs to use either plate theory or numerical methods to show that roof failure will not occur.

Findings:

The Operator needs to analyze the potential for roof failure using a multiple bed technic. Analysis of the roofs above the intersections must be done using plate theory or numerical techniques.

Page 7, Pumping From Crandall Creek

Genwal has committed not to dewater Crandall Creek. They should actually commit to maintaining a minimum in-stream flow which will be determined during 1995.

Analysis

The Operator has responded to the F.S. in a memo not incorporated in the plan. However, the Operator's existing plan commits to provide minimum in-stream flows to maintain the flora and fauna of the stream by August 31, 1995 (page 7-33, revised 8/31/94).

Findings:

The Permittee will meet permit commitments and fully satisfy the F.S. concerns when the August 31, 1995 plan for minimum in-stream flows is completed. The plan is considered complete

altered". The original buffer zone allowance was based on the commitments made for construction phase according to the Permittee. The Permittee has switched the order of commitment number 8 and number 9 from the original approval and re-wrote the original commitment number 8 (now Commitment #9). The change indicates "if future disturbance of Crandall Creek is required..., Genwal commits to not disturbing Crandall Creek until approval is obtained from DOGM". The Permittee has not received additional buffer zone variances or stream channel disturbances for mining and reclamation activities beyond the buffer zone disturbance. Since, the original buffer zone approval was for construction disturbance only, additional measures will need to be identified for water quality and fisheries protection during reclamation activities.

Findings:

The Operator has met the minimum requirements of this section and clarified the intent to the changes from the original buffer zone variance approval.

Subsidence Monitoring and Control Summary (Third Paragraph)

The Operator provides commitments for replacement and notification of reduced flow rates in several portions of the plan as follows.

"If during the monitoring of the springs, it is determined that the flow rate has decreased (and that the decrease is not associated with verified climatic changes) at any seep or spring in the area, Genwal would notify the Division of Wildlife Resources, the Division of Oil Gas and Mining and the U.S. Forest Service." (Chapter 3).

Then the Operator will mitigate the damage. The mitigation will consist of installing guzzlers and other approved mitigation measures to replace water in quantity and quality.

R645-301-724.200 (First Paragraph)

Baseline Surface Water Information

Appendix 7-1 lists water rights in and adjacent to the permit area. Locations of surface water rights are on Plate 7-15. Surface water rights are summarized in Table 7-6. The name and location of streams are on the USGS topographic map used as a base for several plates in the proposed plan. The only impoundment and discharge into any surface-water body in the proposed permit and adjacent areas is the sediment pond and its discharge structures shown on Plate 7-5a, any associated minewater discharge would occur through the pond outlet points 001 and 002, the primary spillway and decant structures.

R645-301-728

Probable Hydrologic Consequences Determination ("PHC")

(Last Paragraph - 6th)

There is some potential for impact to seeps and springs through subsidence. Seeps/springs and water rights have been identified. Genwal is monitoring flow rates and quality for the water rights within and adjacent to the current mine permit area. A commitment is made by the Permittee to develop an alternate water source in coordination with the Division of Oil Gas and Mining, Division of Wild Life Resources, the State Engineer, and the U. S. Forest Service, in the event any water rights or springs/seeps are adversely affected by the mining operation or reclamation activities.

**Acid and Toxic (Add to Last paragraph, last sentence.)
Per March 30, 1995 memo**

However, a recent discussion with Randy Gainer of Genwal indicated the samples were recently obtained and the Permittee committed to submit results of this data with the upcoming 1994 annual report in the February 15, 1995, response memo.

Remove this Deficiency

Deficiency:

- ~~1. The proposed method of analysis for acid and toxic constituents is not provided, therefore the Operator does not meet the requirements of R645-301-120, and R645-301-731. The plan must contain a commitment to monitor materials once a year at a minimum for acid and toxic materials.~~

Add This Findings

Findings:

A finding cannot be made for this section until the analysis for acid and toxic forming materials for the mined coal seam are interpreted and received.

Pond Designs

(Last sentence, last paragraph)

In Section 7.42.22 the Operator commits to sample the thickness of the clay liner at 8 locations, if any holes penetrate less than 10 inches of clay additional clay will be compacted.

RECOMMENDATION

The Division should include and incorporate the following pages 3-8, 3-9, 3-17, 3-18, 3-35, 3-36, 3-37 into the Mining and Reclamation Plan and request the Permittee incorporate other

Sections referencing decreased flow rate and water replacement in Chapters 5 and 7 to coincide with this approved portion of the plan. The amendment should be approved and incorporated into the existing plan after an acceptance memo is received from the F.S..

The identified subsidence deficiency should be correlated to other condition requirements resulting from the State Trust Lands concerns. The following requirements should be coordinated with the deficiency response requirements identified in the April 21, 1995 memo due May 22 and with the review completed by Wayne Western on April 14, 1995:

Requirements

R645-301-525.200. Subsidence Control

1. The Operator needs to analyze and, submit for inclusion in the Mining and Reclamation Plan, the potential for roof failure using a multiple bed technic. Analysis of the roofs above the intersections must be done using plate theory or numerical techniques.

R645-301-420. Air Quality

1. The Operator should provide an Air Quality Permit which corresponds to the estimated annual coal production and current proposed operating plans.

Recommendation:

It is recommended the Permittee work in coordination with both the F.S. and State Trust Lands. The Permittee may find it prudent to show how meeting both the Maximum Recovery and Protection of the Hydrologic balance is dictated as presented in the calculations used to minimize the potential of surface subsidence in the buffer zones.