



Section 2.5.4 - Soil Volume

Soil Inventory Calculations

Pre-mine SPGM volumes were inventoried for each landowner within the permit area. Volumes were calculated by multiplying the acres of each map unit by landowner, as shown in [Section 2.5.3](#), by the depth of topsoil and subsoil in that map unit, as found in Table 4 of [Section 2.5.2](#) and then multiplying by a conversion factor of 134.444 to convert the volume to cubic yards. Cubic yards were totaled for each landowner and reported in [Section 2.5.4.1](#). This provides an inventory of the soils available in the entire permit area, whereas [Section 2.5.4.2](#) provides volumes for each landowner within the mining disturbance limit. A mixing agreement was secured for all landowners within the main body of the permit area. Surface owners include CCMC, Schulte, State of ND, Swenson, Unruh, Voigt, both Winklers, and the Young Paine Trust. No mixing agreements are in place for landowners of the Revision 1 haulroad corridor, which are the lands north of County Road 12. Surface owners include Gunsch, Otter Tail et al, Schwalbe, and the State of ND.

Soil Respread Calculations

All topsoil and subsoil will be salvaged and used to respread the reclaimed lands. Based on experience at other mine sites, it can be assumed that because of soil compaction during handling, 90% of the bank soil volumes would be available. This factor is conservative; that is, soils may be less compacted during handling, but not more compacted. A comparison of projected available SPGM and the calculated required SPGM for respread can be found in Section 2.5.4.2. The projected respread depth based on available soils by landowner can also be found in Section 2.5.4.2. After activities commence, respread depths will be recalculated based on actual soil salvage and disturbance boundaries, and results will be presented annually to the NDPSC in a soils handling plan.

The required respread volume is based on NDAC 69-05.2-15, and [Policy Memorandum 17 to Mine Operations](#) from the North Dakota Public Service Commission (NDPSC). Refer to Section 2.5.7 for the Projected Soil Respread Depth Map. Overburden sample holes were placed in the permit area at an approximate spacing of one hole per 40 acres and are shown on the map within the mining disturbance limit. The projected respread depths for each quarter-quarter section was calculated from the overburden quality of the sample hole drilled in that location. Analysis of the cores in five-foot intervals is used to determine the projected respread thickness according to the following table (from NDPSC regulations):

<u>Spoil Properties</u>		<u>Total Redistribution Thickness</u>
<u>Texture</u>	<u>Sodium Adsorption Ratio (SAR)</u>	<u>(Topsoil Plus Subsoil) Average in Inches (Centimeters)</u>
Medium*	<12	24 (61)
Coarse**	<12	36 (91)
***	12-20	36 (91)
***	>20	48 (122)

- * Loam or finer
- ** Sandy loam or coarser
- *** Not applicable

Where overburden depths are less than 85 feet above coal, respread depths were calculated by identifying the best sample from the worst 20% of samples at each borehole location. Where overburden depths are greater than 85 feet above coal, a different method will be utilized to calculate projected respread depths. Overburden up to 85 feet in depth is typically spoiled by the dragline using a simple side casting method. When overburden depths exceed 85 feet, a truck-shovel pre-bench fleet will normally remove any overburden greater than 85 feet above coal. Pre-bench material is usually hauled across the active pit and placed on spoils created by the dragline. Because of this mining method, where pre-benching operations occur, the projected respread thickness will be based on the best sample from the worst 20% of samples of the overburden removed by the pre-bench fleet. This depth from the surface will be determined by subtracting 85 feet from the total depth of overburden, which would account for the overburden removed by the dragline. The 85 foot cover limit line is shown on the Projected Soil Respread Depth Map of [Section 2.5.7](#). Holes have not been drilled on tracts with unleased Federal Coal, so these areas were assumed to require the maximum 48 inch respread depth. Since most of the land surrounding these tracts requires 48 inches, it is likely that this will be the actual depth required. Overburden depths for the Upper Beulah bed can be found in [Section 2.1.12](#).

On November 1, 2020, Coyote Creek Mining Company obtained the Federal coal leases for the SW4 of Section 24, T143, R89W and the SE4 of Section 26, T143, R89W. Revision 11 contains updated plans to mine these two Federal coal tracts. Overburden samples were collected on the two federal coal tracts and respreads thickness were projected based on the overburden quality.

