ENVIRONMENTAL REVIEW SUPPORT DOCUMENT

GLOSSARY

TWIN METALS MINNESOTA PROJECT

Environmental Review Support Document

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1.0 PURPOSE

The purpose of this document is to help the reader understand how Twin Metals Minnesota is using terms across environmental review documents. These are not intended to be legal definitions, nor are they intended to encompass or resolve the comprehensive and differing definitions and interpretations that can be found in federal, state, and local law and rule.

2.0 GLOSSARY

1854 Treaty Authority: An inter-tribal natural resource management agency that manages the off-reservation hunting, fishing, and gathering rights of the Grand Portage and Bois Forte Bands of the Lake Superior Chippewa in the territory ceded under the Treaty of 1854.

access road corridor: The standardized name for the corridor from Trunk Highway 1 to the plant site; this corridor would contain the access road for the project.

access road: The primary road critical to TMM operations used to transport concentrate to market, transport reagents and consumables, and provide access to employees; the access road would be from the north of the plant site to Trunk Highway 1.

acid mine drainage (AMD): Acid rock drainage as defined below that originates from mining areas.

acid rock drainage (ARD): A low pH, metal-laden, sulfate-rich drainage that occurs during land disturbance where sulfur or metal sulfides are exposed to atmospheric conditions. It forms under natural conditions from the oxidation of sulfide minerals and where the acidity exceeds the alkalinity. Non-mining exposures, such as along highway road cuts, may produce similar drainage. Also known as acid mine drainage (AMD) when it originates from mining areas (INAP 2014). ARD may occur naturally in the absence of anthropogenic activities.

acid-base accounting (ABA): An analytical technique applied to mine wastes and geologic materials that evaluates the potential acidity from sulfur versus the neutralization potential. It is used to estimate the potential of that material to be acid producing or acid neutralizing (INAP 2014).

AERMOD air dispersion model: The U.S. Environmental Protection Agency approved model designed to predict short-range (up to 30 miles [50 kilometers]) dispersion of air pollutant emissions from stationary industrial sources.

air dispersion model: A computer program that incorporates a series of mathematical equations used to predict downwind concentrations in the ambient air resulting from emissions. Inputs to such a model include the emission rate; characteristics of the emission release (e.g., stack height, exhaust temperature, flow rate); and atmospheric dispersion parameters (e.g., wind speed, wind direction, air temperature, atmospheric stability, height of the mixed layer).

ambient air quality: The quality of the portion of the atmosphere, external to buildings, to which the public has general access.

analysis area: The area where TMM studied baseline conditions.

anisotropy: The condition of having different properties in different directions.

aquatic biota: Collective term describing the organisms living in or depending on the aquatic environment.

aquifer: A subsurface saturated geologic formation or part of a formation of sufficient permeability to transmit groundwater and yield usable quantities of water to wells and springs.

archaeological site: The physical remains of any area of human activity, generally greater than 50 years of age, for which a boundary can be established. Examples of such resources could include domestic / habitation sites, industrial sites, earthworks, mounds, quarries, canals, roads, etc. Under the general definition, a broad range of site types would qualify as archaeological sites without the identification of any artifacts.

Area of Potential Effect: The geographic region that may be impacted as a result of the construction and operation of a proposed project.

attainment area: A geographic area considered to have air quality as good as or better than the National Ambient Air Quality Standards as defined in the Clean Air Act.

average: A measure of the statistical mean of the data set.

backfill plant: At the backfill plant, tailings filter cake would be repulped and blended with binder to create an engineered tailings backfill.

bankfull stage: The stage at which a stream first overflows its natural banks formed by floods with 1- to 3-year recurrence intervals.

basal mineralized zone (BMZ): The lowermost layer of the Duluth Complex bedrock in the vicinity of the Project, which contains the target mineralization of the Maturi deposit.

base flow: The sustained flow of a stream in the absence of direct runoff, sustained largely by groundwater.

baseline: Conditions prior to Project activities.

bedrock: Solid rock, overlaid in most places by unconsolidated deposits.

berm: A mound or wall of earth.

best available control technology: An emissions limitation based on the maximum degree of control that can be achieved. It is a case-by-case decision that considers energy, environmental, and economic impacts. This can be add-on control equipment or modification of existing production processes or methods. It includes fuel cleaning or treatment and innovative fuel combustion techniques. This may be a design, equipment, work practice, or operational standard if imposition of an emissions standard is infeasible.

best management practice: The schedule of activities, prohibition of practices, maintenance procedures, and other management practices to avoid or minimize pollution or habitat destruction to the environment. Best management practices can also include treatment

requirements, operating procedures and practices to control runoff, spillage, or leaks; sludge or waste disposal; or drainage from raw material storage.

bias: An indication of how close a sample can be expected to come to the true value under ideal conditions.

biodiversity: The degree of variation in lifeforms within a given species, ecosystem, or biome. It is a measure of the health of ecosystems.

blanks: Samples that should not contain the contaminant of concern. Blanks can be pure water or clean sand, for example. Blanks are run to detect contamination and other analytical problems.

Boundary Waters Canoe Area Wilderness: This wilderness is a unique area located in the northern third of the Superior National Forest in northeastern Minnesota. It is approximately 1.3 million acres in size, extends nearly 150 miles along the International Boundary adjacent to Canada's Quetico Provincial Park, and is bordered on the west by Voyageurs National Park. The Boundary Waters Canoe Area Wilderness contains over 1,200 miles of canoe routes, 11 hiking trails, and approximately 2,000 designated campsites.

catchment area: The area from which precipitation flows into a surface water body or reservoir.

