

June 16, 2003

TO: Internal File

THRU: Peter H. Hess, Environmental Scientist III, Team Lead

FROM: Wayne H. Western, Environmental Scientist III, Engineer
Dana Dean, P.E., Environmental Scientist III, Engineer
Randy Harden, P.E.

RE: Division Order, West Ridge Resources, Inc, West Ridge Mine, C/007/041-DO00A-7

SUMMARY:

On November 13, 2002, the Division completed a technical analysis for the highwall elimination plan at the West Ridge Mine. The Division found several deficiencies in the backfilling and grading plan. The Permittee responded to some of the deficiencies in the March 17, 2003 submittal. Responses to other concerns have been determined to be inadequate.

A critical area relative to a design of the reclamation plan for the portal highwall area is the backfilling and grading plan, and its ability to meet the minimum regulatory requirements. The Division's engineering staff concentrated on the backfilling and grading plan for the highwall to determine if the plan meets the minimum requirements. The primary issue is whether the physical properties of the backfill material will meet or exceed those required for the proposed design. After analyzing the submittal, the Division concluded that the Permittee did not provide enough information.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

TECHNICAL MEMO

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:



On November 13, 2002, the Division completed a technical analysis for the highwall elimination plan for the West Ridge Mine. The Division found several deficiencies in the backfilling and grading plan. The Permittee responded to several deficiencies in the March 17, 2003 submittal. Others were either not addressed, or the responses were felt to be inadequate.

The Division reviewed the March 17, 2003 submittal and found three issues in the backfilling and grading plan that need to be addressed before the Division can make a finding. The three issues are: 1) the angle of repose for the different soils that are associated with the reclaimed highwall slope must be determined. 2) The test results must either show peaks or the Permittee must use alternative methods to determine the soil properties. 3) The Permittee must conduct a rigorous testing program to show that the backfill material **will consistently meet or exceed the requirements of the material necessary to implement the design.**

Angle of Repose

The Permittee did not address the deficiencies relative to the angle of repose in the March 17, 2003 submittal. The Division required the Permittee to determine the angle of repose for the materials that would be associated with the reclaimed highwall. The basis for the request is the requirement of R645-301-553.130, which states...

“R645-301-553.130, The Permittee must achieve a postmining slope that does not exceed either the angle-of-repose or such lesser slope as is necessary to achieve a minimum long-term static factor of 1.3 and prevent slides, except as provided in R645-301-553.530.”

In order for the requirements of R645-301-553.530 to be considered for compliance the highwall would have to be in either a previously mined or a continuously mined area. The highwall is post-SMCRA; therefore the regulation does not apply.

The Permittee did not give the Division the angle of repose. Instead, the Permittee addressed the angle of repose issue on page 4 as follows:

“West Ridge further proposes that the geogrid will reinforce and stabilize the surficial rooting zone. Geogrid reinforced slopes are typically constructed and fully vegetated at slope angles up to 70 degrees according to Tensar, a leading geogrid manufacturer, designer, and installer (Tensar 2003.) This approach should eliminate the need for determining the angle-of-repose of the uncompacted backfill material as requested by DOGM. West Ridge could not find an acceptable method for determination of angle of repose, based on a search of ASTM methods and contact with several soil laboratories.”

The Permittee did not state the angle of repose for any of the soil materials to be used. They did state that the mean slope angle of the undisturbed slopes in the area is approximately 32 degrees. In steep slope areas, (i.e., the West Ridge Mine location), the natural slope angle is usually at or near the angle of repose. The slope angle of the proposed reclaimed highwall is 40 degrees, which is 8 degrees steeper than the natural slope angle.

The Division is concerned that if the plan to reclaim the slope to a forty-degree vertical angle were approved, then the slope angle would be steeper than the angle of repose for the involved materials. The native slopes consist of consolidated material; the reclaimed slope area will consist of broken material that will be compacted by man made methods. The growth medium that will be spread to provide the vegetative cover will not be compacted. This material, as well as the backfill material must have angles of repose determined for them. If the angle of repose of the soils indicates that the material will remain stable on the forty-degree vertical angle slope, then a problem does not exist. If the soils will slump, the design is not acceptable.

The Division will not challenge the Permittee’s statement that geogrid can reinforce or stabilize the soils. However, the use of geogrid does not allow the Division to ignore the requirements of R645-301-553.530. Therefore, the proposed design to reclaim the highwall does not meet the requirements of R645-301-553.130.

Post Peak Curve

The Division reviewed the slope stability study. The Division has concerns about the interpretation of the data from the material testing process. On page 9 of the March 17, 2003 submittal, the Permittee states the following:

“The results of the three-point direct shear test program indicate that the post-peak friction angle for the test material is 54 degrees and the cohesion is 1877 psf.”

The chart in Appendix A under Backfill that shows displacement verses shear stress **does not show a peak**, so the Division is unable to determine a value for the post peak angle. (Note: the chart for displacement verses shear strength is labeled topsoil instead of backfill).

TECHNICAL MEMO

Test Samples

The Permittee **used only one sample to determine the physical properties of the backfill material**. The values for those properties are felt to be unusually high; therefore the Division must require that additional tests be conducted such that a mean value for the friction angle and cohesion is determined. With this additional information, the Division will be able to determine whether or not the slope will meet the design requirements.

The test result for cohesion for the residual soil was determined to be 1,515 psf. A value of 42 degrees was determined for the internal angle of friction. (Note: the backfill material has 24% more cohesion and a 29% greater angle of friction than the residual soils.)

To verify that the backfill material can consistently meet or exceed the design requirements the Permittee must design a rigorous material testing procedure. **This should be done not only to obtain sufficient information to receive a Division approval for the design, but also to ensure that the approved design requirements are being met when the approved design is implemented.** The testing program must involve several samples from different areas.

Properties of Synthetic Materials

The permittee did not provide material specifications for the geogrid, the geosynthetic composite drain material or the geotextile filter fabric, all of which are considered critical aspects of the proposed design. This should include discussions of the effective life of each of those materials as well as whether or not any of the stability requirements of the design could be affected following the termination of each of the materials effective lives.

Findings:

The information provided in the March 17, 2003 submittal is inadequate to meet the minimum requirements of the regulations. Before approval, the Permittee must provide the Division with the following in accordance with:

R645-301-553.130, The Permittee must conduct tests to determine the angle of repose of all unconsolidated materials that will be part of the reclaimed highwall slope area.

R645-301-541.400, The Permittee must either provide the Division charts of displacement verses shear stress that show a peak value or remove the statement on page 9 that the backfill material has a post peak internal friction angle of 54 degrees and cohesion of 1877 psf. The Permittee may use another generally accepted method for determining the internal friction angle and the cohesive strength of the test material if desired.

R645-301-553, The Permittee must provide the Division with a rigorous testing plan that will show whether all unconsolidated materials will or will not meet the design parameters for the reclaimed highwall.

R645-301-542.200, The permittee must provide the Division with material specifications for the geogrid, the geosynthetic composite drain material and the geotextile filter fabric. The permittee must include discussions of the effective life of each of those materials as well as whether or not any of the designs stability requirements could be affected following the termination of each of the materials effective lives.

RECOMMENDATIONS:

The Division should deny the amendment until the Permittee corrects all the above-mentioned deficiencies.