

## **Comments of Water Legacy**

### **PolyMet NorthMet Mining Project and Land Exchange Supplemental Draft Environmental Impact Statement**

#### **Submitted to Joint Preparers:**

Minnesota Department of Natural Resources  
United States Army Corps of Engineers  
United States Forest Service

#### **Provided to Cooperating Agencies:**

Bois Forte Band of Chippewa  
Grand Portage Band of Lake Superior Chippewa  
Fond du Lac Band of Lake Superior Chippewa  
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## INTRODUCTION

WaterLegacy is a non-profit organization formed to protect Minnesota's water resources and the communities that rely on them. We have approximately 10,000 members and supporters across the state of Minnesota. Our comments on the PolyMet NorthMet Supplemental Draft Environmental Impact Statement (SDEIS) include an Executive Summary, which provides a digest of our recommendations, a narrative explanation of the basis for our recommendations and a set of 54 exhibits.

The 90-day comment period was insufficient, not only because the SDEIS is long, but because important information was omitted from the SDEIS and even from the reference documents provided on CDs. Data practices requests were required to secure missing information. In addition, fundamental assumptions upon which its conclusions are based are neither revealed nor substantiated in the SDEIS. Meaningful comments required extensive research outside the confines of the SDEIS. With additional time, it is likely that further errors and omissions would have been verified.

With WaterLegacy's comments, we have submitted expert reports from Dr. Brian Branfireun, an internationally-recognized mercury and methylmercury expert; Bruce Johnson, a retired chemist who worked for three decades as a state environmental regulator; Dr. Don Lee, an engineer and hydrologist with a 31-year career of environmental analysis at Oak Ridge National Laboratory; and J.D. Lehr, a professional geologist familiar with the specific geology of the proposed PolyMet project site. Dr. Branfireun has supplied a folder containing his references and Mr. Lehr has included a set of illustrative maps and figures with his technical review.

WaterLegacy's submissions reach the conclusion that the SDEIS is inadequate and the project is likely to pose significant adverse impacts to the environment, to human health, to environmental justice and to tribal rights and resources. The SDEIS is data poor, and its modeled outcomes are determined by unsubstantiated and unreasonable assumptions, rather than by empirical information and field experience. Basic information required to evaluate PolyMet's proposed action, such as a water balance and loading of solutes in process water flows, is not presented. Closer review reveals that fundamental modeling assumptions, like Partridge River baseflow, are erroneous. Cited literature is misrepresented and information selectively presented, suggesting advocacy for the project, rather than an independent assessment of its probable outcomes.

Federal regulations promulgated under the National Environmental Policy Act (NEPA) are not followed in the SDEIS. Information is not the high quality required under NEPA, foreseeable failures are not analyzed, cumulative impacts are arbitrarily limited, and no alternatives are evaluated, although alternatives analysis is the heart of the EIS under applicable law. Dr. Lee's opinion summarizes the defects under NEPA:

The SDEIS is not compliant with the regulations in 40 CFR 1500 – 1508, and is technically inadequate. The proposed action is conceptual and not specific, and is not compared to reasonable alternatives. The descriptions of the affected environment are not representative of the site specific conditions at the mine site or the plant site. The environmental consequences presented in the SDEIS are based on assumptions that are not substantiated or are unjustified. Consequently, the conclusions presented in the SDEIS are not defensible and should not be used as a basis for making decisions affecting the environment. (Lee 2014, p. 1)

The analyses presented in the SDEIS are not based on an analytical or scientific review of the proposed action and the reasonable alternatives to the proposed action. Instead, the analyses are based on a conceptual description of the proposed action and an extensive set of assumptions of the environment and the performance of the conceptual design. The SDEIS is technically inadequate as a result of the numerous omissions and flaws in the analyses presented in the SDEIS. In my experience of reviewing and preparing environmental impact statements, the SDEIS is the least defensible and most technically flawed environmental impact statement I have encountered. (Lee 2014, p. 13)

The PolyMet proposed action described in the SDEIS also fails to satisfy Clean Water Act Section 404 requirements. The SDEIS does not demonstrate that the project is the least environmentally damaging practicable alternative or that its impacts on aquatic resources of national importance will be mitigated. The proposed land exchange serves a narrow private interest and contradicts both federal policy and federal fiduciary responsibilities to protect tribal resources.

Perhaps most troubling, the PolyMet SDEIS declines to model what are likely to be the most significant adverse impacts of its proposal – indirect destruction of high value wetlands in the Partridge River watershed near the mine site and increases in methylmercury contamination of fish as a result of emissions, discharges and hydrologic changes resulting from the proposed action. Dr. Branfireun's expert opinion supports long-standing positions of Tribal Cooperating Agencies that these adverse impacts could have been and should have been modeled. Failure to do so violates NEPA regulations and calls into question the entire framework of the PolyMet environmental review exercise.



The consequences of this deficiency are substantial. As Dr. Branfireun explains, “discharges of sulfate and total mercury and hydrologic changes to peatlands at the project site have the potential to significantly increase methylmercury in downstream wetlands and surface waters.” In addition, “There is also no reason to assume that effects on mercury and methylmercury would be limited to the smaller streams, or the main channels in the Partridge or Embarrass River watersheds. Both direct and indirect water quality impairments would have the potential to affect the St. Louis River.” (Branfireun 2014, pp. 18-19)

Even with all of the limiting assumptions and lack of clarity in the SDEIS disclosures, scrutiny reveals that the PolyMet project would result in wetlands destruction dwarfing cumulative past and foreseeable watershed impacts from all other sources. The PolyMet project would have the potential for significant adverse impacts to aquatic life, a federally-listed species, and to persons who consume fish and wild rice for subsistence. The project is modeled to increase cancer risks above Minnesota’s health risk threshold and to exceed Minnesota’s health risk limits for pollution in groundwater. In addition to degrading water quality in outstanding resource value waters, the PolyMet project would cause or contribute to excursions above water quality standards at the mine site and the plant site.

In February 2010, the United States Environmental Protection Agency (EPA) concluded that the PolyMet draft environmental impact statement was inadequate and the PolyMet project environmentally unsatisfactory. Modeling constructs developed in the intervening years may have reduced the transparency of flaws in both the analysis and the project, but these flaws have not been rectified. The PolyMet SDEIS remains inadequate and the PolyMet proposed action remains environmentally unsatisfactory.

## **EXECUTIVE SUMMARY - ACTION RECOMMENDATIONS**

### **Introduction - Basic Data**

- The SDEIS must be revised to provide a clear water balance showing inputs and outputs from the mine, plant, tailings basin, treatment facility and hydrometallurgical residue facility during operations, closure and long-term treatment and maintenance.
- The SDEIS must be revised to provide a clear statement of the concentration predicted of solutes for representative years in all mine site and plant site potential sources of contamination in units of measurement comparable to water quality standards.
- The SDEIS must be revised to provide a clear explanation of the modeled sources of solutes in waste rock piles, tailings, mine pits, equalization basins and the HRF, specifying for each the source and concentration of inputs and the degree to which the modeling has assumed a concentration cap, adsorption of solutes or burial of solutes.
- The SDEIS must be revised to describe the basis for any such critical assumptions pertaining to the level of solute concentrations, including concentration caps, burial or adsorption assumptions.
- The SDEIS must be revised to provide a clear statement of the volume and concentration of seepage, leakage, spillage and runoff from any potential source of contamination at the mine site and plant site.
- The SDEIS must be revised to make explicit any assumptions about the efficacy of liners or caps in containing seepage or process water or limiting percolation of precipitation, including all field experience that supports these assumptions and a comparison between the climate conditions and duration under which these were tested as compared to the proposed action.
- The SDEIS must be revised to substantiate any assumptions about the efficacy of collection systems in containing seepage, specifying the particular field experiences, climates, geological conditions and designs where the efficacy has been demonstrated.
- The SDEIS must be revised to substantiate any assumptions regarding hydraulic conductivities in surficial and bedrock materials.
- The SDEIS must be revised to identify the capital, replacement cycle, operations, and maintenance costs for all treatment and mitigation measures during operations, reclamation and long-term closure, specifying which measures are definite and which are contingent as part of adaptive management.

### **Basic Modeling**

- The SDEIS must be revised to provide accurate baseflow modeling for the Partridge River.

- The SDEIS must be revised to model propagation of contaminants through high conductivity surficial materials and secondary porosity features in bedrock.
- The SDEIS must be revised to model propagation of uncaptured seepage in all directions indicated by reasonable geology, hydrology, history and data.
- The SDEIS must be revised to use current and substantiated sorption coefficients.
- The SDEIS must be revised to model site-specific impacts on wetlands that would result from mine drawdown, calibrating such model using accurate hydrologic data and field experience.
- The SDEIS must be revised to model increased mercury methylation in the project area and downstream in the St. Louis River as a result of hydrologic changes, mercury air emissions, dust deposition, and discharge of mercury and sulfates.

#### **I. Mercury and Methylmercury**

- The Proposed Action must be substantially changed to preclude use of untreated Colby Lake water for stream augmentation to Unnamed Creek, Mud Lake Creek, Trimble Creek or Second Creek.
- The SDEIS must be revised to explain how stream augmentation will be ensured without relying on untreated Colby Lake water to serve this purpose and must demonstrate that the proposed solution will comply with applicable water quality standards.
- The SDEIS must be revised to analyze impacts of mercury air deposition from the PolyMet mine site, including magnitude and speciation. This analysis must consider impacts on all waters, including the Second Creek watershed and waters upstream of identified Embarrass River lakes.
- The SDEIS must be revised to analyze impacts of mercury air deposition considering species other than fish and potential bioaccumulation in downstream waters.
- The SDEIS must be revised to provide explicit information as to the mass of mercury in peat, overburden, ore, waste rock, process water, tailings, reject concentrate, filtered sludge, HRF waste and any other potential sources of mercury release from the project.
- The SDEIS must be revised to disclose mercury concentrations in seepage from all potential project sources, including the OSLA, Category 1 waste rock pile, liner leaks, mine pits, tailings piles and the HRF, making explicit any assumptions regarding leaks, infiltration and adsorption.
- The SDEIS must be revised to provide a scientific basis for its assumptions regarding mercury burial, sequestration or adsorption in the East Pit, West Pit lake, tailings or hydrometallurgical residues.

- The SDEIS must be revised to use a reasonable range of probabilities for mercury burial, sequestration or adsorption in lake sediments, tailings, residues and surficial materials based on uncertainty as to the mechanisms of adsorption and desorption and the range of values observed in tests and field experience.
- The SDEIS must be revised to disclose the influent and effluent assumptions and targets for the WWTF, both prior to and after conversion to reverse osmosis, and for the WWTP, explaining for both facilities the treatment methods proposed to achieve compliance with the Great Lakes mercury standard.
- The SDEIS must be revised to assess the sulfur content of mine site and plant site particulate emissions and the impacts of particulate emissions and ore spillage on mercury methylation in the project area and on sulfate loading to the Partridge River and Embarrass River watersheds.
- The SDEIS must be revised to assess the impacts of all mine site sulfate seeps and liner leaks to shallow groundwater on mercury methylation.
- The SDEIS must be revised to disclose the concentration of sulfates in tailings basin pore water and seepage release beneath the tailings basin.
- The SDEIS must be revised to model reasonably foreseeable improvements of water quality at, near and downstream of the tailings basin for a “no action” baseline considering natural attenuation through precipitation and mitigation likely to be required in compliance with the Cliffs Erie Consent Decree.
- The SDEIS must be revised to assess the impacts of tailings basin sulfate releases on mercury methylation as compared to a “no action” baseline.
- The SDEIS must be revised to model the impacts of sulfate and mercury emissions and release and hydrologic changes at both the mine site and the tailings basin site on mercury methylation.
- The SDEIS must be revised to evaluate effects on water quality, wildlife, human health, tribal rights and resources and environmental justice resulting from cumulative impacts of the PolyMet proposed action on the St. Louis River and estuary.
- The SDEIS must be revised to determine effects of the PolyMet project on compliance with the downstream Fond du Lac water quality standard for mercury.
- The SDEIS must be revised to provide a health impacts assessment for methylmercury, describing salient health impacts and assessing cumulative health risks of increased mercury on fetuses, infants, children and adults.
- The SDEIS must be revised to assess disparate impacts of methylmercury bioaccumulation on low-income families and tribal members who rely on fish for

subsistence.

- The SDEIS must be revised to analyze cumulative impacts of mercury and sulfate releases and methylmercury bioaccumulation on tribal rights and resources and environmental justice.
- The SDEIS must be revised to conclude that the PolyMet proposed action would pose an unacceptable cumulative risk to human health and to environmental justice.

## **II. Mine Site Water Quality**

- The SDEIS must be redone to accurately model Partridge River baseflow, using all reasonably available data and the range of minimum flows calculated by tribal and MDNR scientists.
- The SDEIS must be redone to revise modeled predictions of inflows and outflows, water quality and wetlands impacts at the mine site, showing the effects that a change in Partridge River baseflow has had on these modeled outcomes.
- The SDEIS must be revised to disclose changes in the volume and chemistry of water inputs to the mine site WWTF, tailings piles and plant site WWTP based on revised predictions of baseflow, identifying any planned changes in treatment facilities.
- The SDEIS must be revised to consider the presence of known bedrock fractures transecting mine pits and beneath mine site contamination sources in calculating potential water quality impacts.
- The SDEIS must be revised to assess the hydrologic significance of bedrock fractures, faults and secondary porosity features at the mine site.
- The SDEIS must be revised to consider blasting and weathering impacts on propagation and access of contaminated groundwater to bedrock fractures.
- The SDEIS must be revised to provide more robust assessment of the connection between deep groundwater and surficial waters, including additional deep borehole sampling as well as pump testing.
- The SDEIS must be revised to assess surficial materials, such as zones of outwash sand and gravel that may provide high conductivity pathways for contaminants.
- The SDEIS must be revised to consider the full range of hydraulic conductivities of surficial materials, not just an average based on excluding the most conductive samples.
- The SDEIS must be revised to analyze propagation of seepage from all mine site contaminant sources through shallow groundwater and bedrock secondary porosity

features in multiple directions, including flow north and northeast to Yelp Creek, the Hundred Mile Swamp and the Partridge River.

- The SDEIS must be redone to analyze the Category 1 waste rock pile as an independent contaminant source, propagating pollutants in various directions through shallow groundwater and bedrock secondary porosity features.
- The SDEIS must be revised to analyze alternatives to minimize seepage from the Category 1 waste rock pile, including liners and a seepage collection system.
- The SDEIS must be revised to disclose the volume and concentration of Category 1 waste rock pile seepage at various mine years and stages, stating clearly what volume of seepage reduction and collection has been modeled to make water quality predictions.
- The SDEIS must be revised to use a reasonable range of input assumptions to model uncaptured seepage from the Category 1 waste rock stockpile. This reasonable range of input values must be based on site-specific hydrogeology, climate, change over time, and field experience.
- The SDEIS must consider a broader range of input assumptions for the efficacy of the geomembrane system over time in preventing introduction of precipitation to the Category 1 waste rock pile.
- The SDEIS must be revised to modify the concentration cap assumption for the Category 1 waste rock pile considering the variability of sulfur concentrations and the potential for pockets of acidity and high metals leachate in this waste rock.
- The SDEIS must be revised to remove the potential use of Category 1 waste rock for construction materials given its potential to generate acids and leach metals.
- The SDEIS must disclose solute concentrations within the mine pits at representative years and identify the nature and extent of reduction in solute concentrations predicted to result from subaqueous disposal, any proposed treatment method and from attenuation.
- The SDEIS must be revised to substantiate claims for the efficacy of subaqueous disposal in preventing acid mine drainage and reducing solute concentrations and to discuss the relationship between cycling of pit water for treatment and maintaining anoxic conditions.
- The SDEIS must reconcile the apparent contradiction between statements that in-pit disposal in the West Pit Backfill alternative provides no environmental advantage and assertions for the proposed action that subaqueous disposal is highly beneficial.
- The SDEIS must be revised to analyze the nearest point of connection to surface water for all discharges to groundwater from any mine site contamination source.
- The SDEIS must be revised to disclose at P90 probabilities the levels of all regulated parameters at the closest location where they would be discharged to surface water from

any mine site contamination source.

