



February 24, 1988

TO: John Whitehead, Permit Supervisor

FROM: Dan Duce, Soils Specialist DD

RE: Mid-Term Response, Diamond Shamrock, Trail Mountain Mine, ACT/015/009, Folder #2, Emery County, Utah

Background

On August 18, 1987, I requested a review of the history behind the construction of the test plots at Trail Mountain. During the mid-term review, it was not clear in the MRP if the test plots were constructed according to OSM Stipulation #1, dated October 1984. This stipulation stated that all material exceeding Ec values of 16 mmhos/cm² would be buried to two feet during reclamation and the surface 6 inches of soil would be 8 mmhos/cm² or less. The test plots were to be constructed incorporating substitute materials having these approximate Ec values. A regrading sampling program was also to be submitted to confirm salinity did not exceed these values after reclamation.

During the mid-term review, Trail Mountain submitted the regrading sampling program, which was to be received 60 days after permit approval. This sampling program was approved on June 15, 1987.

To clarify my mid-term request dated August 18, 1987, I met on September 29, 1987 with Patrick Collins of Mt. Nebo Scientific, who performed the test plot work. During this meeting, it was evident that the Division did not have a complete MRP which showed data and explained the decision behind the test plot construction.

In November of 1987, a review and update report of soil sampling at Trail Mountain was submitted as the Mid-Term Response.

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This review clarified that there were three sampling phases prior to the test plot construction. Phase I occurred in 1981, by Vaughn Hansen and Associates, to characterize the native soils for the MRP. Phase II occurred in 1983 by Mt. Nebo Scientific. Both native soils and spoils were sampled. During this phase, high E_c values (8 mmhos/cm²) were noted. Phase III sampling took place in 1984 to determine the extent of salinity in the spoil material. This sampling scheme was designed by Mt. Nebo Scientific and Division personnel (E. Hooper and T. Portle). A statistical comparison of native soil and spoil salinity was conducted using data from all three sampling phases. This comparison showed that native soil and spoil material were not significantly different in salinity levels (see Analysis Section--this comparison used CEC values instead of E_c for the native soils, which resulted in an incorrect finding). Based on the incorrect finding that the salinity was not different in the soil and spoil material, the test plots were constructed without using OSM Stipulation #1 criteria.

Phase IV sampling occurred in the fall of 1987 on the test plots. This sampling was requested in the August 18, 1987 Mid-Term Review to verify test plot salinity levels.

Analysis

The Phase I soil sampling program conducted by Vaughn Hansen in 1981 and used for the soil survey data in Chapter VIII of the MRP was used to compare native soils and spoil salinity (see page 19 "Soil Sampling Program..." and page 17D-H of the Mid-Term Response). These native soils designated as samples 36 and 37 on page 17H used Cation Exchange Capacity (CEC) values instead of E_c or Electrical Conductivity values. Page 8-9, Table 8-2 and page 8-12, Table 8-3, Chapter VIII of the MRP accurately show the salinity of these soils as very low. Because the wrong soil parameter was used (CEC vs E_c) the finding on page 17-E of Appendix 9 and page 20 of the midterm review and update report is incorrect in that the native soils and spoils salinity are not different. Using the correct E_c values mean salinity of the native soils would be 3.36 mmhos/cm² and these soils would be considered non-saline and significantly lower in salinity than the spoils material.

The test plots were constructed on the basis that the material (soil and spoil) were not different and therefore were not constructed in accordance with OSM Stipulation #1. This stipulation required the test plots to have the surface 6 inches of soil be 8mmhos/cm² or less, and the underlying 18 inches of soil to be 16 mmhos/cm² or less.

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Page 21 and 22 of the mid-term response compares 1983 test plot soil salinity data with 1987 data. The operator contends this comparison shows that the salinity of the test plots is decreasing overtime. Although this is a positive comparison, the Division contends this comparison is inconclusive, since random sampling did not occur in these sampling years on the test plots to account for natural spacial variability.

Despite the problems with the test plot design, successful revegetation on the test plots has occurred to date, except for shrubs (see midterm response page 1, paragraph 4). The test plots were constructed with moderately saline soil, average E_c equalled 6.4 mmhos/cm^2 .

The operator also has a regraded surface sampling program to confirm salinity values do not exceed 8 mmhos/cm^2 in the surface 6 inches, and 17 mmhos in the underlying 18 inches of soil.

Although the regraded sampling plan was approved on August 21, 1987 memo to file, all the data was not present in the MRP to determine that the findings made in the MRP, that spoil salinity was not different from native soils, was incorrect. Therefore, the test plots should have been constructed according to OSM Stipulation #1.

Recommendations

To ensure successful revegetation at the time of reclamation, the following should be changed on the regrading sampling program.

1. The limits on E_c , or Electrical Conductivity for the regraded sampling plan, should be changed as follows: 8 mmhos/cm^2 or less in the surface 12 inches and the underlying 36 inches, 16 mmhos/cm^2 or less. A composite samples should be taken at each grid point for the top 12 inches, and 2 samples should be taken in the underlying 36 inches at each grid point.
2. To clarify the MRP, the following should be corrected to accurately depict all soil sampling accomplished to date, problems associated with the test plots, and the present reliance of the regrading sampling program to achieve successful revegetation.

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- (a) All soil analyses taken to date on the spoils and natural soils should be shown in tabular form: parameters, sample number, depth and location (as in Tables on pages 17F-H).
- (b) All sample locations must be located on Map A; presently only points 1-25 exist.
- (c) The mid-term response should delete all impertinent material (e.g. the finding on page 17E, 20, 22, and 23) and present the data along with the regrading sampling program for achieving successful vegetation.

djh

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