Class I Area: Under the Clean Air Act, this is an area in which visibility is protected more stringently than under the National Ambient Air Quality Standards, with only a small increase in pollution permitted. Such areas typically include national parks, wilderness areas, monuments, and other areas of special national and cultural significance.

Class II Area: Under the Clean Air Act, this designation applies to all clean air regions *not* designated Class I areas, with moderate pollution increases allowed.

Clean Air Act: This Act defines the U.S. Environmental Protection Agency's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The last major change in the law, the Clean Air Act Amendments of 1990, was enacted by Congress in 1990. This Act was incorporated into the United States Code as Title 42, Chapter 85.

Clean Water Act: This act is the primary federal law in the United States governing water pollution. The act establishes the goals of eliminating releases of high amounts of toxic substances into water, eliminating water pollution, and ensuring that surface waters meet standards necessary for human sports and recreation. This act does not directly address groundwater contamination. Groundwater protection provisions are included in the Safe Drinking Water Act, Resource Conservation and Recovery Act, and the Superfund Act.

closure: The process of terminating and completing final steps in reclaiming any specific portion of a mining operation. Closure begins when, as prescribed in the permit to mine, there will be no renewed use or activity by the permittee (Minnesota Rules, part 6132.0100). For the Project, closure is defined as the 3-year phase after operations cease. During closure, infrastructure would be removed, flooding of the underground workings would begin, and disturbed surfaces would be regraded and revegetated.

comminution circuit: Process circuit to reduce the particle size of ore.

Comprehensive Environmental Response, Compensation, and Liability Act: Commonly known as Superfund, this act was enacted by Congress on December 11, 1980 and created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

comprehensive land use plan: A document adopted by local elected officials that establishes policies and guidance for land use, municipal growth, public services, and infrastructure. Comprehensive plans provide the rationale and legislative basis for local zoning and subdivision ordinances.

concentrate: Concentrates would be the end products of the TMM Project. These concentrates would contain the minerals that would be separated from rock in the mine. TMM's concentrates would be produced either through the flotation process or the gravity concentration process and would be sold on a global market.

concentrate dewatering: Process circuit consisting of thickening and filtration to produce a concentrate filter cake that is ready for shipment.

concentrate storage and loadout: Temporary concentrate storage area at the concentrator before that would include a loadout area to load trucks or containers with concentrate for shipment.

concentrator services building: The building that would contain surface maintenance, warehouse, change rooms for concentrator and tailings dewatering plant operators, and offices.

concentrator: A subset of the process related to recovery of the target metals. The concentrator would include grinding, gravity flotation, concentrate dewatering, concentrate storage and loadout, and reagent makeup. The concentrator would be located at the plant site.

cone of depression: A depression in the water table or potentiometric surface typically in the shape of an inverted cone that develops when groundwater is being withdrawn, centered around the withdrawal location.

confined aquifer: An aquifer that is overlain by a strata of distinctly lower hydraulic conductivity than the aquifer, which results in hydraulic heads above the top of the aquifer.

construction dewatering water: Surface water and groundwater removed to dry and/or solidify a construction site to enable construction activity.

construction rock: A subcategory of waste rock that could be used as construction material. This rock would have primary objectives and selection criteria that will be determined by the ongoing Mine Materials Characterization Program.

construction stormwater: Direct precipitation, precipitation runoff, stormwater runoff, snowmelt runoff, and surface runoff and drainage that has contacted surfaces disturbed by construction activities that could have increased constituent loading.

construction: The 30-month phase during which surface facilities and underground infrastructure would be constructed. The construction phase would last from the third quarter of Mine Year -3 to the end of Mine Year -1.

consultation (for cultural resources): The process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 process. The Secretary's "Standards and Guidelines for federal Agency Preservation Programs pursuant to the National Historic Preservation Act" provide further guidance on consultation.

contact water: Water that comes in direct contact with ore or waste rock (except construction rock) or infiltrates into tailings.

contaminant: A substance that pollutes air, soil, or water. It may also be a hazardous substance that does not occur naturally or that occurs at levels greater than those found occurring naturally in the environment.

contaminate: To make (something) dangerous, dirty, or impure by adding something harmful or undesirable to it.

contamination: The intrusion of undesirable (i.e., unwanted physical, chemical, biological, or radiological) elements, or matter that has a negative effect on air, water, or land.

copper concentrate: The first flotation product that would recover copper, gold, silver, platinum, and palladium while minimizing the amount of nickel and cobalt recovered.

criteria air pollutant: Seven common air pollutants for which the US Environmental Protection Agency has set primary (may harm human health) or secondary (may affect the environment and/or cause property damage) national air quality standards. These pollutants are: particulate matter less than or equal to 10 microns in size, particulate matter less than or equal to 2.5 microns in size, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, and lead.

cultural resources: Archaeological, traditional, and built environment resources, including but not necessarily limited to buildings, structures, objects, districts, and sites.

cumulative effect: The effects on the environment that would result from the incremental effect of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

dam: A structure that impounds water, consistent with Minnesota Rules, part 6115.0320, subpart 5.

damaged rock zone (DRZ): Bedrock adjacent to the underground workings that has been disturbed by the mining process, including blasting and stress release due to underground excavation.

dBA: A-weighted decibel.

dBAf: A-weighted decibel with root mean square (RMS) fast time weighting.

decibel: A unit expressing the relative intensity of sounds on a logarithmic scale from zero (for the average threshold for human hearing) to approximately 130 (for the average level at which sound is perceived as painful to humans).

decline conveyor: The conveyor that would transport ore from the underground crushing stations up the decline to the transfer tower on the surface.

decline: An inclined tunnel connecting the ground surface to the underground workings, through which miners, materials, and air enter and leave the underground workings. Declines are part of the underground workings.

