

0013



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

OK

Michael O. Leavitt  
Governor  
Kathleen Clarke  
Executive Director  
Lowell P. Braxton  
Division Director

1594 West North Temple, Suite 1210  
PO Box 145801  
Salt Lake City, Utah 84114-5801  
801-538-5340  
801-359-3940 (Fax)  
801-538-7223 (TDD)

March 18, 2002

TO: Internal File  
THRU: Peter H. Hess, Sr. Reclamation Specialist, Engineer, Team Lead  
FROM: Priscilla W. Burton, Sr. Reclamation Specialist, Soils  
RE:  Division Order, West Ridge Resources, Inc., West Ridge Mine, C/007/041-DO00A-5

*PHH by am*

**SUMMARY:**

Construction of the portal at the West Ridge Mine did not go according to plan when burned coal was encountered. The extensive highwall was not contemplated in the Mining and Reclamation Plan and the Division requested a modification to the reclamation plan.

The chronology of the Division Order is as follows:

Division Order		April 6, 2000
Initial Submittal	July 14, 2000	
Follow-up information	September 18, 2000	
Division Response		November 30, 2000
West Ridge Resources, Inc Response	March 16, 2000	
Follow-up information	July 2 & 14, 2001	
Division Response		September 21, 2001
Follow-up information	January 15, 2002	
This Technical Analysis		March 12, 2002

The Permittee has provided the Division with one scenario for backfilling the highwall with angular rock fill to a slope of 40 degrees (less than 1.5h:1v). The Division is not convinced that the proposed angular rock fill with less than 5% fines can support plant roots and achieve vegetative cover and diversity. Therefore, the Division has requested that the Permittee also evaluate an alternative scenario of a lesser-angled backfilled slope (encroaching upon the experimental practice) so that the Division can make a Finding that the continued existence of the experimental practice is environmentally sound.

TECHNICAL MEMO

---

TECHNICAL ANALYSIS:

## GENERAL CONTENTS

### PERMIT APPLICATION FORMAT AND CONTENTS

Regulatory Reference: 30 CFR 777.11; R645-301-120.

#### **Analysis:**

This January 15, 2002 submittal includes an Addendum to Appendix 5-9 as specified on the accompanying C1C2 form. The June 2001 submittal included Appendix 5-9 West Ridge Mine Proposed Highwall Reclamation and Attachment A Stability Evaluation for the Proposed Reclaimed Slope At the Portal Excavation (Revision 1) and Appendix A (XSTABL output files).

The Appendix 5-9 designation is curious, since the last Appendix listed in the Table of Contents – Appendices for Chapter 5 ends with Appendix 5-6. However, there is an Appendix 5-7 in the MRP entitled West Ridge Mine Pump house Reclamation and Sedimentation Control. Please update the Table of Contents for the Appendices to include Appendix 5-7 and this most recent submittal.

Terracon Consultants (1997) generated the shear strength values for the compacted fill. The Terracon Report is referenced in the Agapito Report, but was not found in the submittal or earlier submittals of DO00A.

Based upon the Terracon Consultants work, the average values of cohesion and internal angle of friction for the unsaturated (but moist) backfill material are reported in Appendix 5-4, Table 3-1 of the approved MRP as 347.5 psf and 31.5 degrees, respectively. The same backfill material is reported in Table 2 of the January 11, 2002 Agapito report to have a moist cohesion of 771.7 psf and internal angle of friction of 38.4 degrees also based upon the Advanced Terra Testing (2002) study. Later in the 2002 Agapito study, this figure of 38.4 degrees is related to be the post-peak friction angle (page 8). The Division would like an opportunity to review and compare the 1997 Terracon Consultants report with the 2002 Advanced Terra Testing study.

#### **Findings:**

The submittal does not include material that is referenced, but unavailable to the Division. Prior to approval and in accordance with:

**R645-301-121.100**, Please update the Table of Contents – Appendices (page iv of Chapter 5 of the MRP) to include Appendix 5-7 and this most recent submittal and provide a C1C2 form that relates the manner of incorporation of the various rounds of DO00A into the MRP.

**R645-301-122**, Please provide the Division with a copy of Terracon Consultants Western, Inc. (1997), “Borrow Source Evaluation Laboratory Results,” Terracon Project Report #61971038 Prepared for Andalex, Salt Lake City, Utah, December 18 as referenced on page 6 of the Agapito Report.

## REPORTING OF TECHNICAL DATA

Regulatory Reference: 30 CFR 777.13; R645-301-130.

### Analysis:

The reclamation plan is based upon a report jointly produced by Agapito Associates, Inc. (AAI) and Mt. Nebo Scientific, entitled, “Stability Evaluation for the Proposed Reclaimed Slope at the Portal Excavation, West Ridge Mine, January 2002.” AAI was responsible for slope stability and geotechnical design. Mt Nebo supplied the revegetation and erosion control methods. Both these consultants have been listed by names and addresses in Appendix 1-6.

