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November 6, 1992

TO: Daron Haddock, Permit Supervisor

FROM: Priscilla Burton, Senior Reclamation Soils Specialist

RE: Final Review, Sowbelly Canyon Reclamation Plans, AMAX Coal Co. ACT/007/004-92C Permit Stipulation under Docket 91-001, Folder #2, Carbon Co. Utah.

SUMMARY:

In a technical review dated 9/18/92, I commented upon a area of sodic soils reported with Sowbelly sampling conducted in 1990 and 1991. The present reclamation plan does not identify the area of concern on a map or in the narrative. The present plan does indicate that the existing soils will be evaluated for toxicity of saline-sodic overburden with 9 samples (1 per 2.3 acres). The reclamation plan is written in accordance with R645-301-731.300. No requests for exemption from the general requirements of R645-301-553.250 have been submitted.

ANALYSIS:

R645-301-243. Soil Nutrients and Amendments.

Proposal:

The plan calls for fertilization based upon soil testing as described on page 3.2-17. Testing includes an analysis of nitrogen, phosphorus and potassium. Sampling is included in weeks 1-6 in the reclamation time table (sec 3.2-6).

Analysis:

The applicant is in compliance with this rule. The additional cost of sampling during reclamation will be addressed in a separate submittal (page 5, 10/28/92, Response Summary).

553.250. Refuse Piles.

Proposal:

Special handling and sampling of the regraded site is discussed on pages 3.2-16 and 3.2-17 of the reclamation plan. Acid and Toxic forming materials will be buried no less than four feet deep. One sample per 2.3 acres will be taken. Sampling depths are not specified. Segregation of samples is not specified. Specific plans for the sodic material identified through sampling to date is not mentioned. The location of the sodic material is not identified in the narrative or on a map. Field sampling to determine the extent of the material is not indicated in the plan.

Analysis (by Itemized Deficiency):

Deficiency

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.*

The present plan does not adequately address this stipulation. Although a general commitment to follow the regulations was found. A discussion of isolation and handling of the sodic material known to be present on the site has been avoided.

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.

Deficiency

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.*

The Sowbelly reclamation plan states that acid/toxic material will be buried no less than four feet in accordance with R645-301-731.300. The Division should emphasize that all refuse must be buried four feet deep in accordance with R645-301-553.252. Although this practice is not explicitly stated within the Sowbelly reclamation plan, no request for an exception to this rule/performance standard has been received. Therefore, the Division will hold the Permittee responsible for compliance with the regulations and performance standards of R645-301-553.250: *...coal mine waste will be covered with a minimum of four feet of the best available, nontoxic and noncombustible material* ....This requirement should be stated in the approval document for the Sowbelly reclamation.

Deficiency

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).*

The intention of this stipulation was to ensure identification of acid and toxic forming material in the top four feet of root zone. Pages 3.2-16 and 3.2-17 cover these commitments. The intention of this stipulation appears to have been met, however several comments should be made clear on conducting soil sampling.

1. Laboratory rather than field sampling seems implied by the text. Lab generated information will delay grading decisions, therefore, field sampling by a qualified individual is recommended for pH and EC.

2. Sampling for pH and EC should be conducted to a depth of four feet and samples should be depth segregated as follows: 0-6", 6-12", 12-24", 24-36", 36-48", resulting in four subsamples for every location sampled.

3. Locations of samples will be recorded on a map for review.

These specifics are mentioned to enable AMAX to present adequate information to the Division for evaluation of the present grading plan and any field changes to the present plan.

RECOMMENDATIONS:

AMAX Coal Co has not adequately addressed Deficiency #1 of this regulation. The deficiency remains as written and should be included as a condition of approval for reclamation.

Deficiency #2 has been addressed. No request for exemption to the performance standard of four feet of cover over coal mine waste has been received by the Division. The regrading plan will be evaluated according to the general requirement of R645-301-553.250 in the absence of this request.

Deficiency #3 has been addressed. Suggestions for sampling are proposed to facilitate the Divisions' understanding and evaluation of reclamation progress.

One deficiency remains to be addressed and is restated below, this deficiency should

One deficiency remains to be addressed and is restated below, this deficiency should be included as a condition of approval of the Sowbelly reclamation plan.

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.

The Division must ensure that the requirements of R645-301-553.250 are met. Upon subsequent reclamation or bond release inspections, the Division will employ simple techniques (field pH and EC) to verify the non-toxic, non-acidic nature of the top four feet of regraded spoils.

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