development rock: Sulfide barren rock mined from the hanging wall that would be used for construction aggregate. Development rock would be mined during the construction of the declines and ventilation raises, and periodically throughout the Project.

dike: A structure that directs or contains the flow of water.

discharge (Project definition): Release of water from the Project to the environment in accordance with applicable regulations and permit conditions; also, the water released.

discharge (CWA definition): Any addition of any pollutant or combination of pollutants to navigable waters from any point source. (40 CFR § 122.2)

drainage: Natural watershed surface water features or processes, for example "drainage of lakes or wetlands", "drainage basins", or "existing drainage ways."

draindown: Draindown is any draining of entrained process water that would mix with infiltrating precipitation and be collected by the dry stack facility liner system. Draindown is categorized as mixed water.

drill water: Mine supply water used to operate the underground drills.

dry stack facility perimeter ditch: A ditch around the dry stack facility that would collect water from the over-liner drain and under-liner drain for conveyance to the tailings management site pond 1. This ditch’s catchment area would begin at the downslope edge of the dry stack facility runoff collection ditch and extends to the perimeter haul road. Water in this ditch would be categorized as mixed water.

dry stack facility pore water: Water held within the void spaces of the tailings filter cake in the lined dry stack facility.

dry stack facility runoff collection ditch: Ditches around the lined dry stack facility that would collect runoff and direct it to ponds at the tailings management site. Water in these ditches would be categorized and managed as either industrial stormwater or non-contact water depending on the reclamation status of contributing areas.

dry stack facility: A dry stack facility is the most sustainable method used to store filtered tailings cake produced from the processing after the 4% of the ore that is copper, nickel, cobalt, platinum, palladium, gold, and silver is recovered. Before placement at the dry stack facility, the tailings would be filtered to remove the majority of water. The dry stack facility would be a lined facility where the tailings filter cake (silty sandy material) is placed and compacted in lifts. The dry stack facility would be constructed in three stages (stage 1, stage 2, and stage 3), generally from west to east.

Duluth Complex: Precambrian mafic to felsic intrusive rock formation related to the Midcontinent Rift System, which makes up much of the bedrock of northeastern Minnesota.

duplicate: A sample (usually a real environmental sample, but sometimes a standard) that has been divided into two equal aliquots, each of which is analyzed in exactly the same manner. The results of the duplicate pair are often expressed as “relative percent difference.”

dust control water: Water used to moisten surfaces in order to suppress dust.

Ecological Land Type: A hierarchical level of the National Hierarchical Framework of Ecological Units and Ecological Classification System that is determined based on differences in vegetation, soils, climate, geology, and/or hydrology.

effective porosity: The ratio of the total volume of connected voids available for fluid transmission to the total volume of the porous medium. It can also be defined as the interconnected pore spaces (units [L^3/L^3] or dimensionless).

eligible (for historic properties): Historic properties formally determined as such in accordance with the regulations of the Secretary of the Interior and all other properties that meet the National Register criteria.

Endangered Species Act: This act was enacted in 1973 (7 United States Code Section 136, 16 United States Code Section 1531 et seq.) and was designed to protect critically imperiled species from extinction as a "consequence of economic growth and development un-tempered by adequate concern and conservation." This act is administered by the United States Fish and Wildlife Service and the National Oceanic and Atmospheric Administration.

endangered species: A species that is in danger of extinction throughout all or a significant part of its range. This is a U.S. Fish and Wildlife Service formal listing under the Endangered Species Act.

engineered tailings backfill bleed water: Process water that flows out of the engineered tailings backfill when it settles and solidifies in the underground workings.

engineered tailings backfill: Tailings which would be combined with a binder and pumped underground as a thickened slurry for placement in mined out stopes. The binder would increase the structural integrity, minimize movement of water, and enhance the chemical stabilization of the engineered tailings backfill.

environmental justice: The fair treatment and involvement of all people, regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. “Fair treatment” means that no group, including racial, ethnic, and socioeconomic groups, will bear a disproportionate share of the negative environmental consequences resulting from the execution of federal, state, local, and tribal programs and policies. Executive Order 12898 directs federal agencies to incorporate achieving environmental justice into their missions by identifying and addressing disproportionately high and adverse effects of agency programs, policies, and activities on minority and low-income populations.

environmental protection measures: Measures TMM would take to avoid, minimize, and/or mitigate potential effects.

equipotential line: A line or surface at which the hydraulic head is the same.

evaporation: The process by which water changes from a liquid to a gas or vapor.

evapotranspiration (ET): The amount of water transferred from an area of land to the atmosphere by the combination of direct evaporation from soil and other surfaces and plant transpiration.

extreme storm event: unexpected, severe, or unseasonal weather events, specifically weather events at the extremes of historical distribution.

fault: A fracture or zone of discontinuity between two blocks of rock across which there has been significant displacement as a result of rock-mass movement.

filter cake storage and loadout building: The filter cake storage and loadout building would be located adjacent to the filter building. It would temporarily store tailings filter cake until it is loaded onto trucks and transported to the dry stack facility for placement.

filter plant: The facility that would produce tailings filter cake for placement on the dry stack facility or for use in backfill.

flood: 1) The process of water entering the underground workings after mining ceases. 2) In hydrologic systems, a temporary overflow of water onto land not normally covered by water.

flotation circuit: Process circuit to recover the target metals into two flotation concentrates, a copper concentrate and a nickel concentrate. The waste product from this process would be tailings.

footwall: The rock on the underside of an inclined fault or mineral deposit.

fracture: A planar (or nearly planar) structural discontinuity or separation in rock.

fragmentation: A decrease in the area of contiguous habitat available to wildlife.

fugitive dust: Airborne particulate matter. This can include emissions from haul roads, wind erosion, exposed surfaces, and other activities that remove and redistribute soil.

fugitive emissions: Emission releases directly into the atmosphere that cannot reasonably pass through a stack, chimney, vent, or other similar opening.

gangue mineral: Commercially worthless minerals that are closely mixed with valuable minerals in an ore deposit.