Terracon Consultants Western, Inc. conducted the soil engineering analyses in 1997.

Advanced Terra Testing, Inc. conducted soils investigations in 2002.

### Findings:

The information is not adequate to provide a reporting of technical data. Prior to approval, in accordance with:

**R645-301-130**, Add pertinent information for Terracon Consultants Western, Inc. and Advanced Terra Testing, Inc to the MRP, Appendix 1-6, Consultation and Coordination.

## ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

## SOILS RESOURCE INFORMATION

TECHNICAL MEMO

---

Regulatory Reference: 30 CFR 783.21; 30 CFR 817.22; 30 CFR 817.200(c); 30 CFR 823; R645-301-220; R645-301-411.

**Analysis:**

Soils in the vicinity of the highwall are listed on Map 2-2 as Midfork very stony fine sandy loam, 10 – 50% slopes. These soils are described in Appendix 2-2. Pit 14 was located in the immediate area of the highwall. In his January 15, 1997 Soil Resource Assessment, Mr. James Nyenhuis described the soils on the slopes of the highwall thusly:

*It (the Midfork map unit) is located primarily along the more densely vegetated south slope (north-facing slope) of the right fork drainage...Present vegetation is mainly Douglas-fir and snowberry. The average annual precipitation is 16 to 20 inches, and the average freeze-free period is 60 to 80 days.*

*The M map unit is 75% Midfork, and 10% Rubbleland, 10% Commodore, and 5% Rock Outcrop. Midfork is deep to very deep, well drained. Effective rooting depth is 60 inches or more. Commodore is similar to Midfork but is shallow (<20 inches) to bedrock. Commodore was not sampled because it is a minor inclusion. Typically, the surface of Midfork is covered by an organic layer of twigs, leaves, and needles about 1.5 inches thick. The very dark grayish brown to brown "A" horizon is 5 – 7 inches thick and has gravelly to very stony fine sandy loam-to-loam texture. Total rock fragment content of the "A" horizon ranges from about 17 – 35% and can include about 10% gravel, 5 to 10% cobble or flagstone, and 2 – 15% stones and boulders.*

*The underlying subsoil layer is typically from about 7 to 18 inches in depth, and has very cobbly sandy loam-to-loam texture. Total rock fragment content of the subsoil ranges from about 7 to 40% and can include 5 to 15% gravel, 5 to 15% cobble or flagstone, and 1 to 15% stones and boulders. The substratum extends from the subsoil to a depth of 60 inches or more and has very gravelly to very stony sandy loam-to-loam texture. Total rock fragment content of the substratum ranges from about 35 to 40% and can include 10 to 15% gravel, 10 to 15% cobble or flagstone, and 10 to 20% stones or boulders. (Appendix 2-2, pp 14 - 15).*

Soils from the highwall slope were salvaged to a depth of 18 inches. Mr. Nyenhuis indicated that below this depth the rock fragment content exceeded 35 – 40% and 20% of that was large stones and boulders (Appendix 2-2, page 15).

**Findings:**

The information provided in the MRP adequately describes the pre-existing condition of the highwall.

## OPERATION PLAN

### TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-230.

#### Analysis:

##### Removal and Storage

This submittal revises page 30 of Appendix 5-5 to state, "In the left fork, the secondary topsoil storage area (ASCA Y) has been eliminated. This area is an optional topsoil storage site and is to be used only on an as-needed basis." Since this area has been dedicated to coal storage, the area will not likely be used as a topsoil storage site. The Division recommends that the statement referring to optional topsoil storage in the Left Fork be struck from the plan.

Map 2-2, Mine site Order 1 Soil Survey has been revised accordingly. Sample site locations have been retained on Map 2-2. (The commitment to sample the soil of the operations pad over the next five years is described in the Annual Report year 2000.)

Map 2-4, Topsoil Storage Area provides cross-sections and a profile of the topsoil stockpile, indicating that 7,613 cu yards of soil are presently stored in the topsoil storage area.

#### Topsoil Substitutes and Supplements

Borrow area soils have been identified on page 2-14 of the MRP and in Appendix 2-4. Map 2-4 locates the borrow soils and provides reclamation contours for the borrow site.

#### Findings:

The As-Built maps submitted are adequate to satisfy the operations plan topsoil and subsoil requirements of the Regulations. There is one detail to be corrected prior to approval and in accordance with:

**R645-301-121**, Please amend page 30 of Appendix 5-5 to indicate ASCA Y has been dedicated to coal storage and will not serve as an optional topsoil storage site on as as-needed basis.

