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

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November 25, 2002

Mr. Gary E. Gray, Resident Agent
West Ridge Resources, Inc. / West Ridge Mine
P. O. Box 1077
Price, Utah 84501

Re: Findings for Proposed Highwall Reclamation Plan, Submittal of "As-Built" Information, West Ridge Resources, Inc., West Ridge Mine, ACT/007/041-DO00A-6, Outgoing File

Dear Mr. Gray:

The above-referenced amendment has been reviewed and there are still deficiencies that must be adequately addressed. The outstanding issue is the reclamation plan, especially identification of the source of the backfill material and associated bond calculations. This deficiency is critical to the evaluation of the remainder of the document, i.e. the identification of the backfill material, because material characteristics are critical to the development of a sound reclamation plan meeting the requirements of the R645 coal rules.

The Division has also requested an evaluation of a reclamation plan for the portal highwall area utilizing a smaller vertical angle slope. You indicated that in order to reclaim the highwall with that specification, it would be necessary to move the Right Hand Fork drainage to the northwest. This would naturally result in additional disturbance, and require reconstruction of the drainage to established performance standards. Technical information must be provided to support this scenario so the Division can determine which slope angle is the most environmentally sound and relative to the experimental practice.

Part of the established procedure required when evaluating Experimental Practices Mining is R645-301-218:

> ***"Revisions or modifications to an experimental practice shall be processed in accordance with the regulatory requirements for revisions or modifications and approved by the Division. Any revisions which propose significant alterations in the experimental practice shall, at a minimum, be subject to notice, hearing, and public participation and concurrence by the Director. Revisions that do not propose significant alterations in the experimental practice shall not require concurrence by the Director."***

The Division is very concerned about the length of time that has transpired since the issuance of the Division Order in April of 2000 until now, with the probability of yet additional Division reviews pending. (It should be noted that the drainage plan (Appendix 7-4) associated with this Division Order was approved in July 2002). It is imperative that the next response adequately address all of the concerns, so the Division can issue a final approval for the reclamation plan. Please respond with all of the requisite information by January 21, 2003.

If you have any questions, please feel free to call Pete Hess at (435) 613-5622 or me at (801) 538-5268. Thank you.

Sincerely,

Pamela Grubaugh-Littig
Permit Supervisor

PHH/sd
enclosure
cc: Price Field Office
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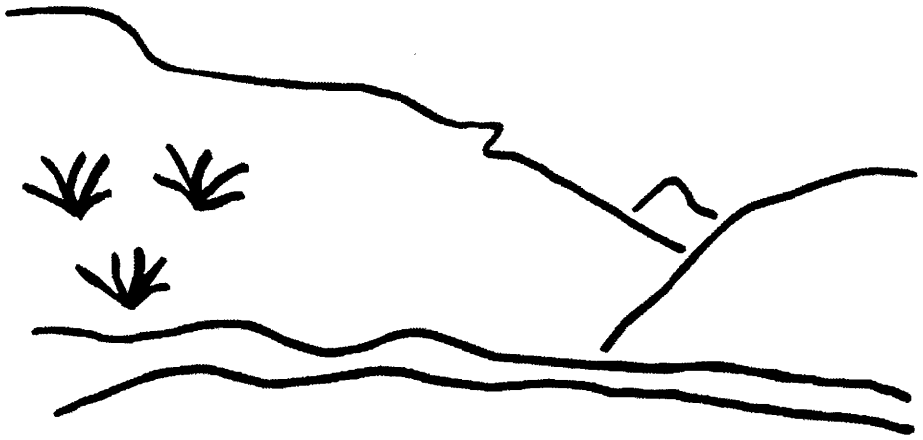
State of Utah



Utah Oil Gas and Mining

Coal Regulatory Program

West Ridge Mine
Revision to Highwall Reclamation Plan
Submittal of "As-Built" Information
C/007/041-DO00A-6
Technical Analysis
November 13, 2002

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TECHNICAL ANALYSIS

The Division regulates the Surface Mining Control and Reclamation Act of 1977 (SMCRA). When mines submit a Permit Application Package or an amendment to their Mining and Reclamation Plan, the Division reviews the proposal for conformance to the R645-Coal Mining Rules. This Technical Analysis is such a review. Regardless of these analyses, the permittee must comply with the minimum regulatory requirements as established by SMCRA.

Readers of this document must be aware that the regulatory requirements are included by reference. A complete and current copy of these regulations and a copy of the Technical Analysis and Findings Review Guide can be found at http://ogm.utah.gov/coal

This Technical Analysis (TA) is written as part of the permit review process. It documents the Findings that the Division has made to date regarding the application for a permit and is the basis for permitting decisions with regard to the application. The TA is broken down into logical section headings which comprise the necessary components of an application. Each section is analyzed and specific findings are then provided which indicate whether or not the application is in compliance with the requirements.

Often the first technical review of an application finds that the application contains some deficiencies. The deficiencies are discussed in the body of the TA and are identified by a regulatory reference which describes the minimum requirements. In this Technical Analysis we have summarized the deficiencies at the beginning of the document to aid in responding to them. Once all of the deficiencies have been adequately addressed, the TA will be considered final for the permitting action.

It may be that not every topic or regulatory requirement is discussed in this version of the TA. Generally only those sections are analyzed that pertain to a particular permitting action. TA's may have been completed previously and the revised information has not altered the original findings. Those sections that are not discussed in this document are generally considered to be in compliance.

INTRODUCTION

In the permit application package, West Ridge Resources, Inc. proposed to construct a portal highwall that was smaller than the one which was actually constructed to access the coal seams inherent with the "C" Canyon area. During preliminary construction, the Permittee encountered burnt coal near the outcrop, which was more extensive than originally anticipated. The high temperatures generated during the burn created very unstable roof conditions several hundred feet into the outcrop, particularly in the run-of-mine belt portal area. The Permittee could not follow the approved mine plan because that plan would not allow the Permittee to adequately control the fragile roof conditions. The highwall was constructed without the submittal of a revision to the reclamation plan for the portal area. The constructed highwall was made more extensive by the addition of a safety bench, which the Permittee believed was necessary to protect employees and machinery from falling debris.

As part of the permit application package, the Permittee had proposed utilizing an experimental practice for the storage of the "C" Canyon topsoil "in-situ." This proposal was reviewed and approved by both the Division and the U.S. Department of the Interior, Office of Surface Mining. With the construction of the more extensive portal highwall, the Division developed concerns relative to the reclaim ability of that area and its potential affect on the "in-situ" topsoil storage plan. The Division aired these concerns to the Permittee in Division Order DO00A; issued on April 6, 2000.

