Technologically Enhanced Naturally Occurring Radioactive Material

Radiological hazards associated with operation of the project include potential exposure to Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) due to processing of ore containing naturally occurring radionuclides, including naturally-occurring uranium. Baseline geochemical characterization indicates that radionuclides are elevated in some samples of materials including tailings and waste rock and ore, and there is the potential for leaching of radionuclides from tailings at concentrations exceeding threshold values. The tailings impoundment would therefore be constructed as a zero-discharge facility to avoid potential impacts to groundwater. The Thacker Pass Waste Rock and Gangue Management Plan also includes provisions for quarterly groundwater sampling and reporting, including analysis of radionuclide concentrations.

The Nevada Hazardous Material Regulations definition of radioactive material (NAC 459.076) incudes TENORM, although TENORM is not explicitly defined in the regulation (ASTSWMO, 2014). The Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation (NDEP-BMRR) has established guidelines for waste rock, overburden, and ore characterization and evaluation and for ecological risk assessment for proposed mining projects (NDEP-BMRR 2019). In accordance with guidelines, waste rock, overburden, and ore are evaluated for the potential to release pollutants to the environment using NDEP-specified procedures, including analysis for the NDEP Division Profile I list of parameters. NDEP may also specify analysis of other parameters/constituents required on a site-specific basis (e.g., radio-chemical analysis). Division Profile I-R reference values include uranium (0.03 mg/l), thorium (15 pCi/l), radium 226 / radium 228 (5 pCi/l) and gross alpha radiation. LNC considered guidelines set forth in the NDEP-BMRR waste rock, overburden and ore evaluation guidelines and ecological risk assessment guidelines in conducting waste characterization, modeling, and analysis for the proposed project (LNC 2020a; LNC 2020b).

The Thacker Pass Baseline Geochemical Characterization Study (LNC 2020a) includes analysis of three by-products from the lithium process: clay tailings, neutralization solids and sulfate salts. These by-product materials would be co-mingled in the lined tailings impoundment. Multi-element analysis found that uranium was enriched above average crustal concentrations in the neutralization solids. Multi-element analysis also found that uranium was elevated in approximately fifty percent of the oxidized ore feed and gangue samples. Similar trends in element enrichment were observed in the unoxidized ore feed and unoxidized gangue samples. Analysis of leachate samples indicated that uranium and gross alpha were elevated in two of three unoxidized gangue samples and that radium226/radium228 was elevated on one of three unoxidized gangue samples.

Kinetic humidity cell tests (HCTs) were also conducted to define sulfide oxidation rates and metal leaching potential under laboratory-controlled oxygen and water exposure conditions that simulate weathering of materials in the field. Kinetic testing of waste rock found that low levels of uranium were initially flushed from the HCTs at concentrations above NDEP Profile I-R reference values