K4.14 SOILS

This appendix contains supplemental information about the model and analysis of dust deposition on soils in the mine site area during operations.

Potential increase in metal concentration in the top 1 inch of soil at the mine site was estimated using AERMOD modeling data for airborne metals concentrations and dust deposition (PLP 2018-RFI 009). To simulate particulate deposition, the AERMOD dispersion model requires estimates of particulate size, particulate density, and the mass fraction of particulates. The following assumptions were used as inputs to the AERMOD model to estimate particulate deposition (PLP 2019-RFI 141):

- Particle Size—Particulate diameter is assumed to be either 1 or 10 microns, depending on particulate source.
- Particle Density—1 gram per cubic centimeter (g/cm^3) for particulates sourced from combustion turbines; 2.65 g/cm^3 was used for all other particulate matter greater than 10 microns in diameter (PM_{10}) fugitive particulate sources.
- Mass Fraction—For combustion turbines, it is assumed 50 percent of particulates are of 1-micron diameter, and 50 percent are of 10-micron diameter. For all other fugitive particulate sources, it is assumed that 20 percent of particulates are 1 micron in diameter and 80 percent of particulates are 10 microns in diameter.

Additional rationale and information pertaining to dispersion modeling deposition inputs are described in PLP 2019-RFI 141. The EPA defines ambient air as the portion of the atmosphere, external to buildings, to which the general public has access (40 CFR Part 50.1 [e]). Airborne metal concentration was modeled along the mine site safety boundary to determine the maximum cumulative concentration of metals at the point where public (access) would be precluded. The full field receptor grid encompassed an area of approximately 29 kilometers by 37 kilometers. Extrapolating from the upper-bound airborne concentration, dust deposition was modeled by calculating deposition values for metals (PLP 2018-RFI 009). The incremental increase in metals concentration in mine site soil over the 20-year mine life was calculated using the following formula (EPA 2005):

$$Cs = 100 t_D * \left(\frac{D}{Z_S * B_D}\right)$$

Where:

- C_s is the average soil concentration over the exposure duration (milligrams [mg] constituents of potential concern [COPC] per kilograms [kg] of soil);
- D is the yearly dry deposition rate (in grams COPC per square meter per year [g COPC/m^2-yr]); t_D is the time period over which deposition occurs (in years);
- Z_S is the soil-mixing-zone depth (in centimeters [cm]),
- B_D is the soil bulk density (grams per cubic centimeter [g/cm^3]),
- 100 is a unit conversion factor.

The expected constituent soil concentration after the 20-year mine life due to operational dust deposition was calculated by adding the incremental increase to baseline soil concentrations provided in Appendix K3.14, Soils. Calculated results are summarized in Table 4.14-2 (Section 4.14, Soils). The greatest accumulation of dust deposition at the mine site safety boundary is provided in Figure 4.14-1, which coincides with the greatest prevailing wind direction to the southeast.