On July 14, 2000, the Division received the response to Division Order DO00A-1 dealing with as-built drawings and slope stability analyses for the West Ridge Mine. The Division found several deficiencies with the as-built maps and slope stability analysis. On November 30, 2000, the Division returned a deficiency response indicating that more information was needed relative to the backfilling and grading plan (i.e., type of material to be used for fill, material characteristics, material size gradation, compaction requirements, etc.).

The permittee responded on March 16, 2001. The Division returned the entire submittal before completing its review, based on the fact that the Permittee had failed to submit the information that had been requested within the previous deficiency document.

INTRODUCTION

On July 2 and July 14, 2001, the Permittee provided a highwall reclamation plan that included a detailed slope stability analysis performed by Agapito Associates, Inc. and a revegetation plan for the 40-degree incline by Mt. Nebo Scientific. On October 9, 2001, the Division's Technical Analysis pointed out that the proposed talus slope would not blend with the character of the site and that revegetation requirements necessitated cover on the talus slope equivalent to that in the undisturbed area. The Division requested further detailed information on the specifications of the proposed rock fill slope, including compaction requirements, detailed earthwork calculations, monitoring plan for groundwater, stability analyses, and a commitment to have a registered professional engineer specializing in geotechnical work on site during reclamation construction.

On January 15, 2002, follow-up information was received. Still having reservations about the stability analysis, the Division requested on April 1, 2002, further information on the assumptions of the stability analysis, and further reclamation treatments to protect the slope from erosion. The April 1, 2002 technical analysis also contained a requirement that the Permittee evaluate an alternative scenario of a lesser-angled backfilled slope (encroaching upon the experimental practice). **This is necessary such that the Division can make a determination through a written Finding that the continued existence of the experimental practice is environmentally sound.**

On August 15, 2002, the Division received a submittal from the Permittee that contained supplemental information for slope stability analysis, a comprehensive reclamation plan, and supportive documentation for revegetation of the steep slope. The following technical analysis documents numerous deficiencies that exist with the proposed plan.

SUMMARY OF DEFICIENCIES

The Technical analysis of the proposed permit changes cannot be completed at this time. Additional information is requested of the permittee to address deficiencies in the proposal. A summary of deficiencies is provided below. Additional comments and concerns may also be found within the analysis and findings made in this Draft Technical Analysis. Upon finalization of this review, any deficiencies will be evaluated for compliance with the regulatory requirements. Such deficiencies may be conditioned to the requirements of the permit issued by the division, result in denial of the proposed permit changes, or may result in other executive or enforcement action and deemed necessary by the Division at that time to achieve compliance with the Utah Coal Regulatory Program.

Accordingly, the permittee must address those deficiencies as found within this Draft Technical Analysis and provide the following, prior to approval, in accordance with the requirements of:

Regulations

R645-301-233, The plan must clearly indicate the source of the substitute topsoil for the reclamation of the highwall. 12

R645-301-233.100, The Permittee must identify the source of the backfill material which will become the rooting zone as described on page 10 of the Agapito Associates, Inc. (AAI) and Mt. Nebo Scientific, entitled, "Stability Evaluation for the Proposed Reclaimed Slope at the Portal Excavation, West Ridge Mine, August 2002, Revision No. 3." 30

R645-301-242.120 and R645-301-242.120, Appendix 5-9 should include: (1) a determination of the level of compaction at a depth of two to four feet in native ground on an adjacent undisturbed, vegetated slope, and (2) an analysis of whether this existing level of compaction can be duplicated on the regraded slope at a depth of two to four feet while still maintaining stability. 30

R645-301-521.190, The Permittee must commit to observing and documenting the moisture condition on the highwall during the second and third quarters of every ground water monitoring year over the life of mine. 29

R645-301-541.400, (1) Machinery type and specifications required to achieve the compaction requirements must be included in the submittal. (2) The Permittee must commit to utilizing the expertise of a professionally certified engineer with geotechnical expertise during the construction process of the highwall area. 29

SUMMARY OF DEFICIENCIES

R645-301-542.200 and R645-301-512.120, (1) Although the designs in Appendix 5-9 have been certified by a registered professional engineer, Section 6.0 of Appendix 5-9 contains disclaimers relative to the ultimate performance of the design. The design engineer must evaluate as many factors as possible to develop a more credible design, including the geology of the existing slope, the properties of the existing fill, groundwater conditions, and state what assumptions were made in the design. **(2) The professional engineers stamp must be signed and dated.** 27

R645-301-542.200, (1) The Permittee must show that the backfill material can be compacted in six-inch to two-foot lifts to meet the soil properties that are recommended in Appendix 5-9. (2) The Permittee must commit to ensuring that the recommended lift thickness is verified and that adequate compaction is being met. 28

R645-301-542.200, The Permittee must incorporate detailed cross-sections that show the design requirements from Appendix 5-9 for the highwall area. **The reclamation cross-sections that have been submitted previously and depicted on Maps 5-6A and 5-6B, Mine site Cross Sections, Right Fork, Stations 23+00 through 27+00 must be modified to reflect the design in Appendix 5-9.** Maps 5-6A and 5-6B only depict final surface configurations in the portal highwall area. Additional drawings of the aforementioned cross-sections must show the rock fill, the compacted fill, and all drainage controls. These additional cross-sections for the reclaimed highwall must have the same level of detail as Figure 4 in Appendix 5-9. Note: detailed cross-sections showing the designs **were not included** in the August 15, 2002 submittal. 27

R645-301-542.200, The Permittee must incorporate the design requirements for the highwall elimination plan given in Section 3.1 of Appendix 5-9 into the Mining and Reclamation Plan, or a reference as to the location of the designs must be made in the MRP. 27

R645-301-553.130, (1) The Permittee must clear up the confusion over what material was tested for shear strength parameters presented as backfill in Table 2 of Appendix 5-9. **(2) The Permittee must state where the backfill material will come from.** (3) The Permittee must provide the Division with the angle of repose of the backfill material. (4) The Permittee must provide the results of laboratory tests confirming the shear strength parameters described for the compacted fill and surficial residual soils, Site S-5 of the 1998 Terracon Consultants Western Inc. report. 28

R645-302- 212.300 and R645-302-214, The Permittee must identify a source of fill meeting the requirements identified in the Agapito Associates, Inc. (AAI) and Mt. Nebo Scientific report, entitled, "Stability Evaluation for the Proposed Reclaimed Slope at the Portal Excavation, West Ridge Mine, August 2002, Revision No. 3". 34

GENERAL CONTENTS

PERMIT APPLICATION FORMAT AND CONTENTS

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

Analysis:

The August 15, 2002 submittal of Appendix 5-9 Agapito Report supercedes all previous versions of the Agapito Report.

