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TO: File

THRU: Joe Helfrich, Permit Supervisor

THRU: Daron Haddock, Permit Supervisor

FROM: Robert Davidson, Soils Reclamation Specialist RAD
Paul Baker, Reclamation Biologist

RE: Experimental Practices - Technical Analysis of the West Ridge Permit Application Package, West Ridge Resources, Inc., West Ridge Mine, PRO/007/041-98-1, Folder #2, Carbon County, Utah

SUMMARY:

The first PAP submittal for the West Ridge mine was received on January 26, 1998. The Division completed and replied with their initial Technical Analysis response on August 20, 1998. West Ridge Resources resubmitted the PAP on October 7, 1998, and the Division responded with a Technical Analysis on November 27, 1998. A third submittal was received on January 11, 1999. The Division responded with memos from each of the review team disciplines on January 27, 1999. A fourth submittal was received on February 1, 1999 in response. This analysis and review of the fourth submittal is for Experimental Practices.

TECHNICAL ANALYSIS:

REQUIREMENTS FOR PERMITS FOR SPECIAL CATEGORIES OF MINING

EXPERIMENTAL PRACTICES

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:

Chapter 2, Soils, incorporates traditional methods of salvaging/stockpiling and an experimental practice method for protecting soils in-place. The **Experimental Practice** is unique by taking a **Reclamation Approach** for topsoil protection.

Operations - Experimental Practices

Appendix 2-6, West Ridge Mine Experimental Practice In-Place Topsoil Protection, details protecting topsoil resources in-place for (1) buried topsoil areas, and (2) buried RO/RL (rock outcrop/rubbleland) Travessilla Complex soil area. These two combined areas account for 16.75 acres of the total 29 acres of disturbed area.

(1) Buried Topsoil Areas

West Ridge Resources is proposing a topsoil protection plan which incorporates **Experimental Practices (R645-302-200) for protecting in-place soil with a layer of geotextile fabric.** The geotextile fabric provides a protective barrier between the existing soils and the imported fill materials used to construct the mine pads. By utilizing this procedure, soils are not only preserved in-place, but the existing stream channel geomorphology and original ground surface configuration are preserved likewise. Approximately 4.75 acres of the proposed 29-acre disturbed area will be affected using the geotextile fabric.

In order to evaluate the effects of burying topsoil in-place under the pad fill, West Ridge Resources has proposed a test plot study in the right fork topsoil stockpile (Appendix 2-6, Section 6). After the fill material has been in place for five years, the test plot study will be implemented. The purpose of the study is to monitor and compare reclamation success of the Experimental Practice versus traditional reclamation methods using salvaged and replaced topsoil. The test plot study will utilize the same methodology as proposed for final reclamation and will be monitored for five years to access reclamation. The right-fork topsoil stockpile will be used for the test plots.

During construction of the topsoil pile, geotextile will be placed in the area where one of the test plots will be. Enough material will be placed over the geotextiled area to simulate the amount of fill that will be on the experimental practice area. After about five years, soil over the geotextile will be removed and placed in a 12-18 inch layer on another part of the topsoil pile. The purpose of these treatments is to compare traditional topsoil salvage and replacement techniques with the experimental practice.

One portion of the test plot area will be treated with a commercially available soil activator designed for revitalizing soil. This will be done to determine if this method promotes faster establishment or greater diversity. Although this is not currently being proposed in the final reclamation plan, it could be used if the test plots indicate it is a beneficial treatment. The test plots will then be seeded and mulched as shown in the plan for final revegetation.

Monitoring will proceed for five years or until a determination of success has been made and will compare the test plots with each other and with the Douglas fir/maple reference area. If

the results show a need to revise the revegetation plan, the applicant will work with the Division to amend the plan and incorporate needed changes. If reclamation success is not achieved, other options will be reviewed with the Division. As a last resort, West Ridge Resources will utilize the soil borrow area for obtaining soils to reclaim the site if the experimental practice is determined to be unworkable.

