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State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
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September 16, 1991

Mr. Johnny Pappas, Environmental Coordinator
Soldier Creek Coal Company
P. O. Box I
Price, Utah 84501

Dear Mr. Pappas:

Re: Division Order #DO 91-A, Mid-Term Review Suggested Test-Plot Design and Implementation, Soldier Creek Coal Company, Banning Loadout, ACT/007/034, Folder #2, Carbon County, Utah

As you are aware Division Order #DO 91-A was issued on August 26, 1991 as a conclusion to the Mid-Term Permit Review at the Banning Siding Loadout. Part of the order required the demonstration of reclamation feasibility. The enclosed technical memo is designed to assist you in completing the requirements of the Division Order. Please review it carefully. It is only to be considered a recommendation and should be used as a guide, not as a requirement.

Remember you have only till November 1, 1991 to complete the Division Order. If you have any questions please feel free to phone me, Priscilla Burton, or Paul Baker at 538-5340.

Sincerely,

Daron R. Haddock

Daron R. Haddock
Permit Supervisor

Attachments
cc: P. Baker, DOGM
P. Burton, DOGM
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TO: Daron Haddock, Permit Supervisor

FROM: Paul Baker, Reclamation Biologist
Priscilla Burton, Reclamation Soils Specialist

DATE: September 16, 1991

RE: Mid-Term Review Suggested Test-Plot Design and Implementation. Soldier Creek Coal Co., Banning Loadout, ACT/007/034, Folder #2, Carbon County, Utah.

SUMMARY

In November 1988, Soldier Creek Coal Co. established a test plot at the Banning Loadout south of the loadout area next to the railroad tracks. This plot has been subsequently monitored, but in 1990, the plot only had about 2% cover, none from seeded species. Procedures used in establishing this plot are the same as those proposed for final reclamation and have clearly been unsuccessful. New reclamation methods must be developed to demonstrate the reclaimability of the site.

Expansion of the facility may take place in the location of the present test plot. Relocation of the test plots is desireable for this reason.

ANALYSIS

R614-301-356.250 and R614-301-341.300.

Soldier Creek must be able to demonstrate reclamation feasibility by the methods proposed in the MRP.

The present location of the test plots has been subject to vehicle traffic and may eventually be engulfed by expansion of the loadout facility. A suggested new site is along the northwest perimeter fence. This location affords protection from vehicles. Further protection could be gained by the placement of snow fences along the exposed southwest and south sides. In addition, this location is representative of the soils to be reclaimed, i.e. in situ soils with a layer of coal fines on the surface.

Design

The following design is recommended as an amendment to the test plot design and

construction in the MRP.

There will be two main treatments:
1) Organic matter addition with gouging
2) Organic matter and peat or shredded bark with gouging
and a control (reclamation as described in the MRP) with gouging.

All of the treatments will be mulched with hay that has been anchored to the soil.

Gouging is a water harvesting technique where pits approximately 10 inches deep by 18 inches wide by 25 inches long are dug by a backhoe or other equipment. Gouging has many beneficial effects, including decreasing erosion and increasing the amount of water available at the bottom of the pits.

Each treatment will cover 100 sq feet and will be replicated twice, a total of 200 sq feet per treatment. In the suggested location along the fence line, this will require a five foot section of land that is 120 feet long. Use of this area should not hinder truck traffic into and out of the loadout. The treatment replications must be randomly placed and a map of the fieldplots must be provided in the MRP.

Procedure

First, the plots will be staked and labeled. The organic amendment and bark/peat moss will be applied to the appropriate plots. The entire area will then be immediately ripped to 18-24 inches and disked to leave a moderately rough surface and ensure inversion of the soil. Next, gouging will be performed on half of the plots and seed broadcast over all the plots. Seeding will take place in late October to late November. In order to plant seed on the gouged areas, it is necessary to broadcast the seed. The seed may be either hand broadcast or hydroseeded. Finally, mulch will be applied and anchored. All plots will be mulched with one ton per acre of noxious weed free hay. Mulch should be either crimped or anchored with netting. Crimping should be done either, preferably, by hand (shovels) or, alternatively, by using a flexible disk or cultipacker so that the gouges may be retained. Crimping serves a dual purpose of anchoring the mulch and incorporating the broadcast seed into the soil. Hand crimping should not be done so deeply that seed would not be able to emerge. If netting is used, the seed should first be raked by hand into the soil.

The following seed mix is recommended:

Species Common Name	Scientific Name	Rate (Pounds PLS/Acre)
Shrubs:		
Shadscale	Atriplex confertifolia	3.0
Gardner Saltbush	Atriplex gardneri	2.0
Fourwing Saltbush	Atriplex canescens	3.0
Grasses:		
Indian Ricegrass	Stipa hymenoides	5.0
Bottlebrush Sqirreltail	Elymus elymoides	2.3
Sand Dropseed	Sporobolus cryptandrus	0.1
Forbs:		
Pale Evening Primrose	Oenothera pallida	0.5
Scarlet Globemallow	Sphaeralcea coccinea	0.7

This seed mix is modified from the approved mix in the MRP and is based mainly on what is in the reference area. Warm season grasses included in the approved seed mix are difficult to establish from seed and may need to be transplanted from plugs if they are found necessary to achieve needed diversity and seasonal characteristics. Depending on what success is achieved with the methods used, transplanting may be recommended or required later.