The Table of Contents for the Appendices is up to date.

Terracon Consultants (1997) generated the shear strength values for the compacted fill. The Terracon report is referenced in the Agapito report. A **1998** Terracon Consultants Western Inc. report has been added to Appendix 5-9.

Findings:

The information provided meets the minimum clear and concise requirements of the Regulations.

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, August 2002, Revision No. 3." AAI was responsible for slope stability and geotechnical design.

Laboratory data from soils investigations on the backfill was conducted in 2002 by Advanced Terra Testing, Inc. is included as Appendix A of the AAI report. The laboratory is identified on a fax transmittal form included in Appendix A of the Agapito report.

Terracon Consultants Western, Inc. is referenced in the AAI report as having conducted the soil engineering analyses in 1977 on the surficial residual soils and the compacted fill that comprises the bench at the base of the slope. The report was provided to the Division on August 15, 2002.

Mt Nebo supplied the revegetation and erosion control methods. The three consultants have been listed by names and addresses in Appendix 1-6.

Findings:

The information meets the minimum regulatory requirements for the reporting of technical data.

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

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:

Topsoil Removal and Storage

This submittal revises page 30 of Appendix 5-5 to indicate that there is no topsoil storage area in the left fork. The topsoil storage area, which was previously identified as ASCA "Y" does not exist. The ASCA "Y" designation has been used by the permittee to identify the outslope of the left hand fork coal storage pad (NNW end) from the berm at its crest to the toe which terminates in the bottom of the left hand fork drainage.

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. This storage pile exists in the right fork of "C" Canyon and is partially included within ASCA "X".

The As-Built maps submitted are adequate to satisfy the operations plan topsoil and subsoil requirements of the Regulations.

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. The plan does not directly indicate that these soils will be used for topsoil, but no other source of topsoil is promoted.

Findings:

The information supplied does not meet the requirements of Reclamation Plan, Backfilling and Grading. Prior to approval, the Permittee must provide the following:

R645-301-233, The plan must clearly indicate the source of the substitute topsoil for the reclamation of the highwall.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

Analysis:

Diversions: General

Page 10a of Appendix 7-4 was reviewed and felt to be incomplete. However, it was determined via telephone conversation with the permittee's consultant, Mr. Dan Guy, P.E., of Blackhawk Engineering that the only error was in pagination. Page 10a should have been numbered Page 11a in the October 3, 2002 submittal. The permittee is aware of pagination errors that must be corrected when the clean copies of Appendix 7-4 are submitted, following conditional approval.

Diversions: Miscellaneous Flows

Drainage from the undisturbed areas will be directed through 14 underground culverts and 2 ditches to a discharge point below the disturbed area. Undisturbed culverts are properly sized for a 100-year, 6-hour storm event. Undisturbed ditches are properly sized for a 10-year 24-hour event with a minimum freeboard of 0.5 feet.

Drainage from the disturbed areas will be directed to a sedimentation pond via 14 ditches and 13 culverts. Disturbed culverts and ditches are sized for a 10-year 24-hour storm, the ditches having a minimum freeboard of 0.5 feet.

All culverts and ditches were sized using the Office of Surface Mining's STORM computer program, version 6.20 and Flowmaster version 3.43. Construction design

recommendations are larger than the calculations call for, providing for factors of safety ranging from 1.1 to 4.8 for the culverts and the minimum freeboard of 0.5 feet for the ditches.

All culverts will be fitted with trash racks at the inlet to keep rocks and debris from entering and plugging the culverts. The trash racks and culverts will be inspected regularly and cleaned as necessary. Outlets will also be inspected regularly and maintained as needed.

Siltation Structures: Sedimentation Ponds

There is one sedimentation pond at the West Ridge Mine, consisting of two cells. The pond has been designed to hold a 10-year 24-hour storm event. The application states that the total pond capacity is 8.170 acre-feet, with a sediment storage capacity of 1.824 acre-feet. Expected runoff volumes are: 2.160 acre-feet from the disturbed area, 2.790 acre-feet from the undisturbed area, and 0.277 acre-feet direct precipitation into the pond. The 60% sediment clean-out volume is 1.110 acre-feet in Cell A (6942.8 feet elevation) and 0.469 acre-feet in cell B (6928.8 feet elevation).

Sediment yields were calculated using the Universal Soil Loss Equation (USLE) and a total of 0.608 acre-feet of sediment is expected in 1 year (0.438 Cell A, 0.170 Cell B). In three years, the total sediment expected is 1.824 acre-feet (1.314 Cell A, 0.510 Cell B).

Siltation Structures: Other Treatment Facilities

As part of the revised alternate sediment control information received on October 3, 2002, the permittee submitted a new Plate 7-2, Mine Site Drainage Map, along with revised text. The new Map 7-2 depicts four areas which utilize alternate sediment control methods within the Mine's disturbed surface facilities area. These are:

1) ASCA "W"; this ASCA lies on the west side of the County road on the cut bank created to construct that portion of same. Runoff reports to the disturbed ditch designated as UD-15 from the cut bank as well as the County road. Volume 2, Chapter 5, Engineering, Section R645-301-527 TRANSPORTATION FACILITIES, page 5-33 paragraph four, references this portion of the County road drainage reporting to the same ditch (UD-15) as the runoff from the cutbank. The watershed for ASCA W encompasses 1.33 acres as described on page 12 of Appendix 7-4, Section 2.11, ALTERNATE SEDIMENT CONTROL AREAS. This acreage is also depicted on Map 7-2, in the lower left corner. The treatment methods described in the MRP text coincide with the treatments depicted on the Plate 7-2 legend.

Chapter 5, page 33 of the West Ridge mining and reclamation plan discusses that portion of Carbon County road that exists within the Mine's disturbed area perimeter, (i.e., above the gate). Figure 5-3, West Ridge Road, Typical Cross Section, shows a cross-section of the road. As depicted by Figure 5-3, the road is crowned in the center with a 2 % gradient that will allow precipitation to flow toward ditch UD-15. Hence, the center of the County road is accurately depicted as the demarcation line or eastern boundary of the ASCA. The western boundary of the ASCA is the crest of the road cut made to construct the road.

2) ASCA "X"; (See Map 7-2); this alternate sediment control area is also described on page 12 of Appendix 7-4, as well as within the ASCA legend provided on Plate 7-2. ASCA "X" encompasses 1.19 acres. The Test Plot area is encompassed within ASCA "X" and consists of 0.14 acres of the total 1.19 acres. The Test Plot area utilizes a silt fence about the down-sloped areas as treatment for the runoff. Pocking and vegetation are also used here. An undisturbed drainage lies adjacent to the western boundary and same is included within the ASCA area. Much of the sediment control within the ASCA is provided by undisturbed natural vegetation. The only disturbance created during the construction of the Test Plot area (outside of the Test Plot area itself) were wheel tracks created over the vegetation by the rubber tired backhoe used to construct the area. These wheel tracks are approximately two hundred and seventy feet long, traveling from the inlet of the right fork undisturbed drainage culvert to the Test Plot area. The natural vegetation that was flattened by the tramming rubber tired construction equipment has since revitalized itself.