GAP land cover: A hierarchically organized vegetation cover map developed as part of the U.S. Geological Survey's Gap Analysis Program. Units of analysis are Minnesota Ecological Classification System subsections.

Giants Range Batholith (GRB): 2.68-billion-year-old granitoid batholith composed of silica-poor rocks ranging from diorite to quartz monzonite in composition.

Giants Range: An outcrop of the Giants Range Batholith that forms a narrow surface ridge that strikes east-northeast.

glacial drift: Generic and inclusive term for any material that has been transported by glacial ice.

glacial till: Glacial deposits that are unsorted and unstratified.

grain size: The diameter of individual sediment particles or the lithified particles in clastic rock.

gravity concentrate: The product of the gravity concentration circuit that would target the recovery of platinum, palladium, and gold.

gravity concentration circuit: Process circuit within the comminution circuit used to recover targeted metals, including platinum, palladium, and gold to produce gravity concentrate. The gravity concentration circuit uses the differences in the density of the gold, platinum, and palladium minerals to separate these denser minerals from the remaining minerals.

greenhouse gas: Gases that trap heat in the atmosphere. Some greenhouse gases, such as carbon dioxide, occur naturally and are emitted to the atmosphere through natural processes and human activities. The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases.

groundwater cutoff wall: The seepage cutoff trench with grout curtain as necessary depending on bedrock conditions surrounding the dry stack facility.

groundwater: The water located beneath the ground surface in soil and rock pore spaces and fractures.

hanging wall: The rock on the upper side of an inclined fault or mineral deposit.

haul road: A specific subset of service road that would surround the dry stack facility and be used by haul trucks to transport tailings filter cake onto the dry stack facility.

hazardous air pollutant: Air pollutants that are not covered by ambient air quality standards, but that may present a threat of adverse human health or environmental effects. These pollutants are listed on the federal list of 189 hazardous air pollutants in 40 Code of Federal Regulations 61.01.

hazardous material: Any item or agent (biological, chemical, physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. The term includes hazardous substances, hazardous waste, marine pollutants, and elevated-temperature materials—materials designated as hazardous under the provisions of 49 CFR 172.101. Hazardous material categories include: explosives, gases, flammable liquids, flammable solids, spontaneous combustibles/dangerous when wet, oxidizers and organic peroxides, poisons and infectious substances, and corrosives.

hazardous waste: A category of waste regulated under the Resource Conservation and Recovery Act. Such waste includes solid waste listed in the Resource Conservation and Recovery Act that exhibits at least one of four characteristics (as described in 40 Code of Federal Regulations 261.20 through 261. 24): ignitability, corrosivity, reactivity, or toxicity; or that is listed by the U.S. Environmental Protection Agency in 40 Code of Federal Regulations 261.31 through 261.33.

heterogeneity: A characteristic of a material or geologic formation in which material properties vary spatially.

historic property: Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places, including artifacts, records, and material remains related to such a property or resource.

homogeneity: A characteristic of a material or geologic formation in which material properties are spatially uniform.

host rock water: Natural groundwater in the bedrock that is mined or that is adjacent to the underground workings.

hydraulic conductivity: A quantitative measure of the ease with which a material transmits water, such as water moving through pore spaces or fractures in soil or rock in presence of a gradient.

hydraulic gradient: The change in hydraulic head over a particular distance and direction, often measured in the direction of greatest change (Units [L/L] or dimensionless).

hydraulic head: The mechanical energy per unit weight of water, measured as the elevation of water in a well referenced to a specified datum (Units [L]).

hydrogeology: The study of the water below the Earth’s surface and its interrelationship with geologic materials.

hydrograph: A graph depicting a change in water elevation, flow, stage, or other characteristics over time.

hydrology: The study of the occurrence, circulation, distribution, and properties of the waters of the earth and its atmosphere.

impact assessment criteria: Thresholds defined by TMM for evaluating potential environmental impacts.

impaired water: As defined under Section 303(d) of the Clean Water Act, waters that are too polluted or degraded to meet the water quality standards set by states, territories, or authorized tribes.

in situ: This refers to actions happening “in place” or “in position” where they would naturally occur.

industrial stormwater: Direct precipitation, precipitation runoff, stormwater runoff, snowmelt runoff, and surface runoff and drainage that has contacted industrial areas or activities that could have increased constituent loading and is not process water, contact water, or mixed water. This would include stormwater and snowmelt runoff from the surface of dry stack facility tailings assuming such water is in compliance with applicable standards.

inferred fault: A fault inferred to be present through examination of topographic features or geophysical data. At ground surface, faults may be inferred from a topographic ridge or an abnormally straight section of a stream channel.

infiltration: Downward entry of water into soil or rock, including the dry stack facility; also, the water that enters.

invasive species: Organisms that cause, or are likely to cause, harm to the economy, environment, or human health due to their tendency to out-compete other species.

isotropy: The condition in which the property or properties of interest are the same in all directions.

L_{10}: Sound levels exceeded 10 percent of the time.

L_{50}: Sound levels exceeded 50 percent of the time.

Laurentian Divide: A geological formation that runs along the crest of low, rocky hills and divides the Red River and Rainy River basins from the Minnesota River and Lake Superior basins. The Laurentian Divide is part of the Northern Divide, a continental divide that separates drainages to the Hudson Bay and Arctic Ocean from all other drainages in North America. Streams on the north slope of the divide flow through Canada to Hudson Bay. On the south side of the divide, streams flow south to either Lake Superior and the Atlantic Ocean, or the Mississippi River and the Gulf of Mexico.

laydown area: Area used for material and equipment storage throughout the Project.

