



**Public Service Commission
Reclamation Division**

Memorandum

To: John Schuh, Jonathan Emmer, Guy Welch
From: Monty Johnson
Date: December 19, 2023
Subject: Coyote Creek Mining Company (CCMC): Soils & Permitting Process

Permitting and Projecting Soil Respread

Gathering pre-mine information on soil resources is a requirement of any mining company’s permit application per NDAC 69-05.2-08-01(1) which states “*Each application must include a description of the premining environmental resources of the permit and adjacent areas that may be affected by mining.*” It is a requirement for mining companies to submit a detailed soil survey by a soil classifier per NDAC 69-05.2-08-10. The intent of the detailed soil survey is to provide information on the amount of suitable plant growth material (SPGM) available to a mining company before mining occurs. As defined in NDCC 38-14.1-02, SPGM “*means that soil material (normally A, B, and portions of the C horizons) located within the proposed permit area which, based upon a soil survey, is found by the commission to be the most acceptable as a medium for plant growth when respread of the surface of regraded areas.*” The soil surveys are typically conducted on the first five feet of the soil profile.

After the soil survey is conducted, the next step in the permitting process is to estimate how much SPGM is necessary for reclamation, commonly referred to as projected SPGM respread thicknesses. A mining company has two options for their approach to soil reclamation. They can either salvage all available SPGM and respread this same amount, or salvage and respread a specific amount based on the graded spoil properties during the reclamation phase. However, a mining company must comply with NDAC 69-05.2-21-03 which states that toxic forming materials must be covered with an adequate amount of non-toxic material or, in this case, SPGM material. The toxic forming material encountered in surface mining in North Dakota are sodic soils found in the overburden material. Sodic soils can be characterized as soils that have a sodium adsorption ratio (SAR) of 12 or greater. Policy Memorandum No. 3 to Mine Operators provides a detailed explanation of NDAC 69-05.2-21-03.

The process of projecting SPGM respread thicknesses begins with using the information gathered from the geologic investigation of overburden material required by NDAC 69-05.2-08-05. Overburden samples are required to be taken at five-foot intervals from borings spaced at a minimum of one drill hole per forty acres. Chemical (SAR) and physical (soil texture) properties of the overburden samples are used to create a projected SPGM respread depth map based on calculations used to determine SPGM redistribution thicknesses outlined in Policy Memorandum No. 17 to Mine Operators and NDAC 69-05.2-15-04(4). The results of the projected respread thicknesses based on the analysis of the in-situ overburden are used to determine if the amount of SPGM available from the detailed soil survey is enough to reclaim the mined land based on the projected respread thicknesses and comply with NDAC 69-05.2-21-03.

If it is determined that enough SPGM is available to reclaim the mined land to the projected respread thicknesses based on the detailed soil survey, no further soil investigations must be conducted. However, in CCMC’s case, it was determined that not enough SPGM was available to reclaim the land to the

projected respread thicknesses. For example, Table 2.5.4.2 of Permit NACC-1302 shows that Voigt owned lands within the proposed mining disturbance boundary contain enough SPGM to be respread at an average thickness of 32 inches while the projected respread depth map (Section 2.5.7 of Permit NACC-1302) projects that Voigt owned lands would have to be respread at an average of 45 inches. As a result, CCMC was required to supplement the lack of available SPGM with “other suitable strata” based on NDAC 69-05.2-15-02(5)(b) which states that *“The permittee or operator may be required to use other suitable strata to supplement subsoil materials if the commission determines additional suitable materials for spreading over affected areas are necessary to meet the redistribution requirements of subdivision a of subsection 4 of section 69-05.2-15-04...”*. Other suitable strata can be defined as overburden materials (other than topsoil and subsoil) that have an electrical conductivity of less than 6 mmhos/cm and a SAR of less than 12. CCMC had to find other suitable strata to supplement the lack of subsoil quality material needed for reclamation.