ASCA "X" also encompasses the northeast end of the right fork topsoil storage area. A total containment basin exists between the toe of the topsoil pile and the northeast edge of the main facilities disturbance. A design certified by a Utah registered professional engineer has been included as part of the submittal. Same is included as Figure 7. The treatment methods described on Map 7-2 for ASCA "X" include silt fence, vegetation, roughening and containment. Map 7-2 and the text of the mining and reclamation plan are congruent with the field conditions of ASCA "X".

3) ASCA "Y" lies in the left hand fork of "C" Canyon, and encompasses the outslope of the left hand fork coal storage pad from the berm at the crest to the Canyon drainage (inlet to undisturbed bypass culvert UC-HH). The disturbed area acreage here is 0.04 acres; large rock has been placed such that the entire slope is covered. Thus, sediment control / erosion protection is provided by reducing raindrop impact via the large rock. Map 7-2 is congruent with the MRP text.

4) ASCA "Z" is depicted on Map 7-2, Mine Site Drainage Map. This area encompasses the parking area and the Mine office (1.62 acres). The western boundary of ASCA "Z" takes in 385 feet of the County road on the opposite side of the "crown" discussed within ASCA "W". The eastern boundary of ASCA "Z" is co-linear with the crest of the cut bank constructed during the development of the office pad area. The northeast boundary takes in the crest and the outslope of the dam embankment of Cell "B" of the sediment pond. The toe of the outslope of the Mine office / parking lot pad is co-linear with the SW boundary. The treatment listed for ASCA"Z" on Map 7-2, and correlated by Page 12 of Appendix 7-4, is as follows:

1. "The parking lot pad is sloped to the NE where any runoff is contained and evaporated. The retention area also contains a small drain and gravel field to provide some percolation of runoff.
2. Erosion protection is provided by the durable rock (slag) installed on the surface of the parking area and large rock and vegetation on the outslope.
3. A silt fence exists at the toe of the outslope."

Runoff calculations have been provided for four events, including a 10 year 24 hour design event for the ASCA areas discussed above. These are shown in Table 9, page 28 of Appendix 7-4.

The effectiveness of the treatments utilized by each of the aforementioned alternate sediment control areas will be evaluated by the inspection process at the site.

Discharge Structures

A riprap apron has been placed at the discharge of the final undisturbed culvert (UC-OO) to prevent erosion in the receiving channel. The apron is designed to fit the natural channel as closely as possible. The apron was designed for a 100-year 6-hour storm event.

Findings:

Information provided in the application is considered adequate to meet the minimum Hydrologic Information requirement of the R645 coal rules.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Analysis:

Certification Requirements

A professional engineer, registered by the State of Utah, has certified Map 7-2, Mine Site Drainage Map. The map shows the location of each drainage area, culvert, drainage ditch, ASCA and snow storage site.

Findings:

Information provided in the application is considered adequate to meet the minimum Maps, Plans and Cross Sections of Mining Operations requirement of the Regulations.

RECLAMATION PLAN

BACKFILLING AND GRADING

Regulatory Reference: 30 CFR Sec. 785.15, 817.102, 817.107; R645-301-234, -301-537, -301-552, -301-553, -302-230, -302-231, -302-232, -302-233.

Analysis:

General

In the permit application package, the Permittee proposed to construct a portal highwall that was smaller than the one which was actually constructed to access the coal seams inherent with the "C" Canyon area. During preliminary construction, the Permittee encountered burnt coal near the outcrop, which was more extensive than originally anticipated. The high temperatures generated during the burn created very unstable roof conditions several hundred feet into the outcrop, particularly in the run-of-mine belt portal area. The Permittee could not follow the approved mine plan because that plan would not allow the Permittee to adequately control the fragile roof conditions. The highwall was constructed without the submittal of a revision to the reclamation plan for the portal area. The constructed highwall was made more extensive by the addition of a safety bench, which the Permittee believed was necessary to protect employees and machinery from falling debris.

As part of the permit application package, the Permittee had proposed utilizing an experimental practice for the storage of the "C" Canyon topsoil "in-situ." This proposal was reviewed and approved by both the Division and the U.S. Department of the Interior, Office of Surface Mining. With the construction of the more extensive portal highwall, the Division developed concerns relative to the reclaim ability of that area and its potential affect on the "in-situ" topsoil storage plan. The Division aired these concerns to the Permittee in Division Order DO00A.

The portal highwall is approximately 300 feet long and varies in height from zero to 85 feet. The maximum angle from horizontal of the highwall is 73°. The natural slope angle above the highwall is 32°. The Permittee plans to reclaim the highwall with a reclaimed slope angle of 40° from horizontal. By definition, the plan to reclaim the slope at this angle would classify the reclaimed slope as a "steep slope", i.e., having a slope angle steeper than twenty degrees.

The Permittee contracted Agapito Associates, Inc. to conduct the slope stability analyses to address the Division's concerns relative to the slope stability of the reclaimed area. This was done in order to develop an acceptable reclamation plan for the highwall area. In addition to the

slope stability analysis, it was necessary for the Permittee to develop an acceptable revegetation plan for the slope, paying particular attention to percent cover.

Agapito has on three occasions performed slope stability studies on the highwall area. The Division reviewed two of these and requested additional information. The third analysis was submitted with the Permittee's January 15, 2002 response and addresses the following:

- Slope stability
- Pore water pressure
- Vegetation density

The Division had some concerns about the backfilling and grading plan after reviewing the January 15, 2002 submittal. The Division requested additional information. On August 15, 2002, the Permittee responded with a combined report, Revision No. 3, authored by Agapito Associates, Inc. (AAI) and Mt. Nebo Scientific, entitled, "Stability Evaluation for the Proposed Reclaimed Slope at the Portal Excavation, West Ridge Mine, August 2002, Revision No. 3." **This report will hereafter be referred to as Appendix 5-9,** and pertains to the backfilling portion of the proposed reclamation plan.

Slope Stability

The Permittee's consultant describes the geotechnical testing that was performed to determine the design properties necessary for the proposed backfill material that will be used in the portal area in Section 2 of the study.

