



State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Norman H. Bangertter

Governor

Dee C. Hansen

Executive Director

Dianne R. Nielson, Ph.D.

Division Director

355 West North Temple

3 Triad Center, Suite 350

Salt Lake City, Utah 84180-1203

801-538-5340

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TO: Daron Haddock, Permit Supervisor

FROM:  Priscilla Burton, Reclamation Soils Specialist

RE: Technical Deficiency Review. Sowbelly Canyon Reclamation Plans. AMAX Coal Co. ACT/007/004 Permit Stipulation under Docket 91-001. Folder #2. Carbon Co. Utah.

SUMMARY:

Soil sampling conducted in 1990 indicated a potential for sodic soils at single sample location (site S-7) in Sowbelly Canyon. Follow-up sampling conducted upstream and downstream of the location in 1991 confirmed that saline-sodic material was found at soil sample location U-7, thirty feet downstream of site S-7 in Sowbelly canyon. The present reclamation plan does not provide for special handling of this toxic material.

ANALYSIS:

R645-301-243. Soil Nutrients and Amendments.

Proposal:

The plan calls for fertilization based upon soil testing as described on page 3.2-16. Testing as described on this page does not include an analysis of phosphorus or potassium, two macronutrients commonly available in fertilizer. Tests which were previously conducted in 1990 and 1991 on the Sowbelly 'in situ' soils provided characteristics of the nature of the soil texture, available water holding capacity and general suitability of the material for plant growth.

Analysis:

Testing conducted after grading for the purpose of determining fertilization levels should include available phosphorus and potassium and nitrogen levels. The Division is uncertain whether further testing will occur after grading or if previous testing conducted in 1990 and 1991 for the parameters mentioned on page 2.2-16 was intended to suffice for this purpose.

Deficiency:

1. Amax Coal Co. should provide for testing of the regraded spoils for nitrogen phosphorus and potassium to allow determination of adequate fertilization levels to comply with R645-301-243. Testing of the regraded spoils should be factored into the Reclamation Timetable (Section 3.2-6) and the Reclamation Costs (Section 3.1-10).

553.250. Refuse Piles.

Proposal:

The plan describes regrading the surface to allow for adequate drainage. What material remains on the surface will be the plant growth medium. Areas which do not successfully revegetate will be covered with 6 inches of borrow material.

Analysis:

Previous testing (1990) of Sowbelly canyon soils from 0 - 4' illuminated an area of potential revegetation difficulty: the location of sample S-7 (near the existing pond 5). The plan states on page 3.2-1 that *"some coal or coal waste has in the past, been dumped on the embankment slopes in this area."* Site S-7 was further investigated in 1991 and the results indicate that area U-7 (30' downstream) from site S-7 is extremely saline-sodic. The site was investigated at intervals down to four feet. The Electrical Conductivities (EC) reported ranged from 30 to 103 mmhos/cm and increased with depth. The Sodium Absorption Ratios also increased with depth from 110 to 361. The Exchangeable Sodium Percentages (ESP) were analyzed for the site and ranged from 40 to 100% of the total Cation Exchange Capacity. (ESP values were not repeatable in this study, although the SAR and EC values were. The high values of sodium may have exceeded the confidence interval of the sodium replacement method for analysis of ESP. This possibility was discussed with Ms. Linda Spencer of Intermountain Laboratories in Farmington, NM, 9/18/92.)

A saline-sodic soil by definition is one with an EC of greater than 4 mmhos/cm and an ESP greater than 15% of the total exchange capacity. Over time, leaching of these soils will likely create increases in pH and concentrations of available sodium which is toxic to plant growth and detrimental to soil structure. The low level of calcium and magnesium salts in the soil will exacerbate the situation.

Prior to the onset of regrading in this location, the plan must include measures to determine the extent and location of this saline-sodic material and insure burial or removal of the material from the site. Burial must be out of the plant root zone (at a minimum below four feet) and sufficiently distant from surface waters and out of reach of ground waters. To determine the extent of the material, field sampling of pH and EC can be conducted in the location of Pond 5. Any EC levels greater than 8 mmhos/cm will be considered suspect and greater than 15 mmhos/cm will be considered unacceptable (see Division Guidelines). Values of pH 5.0 and/or 8.5 will be considered suspect and values of pH 4.5 and less and of 9.0 or more will be considered unacceptable. Intensifying sampling in areas suspect will enable field mapping of the toxic material. If removal of the material is the preferred alternative to burial, sampling for pH and EC will be required to a depth four feet below the proposed final reclamation contours in the area of the toxic material, to ensure complete removal within the root zone.

Sowbelly reclamation plans should include sampling the entire 16 acre site after regrading for field parameters of EC and pH to ensure other pockets of such toxic material are not exposed within the root zone (four feet deep). This inexpensive field check will save AMAX time and money in the long run.

The reclamation timetable and cost estimates should include this special handling and sampling effort.

Deficiencies:

1. Prior to regrading of the Pond 5 location of Sowbelly Canyon, AMAX Coal Co., in consultation with the Division, should determine the extent and location of saline-sodic overburden, and provide for special handling or burial of this toxic material to comply with the requirements of R645-301-553.252.
2. AMAX Coal Co. should provide a commitment in the Sowbelly Canyon reclamation plan to identify and cover all acid/toxic forming materials *with a minimum of four feet of the best available, nontoxic and noncombustible material* in accordance with Regulation R645-301-553.252 and R645-301-731.300.
3. AMAX Coal Co. should include field sampling for pH and EC, and special handling provisions for toxic overburden in the Reclamation Timetable (Section 3.2-6) and Reclamation Cost Estimates (Section 3.1-10).

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CONCLUSION:

Sowbelly reclamation is scheduled for bid in the Fall of 1992. Recognizing the need to accomodate reclamation schedules, a plan for field analysis and evaluation of the acid/toxic material on the site has been proposed. Prior to the onset of grading in the Pond 5 location, the saline-sodic material should be identified in extent and location and mapped. A plan for either burial or removal of the material can be developed (in consultation with the Division) utilizing field information to either remove the material from the site or bury the material in place.

Regulation R645-301-553.250 requires a minimum of four feet of cover on this material rather than the proposed 6 inches. The quantity of cover required to achieve a four foot depth can not be determined at this time, since the extent of the material is unknown.