- The SDEIS must be revised to clearly state that the proposed action would have significant adverse effects on the environment, including violation of numeric surface water quality standards as a result of mine site discharge.

### **III. Tailings Site Water Quality**

- The SDEIS must be revised to include a clear and intelligible water balance for the tailings basin and WWTP.
- The SDEIS must be revised to consider the presence of known bedrock fractures beneath the tailings basin.
- The SDEIS must be revised provide a reasonable assessment of tailings seepage through faults, fractures and other secondary porosity features beneath the tailings basin.
- The SDEIS must be revised to use a reasonable range of assumptions based on site-specific conditions and field experience to model containment and release of untreated seepage to surface water and groundwater.
- The SDEIS must be revised to assess potential seepage toward the east based on changes in the topography and water table height in tailings Cell 1E and Cell 2E.
- The SDEIS must be revised to provide a reasonable assessment of seepage toward the south and Second Creek based on hydrological testing, LTVSMC experience and increased storage of tailings and process water.
- The SDEIS must be revised to specify concentrations of constituents in plant process water, tailings basin pore water, untreated seepage and WWTP influent, using numbers that allow easy comparison with applicable surface and groundwater quality standards.
- The SDEIS must be revised to specify concentrations of constituents in mine site process water and to verify the capacity of the WWTF to reduce contaminants to meet “targets.”
- The SDEIS must be revised to disclose its assumptions regarding the capacity of the tailings site to contain water, the water pressure exerted, and what increase in the volume of groundwater is predicted during operations and closure.
- Where field experience has demonstrated the insufficiency of water quality models, the SDEIS must demonstrate that models have been revised to verify their accuracy.
- The SDEIS must be revised to disclose its assumptions regarding concentration caps, explaining what concentrations of solutes would be predicted absent a cap, and how uniform pH and sulfate would be maintained with varying inputs over thousands of acres.

- The SDEIS must be revised to disclose and substantiate its assumptions regarding burial, sorption or retention in tailings and reduction in chemical reactivity resulting from bentonite placement, including field experience that supports those assumptions.
- The PolyMet revised SDEIS must consider alternative methods of avoiding or mitigating impacts of tailings seepage on water quality, including but not limited to constructing a new and completely lined tailings facility on a properly prepared bedrock surface.

#### **IV. Hydrometallurgical Residue Facility**

- The SDEIS must be revised to provide detailed disclosure of the chemical composition and pH of all individual wastes proposed for disposal in the HRF, including but not limited to hydrometallurgical process wastes and WWTF sludge.
- SDEIS must be revised to analyze the chemical composition of all HRF wastes based on additional leachate testing that reflects the current hydrometallurgical and WWTF sludge formation processes, and must evaluate chemical changes over time.
- The SDEIS must be revised to provide a current mass balance for mercury, including a current analysis of the mass of mercury that would be deposited in the HRF from all wastes, including but not limited to hydrometallurgical process wastes and WWTF sludge.
- The SDEIS must be revised to provide a rigorous analysis of whether the HRF wastes or any part of them are hazardous wastes under Minnesota law, requiring issuance of a hazardous waste disposal permit.
- The SDEIS must be revised to reject any location for the HRF on top of wetlands, compressed peat, slimes or unconsolidated materials, and to reject any location on top of faults or fractures, unless detailed hydrologic analysis has demonstrated lack of hydraulic conductivity to shallow groundwater.
- The SDEIS must be revised to conclude that the location for the HRF in the PolyMet proposed action is unacceptable.
- The SDEIS must be revised to model water quality impacts from the HRF based on a reasonable and conservative range of liner leakages under normal conditions.
- The SDEIS must be revised to model water quality impacts from HRF discharge in the reasonably foreseeable event of liner failure or stability failure.
- The SDEIS must be revised to evaluate alternatives to mitigate leakage from the HRF including completely dewatering and solidifying HRF materials.
- The SDEIS must be revised to evaluate the potential that materials deterioration and maintenance lapses over time would increase liner leakage and water quality impacts.



## **V. Wetlands & ARNI**

- The Section 404 permit for the PolyMet project must be denied because the proposed action has substantial and unacceptable impacts on aquatic resources of national importance (ARNI).
- The Section 404 permit for the PolyMet project must be denied because the proposed action has substantial and unacceptable impacts on wetlands in the Partridge and Embarrass River watersheds, impacting drinking water quality, fisheries and wildlife in the Lake Superior Basin.
- The Section 404 permit for the PolyMet project must be denied because the applicant's mitigation plan fails to compensate for reasonably foreseeable indirect adverse impacts on wetlands.
- The Section 404 permit for the PolyMet project must be denied because the applicant's mitigation plan proposes compensation for direct destruction of wetlands outside the Lake Superior Basin.
- The Section 404 permit for the PolyMet project must be denied because the applicant's mitigation plan fails to minimize and avoid impacts on irreplaceable wetlands in the Lake Superior Basin.
- The Section 404 permit for the PolyMet project must be denied because the SDEIS fails to consider project and mitigation alternatives that would reduce impacts on wetlands and ARNI.
- The Section 404 permit for the PolyMet project must be denied because it has not been demonstrated that the proposed action is the least environmentally damaging practicable alternative.
- The SDEIS must be revised to employ a valid site-specific model and provide high quality information on the indirect adverse impacts on wetlands from all of the following: a) mine drawdown; b) tailings area hydrological change; c) water quality impacts; d) air deposition of pollutants.
- The SDEIS must be revised to specifically state the number of wetland acres where indirect wetlands impacts are reasonably foreseeable, providing a scientific basis for its conclusions.

## **VI. Land Exchange**

- The United States Forest Service (USFS) should reject the proposed land exchange as inconsistent with federal laws requiring that exchange of public lands be in the public interest and for fair value.

- The USFS should reject the proposed land exchange since it conflicts with federal regulations disapproving exchanges of land with split estates and reserved mineral rights.
- The USFS should reject the proposed land exchange as inconsistent with the Forest Plan, due to water quality and wetlands impacts, and losses of mature forests and high diversity habitats for rare and endangered species and species of special concern.
- The USFS should reject the proposed land exchange due to losses of wetlands, headwaters and higher order streams in the Lake Superior Basin and adverse impacts on high priority national and international waters.
- The USFS should reject the PolyMet project and proposed land exchange as inconsistent with provisions of the Forest Plan and obligations of the federal government to protect tribal rights to fish, hunt and gather plants.
- The USFS should immediately disclose all appraisal information for the land exchange and allow public review and comment.
- The SDEIS should be revised to analyze the impacts of loss of wetlands, headwaters and higher order streams in the Lake Superior Basin.
- The SDEIS should be revised to analyze cumulative impacts of the land exchange and the PolyMet project on tribal rights to hunt, fish and gather wild rice and other plants in the Ceded Territories, Reservation waters, the St. Louis River, and the Lake Superior Basin.

## **VII. Aquatic Life**

- The SDEIS must be revised to assess specific conductivity, including background levels from reference streams, elevations in project waters resulting from existing mining impacts, improvements in water quality predicted from attenuation and enforcement, and impacts from the PolyMet proposed action.
- The SDEIS must be revised to assess cumulative impacts of the specific conductivity from the PolyMet project on aquatic life in downstream waters, including the St. Louis River.
- The SDEIS must be revised to evaluate the significance of the potential impacts on aquatic life from increased metal solutes under the proposed action, including solutes not predicted to exceed numeric water quality standards.
- The SDEIS must be revised to include results from toxicity testing of leachates from PolyMet project wastes and tailings to evaluate risks to aquatic life from uncaptured seepage.
- The SDEIS must be revised to evaluate impacts on aquatic ecosystems from hydrologic changes resulting from the PolyMet project in the Partridge River watershed, including Yelp, Wetlegs, Wyman, Longnose and Unnamed Creek as well as the Partridge River. This consideration must include revised and accurate baseflow inputs.

- The SDEIS must be revised to evaluate impacts on aquatic ecosystems from the volume as well as chemical composition of WWTF effluent that would be discharged to the Partridge River during closure.
- The SDEIS must evaluate the impacts of hydrologic changes to the Partridge River watershed resulting from the PolyMet proposed action, considering seasonal and climatic variations, not just averages.
- The SDEIS must evaluate an alternative where reverse osmosis is constructed on the PolyMet mine site in year one and augmentation provided to Partridge River watershed streams to mitigate impacts on aquatic ecosystems.

### **VIII. Assessment of Health Risks**

- As detailed in Section I, the SDEIS must be revised to provide a comprehensive assessment of the risks of methylmercury resulting from the PolyMet project to fetuses, infants, children and adults, including people who rely on fish for subsistence as a result of fish consumption in the Embarrass River and Partridge River watersheds and in the St. Louis River.
- The SDEIS must be revised to assess impacts of air emissions at the PolyMet mine site and plant site for on-site workers both for cancer and non-cancer health risks.
- The SDEIS must be revised to model exposure of PolyMet on-site workers to mineral fibers and estimate the health risk to workers from mineral fibers based on the best protocols and research available, including the U of M 2013 data.
- The SDEIS must be revised to model the volume and concentrations of mineral fibers in air emissions from the PolyMet mine site and plant site and in water discharge to groundwater and surface water to assess health risks to the public.
- The SDEIS must be revised to disclose all parameters of concern, including lead, mercury and methylmercury in all residential wells between the tailings basin and the Embarrass River, sampling multiple times and correlating results with location and depth of wells.
- The SDEIS must be revised to analyze potential impacts of tailings basin seepage on residential wells, using reasonable assumptions regarding the volume and concentrations of seepage that would be released untreated from the PolyMet tailings piles.
- The SDEIS must be revised to evaluate health risks from coal combustion emissions resulting from the PolyMet proposed action.
- The SDEIS must be revised to state that increased discharge of arsenic from the PolyMet project would increase cancer risks beyond Minnesota's cancer risk threshold of 1 in 100,000.
- The SDEIS must be revised to state that increased manganese discharge at the tailings basin

would exceed Minnesota's health risk limit of 100 µg/L.

- The SDEIS must be revised to provide a Health Risk Assessment for air emissions, discharge to surface water and groundwater and, where applicable, bioaccumulation of pollutants that may pose a risk to human health from the PolyMet proposed action. This Health Risk Assessment, prepared in conjunction with the Minnesota Department of Health, must:
  1. Explain health risks of pollutants in terms intelligible to decision-makers and the public;
  2. Use reasonable assumptions about emissions, seepage and transport of pollutants;
  3. Evaluate cancer and non-cancer risks for vulnerable populations, including fetuses, infants, children and the elderly;
  4. Evaluate cancer and non-cancer risks to populations with highest levels of exposure, including on-site workers, persons with residential drinking wells downstream of the site, and persons who rely on fishing, hunting and gathering for subsistence.
  5. Evaluate cumulative risks of multiple chemicals and exposure routes.
  6. Evaluate past, existing and reasonably foreseeable impacts of pollutants in assessing health risks.
- Upon completion of a Health Risk Assessment, the SDEIS must quantify as socioeconomic costs all costs related to health impacts, including medical treatment costs, lost productivity and costs from reduction of neurological and other functions in infants, children and adults.

## **IX. Failures & Flood Risks**

- The SDEIS must be revised to assess the probabilities and environmental consequences of partial or complete slope failure of waste rock stockpiles.
- The SDEIS must be revised to assess the probabilities and environmental consequences of partial or complete dam or slope failure at the tailings and hydrometallurgical residue storage facilities.
- The SDEIS must be revised to assess the probabilities and environmental consequences of extreme weather and flooding at the mine site and plant site.
- The SDEIS must be revised to assess the probabilities and environmental consequences of pipeline spills and rail accidents along the transportation corridor.
- The SDEIS must be revised to assess the probabilities and environmental consequences of failure of the integrity of liners beneath sumps, basins, ore surge and waste rock piles and the hydrometallurgical residue facility.
- The SDEIS must be revised to assess the probabilities and environmental consequences of failure of leachate collection and wastewater treatment systems to perform as planned.

## **X. Financial Assurance**

- The SDEIS must be revised to provide sufficient detail as to the nature and duration of wastewater treatment, leachate containment, liners, caps, maintenance, monitoring, and wetlands compensation to support mitigation and financial assurance requirements.
- The SDEIS must be revised to provide a detailed projection of capital costs, operating costs, life cycle replacement, adaptive management and contingency costs for unanticipated events to allow determination of financial assurance requirements.

## **XI. Alternatives**

- The SDEIS must be revised to evaluate the Underground Mining project alternative based on the full scope of mineral resources at the site and the reasonable costs of both Underground Mining and the proposed action, including long-term mitigation costs.
- The SDEIS must be revised to evaluate the West Pit Backfill mitigation alternative, explaining any environmental concerns posed by in-pit disposal of waste rock.
- The SDEIS must be revised to evaluate the Mine Site Reverse Osmosis in Year One alternative, including the following components:
  1. Require on-site treatment of mine site stormwater and process water with reverse osmosis to meet surface water quality standards and prevent degradation of water quality starting in year one.
  2. Employ hydrological testing to assess appropriate quantities and locations for water release to support wetlands and headwaters streams in the Partridge River watershed.
  3. Release water treated by mine site reverse osmosis through pipe and/or spigot systems to mitigate the impacts of hydrological changes and mine dewatering on high value aquatic resources in the Hundred Mile Swamp and Partridge River Headwaters.
  4. Treat East Pit water with mine site reverse osmosis starting when reclamation begins, to limit acidity and metals seepage from the East Pit to aquatic ecosystems.
- The SDEIS must be revised to evaluate alternatives for the management of reject concentrate, including but not limited to evaporation or disposing of reject concentrate off site.
- The SDEIS must be revised to evaluate alternatives for the Category 1 waste rock pile that seal faults and fractures, construct the pile over a compacted subgrade, and place liner and leak detection systems under the waste rock pile.
- The SDEIS must be revised to evaluate an alternative for the Overburden Storage Laydown Area that seals any faults and fractures, constructs the pile over a compacted subgrade, and places liner and leak detection systems under the OSLA

- The SDEIS must be revised to evaluate alternatives that place PolyMet tailings in a new tailings facility excavated to bedrock and constructed on a compacted subgrade above liners and a leak detection system.
- The SDEIS must be revised to evaluate additional alternatives that reduce seepage from tailings, including post-closure dewatering and dry tailings disposal.
- The SDEIS must be revised to evaluate alternative locations for HRF, excluding sites located above an existing landfill, compressed peat, wetlands, or bedrock faults and fractures.
- The SDEIS must be revised to evaluate an alternative where HRF wastes are managed and monitored as hazardous wastes, including active dewatering and stabilization at closure.
- The SDEIS must be revised to evaluate the alternative of disposing of hydrometallurgical wastes and sludge off-site in a facility designed and maintained to manage this material.
- The SDEIS must be revised to evaluate an alternative using new rail cars with sealed compartments to transport ore and fines.