The slope stability analysis was presented in Section 4 of the Agapito report. The slope failure modes that were evaluated include:

- The current geometry; static and pseudostatic.
- Reclaimed backfilled slope **without the composite drain**; rotational failure surface; static and pseudostatic.
- Reclaimed backfilled slope **with the composite drain**; rotational failure surface; static and pseudostatic.
- Reclaimed backfilled slope **with the composite drain; failure surface at geosynthetic/ backfill interface**, static and pseudostatic.

A commercially available computer software program (XSTABL) was used to conduct the slope stability analysis. The pseudostatic stability analyses were conducted to simulate earthquake loading. The Division does not have requirements for earthquake load for reclaimed slopes. However, that information is useful for evaluating the general backfilling and grading requirements as well as evaluating the requirements necessary to achieve approximate original contour.

According to Appendix 5-9, the safety factor of the existing portal highwall is 500 for both static and pseudostatic cases. The explanation given for this unusually high safety factor is that there is a very low potential for failure along geologic structures. The dip of the "as-built" highwall is primarily sub-parallel to the slope face.

The backfilled slope was modeled both with and without a composite drain. The drain material will only cover 30% of the current slope face. The geotechnical model that was developed represents the most critical slope geometry with respect to slope height and slope angle. Shear strength parameters were developed for the backfill materials based on comprehensive testing by Advanced Terra Testing, Inc. Shear strength values for the compacted fill were determined from the Terracon Consultants Western Inc in 1998. Shear strength values for the geosynthetic composite drain were determined from manufacturers' recommendations.

The composite drain material has inherent lower shear strengths than the non-covered surfaces have. The backfilled slope with the composite drain was analyzed for two failure modes: rotational and failure of the geosynthetic/soil surface. The stability analyses conducted for rotational failure (through backfill material, with the composite drain in place), indicates stable conditions. The static safety factor was calculated at 1.5. The pseudostatic safety factor was calculated to be 1.4. The stability analyses conducted for plane shear failure at the composite drain/backfill interface also indicates stable conditions. Safety factors of 1.3, static and 1.2, pseudostatic have been determined.

The stability analyses conducted for rotational failure (through the backfill material / no composite drain), indicates more stable conditions. The resulting safety factors are static, 1.7 and pseudostatic, 1.6. The results of these analyses are presented in Appendix 5-9.

All of the failure modes that were analyzed, utilized the following information to develop them:

- The rock fill drain will consist of clean, angular rock fill of the specifications outlined in Table 4 of Appendix 5-9.
- A non-woven geotextile filter fabric will separate the rock fill drain and the overlying backfill.
- "Mohr-Coloumb shear strength parameters for the backfill material were defined by laboratory testing conducted for this evaluation (Table 2)." (Section 2.3, Appendix 5-9)
- "Laboratory testing was prescribed for the backfill material because the performance of the reclaimed slope will depend primarily on the shear strength of the backfill material." (Section 2.3, Appendix 5-9).

The backfill material is reported in Table 2 of Appendix 5-9 to have a saturated weight of 121.6 pcf, a moist cohesion of 771.7 psf, and internal angle of friction of 38.4 degrees based

upon the Advanced Terra Testing (2002) study. Use of the saturated weight provides a more conservative model as the greater weight drives the slope to instability. The figure used for the internal angle of friction is actually the post-peak friction angle.

In the last review of Appendix 5-9, the Division requested an explanation of the post-peak friction angle. Agapito Associates Inc (AAI) have explained on page 8 of Appendix 5-9 that the coarse-grained material chosen for the backfill continues to gain strength after initial shearing, because coarse particles in the material rotate, "causing the sample to dilate and increase shearing resistance." AAI indicates, "Post-peak shear strengths are typically used in slope evaluation because the conservative assumption is made that the material has already undergone peak shearing.

The stress/strain graph for the backfill material is shown on page 3 of Appendix 5-9. The graph indicates that there is no peak shear, but that the material is displaced steadily as force is increased. The internal angle of friction (Phi) was derived from the point on the stress/strain curve where the stress no longer increases as illustrated on page 4, Appendix A, Appendix 5-9.

Issue #1:

The information in Appendix 5-9 has received the scrutiny of a professional engineer, Francis S. Kendorski, Principal and Vice-President of Agapito Associates Inc. **The signature was not dated, however, which is a requirement of certification.**

Issue #2:

Terracon Consultants Western Inc (TCWI) evaluated the geotechnical characteristics of the compacted fill and the surficial soils above the highwall in January **1998**. The surficial soils are described as silty sand with gravel (Section 2.1, Appendix 5-9) and as having a Unified Soil Classification of GC-GM (Table 3, Appendix 5-9).

AAI relied upon a **1997** Terracon Report **to obtain mean values for both the compacted fill and the surficial soils** (Section 2.3.2 of Appendix 5-9). The mean values were the same for both soils: 121.6 pcf saturated weight, 347.5 psf cohesion, and 31.5 internal angle of friction.

In the **1998** TCWI report, the only soils with a unified soil classification of silty sand with gravel (GC-CM) were the soils of the borrow site sample no. 5. Sample results for Borrow Site No. 5 are not outlined in Table 1 of the 1998 TCWI report. **Therefore, the Division could not verify the friction angle and cohesion of the compacted fill and residual soil.**

Other borrow sites in the 1998 Terracon Report are classified as CL-ML. It is imperative that the soil classification being used is the same as that reported by AAI as noted in Section 6.0 of Appendix 5-9.

Issue #3:

Although Appendix "A" of Appendix 5-9 Revision #3, submitted on August 15, 2002 contains information relative to material testing (i.e., a direct shear test and index tests), **an introductory letter to the document claims, "*The Permittee has not identified a source of backfill material for the slope.*"** The letter is addressed to Ms. Pamela Grubaugh-Littig, Permit Supervisor for the Division of Oil Gas & Mining. The source of backfill was a deficiency previously noted by the Division on page nine (9) of the last Technical Analysis, (document dated March 18, 2002, (C/007/041-DO00A-5)).

Apparently a design for the highwall reclamation has been conceived, is capable of being constructed, and has the ability to meet all of the R645 requirements relative to stability, i.e., static safety factors, drainage, and re-vegetation requirements, etc. However, **this same design is based upon backfill material that may not be available.** The Division has most of the material specifications for that highly desirable material, **but the source of the material has not been identified** at this point.

Issue #4:

"Angle of Repose" refers to the angle at which a pile of dumped dry granular material will adopt from the horizontal, and remain static. The granular backfill material will be methodically compacted and moisture conditioned so that it can no longer be considered dry granular material with the previously established "Angle of Repose". The Permittee's proposed reclamation plan is to reconstruct the area at a 40-degree vertical slope. To enable revegetation of the slope, the Division will require the Permittee to maintain an adequate rooting depth which is not compacted to 95% Modified Proctor.