L_{dn}: Day-night average sound level.

leachate: A product solution obtained by leaching, in which a substance is dissolved by the action of a percolating liquid.

leakage: Water that would flow through a liner, independent of pathway.

Leq: Equivalent continuous sound level.

Light Detection and Ranging: An optical remote sensing technology that can measure the distance to, or other properties of a target by illuminating the target with light, often using pulses from a laser. Light Detection and Ranging is often used to create surface elevation models and contour datasets.

Longitudinal longhole retreat (LLR) mining method: The LLR mining method is classified as a stoping method; stoping is the process of extracting ore from an underground mine and leaving behind an open space called a stope. In the LLR mining method, stopes are mined longitudinally along the direction of the ore formation in a backwards fashion and separated by pillars that allow production from other mining units. Stopes would be accessed from different levels (drifts) and the diamond-shaped stope arrangements would allow for flexibility to have the stopes open for extended periods of time, up to multiple years, without backfill.

make-up water: Water drawn from Birch Lake to meet Project water demand during construction and operations.

matrix spike: An environmental sample to which a known amount of contaminant is added. The sample is analyzed WITH the spike and WITHOUT the spike, and the difference between those two results is compared to the amount of contaminant spiked into the sample. That amount divided by the amount added and expressed as a percentage is called the percent recovery.

Maturi Deposit: A defined copper-nickel-cobalt-platinum group mineral deposit in the basal mineralized zone of the Duluth Complex geologic formation.

melt water: Water that has been converted to liquid from solid snow or ice, that flows over the ground surface to a surface water body or Project water management structure.

method detection limit (MDL): The minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results (Electronic Code of Federal Regulations [e-CFR] 2019, Title 40, Part 136).

methylmercury: An organic form of mercury; shorthand for the monomethyl mercuric cation (CH_3Hg^+). This is the biologically active form of mercury formed in the environment from the conversion (methylation) of inorganic mercury by bacteria under anaerobic conditions; this is the form of mercury that accumulates in fish.

mine dry: a portion of the mine services building that includes change rooms with lockers, baskets, showers, and toilets for employees to change into appropriate mining clothing and gear.

mine inflow: Groundwater that flows into the underground workings.

mine portal: The entry to a decline, located at the plant site.

Mine Safety and Health Act of 1977: This act serves to protect the health of American workers. Congress enacted the Mine Safety and Health Act in 1977 to deal specifically with the hazards faced by employees in the nation's many mines. This act sets standards for the mining industry in an effort to eliminate fatal accidents; reduce the frequency and severity of nonfatal accidents; minimize health hazards; and promote improved safety and health conditions in mines. This act also created the Mine Safety and Health Administration, which administers the provisions of this act.

mine services building: The building that would contain the truck shop, mine dry, and warehouse.

mine supply water: Water used in the underground workings for drill water, dust control, and other mine equipment uses.

mining: Mining means the process of removing; stockpiling; processing; storing; transporting, (excluding use of common carriers and public transportation systems); and reclaiming a material in connection with the commercial production of metallic minerals (Minnesota Rules, part 6132.0100, subpart 18).

Minnesota Comprehensive Wildlife Conservation Strategy: A strategic plan to better manage populations of "species in greatest conservation need" in Minnesota. The plan calls for the partnership of conservation organizations across Minnesota to work together to ensure that these species populations are sustained for future generations. Members of the partnership include the Minnesota Department of Natural Resources, the U.S. Fish and Wildlife Service, The Nature Conservancy, Audubon Minnesota, and the University of Minnesota, as well as many other agencies and conservation organizations.

Minnesota Environmental Policy Act: The purposes of Minnesota Law 1973, Chapter 412, are: (a) to declare a state policy that will encourage productive and enjoyable harmony between human beings and their environment; (b) to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of human beings; and (c) to enrich the understanding of the ecological systems and natural resources important to the state and to the nation.

Minnesota Routine Assessment Method: A method used to evaluate wetland functions. It is a practical assessment tool that is used to help local authorities make sound wetland management decisions using descriptive rather than numeric ratings.

mixed water: A mixture of process water and one or more other types of water. Managed as either process water or contact water, depending on its properties.

model domain: The analysis area plus additional area necessary to estimate potential Project impacts to water resources.

monitor well: A well installed into a saturated geologic deposit that is used to measure water level and/or collect water quality samples.

National Ambient Air Quality Standards: The Clean Air Act requires the U.S. Environmental Protection Agency to set these standards (40 Code of Federal Regulations Part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of these standards. *Primary standards* provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. *Secondary standards* provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

National Environmental Policy Act: This act (42 United States Code 4321 et seq.) was signed into law on January 1, 1970. The act establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment and it provides a process for implementing these goals within federal agencies. The National Environmental Policy Act requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

National Historic Preservation Act: This act (Public Law 89-665; 16 United States Code 470 et seq.) is legislation intended to preserve historical and archaeological sites in the United States of America. The act created the National Register of Historic Places, the list of National Historic Landmarks, and the State Historic Preservation Offices. It was signed into law on October 15, 1966. The act requires federal agencies to evaluate the impact of all federally funded or permitted projects on historic properties (i.e., buildings, archaeological sites, etc.) through a process known as Section 106 review.

National Priorities List: The list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the U.S. and its territories. This list is intended primarily to guide the U.S. Environmental Protection Agency in determining which sites warrant further investigation.