## **XII. Cumulative Impacts**

- The SDEIS must be revised to state clearly that the cumulative impacts of the PolyMet project and other past, present and future mining projects would have a significant adverse impact on aquatic life.
- The SDEIS must be revised to state that the cumulative impacts of the PolyMet project and other past, present and future mining projects on wildlife corridors would have a significant adverse impact on the Canada lynx, a federally-listed species.
- The SDEIS must be revised to include a cumulative analysis of the effects of PolyMet proposed action on wetlands values.
- The SDEIS must be revised to analyze the cumulative effects of the PolyMet proposed action on groundwater in the project area, including impacts of Northshore and Cliffs Erie facilities.
- The SDEIS should not be finalized until the mercury TMDL study for the St. Louis River is completed.
- The SDEIS must be revised to analyze cumulative effects of the PolyMet proposed action on mercury and methylmercury in the project area and the St. Louis River.
- The SDEIS must be revised to analyze cumulative effects of the PolyMet proposed action on sulfates and wild rice in the project area and the St. Louis River.

- The SDEIS must be revised to analyze cumulative effects of PolyMet discharge of salts, ions and metals on St. Louis River aquatic life and water quality in the project area and the St. Louis River.
- The SDEIS must be revised to analyze cumulative effects of the PolyMet project on environmental justice, as a result of impacts to natural wild rice, fish abundance and mercury contamination of fish.
- The SDEIS must be revised to analyze cumulative effects of the PolyMet project on tribal trust resources, including fish, wild rice and moose in the project area and the 1854 Ceded Territories.
- The Section 404 permit must be denied due to federal obligations to protect trust resources from wetlands and habitat destruction and increased mercury bioaccumulation in fish.
- The land exchange must be denied due to federal obligations to protect trust resources of high biological diversity that serve as habitat for moose.
- The SDEIS must be revised to analyze cumulative effects of other mining projects based on a current assessment of which projects are reasonably foreseeable.
- The SDEIS must be revised to include planned expansions of mining, processing and tailings disposal at the PolyMet mine site, plant and tailings basin.

## **I. MERCURY & METHYLMERCURY**

### **Introduction**

The PolyMet NorthMet project would increase methylmercury bioaccumulation due to mercury and sulfate discharges and seeps, mercury and sulfur air emissions, and hydrological changes in wetland environments. Cumulative methylmercury impacts from the PolyMet project would affect the St. Louis River and the St. Louis River estuary, the Fond du Lac reservation, tribal rights and resources in the 1854 Ceded Territories, the health of human infants, children and adults and environmental justice.

The PolyMet SDEIS provides an inadequate and, often, misleading assessment of mercury discharges and emissions, sulfur deposition, and sulfate seepage to shallow groundwater. The PolyMet SDEIS analyzes neither the impacts of pollutant discharges nor of hydrologic changes on the formation and bioaccumulation of methylmercury. The attached expert opinion of Dr. Brian Branfireun, an international mercury expert, explains deficiencies in the SDEIS analysis of mercury and mercury methylation as follows:

- Background site-specific analyses and data provided in the SDEIS concerning total mercury and methylmercury in surface and groundwaters are insufficient to evaluate potential impacts of the proposed project
- The SDEIS fails to consider scientifically documented factors that govern mercury methylation and uptake when evaluating the potential impacts of the proposed project.
- The SDEIS does not make a reasonable attempt to model the potential aquatic ecosystem impacts of changes in water chemistry (primarily mercury and sulfate) due to the project. Models are currently available.
- Ombrotrophic bogs play important roles in catchment methylmercury supply, and the SDEIS incorrectly considers them decoupled from sulfur and mercury impacts on receiving waters.
- Hydrological impacts of the proposed development on surrounding wetlands and subsequent changes in methylmercury production and release are not adequately evaluated in the SDEIS.
- The potential for the discharges of mercury and sulfur from the tailings stockpiles/ponds are inadequately addressed in the SDEIS, and the potential for both direct and indirect downstream water quality impairments are understated.

The PolyMet SDEIS then erroneously denies that project activities could result in cumulative effects on water quality in the St. Louis River. As Dr. Branfireun summarizes, “Both



direct and indirect water quality impairments would have the potential to affect the St. Louis River.”

The SDEIS must be rejected due to its inadequate analysis of mercury and methylmercury in the Partridge River watershed, the Embarrass River watershed and the St. Louis River. The SDEIS must be redone to appropriately analyze and model all of these impacts of mercury and methylmercury. In light of the evidence on this record, WaterLegacy believes the PolyMet project must be rejected due to violations of water quality standards limiting mercury in the Lake Superior Basin and impaired waters and due to the substantial and unacceptable impacts of methylmercury bioaccumulation on the environment, human health, tribal resources and environmental justice.

### **Affected Waters**

The Great Lakes Initiative governs bioaccumulative chemicals of concern (“BCCs”) and bioaccumulative substances of immediate concern (“BSICs”). Mercury is both. 40 C.F.R. § 132.2, Table 6. Under Minnesota Rules implementing the Great Lakes Initiative, mercury discharge to surface waters, including wetlands, streams and lakes, is limited to 1.3 nanograms per liter (ng/L). Minn. R. 7052.0100, subp. 5.

NorthMet Project area waters are all designated Outstanding International Resource Waters. Minn. R. 7050.0460, 7052.0300. Any new or expanded point source discharges of bioaccumulative substances of immediate concern (i.e., mercury) are prohibited unless a nondegradation demonstration is completed and approved by the MPCA. (SDEIS, p. 4-24)

Waters that are listed as impaired and do not have a completed Total Maximum Daily Load study (TMDL) have a special regulatory status. The MPCA cannot approve a permit for any new discharge to impaired waters that will cause or contribute to the violation of water quality standards. 40 C.F.R. §122.4(i); *In re City of Annandale*, 702 N.W. 2d 768, 773 (Minn. Ct. App. 2005); *In re City of Annandale*, 731 N.W.2d 502, 511 (Minn. 2007).

Many of the waters downstream of the PolyMet project are impaired for aquatic consumption due to mercury in fish tissue. Downstream waters that have been legally designated by the Minnesota Pollution Control Agency (MPCA) as impaired under Clean Water Act Section 303(d) due to mercury in fish tissue include Embarrass Lake (2002), Sabin Lake (1998), Wynne Lake (1998), Esquagama Lake (1998), Colby Lake (1998), Whitewater Lake/Reservoir (1998).

Further downstream, since 1998, most of the St. Louis River is also listed for “mercury in fish tissue” impairment.<sup>1</sup> (SDEIS, p. 4-133). Among all of these impaired waters, the Whitewater Lake/Reservoir is the only one where a TMDL has been approved.<sup>2</sup>

**1. PolyMet’s use of Colby Lake water for stream augmentation would violate water quality standards and increase mercury loading to a high-risk methylating environment.**

The PolyMet SDEIS does not discuss how pumping water from Colby Lake to augment streams in the project area can be reconciled with Minnesota water quality standards limiting mercury discharge. PolyMet’s proposed release of water from Colby Lake to Embarrass River tributaries or Second Creek would be a point source discharge to the Lake Superior Basin that has the reasonable potential to cause or contribute to an excursion above the 1.3 ng/L mercury standard. Minn. R. 7052.0220, Subp. 1.

Under federal regulations implementing the Great Lakes Water Quality Initiative, 33 U.S.C. §1268(CWA §118), “If a permitting authority determines that a pollutant is or may be discharged into the Great Lakes System at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any Tier I criterion or Tier II value, the permitting authority shall incorporate a water quality-based effluent limitation (WQBEL) in an NPDES permit for the discharge of that pollutant.” 40 C.F.R. §132, Appx. F, Procedure 5.

Discharge is defined to include addition of any pollutant from any “point source” to surface waters of the state in the Lake Superior Basin, which includes addition of pollutants from “discharges through pipes, sewers, or other conveyances.” Minn. R. 7052.0010, Subp. 33, incorporating part of the definition contained in 40 C.F.R. §122.2.

There is no Minnesota case law discussing whether water pumped from Colby Lake would be considered a point source discharge. However, several federal cases suggest that, “a point source need not be the original source of the pollutant; it need only convey the pollutant to ‘navigable waters,’ which are, in turn, defined as “the waters of the United States.” *S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians*, 541 U.S. 95, 105 (2004). See also, *Catskill Mountains Chapter of Trout Unltd., Inc. v. City of New York*, 273 F.3d 481, 491 (2d Cir. 2001).

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<sup>1</sup> MPCA, Minnesota Final 2012 Impaired Waters List, <http://www.pca.state.mn.us/index.php/view-document.html?gid=20346>.

<sup>2</sup> *Id.*

("the transfer of water containing pollutants from one body of water to another, distinct body of water is plainly an addition and thus a 'discharge' that demands an NPDES permit,") In *Rapanos v. United States*, 547 U.S. 715, 743-744 (2006), the Court summarized,

[A] point source need not be the original source of the pollutant; it need only convey the pollutant to 'navigable waters.'" *South Fla. Water Management Dist. v. Miccosukee Tribe*, 541 U.S. 95, 105, 124 S. Ct. 1537, 158 L. Ed. 2d 264 (2004). Cases holding the intervening channel to be a point source include *United States v. Ortiz*, 427 F.3d 1278, 1281 (CA10 2005) (a storm drain that carried flushed chemicals from a toilet to the Colorado River was a "point source"), and *Dague v. Burlington*, 935 F.2d 1343, 1354-1355 (CA2 1991) (a culvert connecting two bodies of navigable water was a "point source"), rev'd on other grounds, 505 U.S. 557, 112 S. Ct. 2638, 120 L. Ed. 2d 449 (1992).

Recent EPA rules adopted to exclude government resource management parties, such government entities engaged in water resource programs, water pollution control programs, and water supply systems, from the requirement of obtaining an NPDES permit for water transfers (73 Fed. Reg. 33697, Table 1, June 13, 2008) neither alter state rules nor the Great Lakes regulatory scheme. Discharge of Colby Lake water to the PolyMet project area would be subject to reasonable potential analysis and compliance with the Great Lakes mercury standard.

The PolyMet SDEIS proposes pumping water from Colby Lake for flow augmentation in several Embarrass River tributaries streams and Second Creek in the Partridge River watershed during mine operations and reclamation. (SDEIS, p. 5-6). In both the SDEIS narrative and its water management schematics, it is clear that Colby Lake augmentation is separate and distinct from augmentation using treated effluent from the plant site wastewater treatment plant (WWTP). (See SDEIS, pp. 3-55, 3-57, 3-73 for schematic illustrations, pp. 5-81 to 5-82, 5-188, 5-387 for narrative).

The SDEIS demonstrates that use of Colby Lake water for flow augmentation would violate Minnesota's 1.3 ng/L Great Lakes mercury standard and the Clean Water Act. Five out of five Colby Lake samples exceeded Minnesota's mercury standard, with a range of concentrations from 4.8 ng/L to 6.0 ng/L and a mean of 5.4 ng/L. (SDEIS, Table 4.2.2-4, p. 4-41). Colby Lake is meaningfully distinct from Second Creek, Mud Lake Creek, Trimble Creek and Unnamed Creek. (See e.g. SDEIS, Figure 4.2.6-1, p. 4-217). PolyMet's Proposed Action will violate laws intended to control bioaccumulative chemicals of concern. This plan is unacceptable.

In addition to constituting a violation of water quality standards, discharge of Colby Lake water would also significantly increase mercury loading to the Partridge River and Embarrass

River watersheds, and to waters that are a high-risk environment for methylation.

WaterLegacy estimated mercury loading to creeks near the PolyMet tailings basin based on the 5.4 ng/L mean for Colby Lake mercury and the 1.1 ng/L mercury average for tailings basin seepage which the PolyMet SDEIS used in calculating changes in mercury loading to the Embarrass River watershed. (SDEIS, p. 5-207). The volume of Colby Lake water used for augmentation was estimated from the PolyMet SDEIS and Barr's memorandum on Tributary Flow Augmentation provided as SDEIS reference Barr 2013a.

Minimum requirements for stream augmentation through operations, reclamation and long-term closure are projected as 280 gallons per minute ("gpm") for Unnamed Creek, 911 gpm for Trimble Creek, 93 gpm before swale construction for Mud Lake Creek and 0 gpm after swale construction, and 400 gpm for Second Creek. (SDEIS, Table 5.2.2-40, p. 5-178, SDEIS reference Barr 2013a, p. 3). The minimum requirement for stream augmentation before swale construction is set at 1,700 gpm, and the minimum requirement after at 1,600 gpm. (SDEIS reference Barr 2013a, p. 3). Swale construction is planned in year 7. (SDEIS, p. 5-174).

The Barr 2013a report explains that at P90 from years 1 to 10, nearly all of the flow demand will be met with Colby Lake water; from years 11 to 19, Colby Lake water use varies; from years 20 to 32, 100 percent of flow demand will be met with Colby Lake water; and, after year 33, Colby Lake water will no longer be used for augmentation. (Barr 2013a, p. 5)<sup>3</sup>

Based on this data, total loading of mercury from Colby Lake flow augmentation to Partridge River and Embarrass River creeks through mine year 32 is estimated at 382.7 grams of mercury.<sup>4</sup> During the first several years of operation, mercury loading would be as much as 14.5 grams per year.

The wetlands complex north of the tailings basin and the Embarrass chain of lakes have been identified as a high-risk environment for mercury methylation. (SDEIS, p. 5-208).<sup>5</sup> To the extent that introducing additional mercury to this environment increases mercury methylation, effects on fish tissue concentrations could increase not only in the Embarrass River watershed, but downstream in the St. Louis River.

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<sup>3</sup> Figure 1, illustration of Colby Lake water use for flow augmentation, Barr Flow Augmentation Report, p. 5 is attached as Exhibit 1.

<sup>4</sup> Calculations used the net mercury loading of 5.4 -1.1 ng/L from the SDEIS and the following estimates of Colby Lake usage based on P90 probability in Barr 2013a: 1,700 gpm years 1-7 (7 years) ; 1,600 gpm years 8-10 (3 years); 800 gpm years 11-20 (9 years); 1,600 gpm years 20-32 (13 years), no use of Colby Lake water after year 32. Conversions were performed with [http://www.convertme.com/en/convert/flow\\_rate\\_volume/gallon\\_min.html](http://www.convertme.com/en/convert/flow_rate_volume/gallon_min.html).

<sup>5</sup> See also Daniel Engstrom Comments on the PolyMet DEIS, attached as Exhibit 2, pp. 4-5.