The slope stability analysis must determine an angle of repose for the uncompacted topsoil material. If the determined angle is less than forty vertical degrees in an uncompacted state, it will not be possible to place and hold that material on the compacted reclaimed slope. Page 11 of Revision #3 states "Slope surface roughening will be accomplished in a random and overlapping pattern, such that there are no continuous planar surfaces that would allow erosion, including slope wash from overland flow and rill formation." This seems adequate, but if problems should develop post construction, the Permittee may need to evaluate a method to "key" the topsoil material into the compacted material to minimize the slippage potential.

Issue #5

The Division must consider the worst-case scenario when evaluating the backfilling and grading requirements of this reclamation plan. The worst-case scenario is that the pad fill material will not meet the material specifications outlined in the Agapito report, Revision #3.

In summary, the Division considers the backfilling and grading plan received on August 15, 2002 inadequate for several reasons. The following items must be resolved in order for the Division to make a finding that the site can be reclaimed:

1) The Agapito report suggests the construction of a "Test Fill" prior to backfilling to assure that the material being used can meet the specifications outlined in Appendix 5-9, revision #3. Where and at what point of the construction of the highwall will the test fill be built and evaluated? By what process and by whom will the test fill be evaluated?

2) What will occur if the material utilized in the "test fill" **DOES NOT** meet the material specifications designated in Appendix 5-9?

3) If the available material (this is assumed to be the pad fill imported from the borrow area located on the County Road near the Highway 123 junction) doesn't meet the specifications of Appendix 5-9 and must be removed off-site for disposal, then a revision of the bond calculations for the removal and disposal of that material is necessary. **The Division must evaluate the worst-case scenario. That evaluation must include bond calculations.**

4) If material meeting the specifications outlined in Appendix 5-9 must be identified, purchased, transported, and then placed and compacted according to Appendix 5-9 recommendations, then, **the cost figures to accomplish this must be included as part of the plan.**

5) The Permittee has shown that the compacted slope will be stable, but the Division requires an uncompacted layer of soil suitable for rooting. **The Permittee has not shown that this layer will be stable, nor have they defined the depth of this layer. What is the angle of repose that the uncompacted backfill material can achieve and remain stable?** If this uncompacted material will not remain stable on a forty-degree vertical angle slope, the seeded material will slump to the bottom in failure. R645-301-553.130 requires that the slope angle be less than the angle-of-repose. If the slope has a safety factor of 1.3 or greater, but the slope angle is greater than the angle-of-repose for the uncompacted root zone, the Division would have to find the backfilling plan to be inadequate.

6) The outer material cannot be compacted due to vegetation requirements. Although some compaction is inherent in the lower soils due to the weight of the material above

it, the Division believes that a standard for compaction at a depth of two to four feet should be established based upon existing adjacent undisturbed vegetated slopes (see deficiency written under Reclamation Topsoil and Subsoil, R645-301-242.120). Therefore, Appendix 5-9 should include:

a) a determination of the level of compaction at a depth of two to four feet in native ground on an adjacent undisturbed, vegetated slope, and
b) an analysis of whether this existing level of compaction can be duplicated on the regraded slope at a depth of two to four feet while still maintaining stability.

A reclamation plan may be in place for many years before the need for it is realized. However, the concerns that have been aired above must be addressed by the Permittee long before mining activities cease.

Design

The slope stability analysis and safety factor determinations were all based upon the design recommendations listed within Appendix 5-9.

Slope angle

The Permittee does not want to decrease the slope angle because they would be required to move the toe of the slope into the experimental practice area, which in turn would require moving the right fork of the "C" Canyon drainage. That part of the experimental practice area would be lost and the streambed would have to be re-established. Maintaining the toe of the reclaimed slope at the toe of the lower bench (operational mode) was the Permittee's primary requirement for the development of the highwall reclamation plan.

The Permittee wants to protect the "in-situ" experimental practice topsoil storage area. While the Division supports the preservation of the experimental practice area, the first priority is to develop and approve an acceptable reclamation plan that meets all of the reclamation criteria established within the State program. **Therefore, if the questions posed by this technical analysis cannot be answered satisfactorily, a second design scenario utilizing a lower slope angle must be presented.**

Minimum Safety Factor of 1.3

The consultant performed a slope stability analysis based on a design involving the use of drains. The first analysis involved a rotational failure for which the safety factor was 1.5. The second involved a plane shear failure along the drain backfill interface. The safety factor for that scenario was 1.3. **The installation of the geosynthetic drain lowers the factor of safety for**

the stability of the slope. Therefore, the Permittee should commit to observing the moisture conditions on the cut slope on at least a quarterly basis over the life of mine. This could be accomplished with photo documentation accompanied by a written record. **At mine closure, the data collected could be used to determine whether a need exists for the installation of the geosynthetic drain.**

The consultant's report recommends that the backfill material should have an internal angle of friction of 38.4° and cohesion of 772 psf. The report also states that the material should be compacted to a minimum of 95% Proctor and recommends that the lift thickness not exceed 2 feet. (See Page 10, Appendix 5-9.)

The Division is not aware of any compaction procedures that will result in a 95% Proctor when the material is placed in 2-foot lifts. The usual procedure is to place material in 4-inch to 6-inch lifts. Therefore, the Division needs the Permittee to provide information on the type of compaction techniques that would result in a 95% Proctor when the material is placed in 2-foot lifts. **Machinery type and specifications** (which would be relative to achieving the compaction requirements) **must also be included**, such that the Permittee, as well as the Division can be reasonably assured that those requirements will be met when the actual work is performed.

Minimizing Pore Water Pressures

The Permittee proposes to place drains in the backfill to handle any water infiltration. The concern here is that a potential exists for the buildup of positive pore pressure within the backfill material.

The drains reduce the safety factor of the design. The Permittee has stated that no seeps or springs exist in the highwall. However, it should be noted that the highwall was exposed during, and has been monitored over, a period when drought conditions were prevalent in the State. The most likely source of water is from surface infiltration. If the slope design incorporating the drains meets the minimum safety factor requirements, then the Division will allow them. A suggestion for monitoring the moisture on the cut slope over the life of mine was included above, (See the heading, **"Minimum Safety Factor of 1.3**)."

The engineering design standards for the required backfill are listed in Section 3.1 of Appendix 5-9. They include the following:

- The backfill material must have an internal angle of friction of 38.4 and shear strength of 771.7 pounds per square foot.
- A test fill should be conducted to assess the maximum lift thickness that will result in a 95% Standard Proctor compaction.
- A maximum lift thickness of 2 feet should be implemented and monitored.