(2) Buried RO/RL Travessilla Complex Areas

The buried RO/RL Travessilla Complex mapping unit will be included in the Experimental Practices. As stated in the Order-III soil survey, the RO/RL Travessilla Complex unit contains 35% soils by volume (25% Travessilla plus 10% other soils) that support a significant vegetation community. Successful reclamation requires the same soil and rock parameters that currently exist to establish revegetation success standards. By preserving these soils in-place underneath the pad fills, successful revegetation should be achieved. Placing the RO/RL Travessilla Complex mapping unit under Experimental Practices will not require the use of geotextile fabric. As stated in the plan, the RO/RL areas will not be covered with geotextile, but instead, fill will be placed directly over the existing ground surface which will be marked with brightly colored marker flagging strips placed on 8-foot centers for the purpose of identifying the original surface during reclamation and excavation of the pad fills. Marker strips will be used on approximately 12 of the 29 acres of the disturbed area.

Construction Sequence

Map 5-11, Construction Sequence, illustrates the different stages of construction for the West Ridge Mine site. Steps 2 and 3 illustrate the experimental practice steps for installing geotextile fabric and marker strips. Construction sequence steps are outlined as follows:

- Steps 1 through 4 are preparatory steps prior to topsoil salvage. Step 1 is removing vegetation; Step 2 is installing culvert and culvert backfill while placing geotextile in channel bottom and placing mrker strips in RO/RL areas; Step 3 is installing geotextile fabric over topsoil fill slopes, and placing marker strips in RO/RL areas; and Step 4 is pulling boulders from the surface of slopes that will be cut. Topsoil salvage occurs in Step 5. After topsoil salvage has occurred from the topsoil area and RO/RL areas, excavation of the side slopes will occur in Step 6. These excavated native materials will be used as pad fill and will be placed over the backfilled culvert adjacent to the cut slopes. Step 7 shows completion of the pad level by hauling in imported fill from offsite, commercial gravel borrow areas. A final cap layer of road base material is placed over the imported fill surface as shown in Step 8.

Reclamation - Experimental Practices

During fill removal, a 12- to 18-inch deep working layer will be left over the experimental practice slopes. Care will be taken not to subexcavate or disturb the geotextile soil surfaces. Equal care will be taken to protect the "ribbon" surfaces in the RO/RL areas. Fill removal from the slopes will be done carefully without disturbing the in-place soils located under the geotextile and marker strips. Fill removal will be done by small earth moving equipment and/or by hand labor if necessary to minimize disturbance of the topsoil. After the pad fill has been removed, the backfilled culvert will serve as the primary access way for machinery and materials associated with the remaining reclamation efforts.

Once the geotextile fabric has been exposed, the fabric will be carefully peeled away from the soil and the condition of the underlying soil materials observed at this time. The soil will be re-exposed in 5-10 foot horizontal zones that can be easily accessed and worked by hand from the adjacent pad fill level.

In RO/RL fill areas, fill will be removed down to the original, undisturbed surface as delineated by the marker strips. Because of the roughness of the ground surface, pad fill be removed to the extent possible.

To relieve soil compaction and increase the ability of the soil to absorb moisture, the re-exposed soil surface will be gouged and hay worked into the soil at the rate of 2,000 pounds per acre. Gouging depressions will approximately measure 24" X 36" X 18" deep and will create a pattern of depressions that help control erosion through water retention, minimize siltation, and allow for air and water penetration into the soil horizon.