National Register of Historic Places: The official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

National Wetland Inventory: The U.S. Fish and Wildlife Service (Service) is the principal federal agency that provides information to the public on the extent and status of the Nation's wetlands. The Service has developed a series of topical maps to show wetlands and deep water habitats. This geospatial information is used by federal, state, and local agencies, academic institutions, and private industry for management, research, policy development, education, and planning activities related to wetlands.

nickel concentrate: The second flotation product that would recover nickel, cobalt, the remaining copper, platinum, palladium, gold, silver, and the remaining sulfides.

noise sensitive area: An area that, because of its use by humans or special status wildlife species, and importance of reduced noise levels to such use, is designated for management which limits the noise level from long-term and/or continuous noise producing sources.

noise: Sound that interferes with speech and hearing and that is undesirable.

noise-sensitive receptors: Locations or areas where dwelling units or other fixed, developed sites of frequent human use occur.

non-contact water ditch: A ditch that would be constructed within the non-contact water diversion area to divert non-contact water around project features at the plant site and tailings management site.

non-contact water diversion area: The area over which non-contact water would be directed away from the plant site and tailings management site by a system of dikes and ditches.

non-contact water: Direct precipitation, stormwater, and surface water that has not contacted ore, waste rock, tailings, industrial areas or activities, or surfaces disturbed by construction activities, including runoff from reclaimed surfaces and water from adjacent watersheds diverted around the facility.

non-detect: Data generated from analysis that fall below the method detection limit of the analytical procedure.

North American Industry Classification System: This system is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

off-site electrical substation: The electrical substation west of Dunka Pit.

operations: The 25-year phase during which ore would be extracted and processed, and water and waste would be managed, concurrent reclamation would occur, and portions of the underground mine would be closed during the operations phase. The operation phase would last from the beginning of Mine Year 1 through the end of Mine Year 25.

ore: Rock mined that contains the targeted metals – copper, nickel, cobalt, platinum, palladium, gold, and silver – which would be recovered through the concentrator to produce three concentrates.

overburden: Waste material and/or rock covering a mineral deposit, or unconsolidated material covering bedrock.

over-liner drain: A drain above the dry stack facility liner that would collect draindown and route it to the dry stack facility perimeter ditch.

particulate matter: Fine liquid or solid particles (such as dust, smoke, mist, fumes, or smog) found in air or emissions.

percent recovery: The percentage of a measured concentration relative to the added (spiked) concentration in a matrix spike sample. Percent recovery is calculated by dividing the sample result by the expected result and multiplying that quotient by 100.

percolation: Downward movement of water through the unsaturated zone; also, the water that moves downward.

permeability: The ability of a porous medium to transmit fluid.

pH: A measure of relative acidity or alkalinity of a solution, expressed on a scale from 0 to 14, with the neutral point being 7. Acidic solutions have pH values lower than 7; basic (alkaline) solutions have pH values higher than 7.

phase: A defined time period of the project. There would be four project phases: construction; operation; closure; and post-closure.

piezometer: A device that measures the pressure of groundwater at a specific point or over a short interval.

plant site electrical substation: The electrical substation at the plant site.

plant site pond: Pond at the plant site where either contact water or industrial stormwater would be stored.

plant site: The portion of the Project that would encompass the following Project features: plant site pond 1, plant site pond 2, plant site pond 3, process water pond, concentrator, temporary rock storage facility, primary ore stockpile, secondary ore stockpile, concentrator services building, mine services building, and the plant site electrical substation.

platinum group metals: Platinum group metals are six chemical similar elements cluster together in the periodic table. The six elements are iridium, osmium, palladium, platinum, rhodium, and ruthenium. This definition has been expanded by the Project to also include gold and silver.

PM_{10}: Inhalable particles, with diameters that are generally 10 micrometers and smaller.

$PM_{2.5}$: Fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.

point source (CWA definition): Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, or vessel or other floating craft, from which pollutants are or may be discharged (40 CFR § 122.2).

pollutant (CWA definition): Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water (40 CFR § 122.2).

pore water: Water within the void spaces of a porous medium.

porosity: The ratio of the volume of open voids within a geologic material compared to the total volume of that material (units [L^3/L^3] or dimensionless).

post-closure: The phase after closure. During post-closure, reclaimed areas would be maintained, and monitoring would confirm that reclamation has been sustained and post-closure performance criteria have been achieved.

potentiometric surface: An imaginary surface representing the hydraulic head of groundwater at a specified depth or elevation or within a specified formation.

prevention of significant deterioration: Applies to new major sources or major modifications at existing sources for pollutants where the area the source is located is in attainment or unclassifiable with the National Ambient Air Quality Standards. It requires the use of Best Available Control Technology, air quality analysis, additional impacts analysis, and public involvement to protect public health and welfare; preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value; ensure that economic growth would occur in a manner consistent with the preservation of existing clean air resources; and assure that any decision to permit increased air pollution is made only after careful evaluation of all the consequences of such a decision and after adequate procedural opportunities for informed public participation in the decision making process.

primary ore stockpile: Covered ore stockpile that is the primary feed stockpile for the concentrator during the operations phase of the Project.

primary porosity: The original voids in the sediment or rock, created when the material was deposited or the rock was formed including vesicles, inter-granular pores, unconformities, and isotropic and anisotropic soil grains.

process water: Water used in the concentrator to process the ore.

process water pond: Centrally located pond west of the concentrator that would be the source for process water. The water in the process water pond would be categorized as mixed water and managed as process water.

process: The process terminology is used to discuss the process as a whole and is inclusive of the concentrator and tailings dewatering plant.