Results

A table summarizing the results can be found in Section 2.5.4.2. None of the land has sufficient SPGM available to meet the respread requirements, as calculated from the Projected Soil Respread Depth Map in Section 2.5.7. However, three factors offset this: less soil may be needed for successful revegetation than is projected, actual required respread depths based on graded overburden quality will likely be less than is projected because of special overburden handling, and deep lift

subsoil will be salvaged to supplement subsoil inventories. First, somewhat less soil may be necessary to meet reclamation success standards than the 47 inches required in Section 2.5.4.2, especially given the lower productivity associated with many of the shallow lift soils. It is expected that approximately 40 inches is needed to adequately cover the sodic spoil that is found throughout the permit area beneath the glacial till. Secondly, there is a significant amount of glacial till within the mining disturbance limit, as shown in Section 2.5.7. Ten feet of till is found over almost the entire area and it ranges in thickness, up to more than 30 feet. This material is non-sodic and through special handling, can be utilized to cover the sodic spoil. The prebench boundary is also shown in Section 2.5.7. Prebench material from these areas will be removed using a hydraulic excavator or scrapers capable of taking variable and shallow lifts, so that glacial till can be placed at the surface of graded spoil. It is anticipated that this will result in more opportunities for reduced respread depths than what is predicted in Section 2.5.7, since calculations used to predict respread depth in prebench areas included overburden from the entire depth of prebench, whereas in real life, prebench operations can selectively handle the better till material. Finally, deep lift sampling was conducted so that all available suitable material can be identified and an adequate amount salvaged.

Haulroad Corridor North of County Road 12

Typically, all available SPGM would be salvaged from associated disturbance areas such as the haulroad corridor and all material would be respread according to NDAC 69-05.2-15-04(4)(b). This would result in adequate respread depths since it would mimic the pre-mine conditions. However, because subsoil stockpiles will be part of the haulroad fill, additional subsoil loss is being assumed at the overburden-subsoil interface and at the surface of the haulroad as a result of potential contamination. Even with this loss, SPGM volumes are expected to be adequate for reclamation success because as shown on the second page of Section 2.5.4.2, soils are quite deep in this area.

However, to assure compliance with NDAC 69-05.2-15-04(4)(b), the haulroad corridor will be sampled by surface owner tract during reclamation to assess overburden quality for use as other suitable strata as required by NDAC 69-05.2-08-11. This material will be used to supplement subsoil that is degraded and unavailable for subsoil respread during haulroad reclamation because of subsoil comingling with overburden and road surfacing material. The use of other suitable strata to supplement subsoil required by NDAC 69-05.2-08-11 will be considered a subsoil substitute as defined by NDAC 69-05.2-15-02(5)(c).

North-South Haulroad Corridor

From approximately Station 23+00 to Station 27+00, the North-South Haulroad will be built out of subsoil as described on page 1 of Section 3.2.4. However, it is assumed that approximately six inches of subsoil will be lost to contamination at the subsoil-overburden interface and an additional six inches of subsoil will be lost to contamination at the surface of the road. This loss will be accounted for in the annual soils handling plan and supplemented with additional subsoil material that will be salvaged and stockpiled from elsewhere on the mine. This will provide compliance with NDAC 69-05.2-15-04(4)(b), which addresses the respread of areas of associated disturbance. The same methods will be used for the County Road 12 detour route, since it is assumed that some subsoil loss will occur from contamination by road surfacing material

at the surface of the detour.

Deadhead Trail Corridors

Portions of deadhead trails will be built out of subsoil as shown in Section 3.1.3 and Section 3.1.1.8.8. However, in like manner to haulroad subsoil fill sections, it is assumed that approximately six inches of subsoil will be lost to contamination at the subsoil-overburden interface and an additional six inches of subsoil will be lost to contamination at the surface of the trail. This loss will be accounted for in the annual soils handling plan and supplemented with additional subsoil material that will be salvaged and stockpiled from elsewhere on the mine. This will provide compliance with NDAC 69-05.2-15-04(4)(b), which addresses the respread of areas of associated disturbance.