Loading of mercury from Colby Lake water transfer to Unnamed Creek, Mud Lake Creek and Trimble Creek within the Embarrass River watershed was also estimated through year 32. Total mercury loading to this high-risk methylating environment would be 288.4 grams. During the first several years of operation, mercury loading to these Embarrass River streams would be as much as 11.1 grams per year. Loading to Second Creek in the Partridge River watershed could total 94.1 grams of mercury through year 32, with as much as 3.4 grams per year for more than 20 years of operations and closure.<sup>6</sup>

The PolyMet SDEIS estimates current mercury loadings to the Embarrass River at 22.3 grams per year. (SDEIS, pp. 5-207, 5-490, 6-34). Through transfer of Colby Lake water alone, the PolyMet proposed action could increase current mercury loading in the Embarrass River watershed by nearly 50 percent. Although the PolyMet SDEIS repeatedly references the moderate increase in mercury loading to the Embarrass River from use of treated WWTP water for flow augmentation (see SDEIS, pp. 5-207, 5-489, 5-490, 6-31, 6-34), the huge potential impact on mercury loading from transferring high mercury concentration water from Colby Lake is not discussed at all in the SDEIS. Analysis of Colby Lake mercury discharge requires a change in the Proposed Action as well as revision of the SDEIS:

**2. The PolyMet SDEIS understates and inadequately analyzes mercury air deposition and mercury seepage to groundwater at both the mine site and plant site.**

**A. Analysis of mercury air emissions and deposition from the PolyMet mine site and plant site is incomplete and inadequate.**

The PolyMet SDEIS inadequately assesses impacts of local mercury deposition on high-risk methylation environments at both the mine site and the plant site. The SDEIS states that no air emissions risk assessment was performed for local mercury deposition at the mine site because potential emissions are less than 1.0 pounds per year. (SDEIS, p. 5-431). Although this screening may be appropriate for dispersed smokestack emissions, it is an inappropriate exclusion for mercury contained in mine site particles, most if not all of which should be assumed to deposit locally in the Partridge River watershed.

Technical documents predict mercury emissions from the mine site as 0.636 pounds, or approximately 288 grams. (PolyMet Work Plan for a Supplemental AERA, Nov. 14, 201, SDEIS

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<sup>6</sup> Calculations isolated 400 gpm of flow augmentation from Colby Lake to Second Creek for years 1-10 and 20-32 and 200 gpm of flow augmentation for years 11-19.

reference Barr 2011h, p. 4). The impact of this level of deposition could be significant for mercury risk assessment. For the Colby Lake watershed, for example, total background mercury loading has been estimated as 1313.80 grams. (Plant Site AERA, Mar. 25, 2013, SDEIS reference Barr 2013k, Table F-3, pdf p. 142). The additional 288 gram load of mercury from local deposition of PolyMet mine site air emissions to this watershed could be as much as 22 percent of background mercury loading; this impact must be carefully assessed.

In addition, the PolyMet SDEIS' analysis of plant site mercury emissions is incomplete. The PolyMet analysis is limited in scope to "increases in mercury accumulation in fish in five nearby lakes" – Heikkila Lake, Colby Lake, Whitewater Lake, Wynne Lake, and Sabin Lake. (Barr 2013k, *supra*, p. 65). The analysis does not consider deposition of mercury from the plant site to the Second Creek watershed, which is immediately adjacent to the plant site and is neither part of the Colby Lake watershed nor the watersheds for Embarrass River lakes. (*Id.*, Large Figure 7, pdf p.115, reproduced as Exhibit 3).

The algorithm used by the SDEIS to determine risk from plant site mercury emissions (4.6 lbs/yr) considers only 26 percent of the mercury deposited in the watershed. (*Id.*, Appx. F, pdf pp. 142-152). Thus, in scenario one for Colby Lake, (*Id.*, p. 142). 42.13 grams of mercury deposited in the watershed would not be considered. This methodology, applied to an area containing wetlands, streams and rivers, seems to exclude waterbodies that are closer to the mercury source and to exclude the possibility of methylmercury bioaccumulation in species other than fish. Impacts upstream and downstream of the five lakes would be missed in this analysis.

In addition, the SDEIS' assumption that there is a simple linear relationship between mercury deposition to a water body and fish tissue methylmercury concentrations (SDEIS, p. 5-21) is too narrow. The SDEIS itself cites literature showing that methylation can be stimulated by increased sulfate concentrations in aquatic systems where sulfate might otherwise be limiting and that increased atmospheric sulfate-loading to a peatland can result in increased mercury methylation and export. (SDEIS, p. 5-207). As explained in the Expert Opinion of Dr. Brian Branfireun attached with these comments, there are a number of factors other than air deposition that contribute to mercury methylation and export. An increase in sulfate to sulfate-limited methylating environments, along with an increase in mercury deposition could have a synergistic and multiplicative effect on methylmercury concentrations.

**B. The PolyMet SDEIS fails to provide high-quality information and analysis regarding mercury seepage and indirect discharges to surface waters.**

“NEPA requires that the Environmental Impact Statement contain high-quality information and accurate scientific analysis.” *Lands Council v. Forester of Region One of the U.S. Forest Service*, 395 F.3d 1019, 1031 (9<sup>th</sup> Cir. 2005), citing 40 C.F.R. §1500.1(b). Where relevant information is missing, “It is impossible to ‘evaluate reasonably foreseeable significant adverse impacts on the human environment’ without it.” *Mont. Wilderness Ass’n v. McAllister*, 658 F. Supp. 2d 1249, 1256 (D. Mont 2009), *aff’d* *Mont. Wilderness Ass’n v. McAllister*, 666 F.3d 549 (9<sup>th</sup> Cir. 2011).

The PolyMet SDEIS does not provide high-quality information as to potential mercury seepage from mine and tailings sites. The SDEIS contains no information regarding mercury levels in groundwater seepage or surface water from mine or tailings basin sites. (See SDEIS, Table 5.2.2-22 Mine Site Groundwater – Maximum P90 Solute Concentration, p. 5-109; Table 5.2.2-23 Maximum Relative Groundwater Concentration Change for Mine Site Surficial Flowpath, p. 5-111; Table 5.2.2-30 Mine Site Surface Water – Maximum P90 Solute Concentration, p. 5-129; Table 5.2.2-38 Maximum P90 Concentrations along Modeled Flowpaths in the Plant Site Surficial Aquifer, p. 5-169; Figure 5.2.2-42 Predicted Groundwater Concentration Ranges at All Plant Site Surficial Groundwater Evaluation Locations, p. 5-171; Figure 5.2.2-43 Maximum Relative Concentration Changes at Surficial Aquifer Evaluation Locations, p. 5-172; Table 5.2.2-42 Plant Site Tributary Surface Water Concentrations, p. 5-183).

With respect to the mine site, the PolyMet SDEIS claims that the West Pit Lake would be the “only surface water discharge at the Mine Site” other than the waste water treatment facility (WWTF), which would be designed to meet the 1.3 ng/L mercury standard by year 40 when it discharges to the Partridge River. (SDEIS, pp. 5-8, 5-202). The SDEIS suggests that humidity cell tests of mercury adsorption, discussed in the next part of this section, relieve project proponents from the obligation to model mercury releases, since “mercury released from waste rock and ore at the Mine Site is not expected to be a constituent of concern in groundwater seepage.” (SDEIS, p. 5-202).

The PolyMet SDEIS states, “Mercury would be released from the Tailings Basin via seepage, discharge from the WWTP, and volatilization from the Tailings Basin pond.” (SDEIS, p. 5-205). Yet, as with the mine site, no information is provided as to reasonably foreseeable

mercury seepage; mercury concentrations in source materials; or absorption and desorption predictions. Although the PolyMet SDEIS claims that a “quasi-analog” mass balance approach was used to estimate future mercury concentrations (*Id.*), no data is presented in the SDEIS to allow a decision-maker or the public to ground truth the reliability of the SDEIS estimates.

**a) *Mine Site Overburden Storage and Laydown Area (OSLA)***

Evidence suggests that the mine site Overburden Storage and Laydown Area (OSLA) would be a significant source of mercury seepage to groundwater. The PolyMet SDEIS proposes that peat and overburden removed from the mine site surface would be stored in a pile near the southern edge of the mine site property boundary. (SDEIS, Figure 5.2.2-4, p. 5-35). Although stormwater runoff from the OSLA would be pumped and sent either to the tailings basin, the WWTF or the East Pit at various times (SDEIS, pp. 5-102, 5-104), the OSLA would have no liner and no containment structure to reduce infiltration to groundwater. (SDEIS, p. 5-97, 5-204). Data on mercury seepage is not provided either for the OSLA or the East Pit Category 2/3 surficial flow path. (*See* SDEIS, Table 5.2.2-22, p. 5-109).

The SDEIS does not disclose mercury concentrations or leach test results from overburden or peat. However, technical documents contain the results of leach tests on both. Leaching tests at 95<sup>th</sup> percentile results showed mercury levels of .018 µg/L in the peat and .016 µg/L in unsaturated overburden. (Waste Characterization Data Package, Mar. 7, 2013, SDEIS reference PolyMet 2013l, p. 4) These results are equivalent to 18 ng/L and 16 ng/L respectively, an order of magnitude higher than the applicable 1.3 ng/L mercury water quality standard.

The SDEIS predicts bottom seepage from the OSLA as 14 gpm (SDEIS, p. 5-102) or approximately 7,363,000 million gallons per year. However, the Wetland Data Package states that the P90 infiltration rate from the OSLA would be 32 gpm, almost 5 times the seepage rate from the mine pits. (Wetland Data Package, Mar. 2013, SDEIS reference PolyMet 2013b, p. 41). This equates to 16,830,000 gallons per year of infiltration to surficial groundwater. The Wetland Data Package cautions that, this analysis indicates areas “that can be conservatively assumed to have potential indirect impacts due to changes in groundwater quality.” (*Id.*)

**b) *Mine Site Waste Rock and Mine Pits***

The PolyMet SDEIS states, “The NorthMet waste rock and ore contain trace amounts of mercury. Laboratory analysis of humidity cell leachates from waste rock samples found average total mercury concentrations between 5 and 7 ng/L, with concentrations unrelated to rock type or



sulfur content.” (SDEIS, p. 5-201). The reference cited on this page, SRK 2007b, does in fact summarize average mercury concentrations as stated in the SDEIS. (SRK2007b, p. 50). However, the report also includes data showing that some leachates had mercury concentrations as high as 21.7 ng/L and 30.1 ng/L. (*Id.*, pdf p. 801). With a bioaccumulative toxin, such as mercury, dilution doesn’t reduce environmental or health hazards, so even intermittent high levels of mercury present a significant concern.

The SDEIS fails to discuss testing updates to determine mercury releases from waste rock. In 2011, six samples were used to set mercury concentration caps for Category 1 waste rock. The report suggested the study effectively simulated the performance of a waste rock stockpile at a pH from 7.9 - 8.3. (Waste Characterization Data Package, Mar. 7, 2013, SDEIS reference PolyMet 2013l, p. 11). Even at this somewhat basic pH, the maximum indicated range for mercury leachate was from 0.01 to 0.03 µg/L. (*Id.*, p. 13). These results are equivalent to 10 to 30 ng/L. The PolyMet SDEIS needs to reconcile various test results and provide mercury leachate results for all categories of waste rock and a reasonable range of predictions of mercury release through seepage.

The PolyMet SDEIS predicts that mercury levels in the West Pit would stabilize at approximately 0.9 ng/L based on the assumption of a 92 percent mercury burial rate. (SDEIS, Table 5.2.2-50, p. 5-203). Although the PolyMet SDEIS refers several times to the 92 percent burial assumption (see SDEIS, pp. 5-202, 5-203, 5-204) at no point does the SDEIS cite any literature or data substantiating this assumption. This SDEIS analysis includes no contribution of mercury from pit walls. The analysis also includes a substantial dilution factor from water treated at the WWTP and untreated tailings basin seepage, the 1.3 ng/L mercury concentration of which is by far the lowest concentration level for all West Pit inputs.

Although the SDEIS suggests that mercury in mine pit lakes generally remains below the 1.3 ng/L standard, average mercury concentrations in 2 of the 16 listed mine pits exceed the standard. (SDEIS, p. 5-202). In addition, mercury concentrations in 5 of the pits ranged above the 1.3 ng/L standard. (Water Modeling Data Package – Mine Site, SDEIS reference PolyMet 2013i, pp. 308-309). Neither the pits nor the data used can be readily identified. A brief review of MPCA discharge monitoring reports from LTVSMC mine pit 1 dewatering shows numerous exceedances of the Great Lakes standard: 2.9 ng/L in April 2002, 2.8 ng/L in October 2004, and 8.8 ng/L in June 2003. (MPCA DMRs for MN0042536, SD003).

***c) Tailings Basin and Hydrometallurgical Residue Facility***

The PolyMet SDEIS states that the tailings basin would receive inputs of mercury from residual concentrations in the tailings and process consumables, with contributions from Colby Lake makeup water and Mine Site process water. (SDEIS, p. 5-205). However, no analysis is provided from which a decision-maker or citizen could determine the mercury mass and concentrations that are deposited to the tailings piles.

Average mercury concentrations in Colby Lake water are 5.4 ng/L. (SDEIS, p. 4-41). No mercury treatment target is provided for the mine site WWTF prior to its conversion to a reverse osmosis plant (SDEIS, Table 5.2.2-28, p. 5-126). However, the SDEIS estimates that treated water from the mine site filtration plant WWTF will have a mercury concentration of 8 ng/L (SDEIS, Table 5.2.2-50, p. 5-203).

The SDEIS states that process and tailings water samples from a pilot study conducted with NorthMet ore were found to have mercury concentrations of 11.2 and 0.7 ng/L, respectively and that mercury loadings to the Tailings Basin are estimated to be 16.2 pounds per year. (SDEIS, pp. 5-205, 5-206). No reference is cited for this data. The SDEIS also asserts, again without a citation, that “about 95 percent of the mercury originating in the ore is expected to remain within—or be adsorbed to—the tailings and the hydrometallurgical residue, where it would remain isolated from further transport to the environment.” (SDEIS, p. 5-431)

The PolyMet SDEIS assumes that mercury concentrations in untreated tailings basin seepage will be 1.1 ng/L; runoff will range from 1.1 ng/L if it interacts with tailings, to 3.5 ng/L if it does not interact with tailings; and tailings basin pond water will be 2.0 ng/l. (SDEIS, p. 5-206). However, even the reports prepared on PolyMet’s behalf do not support these assumptions.

The NTS 2006 bench study referenced in the PolyMet SDEIS (SDEIS, p. 5-206) does not support claims for 95 percent adsorption of mercury to NorthMet tailings. This NTS study is summarized in an Addendum to the RS29T report on Wastewater Treatment Technology, included in the SDEIS references as Barr 2007e. The mercury bench study was a flask test lasting 480 minutes. At the end of 8 hours, mercury in the flask containing tailings had decreased from 3.3 ng/L to 0.9 ng/L, a 73 percent reduction. However, plain water in the control flask reduced mercury concentration from 3.6 ng/L to 2.8 ng/L, a 22 percent reduction. It is unlikely that even the 73 percent reduction can be attributed entirely to the tailings. In addition, the lowest

concentrations in the tailings experiment were from 60 to 240 minutes, when mercury fell beneath the detection limit of 0.5 ng/L. (Barr 2007e, pdf pp. 157, 160) From 60 minutes to 480 minutes, mercury may have desorbed from the tailings, and there is not way to tell if mercury levels would have increased further if the test had continued.

Tests conducted by SRK on PolyMet tailings in 2007 suggest that mercury concentrations in runoff contacting tailings will exceed the 1.1 ng/L assumed in the SDEIS. The SRK report explained, “There were no clear increasing or decreasing mercury concentration trends along the flow path through the LTVSMC tailings.” With 22 samples, mercury concentrations ranged from 2.3 to 5.4 ng/L with a mean of 3.2 ng/L. (SRK 2007c, p. 31) The SRK report explained that test work performed for RS54 “showed that mercury concentrations in contact with tailings are between 2 and 5 ng/L. Likewise, NTS (2006) showed that contact with regional rain water containing 10 ng/L resulted in a similar range of concentrations. Pond concentrations are expected to be in the same range or less.” (*Id.*, p. 98).

