



February 18, 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

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 Ec 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 Ec) the finding on page 71-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 Ec values mean salinity of the native soils would be 3.36 mmhos/cm<sup>2</sup> 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/cm<sup>2</sup> or less, and the underlying 18 inches of soil to be 17 mmhos/cm<sup>2</sup> 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  $6.4 \text{ mmhos/cm}^2$ .

The operator also has a regraded surface sampling program to confirm salinity values do not exceed  $8 \text{ mmhos/cm}^2$  in the surface 6 inches, and  $17 \text{ mmhos}$  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:  $8 \text{ mmhos/cm}^2$  or less in the surface 12 inches and the underlying 36 inches,  $16 \text{ mmhos/cm}^2$  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.

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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.
  - (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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