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State of Utah

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August 28, 1997

TO: File

THRU: Joe Helfrich, Permit Supervisor

FROM: Robert Davidson, Soils Reclamation Specialist RAD

RE: Amendment to Reclamation Plan, Consolidation Coal Company, Hidden Valley Mine, ACT/015/007-97B, File #2, Emery County, Utah

SUMMARY:

An amendment to the reclamation plan for Hidden Valley Mine has been received for achieving vegetation success. The reclamation plan is designed to restore the B-seam adit slope to more closely emulate the natural conditions in the surrounding undisturbed areas. The primary intent is to promote long-term stability. The Hidden Valley Mine design includes:

- regrading the "B" seam cover slope and adjacent alluvial slope,
- covering both areas with rocky material, and
- reseeding all disturbed areas.

Work is projected to be implemented in late summer or early fall, 1997.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

SOILS RESOURCE INFORMATION

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

Analysis:

Consolidation Coal Company proposes to use selected in-place soils and fill materials as substitute soils that have a high content of coarse, rocky material. The proposed reclamation amendment discusses the suitability of soil and fill materials as substitute soils at the Hidden Valley site. The presentation of information is summarized as follows:

- Sampling and Analytical Methods - A total of 10 samples were collected from 8 locations.
- Reclamation Materials Characteristics and Suitability - DOGM's limits for selenium was exceeded on one sample while acid-base potential was exceeded on another sample.
- Acid Forming Materials Evaluation - Implications from the acid forming materials at Hidden Valley do not pose a significant threat to reclamation efforts.
- Selenium Assessment - The risk associated with Se at Hidden Valley is low.

Sampling and Analytical Methods

Sampling included alluvial soil cover materials, cover soil with shale and sandstone fragments, lithochromic shale fragment-substratum, weathered shale, and sandstone borrow materials. A total of 10 samples were collected from 8 locations (HV1 through HV8). Based on physical and chemical criteria, the soil sampling objective was to determine acceptable material for use during reclamation. The majority of samples represent soil cover material that will be placed back on the alluvial terraces. The subsurface layers (HV1-2 & HV4-2) contain sandstone and lithochromic shale fragments. Sample HV5-1 is a lithochromic shale exposed at the surface of the B-adit slope. Sample HV7-1 was collected at the base of a red shale exposure above the A-seam adit slope. Sample HV8-1 represents sandstone cover material proposed for armoring the B-adit slope.

Reclamation Materials Characteristics and Suitability

DOGM's limits for selenium was exceeded on the exposed lithochromic shale sample located on the surface of the B-adit slope; acid-base potential was exceeded on the exposed red shale located above the A-seam adit. Both of these exposed surface samples represent potential substratum materials for use during reclamation.

No other chemical or physical limitations were identified in the current soil cover materials located in the reclaimed areas at the Hidden Valley Mine. Therefore, no limitations exist for using these cover materials as surface reclamation soils and fills.

Acid Forming Materials Evaluation

The acid-forming red shale material located above the A-seam adit slope does not pose a serious threat to reclamation efforts. This same red shale naturally outcrops throughout the canyon and has a limited, localized exposure within the disturbed area. The talus weathered, red shale material currently supports Gardner saltbush where water is allowed to collect. Sampling occurred in the weathered talus directly below the red shale outcrop seam, but not in low lying areas where Gardner saltbush was growing.

The majority of materials at the Hidden Valley site are neutral to slightly alkaline in reaction, and in the long-term, alkalinity from the overlying cover materials is expected to moderate changes in pH of the acid forming layer over time as leaching occurs. Moreover, visual observation of plant growth elsewhere in the undisturbed areas of the canyon shows negligible effects from any acid production within the red shale affected areas.

Selenium Assessment

An excellent discussion and presentation is given on selenium chemistry in soils and plant uptake. The risks associated with Se at Hidden Valley are considered to be minimal for the following reasons:

- The materials associated with the higher extractable Se do not contain elevated concentrations of Total Se. In fact, the Total Se concentrations of materials tested at Hidden Valley are within the range found in uncontaminated soils and are well below the Total Se levels associated with seleniferous Cretaceous shales.

- The area of disturbance is small and will not be intensively managed for domestic livestock production. It is proposed that the post-mining land use be set for wildlife. Therefore, the current acceptable value for extractable Se, as supported

in the literature[1], is set at <0.3 mg/kg.

- The physicochemical characteristics of the lithochromic shales are not conducive to plant uptake of Se. The lithochromic shales produce some acidity and therefore contain significant quantities of sulfate. The antagonistic effects of SO_4 on plant uptake of Se is noted in the literature. The reduction in Se uptake associated with SO_4 is probably the result of specific ion competition.