The PolyMet SDEIS contains no explanation of mercury removal technologies that would be provided at the WWTP. By assuming that WWTP influent will not exceed 1.3 ng/L, the PolyMet SDEIS avoids the question of what treatment and at what cost would be needed if the WWTP had to significantly reduce mercury concentrations in order to comply with the Great Lakes standard. Once full disclosure of tailings basin sources and concentrations is required in a revised SDEIS, it may become evident that mercury concentrations in tailings runoff, seepage and the tailings pond exceed the SDEIS projections. This revised analysis will allow decision-makers to evaluate the risk that uncaptured tailings seeps would violate mercury standards and will ensure that the WWTP is designed so that its effluent can comply with mercury standards.

The PolyMet SDEIS provides no information as to the amount of mercury contained in the hydrometallurgical residue and avoids any discussion of its impacts by assuming that leakage from this facility “would be negligible.” (SDEIS, p. 5-157). PolyMet’s 2007 Mercury Mass Balance states that 85 percent of the mercury from the ore, estimated as 164 pounds per year of mercury, will be deposited in the hydrometallurgical residue, all of which will remain “buried.”<sup>7</sup> No SDEIS references describing the hydrometallurgical residue facility analyze mercury.

Based on the preceding discussion, which describes critical information missing from the PolyMet SDEIS regarding mercury air emissions, concentrations and releases and

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<sup>7</sup> PolyMet, Facility Mercury Mass Balance Analysis (RS66) March 2007, Attachment A, attached as Exhibit 4.

unsubstantiated assumptions regarding mercury burial and sequestration, the SDEIS must be substantially revised.

**3. The PolyMet SDEIS' assessment of the risks of mercury methylation and bioaccumulation is inadequate.**

**A. The PolyMet SDEIS does not evaluate the reasonably foreseeable impacts of the Proposed Action on mercury methylation and bioaccumulation.**

The PolyMet SDEIS admits that mercury methylation and bioaccumulation as a result of conversion of inorganic mercury by sulfate-reducing bacteria is serious problem affecting fish, wildlife and human health. "Methylmercury is much more of a problem than inorganic mercury, in that it can accumulate to concentrations of concern in the aquatic food chain, it is more bioavailable than inorganic mercury, and it can bioaccumulate in fish, wildlife, and humans." (SDEIS, p. 5-20)

The SDEIS states that the State of Minnesota has a strategy to "minimize the discharge of water with elevated sulfate concentrations to methylmercury 'high-risk' situations." (MPCA 2006). (SDEIS, p. 5-20) The SDEIS acknowledges that "high-risk" situations include precisely the types of environments impacted by the PolyMet tailings basin and mine site:

These high-risk areas include wetlands, low-sulfate water (less than 40 mg/L) where sulfate may be a limiting factor in the activity of sulfate-reducing bacteria, and waters that flow to a downstream lake that may stratify, all or most of which apply to the area downstream of the Tailings Basin and the WWTF discharge. (SDEIS, p. 5-208)

Although it is undisputed that the risk of methylmercury is significant and that the PolyMet project would affect high-risk areas for mercury methylation, the PolyMet SDEIS makes no attempt to analyze the risk of mercury methylation locally and downstream as a result of air emissions, water discharges and hydrological changes at the proposed PolyMet mine and plant site. The SDEIS states, "Mercury was not included in the GoldSim model, as insufficient data and a general lack of definitive understanding of mercury dynamics prevented modeling mercury like the other solutes." (SDEIS, p. 5-201) The SDEIS attempts to justify the lack of this analysis on the disputable grounds that "Current scientific understanding of the factors and mechanisms affecting mercury methylation and bioaccumulation is limited." (*Id.*).

The PolyMet SDEIS' half-hearted explanation of why no effort is made to systematically review or quantify potential methylmercury effects is inconsistent with the complex and inconvenient truths reflected in earlier versions of this environmental review document:

Sulfate mobilization, water level fluctuation, and mobilization and methylation of mercury sequestered in peat all tend to increase the potential for mercury bioaccumulation in fish. Finally, the effects of sulfate and mercury mobilization and their effects on mercury methylation are cumulative although not necessarily strictly additive. Individually and collectively these factors may significantly increase the potential for bioaccumulation in fish by increasing the production and bioavailability of methylmercury.

Increased sulfate can be expected to no more than double mean methylmercury bioavailability upstream of the USGS gage above Colby Lake, in the Embarrass River, and in the St. Louis River basin upstream of the Embarrass River confluence. (PolyMet DEIS, Appendix D, pp. 4.5-17 to 4.5-18).<sup>8</sup>

As explained in Dr. Branfireun's expert opinion, modeling of methylmercury impacts of the PolyMet project would have been possible using available models and concepts well-understood in the scientific literature.

Federal regulations do not allow an EIS preparer to omit or summarily dismiss analysis of adverse impacts that are essential to a reasoned choice among alternatives by claiming that the information is incomplete or unavailable. 40 C.F.R. § 1502.22. "If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement." 40 C.F.R. §1502.22(a).

In *Mont. Wilderness Ass'n v. McAllister*, 658 F. Supp. 2d 1249,1256 (D. Mont 2009), *aff'd* *Mont. Wilderness Ass'n v. McAllister*, 666 F.3d 549 (9<sup>th</sup> Cir. 2011), the court granted environmental groups' motion for summary judgment on the grounds that the Forest Service failed to comply with 40 C.F.R. §1502.22(b). The court explained, "The Forest Service merely observed that the information was unavailable, and then concluded that because it was unavailable it was also unnecessary. This was a mistaken course of conduct." *See also Mid States Coalition for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549-550 (8<sup>th</sup> Cir. 2003)(Remand to Surface Transportation Board of railway project; Board's "made no attempt to fulfill" CEQ requirements pertaining to incomplete or unavailable information.)

The next discussion identifies gaps in the SDEIS analysis of mercury methylation and bioaccumulation impacts. Additional more detailed discussion in the expert opinion of Dr. Branfireun is incorporated by reference. The final section proposes that cumulative mercury

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<sup>8</sup> Appendices to the October 2009 PolyMet DEIS are not included in SDEIS reference MDNR and USACE 2009. They can be found at [http://www.dnr.state.mn.us/input/environmentalreview/polymet/eis\\_toc.html](http://www.dnr.state.mn.us/input/environmentalreview/polymet/eis_toc.html).

methylation impacts be analyzed in the project area and downstream in the St. Louis River, focusing on assessment of human health risks and environmental justice impacts.

**B. The PolyMet SDEIS does not assess impacts of particulate air emissions and ore spillage on mercury methylation.**

The PolyMet SDEIS does not discuss the impacts of sulfur from particulate emissions on mercury methylation. Particulate emissions from both the mine site and the plant site are substantial. At the mine site, actual PM<sub>10</sub> particle emissions from stationary sources, fugitive emissions and vehicles are predicted to total 466 tons per year, while actual PM<sub>2.5</sub> particle emissions would be 79 tons per year. (SDEIS, Tables 5.2.7-4 and 5.2-7-5, p. 5-403). At the plant site, actual PM<sub>10</sub> emissions are predicted to total 430 tons per year and actual PM<sub>2.5</sub> emissions 221 tons per year. Total actual mine site particle emissions would be 545 tons per year, while total plant site particle emission would be 651 tons per year. These totals do not include ore fines from the railroad corridor, which are expected to be coarser. (SDEIS, p. 5-403).

The PolyMet SDEIS does not disclose the level of sulfur in these various particulates or analyze to what degree and in what areas sulfur in particulate deposition would contribute to mercury methylation in wetlands at and near the project area. The PolyMet SDEIS states that approximately 543 acres of wetlands along the railroad corridor could be affected by rainfall contacting spilled ore and fines and releasing solutes. (SDEIS, p. 5-277). However, the PolyMet SDEIS does not analyze the effects of this spillage on mercury methylation in these affected wetlands.

**C. The PolyMet SDEIS' analysis of mine site and tailings site sulfate seepage and mercury methylation is inadequate and inconsistent with applicable law.**

***a) Mine Site Sulfate Discharge***

The PolyMet SDEIS acknowledges that the project will increase the sulfate load in the Partridge River. (SDEIS, p. 5-208). However, the SDEIS provides no analysis of how sulfate discharge at the mine site, along with the air deposition and ore spillage previously described, would predictably increase mercury methylation in sulfate-limited waters.

At the mine site, sulfate discharge to surficial groundwater in P90 estimates is predicted to double along the East Pit Category 2/3 flowpath (from 10.8 mg/L to 21.6 mg/L), more than triple along the OSLA flowpath (from 10.8 mg/L to 36.5 mg/L) and nearly quadruple along the

West Pit flowpath (from 10.8 to 41.9 mg/L). (SDEIS, Table 5.2.2-22, p. 5-109). Within the mine site groundwater flowpaths from the West Pit, East Pit, Category 2/3 waste rock pile, overburden storage and laydown area and ore surge pile, the SDEIS identifies 515.8 acres of wetlands. (SDEIS, p. 5-283; Table 5.2.3-7, p. 5-284).

As discussed in Section II of these comments, mine site sulfate discharges are underestimated and seepage will occur in additional directions, potentially impacting more wetlands. The Co-Lead agencies have acknowledged that no field experience substantiates the 90 percent containment assumed for the Category 1 waste rock stockpile and that no range of probable results from this engineered system was evaluated.<sup>9</sup> SDEIS technical documents as well as mine site faults suggest that seepage could propagate in multiple directions and that uncaptured seepage from the Category 1 waste pile could drain outside the West Pit.<sup>10</sup>

PolyMet mine site deposition of sulfur-bearing particles and discharge of sulfates are of particular concern for mercury methylation, since mine site wetlands and waters are likely to be low-sulfate waters where sulfate inputs would increase mercury methylation. (See SDEIS, p. 5-208). WaterLegacy found no sulfate monitoring data for the mine site wetlands within surficial groundwater flow paths. But mean water quality data in creeks south of the mine site potentially impacted by PolyMet mine site seepage demonstrates that these are very low-sulfate waters. Current mean sulfate levels are 0.74 mg/L in Longnose Creek, 2.6 mg/L in Wetlegs Creek and 1.2 mg/L in the Unnamed Creek, the creek to which PolyMet proposes to discharge effluent. (SDEIS, Table 4.2.2-15, p. 4-80; *see also* Figure 4.2.6-1, p. 4-217 for sampling locations; Figure 5.2.2-4, p. 5-35 for surficial groundwater flowpaths). Sulfate inputs could also interact with mercury already present in streambed sediments and riparian wetlands, which may be significant given mercury sampling results of 3.3 ng/L in Longnose Creek, 5.0 ng/L in Wetlegs Creek and 10.3 ng/L in the mine site Unnamed Creek. (SDEIS, Table 4.2.2-15, p. 4-81).

#### ***b) PolyMet Tailings Site Sulfate Discharge***

The SDEIS supplies no predictions of sulfate levels in tailings pore water or in seepage to groundwater beneath the tailings pile. Section III of these comments demonstrates that the

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<sup>9</sup> B. Johnson, MDNR, email to P. Maccabee, WaterLegacy re Probabilities Modeling DPA, Jan. 10, 2014, attached as Exhibit 5.

<sup>10</sup> See Map, Faulted Bedrock and Surface Topography, Vicinity of the PolyMet Project, compiled by geologist J.D. Lehr, attached as exhibit 6; Water Modeling Data Package – Mine Site Mar. 8, 2013, SDEIS reference PolyMet 2013i, Large Figure 21 at pdf p. 483, reproduced as Exhibit 7.

PolyMet SDEIS assumption of more than 99 percent collection of tailings seepage is unsubstantiated and unreasonable. Analysis of both the volume and concentration of sulfates in uncaptured and undiluted groundwater seepage must be provided in a revised SDEIS.

The PolyMet SDEIS does model sulfates at various groundwater evaluation points in the plant site surficial aquifer. P90 predictions for sulfates are 158 mg/L in the north flowpath at the property boundary; 118 mg/L in the north flowpath before Mud Lake Creek; 204 mg/L in the northwest flowpath at the property boundary; 150 mg/L in the northwest flowpath before Trimble Creek; 193 mg/L in the west flowpath at the property boundary and 159 mg/L in the west flowpath before the Embarrass River. (SDEIS, Table 5.2.2-38, p. 5-169). This table, as well as the SDEIS modeling of sulfate concentrations in plant site Embarrass River surface water (SDEIS, Table 5.2.2-43, p. 5-185) compares NorthMet Project Proposed Action predictions only with the “Continuation of Existing Conditions Scenario.”

***c) Failure to Compare Impacts with a “No Action” Alternative Baseline***

The PolyMet SDEIS admits that its “Continuation of Existing Conditions Scenario” is not the same as a “No Action” alternative (SDEIS, p. 5-78) and that sulfate discharge from the tailings basin would improve under a No Action alternative as a result of natural attenuation and additional mitigation measures required by new permit requirements or other state and federal remediation in light of the Cliffs Erie Consent Decree. (SDEIS, p. 5-221). The SDEIS admits, that the “Continuation of Existing Conditions Scenario. . . is not synonymous with the No Action Alternative because it does not account for other foreseeable changes within the NorthMet Project area.” (SDEIS, p. 5-222).

However, the SDEIS provides no comparison of NorthMet Proposed Action plant site sulfate levels to “No Action” sulfate levels. The PolyMet SDEIS’ prediction that increased sulfate loadings from the mine site will be “offset by a large decrease in the Embarrass River Watershed (21 percent at PM-13), resulting in a significant net decrease in overall sulfate loadings to the St. Louis River as a result of the NorthMet Project Proposed Action,” (SDEIS, p. 6-18) relies on a comparison with existing conditions, not a realistic No Action scenario.

The PolyMet SDEIS comparison of Proposed Action water quality impacts at the tailing site to “Existing Conditions” rather than the foreseeable improvements that would result from the No Action alternative is inconsistent with federal regulations and inconsistent with the Consent



Decree for the existing Cliff Erie LTVSMC tailings basin.

Federal regulations require comparison of a project's impacts with the alternative of no action to provide a clear basis for choice among options by the decision-maker and the public. 40 C.F.R. §1502.14(d). As explained in GLIFWC's comments on behalf of tribal cooperating agencies, CEQ guidance states, "Where a choice of 'no action' by the agency would result in predictable actions by others, this consequence of the 'no action' alternative should be included in the analysis." (SDEIS, Appx. C, pdf p. 1973; CEQ, 46 Fed. Reg. 18026, Mar. 23, 10981).

Federal courts require that an agency's analysis base its "no build" or "no action" alternative on accurate baseline data. "'Without [accurate baseline] data, an agency cannot carefully consider information about significant environment impacts . . . resulting in an arbitrary and capricious decision.'" *N. C. Wildlife Fed'n v. N.C. DOT*, 677 F.3d 596, 603 (4<sup>th</sup> Cir. 2012) (Vacating judgment that EIS was sufficient so that agencies and the public could fully evaluate the "no build" data), *quoting N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1085 (9<sup>th</sup> Cir. 2011). "Accordingly, courts not infrequently find NEPA violations when an agency miscalculates the 'no build' baseline or when the baseline assumes the existence of a proposed project." *N.C. Wildlife Fed'n, supra*, 677 F. 3d at 603, *citing Friends of Yosemite Valley v. Kempthorne*, 520 F.3d 1024, 1037-38 (9<sup>th</sup> Cir. 2008); *N.C. Alliance for Transp. Reform, Inc. v. United States DOT*, 151 F. Supp. 2d 661, 690 (D.N.C. 2001).