- Hand-operated compaction equipment should be used near the slope face to assure adequate compaction (see recommendations in this Technical Analysis under Reclamation: Topsoil & Subsoil).
- The separation of the backfill from the highwall should be minimized by ensuring that the established rigorous compaction specifications are followed.
- The reclamation slope face should be irregular.
- Any boulders buried in the slope should have at least 75% of their volume covered.

In order for the Division to approve the highwall reclamation plan, the Permittee needs to incorporate the design recommendations of Appendix 5-9 into the mining and reclamation plan. The design recommendations must include detailed cross-sections that show the rock fill, the compacted fill, and all drainage controls. The Permittee must commit to ensuring that the recommended lift thicknesses are verified and that adequate compaction is being met. **The verification of these critical design requirements is necessary to provide a reasonable amount of assurance that the required static safety factor for the reclaimed area is met. These verifications must be certified by a registered professional engineer, with geotechnical expertise. The records must available for inspection purposes during the construction phase.**

General Backfilling and Grading Requirements

The general requirement for backfilling and grading is that approximate original contour must be established in the area. The requirements for achieving AOC are included in the backfilling requirements. These requirements include:

- Minimize the off-site effects.
- Achieve a final surface configuration that closely resembles the surrounding area.
- Provide a subsurface foundation for vegetation.
- Support the approved post-mining land use.

The general plan to achieve AOC will not change with this most recent revision to the highwall reclamation plan. The reclaimed slope will be similar to those in the undisturbed area. The issues involving vegetation are addressed in other sections of the technical analysis.

All highwalls will be eliminated. Drawing 4 of the Appendix 5-9 is a cross section of the reclaimed highwall. The fill will be placed such that the existing cuts will be fully reclaimed. No spoil piles or depressions are associated with the highwall.

The Division has a concern that the settling of material will result in the highwall becoming exposed. The lift thickness has been proposed to be from six inches to two feet. However, as noted above, **"a test fill should be conducted to assess the maximum lift thickness that will result in a 95% standard Proctor compaction"**. At best, compaction is

only effective to 6 inches, on lifts that are 24-inches thick. Therefore, 18 inches in every lift will be uncompacted. The test fill **must be conducted** to determine the maximum lift thickness, such that adequate compaction requirements are attainable **through the entire depth of the lift.** These factors are critical to ensure that the minimum long-term static safety factor is being achieved during the construction process.

The Permittee did not address the angle-of-repose for the backfill material and other soils associated with the highwall reclamation. The Division is concerned about the angle-of-repose of the backfill because the reclaimed slope will achieve a vertical angle of 40 degrees from horizontal. Therefore, **the Permittee must state where the backfill material will come from.** The Permittee must provide the Division with the angle of repose of the backfill material. This is necessary to ensure that the design requirements, which dictate the required long-term static safety factor, can be met. The Appendix 5-9 analysis does show that the reclaimed slope should have a static safety factor of 1.3.

The backfilling and grading requirements have associated design requirements. R645-301-542.300 and R645-301-512.130 requires that a registered professional engineer certify the design for the reclaimed highwall. **The submitted stamp was not dated.**

The designs in Appendix 5-9 submitted on August 15, 2002 were certified but they contain some disclaimers. The Division realizes that some items that may contribute to failure are outside of the designer's control (such as proper implementation of the plan, non-historic seismic conditions and non-historic precipitation events). Other items in the disclaimer such as geologic variability in the existing slope, variability in the existing fill and variability in groundwater are conditions that the professional engineer certifying the designs should be familiar with. At a minimum, the design engineer should obtain information about the geologic variability, variability in the fill, and variability in groundwater sources through site visits and tests as needed. The design engineer should also state, within the design, what assumptions were made and what process will be followed if any of the assumptions are proven incorrect during construction.

Findings:

The information in the deficiency response is not adequate to meet the requirements of this section. The Permittee must provide the following in accordance with:

R645-301-542.200, The Permittee must incorporate detailed cross-sections that show the design requirements from Appendix 5-9 for the highwall area. **The reclamation cross-sections that have been submitted previously and depicted on Maps 5-6A and 5-6B, Mine site Cross Sections, Right Fork, Stations 23+00 through 27+00 must be modified to reflect the design in Appendix 5-9.** Maps 5-6A and 5-6B only depict final surface configurations in the portal highwall area.

Additional drawings of the aforementioned cross-sections must show the rock fill, the compacted fill, and all drainage controls. These additional cross-sections for the reclaimed highwall must have the same level of detail as Figure 4 in Appendix 5-9. Note: detailed cross-sections showing the designs **were not included** in the August 15, 2002 submittal.

R645-301-542.200, The Permittee must incorporate the design requirements for the highwall elimination plan given in Section 3.1 of Appendix 5-9 into the Mining and Reclamation Plan, or a reference as to the location of the designs must be made in the MRP.

R645-301-542.200 and R645-301-512.120, (1) Although the designs in Appendix 5-9 have been certified by a registered professional engineer, Section 6.0 of Appendix 5-9 contains disclaimers relative to the ultimate performance of the design. The design engineer must evaluate as many factors as possible to develop a more credible design, including the geology of the existing slope, the properties of the existing fill, groundwater conditions, and state what assumptions were made in the design. **(2) The professional engineers stamp must be signed and dated.**

R645-301-542.200, (1) The Permittee must show that the backfill material can be compacted in six-inch to two-foot lifts to meet the soil properties that are recommended in Appendix 5-9. (2) The Permittee must commit to ensuring that the recommended lift thickness is verified and that adequate compaction is being met.

R645-301-553.130, (1) The Permittee must clear up the confusion over what material was tested for shear strength parameters presented as backfill in Table 2 of Appendix 5-9. **(2) The Permittee must state where the backfill material will come from.** (3) The Permittee must provide the Division with the angle of repose of the backfill material. (4) The Permittee must provide the results of laboratory tests confirming the shear strength parameters described for the compacted fill and surficial residual soils, Site S-5 of the 1998 Terracon Consultants Western Inc. report.

R645-301-521.190, The Permittee must commit to observing and documenting the moisture condition on the highwall during the second and third quarters of every ground water monitoring year over the life of mine.

R645-301-541.400, (1) Machinery type and specifications required to achieve the compaction requirements must be included in the submittal. (2) The Permittee must commit to utilizing the expertise of a professionally certified engineer with geotechnical expertise during the construction process of the highwall area.