## RECLAMATION PLAN

### TOPSOIL AND SUBSOIL

TECHNICAL MEMO

---

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

**Analysis:**

**Redistribution**

The following information from the June 2001 submittal was not retracted with the receipt of the Addendum to Appendix 5-9 and [the Division assumes] still applies to soil redistribution:

- The highwall will be backfilled using clean, angular rock fill as recommended in the [Agapito] report (narrative Appendix 5-9).
- The highwall backfill will not be covered with soil and will not be revegetated.
- The reclaimed highwall will have the appearance of a "talus slope."
- The specifications for rock fill are outlined in Table 1 of Attachment A and remain unchanged in Table 4 of the Addendum. The minimum particle size is in the gravel range with less than 5% fines (Section 4, Attachment A, June 2001 submittal).

Even though, the January submittal suggests that "the slope face can be constructed with a somewhat irregular surface to promote revegetation and aesthetically blend with natural slopes in the area," there has been no change from the statement of June 2001 Agapito report in Section 4.0 that "To be free-draining, the backfill material must be relatively free of fines that could prevent drainage of infiltrated surface water and any groundwater and result in elevated pore-water pressures. Clean, angular, well-graded durable rockfill meets these requirements."

And it is doubtful that an uneven slope of angular rock, with 6-inch minus rock scattered over the surface and boulders embedded into the fill could provide the water retention necessary to "provide "micro-habitats" necessary to enhance the establishment of native plant species on the reclaimed surface" (Section 3.1, January 15, 2002 Agapito report). The report continues on to describe fertilization of the rock fill in the Revegetation Plan (Section 3.2) and planting of containerized plants and the application of slow release 6-3-1 Biosol fertilizer.

The slope will be bonded with a bonded fiber matrix material such as EcoAegis or Soil Guard (page 11, January 15, 2002 Agapito Report). The report goes on to say that this matrix has excellent water-holding capacity and increases soil moisture and that seeds can germinate in this material. Since there is no soil applied to the fill, the ability of EcoAegis or Soil Guard to perform in this manner is questionable. Once germinated, the seeds will likely perish due to lack of substrate for growth.

**Findings:**

The plan is unacceptable for reclamation due to the lack of topsoil placement. The Permittee must consider lessening the slope so that soil can be reapplied to the surface to meet the requirements of vegetation cover and density and aesthetics which dictate blending with the natural setting of the canyon (described in the MRP as 10% rubbleland and less than 5% rock outcrop). Prior to approval and in accordance with the following:

**R645-301- 353**, The reclamation of the highwall must include a rooting zone with fine particles greater than 60% such that adequate rooting depth is replaced for plant establishment.

**STABILIZATION OF SURFACE AREAS**

Regulatory Reference: 30 CFR Sec. 817.95; R645-301-244.

**Analysis:**

Nature of the angular rock fill with less than 5% fines is the greatest contributor to stability of the backfill. The angle of repose of a talus slope is between 43 and 45 degrees. This slope will be at 40 degrees. Issues are raised in the Reclamation Backfilling and Grading section of this Technical Analysis, that cast doubt on the values assigned to the backfill material.

In this proposal, a geosynthetic drain will cover 30% of the existing highwall face, in an attempt to minimize water entry into the fill. This drain appears to be the weak link in the construction of the fill, however, as it has the least factor of safety of all the models in Appendix B of the January 15, 2002 submittal.

**Findings:**

The information provided is not adequate to describe the stability of the proposed angular backfill slope. The deficiencies have been addressed under Reclamation Backfilling and Grading.

**EXPERIMENTAL PRACTICES MINING**

Regulatory Reference: 30 CFR Sec. 785.13; R645-302-210, -302-211, -302-212, -302-213, -302-214, -302-215, -302-216, -302-217, -302-218.

---

**TECHNICAL MEMO**

---

**Analysis:**

Backfilling the highwall to the original contour will be stable if the fill remains porous and free of fines. Yet, creation of a lesser slope would cover part of the experimental practice where topsoil is buried in the fill. The Division is of the opinion that the successful revegetation of the site takes precedence over the experimental practice. If necessary to achieve a stable and revegetated site, then the experimental practice area must be reduced in size.

The buried topsoil could be recovered from beneath C canyon and utilized in reclamation of the slope.

**Findings:**

The Permittee has failed to consider a scenario, where revegetation of the site takes precedence over the experimental practice. Prior to approval and in accordance with:

**R645-302- 212.300 and R645-302-214,** The Permittee must demonstrate to the Division through comparative scenarios that retaining the experimental practice will result in a long-term reclamation of the highwall that is more or at least as environmentally protective as the alternative of eliminating the experimental practice and reducing the slope of the backfill and replacing topsoil.

**RECOMMENDATIONS:**

The Permittee has provided the Division with one scenario for backfilling the highwall with angular rock fill to a slope of 40 degrees (less than 1.5h:1v). The Permittee must also evaluate an alternative scenario of a lesser-angled backfilled slope (encroaching upon the experimental practice). This comparison is necessary for the Division to evaluate the environmental impact of protecting the experimental practice. Ultimately, the Division is required to make a Finding whether the continued existence of the experimental practice is environmentally sound.