The no action alternative is meant to "provide a baseline against which the action alternative" is evaluated. *Ctr. for Biological Diversity v. United States DOI*, 623 F.3d 633, 642 (9<sup>th</sup> Cir. 2010). (Finding BLM's approval of an EIS arbitrary and capricious due to flawed assumption regarding result of no action alternative). *See also Ctr. for Biological Diversity v. United States BLM*, 746 F. Supp. 2d 1055, 1090 (N.D. Cal. 2009) ("[T]he purpose of setting a baseline is because the "'no action' status quo alternative . . . is the standard by which the reader may compare the other alternatives' beneficial and adverse impacts related to the applicant doing nothing.")

Where a "no action" analysis relied on the assumption that an old dock would remain and continue to leach creosote pollution into the water if a barge-loading facility were not approved, the court agreed with plaintiffs that "the 'no action' alternative was based on a false assumption." *Preserve Our Island v. United States Army Corps of Eng'rs*, 70 ERC (BNA) 1622, slip op. 46-47 (D.C.W. D. Wash. 2009). The court explained that if the proposed action had not been

approved, removal of the old dock would still have been required under a state lease, which would have eliminated the source of ongoing pollution. *Id.*

In determining the “no action” alternative baseline, an EIS cannot properly include elements that would not comply with law. *Friends of Yosemite Valley v. Kempthorne*, 520 F.3d 1024, 1038 (9<sup>th</sup> Cir. 2008). The effects of current legal proceedings must be accounted for in analyzing the “no action” alternative; agencies failing to do so violated NEPA requirements. *Conservation Northwest v. Rey*, 674 F. Supp. 2d 1232, 1245-1246 (D.C. W.D. Wash., 2009).

Violations of water quality standards at the existing Cliffs Erie LTVSMC tailings basin were the subject of litigation under the Clean Water Act, as a result of which a Consent Decree was entered on March 25, 2010. This Consent Decree between the MPCA and Cliffs Erie stated that long-term plans “shall identify mitigation strategies to address elevated concentrations of sulfates and parameters of concern” and that, upon their approval, schedules and deadlines in the plans would be an enforceable part of the Consent Decree, subject to legal penalties.<sup>11</sup>

If the PolyMet Proposed Action does not proceed, reductions in sulfate discharge from the existing Cliffs Erie LTVSMC tailings basin will be required by the Consent Decree and applicable statutes and rules. Recent pilot testing at the existing LTVSMC tailings basin suggests that reverse osmosis “can effectively reduce the concentration of sulfate and parameters of concern of the discharge at SD026 to less than or equal to the water quality goals.”<sup>12</sup>

Reduction of sulfate discharge from the LTVSMC tailings basin does not depend on approval of the PolyMet project; it is required by law. Effects of tailings basin discharge from the PolyMet Proposed Action must be compared to a “no action” baseline that includes remediation to comply with water quality standards and with the Cliffs Erie Consent Decree.

Finally, although it is likely some waters near the tailings site are no longer sulfate-limited, it cannot be assumed that sulfate additions will not increase mercury methylation near the proposed PolyMet plant. Surface water sampling in tailings basin streams tributary to the Embarrass River identified several low-sulfate sites, including Trimble Creek TC-1 with mean sulfate of 12.4 mg/L, Mud Lake Creek MLC-1 with mean sulfate of 9.8 mg/L and Mud Lake Creek MLC-2 with mean sulfate of 3.2 mg/L. (SDEIS, Table 4.2.2-35, p. 4-131).

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<sup>11</sup> MPCA and Cliffs Erie, Consent Decree, Mar. 25, 2010, Section IX, ¶ 29, attached as Exhibit 8.

<sup>12</sup> Barr, Reverse Osmosis Pilot Test Report SD026 Active Treatment Evaluation Prepared for Cliffs Erie LLC and PolyMet Mining Inc. June 2013, pp. 1, 4-5, 40, report narrative attached as Exhibit 9.

***d. Hydrologic Changes at Mine Site and Plant Site***

The SDEIS acknowledges that hydrologic changes and water level fluctuations increase methylation of mercury:

Methylation of environmental mercury by sulfate-reducing bacteria is also stimulated by drying and rewetting associated with hydrologic changes and water level fluctuations (Gilmour et al. 2004; Selch et al. 2007). Drying (and subsequent increase in exposure to oxygen) of substrate containing reduced sulfur species (sulfides and organic sulfur) oxidizes those species into sulfate, which is remobilized and available to sulfate-reducing bacteria upon rewetting of the substrate. This mechanism stimulates production of methylmercury in sediments exposed to wetting and drying cycles (Gilmour et al. 2004) and probably accounts for some of the elevated methylmercury concentrations observed in releases from wetlands during high-flow events (Balogh et al. 2006). Thus, hydrologic changes and water level fluctuations can stimulate mercury methylation and enhance bioaccumulation. (SDEIS, p. 5-210)

The PolyMet SDEIS makes no effort to apply this scientific research to describe, let alone quantify, risks from the Proposed Action. This omission must be rectified.

The PolyMet open-pit sulfide mine will dewater wetlands in the Partridge River watershed. Dr. Branfireun has opined that effects of water drawdown in the PolyMet SDEIS on methylating wetlands such as ombrotrophic bogs are understated and that it has not been demonstrated that the Partridge River would serve as a barrier for a cone of depression. Even using the underestimates in the SDEIS, there is a “high likelihood” that 866.9 acres of wetlands will be impacted by changes in hydrology and a “moderate likelihood” that an additional 530.7 acres of wetlands near the mine site would be impacted. (SDEIS, Table 5.2.3-3, p. 5-247). Drying of more than a thousand acres of wetlands during mine drawdown and rewetting with precipitation and when mine pits flood during reclamation would stimulate methylmercury production.

Wetlands immediately downgradient of the existing tailings basin were created or expanded as a result of seepage upwelling from the surficial aquifer and surface seepage from the LTVSMC tailings basin. (SDEIS, p. 4-99) Even though stream augmentation may mitigate some of this effect, capture and treatment of tailings basin seepage as a result of the PolyMet Proposed Action is likely to result in drying and rewetting of wetlands downgradient of the existing tailings basin, facilitating mercury methylation and releases during high flow events.

The PolyMet SDEIS must be redone to address all of the gaps and inadequacies described

in this section, in compliance with applicable federal regulations.

**4. The PolyMet SDEIS must be redone to analyze cumulative impacts on mercury bioaccumulation in the St. Louis River and more thoroughly analyze cumulative impacts of mercury on human health and environmental justice.**

**A. The PolyMet Proposed Action will have cumulative effects on St. Louis River water quality.**

The PolyMet SDEIS denies that mercury and sulfate loadings from the Proposed Action have the potential for cumulative effects on water quality in the St. Louis River. (SDEIS, p. 6-18). The PolyMet SDEIS then fails to consider the potential for cumulative effects on water quality in the St. Louis River of mercury methylation near the project area flushed downstream during storm events or bioaccumulating in the food chain. The SDEIS' claims that there are only minor increases in pollutants in each watershed and sufficient "offsets" from the other to render them inconsequential is contrived and inconsistent with the evidence summarized in preceding pages of these comments. As Dr. Branfireun's opinion confirms, failure to consider effects of project area methylation and biomagnification in the St Louis River system is patently unreasonable.

Claims in the PolyMet SDEIS that the Proposed Action will result in only 0.6 grams per year loading to the Embarrass River watershed (SDEIS, p. 5-207) are contradicted by the following: Mercury loading to the Embarrass River watershed from Colby Lake water augmentation discharges would exceed this predicted loading. Mercury air deposition to the Embarrass River watershed was not considered in mercury loading. The efficacy of mercury sequestration in tailings proposed in the SDEIS is unsubstantiated and inconsistent with the project proponent's own tests. The hydrometallurgical residue facility, where up to 164 pounds of mercury per year will be deposited, cannot be assumed to have absolutely no leakage.

Claims in the PolyMet SDEIS that mercury increases in the Embarrass River Watershed will be "offset" by 1.2 grams per year reduction in mercury loadings to the Partridge River (SDEIS, p. 5-489 to 5-490) are undermined by the following: Mercury loading to the Partridge River watershed alone would exceed this predicted "reduction." Neither mine site air deposition of 288 grams of mercury to the Partridge River Watershed nor plant site air deposition of mercury to the Second Creek sub-watershed were considered in this calculation of loading to the Partridge River Watershed. Mine site mercury seepages, including indirect discharge from the unlined peat and overburden storage area and the unlined Category 1 waste rock pile, were also

not considered in the SDEIS to evaluate mercury loading.

Claims in the PolyMet SDEIS that the Proposed Action will increase sulfate loading in the Partridge River Watershed by just 1 percent (SDEIS, p. 6-18) are contradicted by the following: Deposition of 545 tons per year of sulfur-containing particulates as a result of mine site air emissions and spillage of ore fines were not considered in the SDEIS calculation of sulfate loading. Unsubstantiated assumptions were used in the SDEIS to limit the extent and direction of mine site sulfate seepages.

Claims in the PolyMet SDEIS that sulfate increases in the Partridge River Watershed will be offset by a large decrease in sulfate loading to the Embarrass River Watershed (SDEIS, p. 6-18) are undermined by the following: Deposition of 651 tons per year of sulfur-containing particulates as a result of plant site emissions was not considered in the SDEIS calculation of sulfate loading to the Embarrass River watershed. Unsubstantiated and unreasonable assumptions were used in the SDEIS to limit the extent and direction of sulfate seepage from the tailings site. Finally, comparison of tailings basin sulfate releases with “continuation of existing conditions,” rather than a reasonable no action baseline, distorts predictions of sulfate loading to the Embarrass River Watershed.

It would be arbitrary and capricious to deny the potential for cumulative effects of PolyMet project mercury and sulfates on water quality in the St. Louis River. In addition, failure to recognize that increased mercury methylation in PolyMet project area wetlands would have a cumulative effect on the St. Louis River is scientifically indefensible. The SDEIS recognizes that methylmercury that occurs in wetlands in the St. Louis River Basin “is flushed to rivers from wetlands during storm events.” (SDEIS, p. 5-208). The fact that methylmercury bioaccumulates and bioconcentrates in an aquatic system rather than being diluted as it progresses downstream is noted in the SDEIS (SDEIS, p. 5-20) and included in the very definition of a bioaccumulative chemical of concern. *See e.g.* Minn. R. 7052.0010, subp. 4.

**B. PolyMet cumulative mercury and methylmercury impacts are likely to have unacceptable environmental, health and environmental justice effects.**

A rigorous assessment of mercury and methylmercury impacts of the PolyMet Proposed Action is likely to demonstrate that the project’s environmental, health and environmental justice effects are unacceptable. Executive Order 12898 (February 1994) requires federal agencies to

identify and address environmental injustice, as detailed in Section XII. In addition, Executive Order 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*, 1997), requires each federal agency give high priority to the identification and assessment of environmental health and safety risks to children. (SDEIS, p. 5-507). The SDEIS analysis must recognize the cumulative risks from adding additional incremental mercury and methylmercury to an area where fish tissue mercury already poses significant hazards. The SDEIS must also be revised to provide a more robust and candid health risk assessment for mercury.

The revised SDEIS should place mercury deposition to Embarrass River lakes in context by disclosing the actual Hazard Quotient in these lakes. The SDEIS states that the PolyMet Proposed Action alone increases risks from mercury in fish in the five lakes from 0.2 to 1.8 percent and represents 58 percent to 92 percent of the cumulative increase in risk. The SDEIS notes that “the current fish tissue concentration in the five lakes results in Hazard Quotients that exceed 1,” thus requiring limits on fish consumption. (SDEIS, pp. 6-62 to 6-63). What the SDEIS fails to mention is that actual Hazard Quotients for the Embarrass chain of lakes are far above 1. At Wynne Lake, for example, the Hazard Quotient is 46.2, more than 46 times the action forcing level. (Barr, Mercury and Health Report, SDEIS reference Barr 2012b, p. 25). The health risk for subsistence anglers or subsistence tribal members relying on fish from these lakes would be up to 15 times the EPA-assumed safe intake level for a pregnant mother or child under the age of 15. (*Id.*, p. 23)

Mercury and methylmercury impacts to the St. Louis River must also be assessed in light of their cumulative health impact, particularly on tribal and other subsistence consumers of fish. A recent Minnesota Department of Health study found that 1 out of 10 infants in Minnesota's Lake Superior region were born with unsafe levels of mercury in their blood. At a statistically significant level, a greater proportion of Minnesota babies had unsafe mercury in their blood as compared with babies in the Lake Superior region of Wisconsin or Michigan. Mercury levels were also higher in Minnesota in the summer months, suggesting that increased consumption of locally caught fish during the warm months is an important source of pregnant women's mercury exposure.<sup>13</sup>

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<sup>13</sup> Minnesota Department of Health, Mercury in Newborns in the Lake Superior Basin, <http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/newbornhglsp.html> and Mercury Levels in Blood from Newborns in the Lake Superior Basin GLNPO ID 2007-942 Final Report November 30, 2011, p.p. 10, 15, <http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/glnpo.pdf>

Where mercury impairments, hazard quotients and impacts on infants are already high, additional mercury and methylmercury burdens may create unacceptable risks. So that decision-makers and the public can better understand these risks, WaterLegacy recommends that, when the PolyMet SDEIS is revised, the text should summarize salient health effects of methylmercury, such as the following:

Methylmercury is a highly toxic substance with a number of adverse health effects associated with its exposure in humans and animals. . . . Even at very low doses, mercury attacks the nervous system, the kidneys, the immune system, and the reproductive system. Methylmercury is classified as a developmental neurotoxicant, which causes harm to the human central nervous system and is "extremely toxic to the developing brain." Low-dose prenatal methylmercury exposure from maternal consumption of fish or other seafood has been associated with neurotoxicity in children. The public is exposed to methylmercury principally through the consumption of contaminated fish. Once ingested, methylmercury is absorbed into the bloodstream and distributes to all tissues including the brain and developing fetus. In an adult, this mercury can take months to excrete; however, in the fetal brain, the mercury cannot be excreted. . .