TOPSOIL AND SUBSOIL

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

Analysis:

Redistribution

The following information from Revision No. 3 of the Agapito Associates Report (Appendix 5-9) pertains to the substitute topsoil:

- The backfill material will be compacted in lifts, but "mechanical compaction will not be effective near the outside of the slope because the backfill material will not be confined laterally. This will result in a zone of weakly compacted backfill material that is expected to comprise an adequate rooting zone."
- The slope will be roughened using a combination of backhoe and hand tools to leave pocks with a depth of 12 – 18 inches and between 2 – 4 feet wide.
- Boulders will be embedded into the fill for water retention and microhabitat.
- An application of slow release 6-3-1 Biosol fertilizer at 1500 lbs/ac (Section 3.2 Appendix 5.9)
- The mix described in Table 5 of the AAI report will be hydroseeded.
- The seeded slope will be mulched at a rate of 3500 lbs/ac with a bonded fiber matrix such as EcoAegis or SoilGuard.
- Diverter logs may be used parallel to the contour.
- Containerized shrubs and trees will be planted.

Findings:

The information supplied does not meet the requirements of Reclamation Plan, Topsoil Subsoil. Prior to approval, the Permittee must provide the following:

R645-301-233.100, The Permittee must identify the source of the backfill material which will become the rooting zone as described on page 10 of the Agapito Associates, Inc. (AAI) and Mt. Nebo Scientific, entitled, "Stability Evaluation for the Proposed Reclaimed Slope at the Portal Excavation, West Ridge Mine, August 2002, Revision No. 3."

R645-301-242.120 and R645-301-242.120, Appendix 5-9 should include: (1) a determination of the level of compaction at a depth of two to four feet in native ground on an adjacent undisturbed, vegetated slope, and (2) an analysis of

whether this existing level of compaction can be duplicated on the regraded slope at a depth of two to four feet while still maintaining stability.

REVEGETATION

Regulatory Reference: 30 CFR Sec. 785.18, 817.111, 817.113, 817.114, 817.116; R645-301-244, -301-353, -301-354, -301-355, -301-356, -302-280, -302-281, -302-282, -302-283, -302-284.

Analysis:

Revegetation: General Requirements

The permittee proposes to reclaim the highwall area to a 40°-slope angle. The undisturbed slope above the highwall has a 32°-slope angle. The Permittee plans to construct the 40° slope according to the designs outlined in Appendix 5-9:

- Compact the slope to a 95 percent compaction standard.
- The outside edge of the slope will be less compacted and will be the rooting zone.
- An irregular surface will be created by pocking with a track hoe and creating basins 12-18 inches in depth and 2 - 4 feet in diameter.
- Boulders will be incorporated into the fill at a frequency of 1 per 100 sq ft.
- Rocks less than 6" diameter will be scattered on the surface.
- Biosol fertilizer will be applied at the rate of 1500 pounds per acre.
- The slope will be hydro-seeded with the seed mixture shown in Table 5.
- The surface mulched with a bonded fiber matrix material at a rate of 3,500 lbs/ac or at the manufacturer's recommended rate.
- Containerized woody plants will be planted at the rate of 2,500 plants per acre or one plant every 4.27 foot.
- Five to Six foot highballed and burlaped conifer trees will be transplanted at a rate of 145 per acre irregularly on the slope.
- Diverter logs will be used, if needed, for erosion control.

The information provided meets the Division's standard for roughness is detailed at: ftp://dogm.nr.state.ut.us/PUB/MINES/Coal_Related/RecMan/Reclamation_Manual.pdf.

Examples of sites, near the angle of repose, successfully reclaimed and revegetated with 68 percent vegetative cover were presented in the application.

The information presented does not ensure that the surface will be loosened to a four-foot depth to provide for proper root growth. This question has been addressed under Reclamation Plan, Topsoil & Subsoil Redistribution.

Findings:

The information provided meets the revegetation requirements of the regulations.

STABILIZATION OF SURFACE AREAS

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

Analysis:

Figure 4 of the Agapito Associates report Revision No. 3 in Appendix 5-9 illustrates the components of the geotechnical model for the reclaimed slope.

According to the report, infiltration into the surface of the fill will be limited by the steepness of the slope (40%), (Introduction to Appendix 5-9). Section 3.1 describes the following:

- A rooting zone will be formed by the weakly compacted material on the outslope of the fill.
- The slope will be gouged as a means to trap sediment and collect moisture. Gouges will be approximately 12- 18 inches deep and 2 - 4 feet wide.
- Boulders (1 per 100 sq ft) will be used to add additional surface roughening and erosion protection.
- Smaller rocks (6-inch minus) will be scattered on the surface.
- After seeding the slope will be mulched with a bonded fiber matrix at a rate of 3,500 lbs/ac (or as recommended).
- Diverter logs might be placed parallel with the contours of the slope.

Figure 5 shows a cross section of the slope roughening techniques to be employed.

Findings:

The information provided meets the requirements of the regulations for applying the best technology available to stabilize surface areas.

REQUIREMENTS FOR PERMITS FOR SPECIAL CATEGORIES OF MINING

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.

Analysis:

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, the experimental practice area could be reduced in size.

One of the important design criteria mentioned in the introduction to Revision No. 3 of the Agapito Report (Appendix 5-9) was to fix the toe at the lower bench in accordance with the planned reclamation for the area below the slope.

In the last Technical Analysis dated April 12, 2002, the Permittee was asked to demonstrate to the Division that restoration of the highwall to a 40 degree slope and retention of the experimental practice would result in a site that was at least as environmentally sound as the alternative of eliminating the experimental practice and reducing the slope of the backfill and replacing topsoil.

A full exploration of the stability of the 30-degree slope was not offered, but the argument was made that a lesser slope would require altering the location of the stream channel and require additional disturbance to the south-facing slope of the right fork of C Canyon. This would be necessary to retain the same stream gradient as presently exists (letter from Mr. Jim Cremeens, Senior Engineer with Agapito Associates Inc. to Pam Grubaugh-Littig dated August 14, 2002).

The engineering consultants have declared that backfilling the highwall to the original contour will be stable **if a source of fill is identified having the characteristics described by the Agapito report and given the strict implementation of the Agapito compaction requirements** (see disclaimer on page 18 of the report).

Findings:

The stability of the slope described by the Agapito Associates, Inc. (AAI) and Mt. Nebo Scientific, entitled, "Stability Evaluation for the Proposed Reclaimed Slope at the Portal

Excavation, West Ridge Mine, August 2002, Revision No. 3." depends upon the characteristics of the fill used during slope construction. Prior to approval and in accordance with:

R645-302- 212.300 and R645-302-214, The Permittee must identify a source of fill meeting the requirements identified in the Agapito Associates, Inc. (AAI) and Mt. Nebo Scientific report, entitled, "Stability Evaluation for the Proposed Reclaimed Slope at the Portal Excavation, West Ridge Mine, August 2002, Revision No. 3".