Reclamation Sequence

Map 5-12, Reclamation Sequence, illustrates the different stages of reclamation for the West Ridge Mine site. Steps 3 through 8 illustrate all experimental practice steps involved with reclamation for removing fill, restoring buried soils and reclaiming the original soil surface. Reclamation sequence steps are outlined as follows:

- Steps 1 through 5 show reclamation steps prior removing geotextile and reclaiming the original soil surface. Step 1 is removing cap layer and surface structures; Step 2 is removing excess imported pad fills; Step 3 is removing remaining native pad fill and backfilling cutslopes; Step 4 is replacing topsoil on re-established slopes; and Step 5 is relocating boulders on re-established slopes and preparing soiled surface for revegetation. Steps 6 through 7 show removal of geotextile, soil restoration steps and revegetation; Step 8 shows final culvert removal and restoration of Channel, which includes geotextile removal and re-exposure of the original soil surfaces while maintaining the

geomorphology of the stream channel.

Analysis of the Proposed Experimental Practice

The soils regulations are intended to protect and preserve topsoil resources for the purpose of revegetation thus providing a stable surface capable of supporting the postmining land use. The proposed experimental practice, including operation and reclamation procedures, provides protection equal to or greater than what would be obtained through traditional methods required in the regulations. The Division has analyzed issues related to the proposed experimental practice, and the applicant has adequately addressed each of these concerns as follows:

1. **Compaction.** Pad fill material will compact the soil, but in reclamation, the applicant intends to gouge the surface eighteen inches deep and incorporate alfalfa hay. Below eighteen inches, there should be few effects from the fill. This procedure, combined with natural processes (e.g., freeze/thaw), should adequately alleviate compaction and allow vegetation to become established.

2. **Decreased microbial activity.** Soil that is buried for several years has been demonstrated to have few, if any, microorganisms when it is uncovered. Many microorganisms are beneficial in plant establishment and growth.

   While soils in the experimental practice area may have few live microorganisms when uncovered during reclamation, natural inoculation is likely to occur quickly since the site is surrounded by undisturbed areas. Nearly all of the proposed disturbed area would be less than 200 feet from undisturbed areas with the farthest being about 250 feet away. The Division is aware of a nearby area where cryptobiotic soils have become established naturally on a soil borrow area after eight years. The applicant will try a soil activation treatment on the test plots, and if the test plots are unsuccessful, a commercial soil inoculant could also be tried.

   Soil sterility is also a problem where soil is salvaged, stored for several years, and respread, so there is little difference between the proposed practice and what would normally be required.

3. **Preserving channel geomorphology.** The experimental practice will not only allow preservation of soils in place, it will also preserve the channel geomorphology resulting in decreased erosion and a more stable channel very similar to what currently exists.

4. **Contamination.** Native soils could be contaminated by imported fill material;

however, no imported fill will contact the undisturbed soils. In reclamation, the imported fill will be taken away and the native fill from adjacent slopes will be replaced in the cuts (see Map 5-12). In all cases, there will be a buffer of native fill between the imported fill and the native soils. In order to minimize the impact of any deleterious effects of the imported fill, bright marker flagging will be placed between the native and imported fills to delineate between the two fills during reclamation for the purpose of insuring complete excavation and removal of the native fills.

After removing the imported fills, the native fills will be excavated and placed in the cutslopes to achieve approximate original contour. The native fill should not mix with the undisturbed Brycan soils because of the geotextile. There will be some mixing in RO/RL areas, but the native fill is essentially the same material as the RO/RL soil.

The imported fill may mix with and contaminate some of the native fill; however, this potentially-contaminated material will be the first to be replaced on cutslopes and will be buried the most deeply.

Reclamation should be successful with the procedures shown in the application; however, to ensure these practices will be successful, the experimental practice procedure will be tested on the topsoil pile. In addition, the applicant has included a topsoil borrow area from which additional soil could be taken if necessary. The Division considers it highly unlikely the experimental practice will fail and that the topsoil borrow area will be needed. The proposed reclamation plan should result in vegetative cover that meets or exceeds performance standard requirements.

Findings:

The information provided meets the regulatory requirements of this section.

RECOMMENDATION:

The Division recommends that the Office of Surface Mining approve the Experimental Practices for protecting topsoil in-place.