A deep lift soil survey was conducted by a soil classifier to identify areas of overburden that would meet the requirements to be used as a supplement to subsoil as required by NDAC 69-05.2-08-11 which states *“Where the applicant proposes to use other suitable strata as a supplement for suitable plant growth materials or where the commission determined that it is necessary to meet the revegetation requirements, the application must indicate the areal extent of other suitable strata within the proposed permit area and must, on a sampling density determined by the commission in consultation with the applicant, provide results of the analyses, trials, and tests required under subsection 5 of section 69-05.2-15-02.”*

The deep lift soil survey was conducted in the 5 to 10 foot zone, which is essentially a 5 foot extension of the previously conducted detailed soil survey. The results of the deep lift soil survey showed that there was an adequate amount of other suitable strata to supplement the subsoil to achieve reclamation standards and the projected SPGM respread depths. The soil resources section of the permit application was deemed satisfactory as stated in paragraph 4 of Finding No. 2 of the award findings for NACC-1302, which states *“The applicant has demonstrated that sufficient soil materials are available to meet the soil redistribution requirements of NDAC 69-05.2-15 and the revegetation requirements of NDAC 69-05.2-22. The application includes information on sources of non-sodic glacial till material that may be selectively handled to cover sodic spoils or potentially used as other suitable strata to supplement subsoil materials in order to achieve the required respread thickness over sodic spoil material. The actual soil removal volumes and expected respread depths will be calculated annually and presented in an annual soils handling plan prepared by the applicant.”* Once the permit to mine coal was granted and mining operations began, CCMC was required to salvage deep lift SPGM.

The methods above describe the purpose of a soil survey and the development of a projected respread thickness map, and both are used to estimate the amount of SPGM needed for successful mine reclamation. Every spring, CCMC submits an annual soils handling plan which acts as a snapshot in time of CCMC’s current stockpiled inventory of SPGM and their current reclamation obligations. It also includes CCMC’s disturbance plans for SPGM removal for the upcoming year. The Reclamation Division reviews the soils handling plan to track if CCMC has enough SPGM to reclaim the current disturbed areas to the projected respread thicknesses. Yearly topsoil respread depths are addressed in the soils handling plan and are determined by current inventory, topsoil to be stripped in the current year, and land use. During reclamation activities, CCMC typically tries to selectively handle good quality spoils, which is also referred to as overburden, to reduce the actual respread depths based on graded spoil properties outlined in Policy Memorandum No. 17 to Mine Operators and NDAC 69-05.2-15-04(4).

Soil Redistribution and Grade Approval Process

The above section describes the permitting process for soil resources and ensuring a mine has enough soil for successful reclamation. The next step in the process of soil handling is to determine the actual respread depths during the SPGM redistribution phase of reclamation.

After the mining pits are backfilled and graded to the approximate approved post mining topography, a mining company must submit a grade approval request that includes the actual SPGM respread depths within the grade approval request. The actual SPGM respread depths are determined by the graded spoil properties (SAR and soil texture) outlined in NDAC 69-05.2-15-04(4)(a)(2). The graded spoil properties are determined by sampling the spoil material once it has been graded to the approximate approved post mining topography. Policy Memorandum No. 17 to Mine Operators offers guidance on the specific sampling techniques for graded spoil sampling since no specific sampling technique is required by law or rule. The sampling techniques specify that samples should be taken to a 12 inch depth on a grid with approximately 400 foot intervals.

The results of the graded spoil samples dictate the total SPGM respread depths within 400-foot grids as specified in NDAC 69-05.2-15-04(4)(a)(2) and Policy Memorandum No. 17. If a graded spoil sample has medium texture and a SAR of less than 12, SPGM must be respread to a minimum average depth of 24 inches. If a graded spoil sample has coarse texture and/or a SAR of 12 to 20, SPGM must be respread to a minimum average depth of 36 inches. If a graded spoil sample has a SAR of greater than 20, SPGM must be respread to a minimum average depth of 48 inches. It is common that an individual grade approval area will have various respread depths based on variable sample results along the 400-foot grid where the samples were obtained. As shown on page 2 of CCMC's grade approval request for COY-037, sample #3 requires a 24-inch respread depth while sample #5, located 400 feet away from sample #3, requires a 36-inch respread depth. The boundary between the two different SPGM respread thicknesses is halfway between the 400-foot sample grid.

When the Reclamation Division reviews a grade approval request, the proposed SPGM respread depths are reviewed for compliance with NDAC 69-05.2-15-04(4)(a)(2) for areas where graded spoil materials occur. As shown in the various grade approval requests included as exhibits, each grade approval request contains a map showing the grade approval boundary, proposed SPGM respread thicknesses, and the locations of the graded spoil samples. The distance between each sample location and the depth at which each sample was taken are checked to ensure that adequate spacing between sample locations was achieved and that the samples were taken at proper depths. The sample results for each sample location are checked to ensure that the proposed SPGM respread depths correlate to the sample's SAR value and texture. The proposed topsoil respread thicknesses included in grade approval requests are reviewed to ensure that they match the proposed depths from the approved annual soils handling plan. The Reclamation Division verifies actual SPGM respread thicknesses by conducting soil probing on reclaimed land.