- Burial of the dark shales by even a modest thickness of cover materials is expected to reduce the redox potential and promote the stability of selenite rather than selenate. The adsorption of and plant uptake of Se is strongly influenced by Se speciation, with selenite being less readily absorbed by plants and more strongly adsorbed by anion exchange sites. Selenite is the predicted stable Se species in a limited oxidizing and acidic environment.

- The long-term fate of selenium at Hidden Valley is speculated to be controlled by coprecipitation with gypsum. Concurrent oxidation of the primary ferroselite and pyritic mineral phases produces soluble Se and S species, which under high Ca activity, simultaneously precipitate with gypsum. The continuous weathering of pyrite and feldspars provide a continual source of Ca and SO_4 to the soil solution, and gypsum would therefore increase in quantity with time. Furthermore, the size of the crystalline gypsum precipitates is expected to increase because of the restricted leaching and associated dry climate of Hidden Valley.

Findings:

The requirements of this section of the regulations are considered adequate.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

The amendment to the reclamation plan proposes to restore the B-seam adit slope. Restoration will model the natural conditions in the surrounding undisturbed environment by

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[1]Spackman, L.K., D.G. Steward, G.F. Vance, L.E. Vicklund, J.G. Luther, and M.F. Raisbeck. 1996. Interpretation of selenium research for regulatory application. Joint Subcommittee on Selenium in soils, vegetation, overburden, and wildlife. Wyoming Dept. Of Environ. Qual., Casper WY.

incorporating rock to armor the steep, south facing slopes and the flat area between the slope and Ivie Creek. The rock armor will help prevent erosion and help establish revegetation due to the water harvesting and shading effect of the larger rock.

The following analysis summarizes the reclamation plan amendment:

- Reclamation procedures provide conceptual construction components.
- Burying any dark material and/or suspect quality material.
- Additional detailed reclamation information is needed.
- Additional Maps illustrating slope cross sections

General reclamation procedures and recommendations provide conceptual construction components.

Access to the site will be by using the present roadway. Construction equipment will include a crawler bulldozer, a crawler endloader, and support equipment, such as fueling equipment and pickup trucks. Initial grading will be done by the bulldozer. Excavation and transport of the rock cover mulch will be done by the endloader. The roadway will be retained for future site access.

The conceptual components for reclamation construction at Hidden Valley include removal and redistribution of the alluvial soil cover materials, increasing the portal area slope gradient to match the adjacent undisturbed talus slopes, providing a high coarse-fragment content sandstone and soil mulch cover, and hand-broadcast seeding followed by hand raking the seed into soil surface. The plan specifically recommends not using a straw mulch.

Burying any dark material and/or suspect quality material.

The plan specifically states that grading will be done so as to make certain that any dark material or suspect quality material will not be exposed on the surface. Verbal discussion with Consolidation on 7/22/97 during a Hidden Valley site visit verified that any suspect material will be selectively removed, placed and buried in the lower valley fill during construction.

Additional detailed reclamation information is needed.

General recommendations are given for reclamation procedures. The following information is either provided or should occur:

- maps illustrating slope cross sections,
- timing and sequence for soil removal and subsoil placement, and

- cut and fill balances.

Maps illustrating slope cross sections. Slope cross sections are presented by comparing pre and post construction topography. In addition, Consol provided work drawings of the cross sections that are attached with the August 12, 1997 submittal cover letter.

Timing and sequence for soil removal and subsoil placement - The topsoil on the B-adit slope should be stripped away and placed back on the surface along with the rocky substitute soil material. All subsoil materials beneath the topsoil should be used as fills with the dark lithochromic shale material being buried under the deepest layer of fill and soil cover.

Cut and fill balances - Actual projections of materials to be moved are included in the cost estimate, SECTION D. Cut and fill balances are also provided with the August 12, 1997 submittal cover letter.

Findings:

As determined in the analysis section of this TA, approval of the plan is subject to the following Permit Conditions. Accordingly, the permittee must comply with the requirements of the following Permit Conditions, as specified, and in accordance with the requirements of:

R645-301-231.100, Safeguards need to be specified during construction for the timing and sequence of soil removal and subsoil placement. The topsoil on the B-adit slope should be stripped away and placed back on the surface along with the rocky substitute soil material. All subsoil materials beneath the topsoil should be used as fills with the dark lithochromic shale material being buried under the deepest layer of fill and soil cover.