[E]ven at low levels of exposure, methylmercury effects the development of the central nervous system including: (1) motor function deficits; (2) neuropsychological impairment to attention, language, visuospatial performance, and verbal and visuospatial memory; and (3) developmental delays corresponding to one to two months in development for each doubling of exposure. Methylmercury also causes damage to the cardiovascular system, including difficulty regulating heartbeat and blood pressure in children, and heart disease and stroke in adults. Although the effects from exposure to methylmercury are significantly more pronounced in small children and developing fetuses, the damage from exposure to methylmercury is permanent in all populations. *Maine People's Alliance v. Holtrachem Mfg. Co., LLC*, 211 F. Supp. 2d 237, 245 (D. Me. 2002), *aff'd* *Maine People's Alliance v. Mallinckrodt, Inc.*, 471 F.3d 277 (1<sup>st</sup> Cir. 2006)

Cumulative methylmercury health risks may result in violation of the Fond du Lac Band's in-stream human health chronic standard for mercury of 0.77 ng/L. (SDEIS, p. 5-20). Members of the Grand Portage, Fond du Lac and other bands of the Lake Superior Chippewa/Ojibwe are likely to experience disparate impacts from increased mercury contamination of fish:

Members of the Grand Portage and Fond du Lac bands are known to consume substantially more fish than the assumed statewide average. As a result, increased mercury concentrations, and associated increases in mercury bioaccumulation in fish tissue could therefore constitute an EJ impact for Band members and other subsistence consumers of fish. (SDEIS, p. 5-509)

Additionally, the NorthMet Project Proposed Action could affect the availability of 1854 Treaty resources for some Band members through increased bioaccumulation of mercury in fish tissue, including species associated with subsistence. (SDEIS, p. 6-95)

Cumulative increases in mercury concentrations and the resultant increased mercury concentrations in fish tissue could constitute an EJ impact for Band members and other subsistence consumers of fish. (SDEIS, p. 6-101)

These effects are compounded by recognizing the cumulative impacts on the St. Louis River, on Fond du Lac tribal waters and on the St. Louis River estuary, which sustains both St. Louis River and Lake Superior fish. The SDEIS must be revised to disclose and consider the full range of cumulative effects of mercury and methylmercury on the environment, human, health, tribal resources and environmental justice.

However, there is no assurance that improved analysis would be sufficient to address the concerns raised in this comment. PolyMet's sulfide mining, processing and waste facilities would entail every known mechanism for mercury methylation and compound risks in a project area and region where human health hazards are already elevated. The PolyMet Proposed Action would pump and discharge water polluted with mercury to a high-risk methylating environment; deposit mercury air pollution in lakes with a high hazard quotient; store mercury-containing peat, overburden, waste rock and tailings in unlined facilities; deposit sulfur-containing particles and discharge sulfates to groundwater connected to sulfate-limited wetlands; and create wetting and drying cycles affecting mercury methylation processes in over a thousand acres of wetlands. These activities would take place in a water-rich area with extreme storm events as well as nearly thirty inches of precipitation per year.

Not only would mercury and methylmercury increases from the PolyMet project impact downstream water bodies already impaired due to excessive mercury in fish tissue, these increases would also affect tribal waters, treaty lands where tribes have the right to hunt, fish and gather for subsistence, Lake Superior's largest tributary, a critical estuary, and a region where a dismayingly large proportion of infants are born with unsafe mercury levels in their blood. WaterLegacy believes that this PolyMet mine project in this particular location would pose an unacceptable cumulative risk to human health and to environmental justice.

### **Recommendations – Mercury and Methylmercury**

- The Proposed Action must be substantially changed to preclude use of untreated Colby



Lake water for stream augmentation to Unnamed Creek, Mud Lake Creek, Trimble Creek or Second Creek.

- The SDEIS must be revised to explain how stream augmentation will be ensured without relying on untreated Colby Lake water to serve this purpose and must demonstrate that the proposed solution will comply with applicable water quality standards.
- The SDEIS must be revised to analyze impacts of mercury air deposition from the PolyMet mine site, including magnitude and speciation. This analysis must consider impacts on all waters, including the Second Creek watershed and waters upstream of identified Embarrass River lakes.
- The SDEIS must be revised to analyze impacts of mercury air deposition considering species other than fish and potential bioaccumulation in downstream waters.
- The SDEIS must be revised to provide explicit information as to the mass of mercury in peat, overburden, ore, waste rock, process water, tailings, reject concentrate, filtered sludge, HRF waste and any other potential sources of mercury release from the project.
- The SDEIS must be revised to disclose mercury concentrations in seepage from all potential project sources, including the OSLA, Category 1 waste rock pile, liner leaks, mine pits, tailings piles and the HRF, making explicit any assumptions regarding leaks, infiltration and adsorption.
- The SDEIS must be revised to provide a scientific basis for its assumptions regarding mercury burial, sequestration or adsorption in the East Pit, West Pit lake, tailings or hydrometallurgical residues.
- The SDEIS must be revised to use a reasonable range of probabilities for mercury burial, sequestration or adsorption in lake sediments, tailings, residues and surficial materials based on uncertainty as to the mechanisms of adsorption and desorption and the range of values observed in tests and field experience.
- The SDEIS must be revised to disclose the influent and effluent assumptions and targets for the WWTF, both prior to and after conversion to reverse osmosis, and for the WWTP, explaining for both facilities the treatment methods proposed to achieve compliance with the Great Lakes mercury standard.
- The SDEIS must be revised to assess the sulfur content of mine site and plant site particulate emissions and the impacts of particulate emissions and ore spillage on mercury methylation in the project area and on sulfate loading to the Partridge River and Embarrass River watersheds.
- The SDEIS must be revised to assess the impacts of all mine site sulfate seeps and liner leaks to shallow groundwater on mercury methylation.

- The SDEIS must be revised to disclose the concentration of sulfates in tailings basin pore water and seepage release beneath the tailings basin.
- The SDEIS must be revised to model reasonably foreseeable improvements of water quality at, near and downstream of the tailings basin for a “no action” baseline considering natural attenuation through precipitation and mitigation likely to be required in compliance with the Cliffs Erie Consent Decree.
- The SDEIS must be revised to assess the impacts of tailings basin sulfate releases on mercury methylation as compared to a “no action” baseline.
- The SDEIS must be revised to model the impacts of sulfate and mercury emissions and release and hydrologic changes at both the mine site and the tailings basin site on mercury methylation.
- The SDEIS must be revised to evaluate effects on water quality, wildlife, human health, tribal rights and resources and environmental justice resulting from cumulative impacts of the PolyMet proposed action on the St. Louis River and estuary.
- The SDEIS must be revised to determine effects of the PolyMet project on compliance with the downstream Fond du Lac water quality standard for mercury.
- The SDEIS must be revised to provide a health impacts assessment for methylmercury, describing salient health impacts and assessing cumulative health risks of increased mercury on fetuses, infants, children and adults.
- The SDEIS must be revised to assess disparate impacts of methylmercury bioaccumulation on low-income families and tribal members who rely on fish for subsistence.
- The SDEIS must be revised to analyze cumulative impacts of mercury and sulfate releases and methylmercury bioaccumulation on tribal rights and resources and environmental justice.
- The SDEIS must be revised to conclude that the PolyMet proposed action would pose an unacceptable cumulative risk to human health and to environmental justice.

## **II. MINE SITE WATER QUALITY**

### **Introduction**

The PolyMet SDEIS' analysis of water quality impacts from PolyMet's proposed open-pit sulfide mine and other mine site features relies on inaccurate modeling, unsubstantiated and unreasonable assumptions, as well as insufficient data. The SDEIS water quality model outcomes seem to be determined by its assumptions, rather than arrived at by an objective and independent analysis. The SDEIS must be redone to address multiple inadequacies, which are likely to understate water quality impacts. However, even using the highly-limited data and modeling in the SDEIS, excursions from numeric water quality standards are predicted from PolyMet mine site contaminant sources.

### **Mine Site Features**

The mine site contains a number of features that could potentially be a source of seepage or leakage to groundwater. The Category 1 waste rock pile would be an unlined permanent feature on the north side of the mine site. Its maximum surface would be 526 acres, maximum height 240 feet above the ground and maximum volume 167,922,000 tons, or 70 percent of the waste rock mass. At closure, it would be tiered, covered with a geomembrane and vegetated. Uncontained seepage would migrate as groundwater. (SDEIS, pp. 3-43, 5-97, 5-100)

The Category 2/3 waste rock pile, the Category 4 waste rock pile and the Ore Surge pile would have a 12-inch compacted subgrade and an 80-millimeter LLDPE liner. The Category 2/3 pile would be on the southeast side of the site, with a maximum surface footprint of 180 acres, a maximum height of 200 feet and a maximum volume of 44,021,200 tons, or about 27 percent of the waste rock mass. (SDEIS, pp. 3-43, 5-100)

The Category 4 waste rock pile would be on the north side of the site and would be removed in order to excavate the Central Pit from mine year 11 to 20. The Category 4 pile would have a maximum footprint to 57 acres, a maximum height of 180 feet and a maximum volume of 6,206,700 tons. (SDEIS, pp. 3-43, 3-65, 5-100). Starting in year 11, Category 4 and Category 2/3 waste rock stockpiles would be backfilled into the East Pit and all new Category 2/3 and Category 4 waste rock would be disposed of in the East Pit, along with some Category 1 waste rock. (SDEIS, pp. 3-45, 5-343).

A temporary Ore Surge Pile would occupy 32 acres on the south side of the mine site, just west of the Category 2/3 waste rock pile. (SDEIS, p. 4-363). Saturated overburden in an

unspecified amount would either be used for construction or placed in the Category 2/3 or Category 4 lined piles. (SDEIS, p. 3-147).

Seepage above the liners of the Ore Surge Pile, Category 2/3 and Category 4 waste rock piles would be collected and sent to the mine site WWTF filtration plant. Seepage through the liners would enter the underlying surficial groundwater. (SDEIS, p. 5-97, 5-98)

Unsaturated overburden and peat would be stored in a 31-acre unlined Overburden Storage and Laydown Area (OSLA) on the south side of the mine site. It is anticipated that some of this material would be removed and used for construction on site. Seepage from the OSLA would enter the underlying shallow groundwater. (SDEIS, p. 3-44, 4-363, 5-97).

The East Pit would be excavated on the northeastern part of the site until year 11 of mining. By year 16, it is anticipated that mining in the Central Pit would be completed and excavation would have created a combined East Central Pit. The maximum depth of the East Pit would be 630 feet. From years 16 to 20, the remaining Category 2/3 waste rock pile and all waste rock generated from ongoing mining at the West Pit would be disposed of in the combined East Central Pit. Beginning in year 21, the water level in the East Pit would rise above the top of bedrock and discharge pit water into surficial groundwater. (SDEIS, pp. ES-17, 3-45, 3-46).

The West Pit would be excavated on the central portion of the mine site from year 1 through 20. If no additional mining were done of minerals beneath the pit, the West Pit would be flooded from years 20 to 33. The maximum depth of the West Pit would be 696 feet. It is estimated that, beginning in year 33, West Pit water would rise above the top of bedrock and begin to discharge pit water into the surficial groundwater. (SDEIS, p. ES-17, 5-97)

The mine site wastewater treatment facility (WWTF) would be constructed as a filtration plant. Prior to its conversion to a reverse osmosis (RO) facility, estimated to take place in year 40 if and when the West Pit is predicted to overflow, the WWTF filtration plant will contain several “equalization basins,” with geomembrane liners. These waste pools would receive process water collected from the West Pit and East Pit overflow, Ore Surge Pile, Category 1, Category 2/3, Category 4 waste rock piles, and surface runoff from the Overburden Storage and Laydown Area. The west equalization basin for the WWTF would also receive reject concentrate from the plant site reverse osmosis wastewater treatment plant until approximately year 35. Seepage through liners of these basins would discharge to shallow groundwater. (SDEIS, pp. 5-6, 5-97, 5-98).

**1. The PolyMet SDEIS incorrectly models Partridge River baseflow.**

Tribal Cooperating Agencies and the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) raised concerns about the inadequacy of hydrology data as early as 2008, pointing out that higher baseflow would “likely produce a model with higher recharge, more flow to the pits, different contaminant transport results, and different drawdown and baseflow impact predictions.” (SDEIS, Appx. C, pdf p. 1965). In July 2013, tribal scientists showed that mine site base flow was two to three times higher than PolyMet’s 0.5 cfs models, cautioning that it “appears that predictions of effects of the project may be far from accurate.” (SDEIS, Appx. C, pdf pp. 1958-1959).

In mid-January 2014, the MDNR disclosed that the agency had completed a technical review using 2011-2012 data from a new gage at the Dunka Road.<sup>14</sup> The MDNR Baseflow Memo confirmed the assessment made by GLIFWC. Although XP-SWMM modeling in the PolyMet SDEIS estimated the base flow for the Partridge River at Dunka Road to be 0.5 cfs, the Dunka Road stream gage demonstrated a minimum base flow of 1.3 to 1.8 cfs, even under drought conditions. Although additional years of data would significantly improve base flow estimates for this location, the memo gave credence to the view that the SDEIS modeling under predicted Partridge River base flow conditions.<sup>15</sup>

In response to press coverage regarding the MDNR Baseflow Memo, the MDNR issued a statement saying that the PolyMet SDEIS “used an input value of 1.5 cubic feet per second (cfs) as base flow for the upper Partridge River,” so that the new gage data was “within the base flow estimated from the previous data.”<sup>16</sup> WaterLegacy requested clarification from the MDNR of the baseflow input value actually used in modeling for the PolyMet SDEIS in an email on January 31, 2014, and received a response on or about February 21, 2014. MDNR confirmed that the value of 0.5 cfs was used to model baseflow for the Partridge River and that this was a deterministic value. No range of other values was considered.<sup>17</sup>

Both tribal scientists and MDNR scientists concur that it is likely the SDEIS modeling for the mine site uses an inaccurate deterministic baseflow input, and that a more realistic value

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<sup>14</sup> G. Kruse, MDNR, Memorandum, Partridge River Base Flow Analysis MDNR Gage #H03155002, Dec. 17, 2013 “MDNR Baseflow Memo,” attached as Exhibit 10.

<sup>15</sup> *Id.*, p. 7

<sup>16</sup> MDNR, Questions and answers about new river flow data for proposed PolyMet mining project, Jan. 28, 2014, attached as Exhibit 11.

<sup>17</sup> B. Johnson, MDNR email to P. Maccabee, WaterLegacy re Upper Partridge River Baseflow, DPA request of Jan. 31, 2014, attached as Exhibit 12.

would be approximately three times the input used in the SDEIS. Conclusions regarding water quality impacts rely on predictions of groundwater inflows and outflows from the mine pits and the flow of potential seepage and liner leakage from the ore surge pile, waste rock piles, overburden storage and mine wastewater treatment equalization basins. (*See e.g.* Table 5.2.2-26, p. 5-123). The extent of mine dewatering that may impact wetlands and the volume of groundwater required to be treated at mine site or plant site wastewater treatment facilities would also be affected by tripling the volume of baseflow in the model.

**2. PolyMet SDEIS' water quality modeling rests on inaccurate and unsubstantiated assumptions regarding fractures, hydraulic conductivities and pollution transport through bedrock faults and surficial materials.**

The PolyMet SDEIS' models of impacts of mine site pollutants on bedrock groundwater, surficial shallow groundwater and connected surface water are based on a number of assumptions. The SDEIS assumes that bedrock fractures and their impacts are negligible, (SDEIS, pp. 4-45, 4-69, 5-33, 5-113), and that bulk hydraulic conductivity of bedrock is so low that propagation through bedrock would not affect water quality. (SDEIS, p. 5-55, 5-113). The SDEIS further assumes that interactions between bedrock and surficial aquifers are insignificant and the connection between the surficial aquifer and underlying bedrock is weak (SDEIS, pp. 4-46, 4-47, 4-150). Based on the assumption that fractures are negligible and a single personal communication, the SDEIS also assumes that the separation between the pit floors and the Biwabik Formation would prevent any impacts to this important aquifer. (SDEIS, p. 4-43) The SDEIS averages estimated bedrock and surficial hydraulic conductivities to model pollutant propagation without considering fractures and faults. (SDEIS, pp. 4-44, 5-27).