Project: The Twin Metals Minnesota Project. The Project would consist of the underground mine, the plant site, the tailings management site, the non-contact water diversion area, the access road, the water intake corridor, and the transmission corridor.

proposed action: Proposal to authorize and implement an action that addresses a purpose and need.

pumping test: A test made by pumping a well for a period of time, typically at a controlled rate, and monitoring the change in water level in the pumped well and often in one or more observation wells. Pumping tests are used to estimate the hydraulic properties of aquifers, evaluate well performance, and identify aquifer boundaries.

Quaternary: The geologic time period from approximately 2.6 million years ago to the present.

Quaternary unconsolidated material (QUM): Soil, alluvial deposits, peat, and glacial drift from ground surface to the top of bedrock. May be absent in areas where bedrock outcrops to ground surface.

reactive mine waste: Waste that is shown through characterization studies to release substances that adversely impact natural resources (Minnesota Rules, part 6132.0100, subpart 28).

reagent makeup: Process circuit dedicated to preparing reagents for use in the process.

recharge: The process of water addition to the saturated zone; also, the water added.

reclamation: Activities that successfully accomplish the requirements of Minnesota Rules, parts 6132.2000 to 6132.3200.

reclamation material stockpile: stockpile of material suitable as a growth medium such as topsoil and peat for reclamation. Material would be stripped and stored during clearing and construction of the Project.

Recreation Opportunity Spectrum: The framework expressing the desired range of recreational activities that will be encouraged and permitted on national forest lands.

relative percent difference: The difference between two results divided by the average result and expressed as a percent. This is an indication of a lab's precision. The lower this percent, the better the precision.

reporting limit: A multiple of the method detection limit, usually five times but sometimes ten times. Results reported between the method detection limit and the reporting limit should be interpreted as meaning a contaminant is definitely present, but that the concentration is questionable.

residual water: Process water that remains in the pore spaces of the tailings filter cake, the concentrates, and the engineered tailings backfill.

Resource Conservation and Recovery Act: This gives the U.S. Environmental Protection Agency the authority to control hazardous waste from "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. This also sets forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to the Resource Conservation and Recovery Act enabled the Environmental Protection Agency to address environmental problems that could result from underground storage tanks storing petroleum and other hazardous substances. These amendments also address storage and

disposal of solid and hazardous wastes. Mine tailings are exempt from Resource Conservation and Recovery Act Subtitle C regulations.

riparian: Situated adjacent to a river, stream, pond, or small lake.

runoff: The portion of precipitation that flows over the ground surface to a surface water body or Project water management structure.

saturated zone: The part of the subsurface below the water table, in which each pore space is filled with water under greater than atmospheric pressure.

Scenic Integrity Objective: A statement of the intended visual conditions of national forest lands. Scenic Integrity Objectives are part of the United States Forest Service Scenery Management System.

secondary ore stockpile: The secondary ore stockpile would be utilized when the primary ore stockpile is at capacity; this condition would occur intermittently during operations. Ore on the secondary ore stockpile would be rehandled and transferred to the primary ore stockpile on a priority basis as capacity within the facility allowed.

secondary porosity: Voids in the sediment or rock that were created after deposition or formation including faults, fractures, solution cavities, and disruption of soils by plants and animals.

sediment pond: A pond used for settling suspended solids.

seepage: 1) Water that flows downward out of the base of an unlined engineered feature into groundwater. 2) The slow movement of water through natural geologic materials into or out of surface water or groundwater.

sludge: A semi-solid residue containing a mixture of solid waste material and water from air or water treatment processes.

slug test: A test conducted in a well that involves rapidly raising or lowering the water level and monitoring the recovery of the water level back to the original undisturbed position. Used to estimate hydraulic conductivity of the material in which the well is completed.

slurry: A watery mixture or suspension of fine solids.

species of greatest conservation need: Aquatic and terrestrial wildlife species with small or declining populations or other characteristics that make them vulnerable. These include species currently federally- or state-listed as threatened or endangered, and other species identified through analysis of available data and recommendations from experts on particular taxa.

specific storage: The volume of water that a unit volume of aquifer releases or takes into storage per unit change in hydraulic head. The water is released or added to storage as a result of compaction and expansion of the aquifer matrix and the water (units [L^{-1}]).

specific yield: Specific yield is the water released from storage by gravity drainage.

Spill Prevention, Control, and Countermeasure Plan: A written plan that includes requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines.

Standard Industrial Classification: A U.S. government system for classifying industries by a four-digit code. Established in 1937, it is being supplanted by the six-digit North American Industry Classification System, which was released in 1997; however certain government departments and agencies still use the Standard Industrial Classification codes.

standards: Samples containing a known amount of contaminant.

State Historic Preservation Office: The office and official appointed or designated pursuant to section 101(b)(1) of the National Historic Preservation Act to administer the State Historic Preservation Program or a representative designated to act for the State Historic Preservation Officer.

storativity: The volume of water that an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in hydraulic head. For a confined aquifer, the storativity is equal to the product of the specific storage and the aquifer thickness. In an unconfined aquifer, the storativity is equivalent to the specific yield or the effective porosity (dimensionless).

stormwater: Stormwater runoff, snow melt runoff, and surface runoff and drainage (Minnesota Rules, chapter 7090).

subaqueous: Existing or situated under water.

suitable growth medium: A combination of topsoil, peat, and mineral soil.

tailings: Waste by-products of mineral beneficiating processes other than heap and dump leaching, consisting of rock particles, which have usually undergone crushing and grinding, from which the profitable mineralization has been separated. (Minnesota Rules, part 6132.0100, subpart 33).

tailings dewatering plant pond 1: Pond at the tailings dewatering plant where industrial stormwater would be stored.

tailings dewatering plant: Would include the process facilities associated with the tailings thickener, filter plant, filter cake storage and storage loadout building, and backfill plant.