The use of dried, digested, domestic sewage sludge is recommended for the organic matter treatment. This sludge is readily available from Mr. Rod Ivy of the Price River Water Improvement District (PRWID), phone #637-6350. There is no charge for the sludge. For the purposes of this trial, Mr Ivy indicated that there will be no charge for the requisite Toxicity Characteristic Leaching Procedure (TCLP) or other tests routinely run by the PRWID for volatile solides, (BOD), TDS, SS, pH, EC, oil and grease, coliform, and total heavy metals. This is because the bulk of the digested sludge will tested for use on the Carbon County Golf Course (presently under construction). However, during final reclamation, laboratory costs may be incurred.

Although there appear to be numerous tests required prior to land application of domestic sludge, the benefits are many. The addition of organic matter improves the soil structure. The soil fertility of macro and micronutrients will increase. Improvements in water holding capacity and in cation exhange capacity will all produce a more productive soil environment. The ability of organic matter to absorb salts and the lower pH of the sludge will also benefit the saline soils to be reclaimed.

Other alternatives for the organic matter treatment include composted manure or by-products from a rendering plant. These alternatives must also avoid contamination of

groundwater, in compliance with 40 CFR Part 257. Therefore analysis of the organic amendment must still be performed. In particular, nitrate-nitrogen must be analyzed using the standard procedures outlined in 40 CFR Part 141.

In each treatment there is 100 sq ft. The depth of amendment is 18 inches. This translates into a 5.55 cu yd volume of soil to be amended. To achieve the goal of a 40% organic matter: 60% soil in an eighteen inch depth over a 100 sq ft treatment, a six inch layer of organic matter will be placed on the plots prior to ripping. This translates to 3.33 cu yds of organic amendment for each of the two organic matter treatments. The goal of the peat or bark/organic matter treatments is to achieve a ratio of 20% organic matter: 20% peat or shredded bark : 60% soil to an eighteen inch depth. In these treatments, organic matter will be placed three inches deep (1.11 cu yds) and peat or bark three inches deep (1.11 cu yds) on each of the two treatments prior to ripping.

To avoid overdosing the plants, treatment levels may require adjustment once the concentration of nitrate-nitrogen is known.

The peat/shredded bark addition to the organic amendment will supply a carbon source for microbial activity and will result in a rich humus over time. At the present time, there are no specific recommendations for the choice of peat/shredded bark.

Evaluation

Test plots will be monitored yearly for the first five years for percent cover by species. This should be done at the end of the growing season (late August to September). At least three evaluations will be performed per replication. Statistical analyses of the percent cover by treatment will be done with a one-way analysis of variance. Evaluation of cover proportions and diversity at the end of the first growing season will determine whether additional seeding or transplanting will be needed.

One initial evaluation of the control, organic amendment, and organic amendment/peat mix treatments are required to acquire baseline information. The parameters to be evaluated using standard methods decribed in Agronomy Monograph #9 are total nitrogen, nitrate-nitrogen, ammonium-nitrogen, phosphorus, potassium, cation exchange capacity, total organic carbon, texture; soluble calcium, magnesium, and sodium; SAR (calculated), hot water soluble boron. The potentially phytotoxic metals which are not evaluated in the TCLP measurements (Cu, Ni, Zn) must be analyzed using the DTPA (diethylenetriaminepentaacetic acid) method of Lindsay and Norvell, 1978. Sampling of the in situ soil must be done by horizonation.

Further evaluation of the soils will be done during the collection of data after five years.

During this evaluation, soil will be collected and tested from each treatment by depth (0-6", 6-12:, 12-18"), a total of nine samples.

After five years plant tissue analysis will be performed for heavy metals and total nitrogen. Metals to be analyzed will include Cu, Zn, and Ni, but may also include metals of high concentration determined through soil sampling at the outset of the field trials. For the purposes of these analyses, plant materials will be gathered in the summer months before seed production begins. Calculations of the total protein in plant tissues may reveal benefits of the organic amendment. Analysis of heavy metals will determine whether any elevated levels of metals might be detrimental to grazing animals or to plant establishment. Using this information, further statistical analysis on the productivity of the plant community in comparison with the treatment growth medium will be done.

CONCLUSION

An outline of test plots for the Banning Loadout has been provided. The recommendations include a suggested location, revised seed mix, revised organic amendments and soil preparation strategy and discussion of the evaluation and statistical treatment of the data.

Prior to the onset of the field trials as they are presented, Soldier Creek Coal must sample and analyze the in situ soils, and each treatment for parameters which will be valuable indicators of the quality of the growth medium in each treatment. This information will be invaluable during subsequent years of data gathering.

The use of animal manures or dried, deactivated domestic sewage sludge will require testing to assure compliance with the 40 CFR Part 257 (protection of groundwater). In the case of sludge, the treatment plant has consented to incur the cost of laboratory tests for the determination of the hazardous nature of the waste [40 CFR Sec 261.24 and Sec 261.2(c)(1)] prior to allowing use of the material for land application.