tailings filter cake: The dewatered tailings product resulting from pressure filtration.

tailings management site interim pond: Pond at the tailings management site where industrial stormwater would be stored during interim stages of the dry stack facility before the facility is at the full footprint.

tailings management site: The tailings dewatering plant, the dry stack facility, and related infrastructure.

tailings thickener: The equipment that would be used to initially dewater tailings before being fed to the filter plant to produce a tailings filter cake.

temporary rock storage facility: Physical infrastructure on which ore and waste rock that does not meet the selection criteria for construction rock would be stockpiled during the construction phase of the project. It is a lined facility at the plant site that would convey precipitation to plant site pond 2.

threatened species: A species that is likely to become an endangered species within the foreseeable future in all or a significant part of its range.

till: A glacial drift consisting of an unsorted mixture of clay, sand, gravel, and boulders.

ton: A unit of measurement equivalent to 2,000 pounds.

transmission corridor: The transmission corridor would be a corridor beginning at the off-site electrical substation located west of the Dunka River, extending northeast, and terminating at the plant site electrical substation. The transmission corridor would include a two-track, unpaved maintenance road and the power transmission line.

transmissivity: The discharge of water at the prevailing kinematic viscosity through a unit width of an aquifer under a unit of hydraulic gradient normal to the width (units [L^2/T]).

U.S. Forest Service Regional Forester Sensitive Species: A list developed by the Regional Forester that identifies sensitive species. Sensitive species are defined as “plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by: (a) significant current or predicted downward trends in population numbers or density, and/or (b) significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution.” Sensitive species are usually designated for an entire region, but independent “Forest Sensitive” lists are maintained by some individual National Forests.

U.S. Geological Survey gaging station: Facilities used by hydrologists to automatically monitor streams, wells, lakes, canals, reservoirs, and or other water bodies. Instruments at these stations collect information such as water height, discharge, water chemistry, and water temperature.

unconfined aquifer: An aquifer where the water forms a water table under atmospheric pressure, is in contact with the atmosphere, and not contained under pressure beneath a low hydraulic conductivity strata.

unconsolidated deposit(s): Sediment not cemented together; may consist of gravel, sand, silt, clay, and organic material.

underground mine: This includes the underground workings as well as ventilation raise sites, ventilation raise site access roads, underground mobile equipment, and underground mine infrastructure.

underground mine area: The surface projection of the underground workings and underground Maturi deposit.

underground mine water: Water that would be collected by the dewatering system including mine inflow (groundwater that flows into the underground workings), process water associated with the engineered tailings backfill, and mine supply water. Underground mine water is categorized as mixed water and managed as contact water.

underground workings: This includes all underground excavations (i.e., ramps, haulage areas, drifts, stopes, and ventilation raises) beginning at the point the decline or raise goes below ground surface.

under-liner drain: A drain underneath the dry stack facility liner that would drain to the dry stack facility perimeter ditch.

under-liner water: Groundwater that would be collected by the under-liner drains of the dry stack facility.

unsaturated zone: The zone between the land surface and the water table, in which the pore spaces are filled with a mixture of air and water under less than atmospheric pressure.

ventilation access road: An existing drill road would be upgraded in order to accessed VR site 1 and 2. VR site 3 would be accessed via the existing USFS road, National Forest Road 1900. A portion of National Forest Road 1900 would also be used to access the upgraded drill road.

ventilation raise site 1, 2, and 3: The ventilation raise sites serve as air intake and exhaust locations for the underground mine and are labelled from west to east.

waste rock: Rock that may or may not contain metallic mineralization but is not profitable to process for the purposes of producing concentrate.

water intake corridor: The corridor from the water intake facility on Birch Lake to the plant site; this corridor would contain the pipeline for the makeup water, buried electric, and a single lane access road.

water intake facility: The make-up water pumphouse for withdrawal from Birch Lake.

water quality standard: Water quality standards, as defined by the Clean Water Act, consist of three elements: 1) designated beneficial uses; 2) numeric and narrative standards; and 3) antidegradation rules.

water table: The surface below which a formation is fully saturated, i.e., the top of the phreatic (saturated) zone and bottom of the vadose (unsaturated) zone.

Waters of the State (regulatory definition): All streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the state or any portion thereof. (Minnesota Statutes, section 115.01, subdivision 22)

Waters of the United States (WOTUS – regulatory definition): (1) The territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide; (2) Tributaries; (3) Lakes and ponds, and impoundments of jurisdictional waters; and (4) Adjacent wetlands. (33 CFR §328)

watershed: The land area that drains water to a particular surface water body or point along a stream. A ridge or drainage divide separates a watershed from adjacent watersheds.

well yield: The maximum volume of water discharged per given unit of time while maintaining a steady water level above the pump intake in the well.

Wetland Conservation Act: Minnesota legislation, codified in Minnesota Rules, chapter 8420, designed to achieve no net loss in the quantity, quality, and biological diversity of existing Minnesota wetlands, by avoiding impacts to them or restoring and enhancing diminished wetlands. This program is administered by local governments with oversight by the Board of Water and Soil Resources.

wetland delineation: The act of establishing the boundary between wetlands and uplands (or non-wetlands) using soils, hydrology, and vegetation as indicators.

wetland: An area that is inundated or saturated by surface and/or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, fens, and similar areas.

wild rice: A tall aquatic annual grass of North America, bearing edible grain that typically grows in shallow lakes or slow-moving rivers and streams.

zoning ordinance: Locally adopted regulations that divide a town, city, village, or county into separate districts (e.g., residential, commercial, or industrial), define the permitted and prohibited land uses in those districts, and set forth specific development requirements (such as minimum lot size, height restrictions, etc.