The SDEIS further assumes that leaks from liners and seeps from mine pits and unlined contaminant sources would move in the same direction and rate as groundwater and that directions of flow are reflected by and limited to flowpaths toward the south and southwest illustrated in SDEIS maps. (SDEIS, pp. 5-35, 5-81, 5-102, 5-104). These assumptions of propagation, conductivity and direction, along with the baseflow assumptions previously discussed, determine the time that solutes would take to migrate to surface waters (SDEIS, Table 5.2.2-35, p. 5-154), as well as the volume and locations of discharge.

The SDEIS modeling of attenuation through soils results in a prediction that copper, nickel and arsenic will take thousands of years to travel from source areas to evaluation locations or the Partridge River. (SDEIS, p. 5-56). This attenuation model does not consider transport through fractures or other high porosity features.

WaterLegacy believes that the PolyMet SDEIS mine site water quality modeling of propagation of pollutants at the mine site must be revised based on the following evidence and expert opinion in J.D. Lehr's technical memorandum:

- Bedrock beneath the mine site is known to contain fractures and faults.
- Groundwater flow through bedrock occurs through fractures or other secondary porosity features.
- It cannot be assumed that mine site bedrock fractures lack hydrologic significance.
- Surface lineaments may be significantly related to underlying fractures and groundwater in bedrock.
- The presence or absence of over-pressurized groundwater does not determine whether there is a hydrogeological connection of fracture or fault zones.
- Weathering from mine dewatering may increase the aperture of existing bedrock fractures.
- SDEIS bulk horizontal and vertical conductivity values for Duluth Complex bedrock fail to consider transmission through faults, fractures and secondary porosity features.
- There is a potential that mine site bedrock fractures will serve as conduits for significant quantities of contaminated groundwater.
- Insufficient data is provided from which to conclude that the mine pits will not impact the Biwabik Iron Formation aquifer.
- The single 30-day pump test cited in the SDEIS is insufficient to infer that there is a "weak" hydrologic connection between bedrock and surficial deposits.
- It is likely that there would be significant interaction between ground water in surficial materials and bedrock along the lateral trends of bedrock fractures.

- Field measurements and the presence of ammonia in mine site deep groundwater further support a hydrologic connection between surface and bedrock aquifers.
- Hydrologic significance of mine site bedrock fractures, faults and secondary porosity features should be evaluated through further testing.
- Average bulk conductivities for SDEIS surficial zone modeling fail to reflect and inappropriately exclude zones of much higher than average conductivity.
- Surficial materials at the mine site are heterogeneous, and layers of sand and gravel are common, particularly on eastern third of the mine site.
- Permeable glacial outwash sediments, eskers and other areas of sand and gravel have high hydraulic conductivities.
- Surface outwash zones of sand and gravel represent significant high conductivity pathways for groundwater flow and contaminant transport.
- The spatial distribution of permeable outwash layers and their hydrological significance must be considered for accurate modeling of groundwater flow.
- Well-understood geological concepts would suggest that approximately 20 percent of surficial groundwater flowpaths at the mine site should be to the north.
- With respect to geology, the SDEIS has provided a data-poor environmental review process.

In addition, WaterLegacy would call attention to related issues emphasized by Tribal Cooperating Agencies in Appendix C of the SDEIS. As noted in the tribal Cumulative Effects Assessment (SDEIS, Appx. C, pdf pp. 2072-2073), the few deep groundwater borehole samples reflected in the SDEIS record found elevated ammonia nitrogen. Ammonia nitrogen results from a blasting compound and high levels have been found in discharge monitoring reports at the Northshore mine, approximately one mile north of the PolyMet mine site.

Barr's report on ammonia found in PolyMet mine site deep groundwater concluded, "The presence of ammonia in the deep boreholes may indicate that the water in the borehole came from the shallow surficial deposits. Ammonia is not typically found in deep bedrock systems but is common in wetland environments." (Barr, Hydrogeologic Investigation- PolyMet NorthMet Mine Site report RS-02, SDEIS reference Barr 2006b, pp. iii, 14). A second Barr report stated, "The presence of ammonia nitrogen in the samples likely indicates that there is a hydraulic connection between the bedrock aquifer and the surficial aquifer." (Barr, RS10A –



Hydrogeological – Drill Hole Monitoring and Data Collection – Phase 3, SDEIS reference Barr 2006c, pp. 10-11). The 2006 report suggested that additional testing would determine the nature of this hydrological connection. (*Id.*) Despite their QA/QC provisions, SDEIS dismisses these reports as collection or laboratory error. (SDEIS, p. 4-60). No testing has been identified to elaborate upon or contradict the reported results.

In addition to the presence of ammonia nitrogen, findings of tritium in mine site drill holes confirm a hydrological connection between mine site deep groundwater and the surficial aquifer. As explained in a third Barr report, “The samples from pumping well P-2 all contained measurable tritium, indicating that at least a portion of the source water is post-1952 water.” (Barr, RS10A –Hydrogeological – Drill Hole Monitoring and Data Collection – Phase 3, Mar. 2007, SDEIS reference Barr 2007b, pp. 9, 13).

Production at the Northshore mine began in 1955, so both ammonia nitrogen and tritium findings in deep groundwater reflect travel times of contaminants through bedrock in a matter of decades, not the hundreds or thousands of years assumed in the PolyMet SDEIS.

WaterLegacy also shares Tribal Cooperating Agency concerns that blasting may affect fractures extending from the mine pits. Mine site blasting would occur every 2 to 3 days, using up to 7,471 pounds of explosives per blast hole and breaking 200,000 to 300,000 tons of rock per blast. (SDEIS, pp., 5-457, Appx. C, pdf pp. 2071-2072). Ground vibration of 25.4 millimeters per second would extend 1,581 meters, affecting an area of 11,334 acres. (SDEIS, p. 5-457).

The SDEIS must be revised to consider the presence of known bedrock fractures transecting mine site pits and beneath mine site contaminant sources in calculating potential water quality impacts.

### **3. PolyMet SDEIS’ assumptions regarding Category 1 waste rock pile seepage, collection and reactivity underestimate water quality impacts.**

The PolyMet SDEIS doesn’t evaluate the permanent, unlined 526-acre Category 1 waste rock pile as an independent source of contaminants either to surface water or to groundwater. This analysis is avoided through unsubstantiated assumptions that there is no hydrologic connection between shallow and bedrock aquifers beneath the Category 1 waste rock pile, that no seepage will propagate through bedrock faults, fractures or secondary porosity features and that all uncaptured seepage from the Category 1 waste rock pile flowing through the surficial

shallow groundwater will migrate to the West Pit, whether during operations, during reclamation or during hundreds of years of long-term closure. These assumptions are staggering as well as unreasonable.

In addition, the PolyMet SDEIS uses an unsubstantiated deterministic input to model more than a 90 percent collection rate of all seepage from the unlined Category 1 waste rock pile. No field experience supports this presumed collection rate, and PolyMet's own work plan requires engineered systems to be modeled as probabilistic inputs. Finally, SDEIS assumptions regarding the efficacy of seepage reduction from its proposed cover system lack data support and may be overstated.

**A. The SDEIS assumption that *all* Category 1 seepage will migrate to the West Pit is unsupportable.**

The PolyMet SDEIS asserts that *any* uncollected seepage from the Category 1 waste rock pile would migrate through groundwater to the West Pit, presumably during both operations and closure. (SDEIS, pp. 5-6, 5-101).

First, this assertion relies on an assumption that no seepage from beneath this 240-foot tall, 168-million-ton mound of waste rock will propagate downward through fractures, faults or secondary porosity features. This assumption is unsubstantiated and unreasonable. As discussed previously, there are known faults and fractures on the PolyMet mine site. Comparing Figure 5.2.2-17, Mine Site Contaminant Sources (SDEIS, p. 5-95), with the map of Faulted Bedrock and Surface Topography attached as Exhibit 6 to these comments, it is evident that several known faults lie beneath the Category 1 waste rock pile location. Where faults transect the West Pit, the direction of flow for contaminated seepage both during operations and after closure must be analyzed, not assumed. In addition, at least two faults on the southwest portion of the Category 1 footprint angle to the west of the proposed West Pit and would not transect the Pit.

As explained above, there is no scientific basis to assume that surficial groundwater beneath the unlined Category 1 waste rock pile is not hydrologically connected to underlying bedrock groundwater. Hydraulic pressure created by the volume of water within the twenty-story Category 1 waste rock pile would increase the strength of that connection. Seepage through overlying surficial aquifers is likely to follow similar flow directions as underlying fractures and other secondary porosity features (SDEIS, p. 4-44), increasing the likelihood that all seepage

escaping containment would not migrate to the West Pit.

In addition to the influence of bedrock features on overlying surficial drainage, the predominant drainage flow from the northern 20 percent of the mine site drains north to the Hundred Mile Swamp and the Partridge River or Northeast to the Partridge River. (SDEIS, pp. 4-419, 4-151). As illustrated in Large Figure 21 from the Water Modeling Data Package, attached as Exhibit 7 to these comments, drainage from the northern and northeastern portions of the 526-acre Category 1 waste rock pile would flow to the north and northeast, not to the West Pit.

Drainage patterns from the Category 1 waste rock stockpile were modeled by PolyMet in a Rock and Overburden Management Plan, SDEIS reference PolyMet 2012s. This Plan suggested that recovery wells be placed north of the Category 1 waste rock stockpile, since “Along the west, north and east sides of the stockpile, there may be localized areas where the drain pipe cannot be installed at an elevations low enough to ensure that groundwater will not flow beneath the cutoff wall.” (PolyMet 2012s, p. 15). Figure 2-3 in this text, attached as Exhibit 13, shows that travel times to the north and northeast are within 1-5 years and 5-10 years.

It is possible that, during operations, dewatering would create a pressure gradient that would tend to draw pollutants in the surficial groundwater toward the West Pit. However, the West Pit would be flooded during closure, producing a hydraulic head (SDEIS, p. 5-114), rather than a negative gradient for seepage migrating from the Category 1 waste rock pile. Seepage from the Category 1 waste rock pile must be modeled outside the West Pit, toward the west, north and northeast.

**B. Containment efficacy for the mine site collection system is unsubstantiated and modeling of uncaptured seepage is unreasonable.**

The PolyMet SDEIS claims that the containment system for the Category 1 waste rock pile would collect “nearly all (approximately 93 percent) of the seepage from the stockpile.” (SDEIS, p. 5-101). No references are provided in the SDEIS to substantiate this collection efficacy. In addition, “There are no test projects planned for the waste rock stockpile groundwater Containment System.” (Adaptive Water Management Plan (AWMP), SDEIS reference PolyMet 2013g, p. 59) The design of the containment system in the SDEIS seems conceptual. However, based on the illustrations and text in the SDEIS, claims for containment efficacy are unreasonable.

For the first decade of operations, no seepage containment would be provided on the west

side of the Category 1 waste rock pile. The perimeter ring around the stockpile would be completed in mine year 11. (SDEIS, compare Figure 3.2-5, p. 3-23 and Figure 3.2-7, p. 3-28).

The collection system would consist of a trench excavated to bedrock around the perimeter of the Category 1 waste rock stockpile. This trench would be backfilled with “compacted soil material” or with a “manufactured geosynthetic clay barrier.” This compacted soil or clay would not be keyed into bedrock. The drainage collection system would consist of a slotted horizontal drain-pipe surrounded by coarse rock within the trench. (SDEIS, p. 3-46) Stockpile drainage to the trench collected in the drain-pipe would be conveyed “by gravity flow” to sumps that have emergency gravity overflows to the East Pit or West Pit. (SDEIS, p. 3-47).

The SDEIS provides no data or field experience suggesting that compacted soil or clay could withstand hydraulic forces over time, that gravity flow in the trench would maintain a gradient to resist drainage passing through the compacted soil trench wall or that a slotted drain pipe would remain unclogged. The sole support for the claim that “nearly all” seepage would be collected by the proposed perimeter trench and dirt wall is as follows:

The geologic conditions are favorable for a cutoff wall due to the presence of low permeability bedrock. Performance modeling of the containment systems performed by PolyMet and reviewed by the Co-leads provides strong evidence that the capture efficiency would be greater than 90 percent. (SDEIS, p. 3-47)

According to the Work Plan for the PolyMet SDEIS, performance of any engineered system must be evaluated as an “uncertain input” through a probability distribution. (Barr 2012d, p. 1). In response to Data Practices Act request, the Lead Agencies acknowledged that no probability analysis has been done for the collection system at the permanent unlined Category 1 waste rock pile, as explained in Section III. The Mine Site Water Modeling Data Package confirms that all analysis of water quality impacts from the Category 1 waste rock pile was done with a single deterministic input to the model assuming that 93 percent of the seepage from the entire stockpile is collected and contained by the perimeter trench. (SDEIS reference PolyMet 2013i, Table 1-1, pdf p. 627).

The SDEIS’ analysis of water quality is also based on a prediction that the total seepage from the 526-acre Category waste rock pile at closure would be reduced by the stockpile cover system to approximately 43 gpm so that estimated seepage from the pile escaping capture would be about 3 gpm. (SDEIS, p. 5-101). This cover would consist of a geomembrane and overlying vegetated cover. (SDEIS, p. 5-101). This cover would be placed over rough benches of rock that

would be reshaped, resulting in an interbench slope with a ratio of 3.75 horizontal to 1 vertical. (AWMP, SDEIS reference 2013g, p. 35).

The AWMP acknowledges that the stockpile cover system design was based on landfill requirements, and there is no experience of its use for waste rock piles: “[T]he projects listed generally do not use geomembranes for stockpile covers.” (*Id.*, p. 43) Despite the untested challenge of using the geomembrane on rock pile slopes, the SDEIS modeled its efficacy in preventing percolation of precipitation through the Category 1 waste rock stockpile at above 99 percent. (Water Modeling Data Package – Mine Site, PolyMet 2013i, Table 1-1, pdf p. 627) There is no indication that this modeled efficacy varied over time.

The SDEIS does not disclose the volume or concentration of seepage that would result if the cover was not provided or was ineffective. However, the SDEIS states that water modeling indicates that “for many constituents, this stockpile would be the largest source of constituent load” if seepage were to be captured and routed to the West Pit. The SDEIS further states that the Category 1 cover system “would be the primary engineering control” that limits constituent loading from the stockpile. (SDEIS, p. 5-213). Neither seepage collection assumptions nor post-closure seepage reduction assumptions for the Category 1 waste rock pile are adequately substantiated.

### **C. The SDEIS understates the potential of acid generation and solute leachate from the Category 1 waste rock pile and the mine pits.**

A critical premise in the PolyMet SDEIS analysis of water quality implications of permanent Category 1 waste rock pile seepage is that silicate materials would “prevent entirely the onset of acidic conditions in rock with less than 0.12 percent sulfur.” Based on this premise, the PolyMet SDEIS predicts that the Category 1 waste rock pile at the mine site will “never generate acidic leachate.” (SDEIS, pp. 5-51, 5-52).

SDEIS modeling reduces the solute loads released from the Category 1 stockpile using “concentration caps” that assume pore water would be maintained at a near-neutral pH, where many solutes have limited solubility. As a result of the concentration cap, it is assumed that solute loads are proportional to flow rates so that reducing flow of precipitation through the Category 1 waste rock pile would proportionately reduce solute loads. (SDEIS, p. 5-54)

Although separation of sulfur concentrations may be possible in theory, the nature of

Duluth Complex rock and the mining process will preclude uniformity in sulfur concentrations. Disseminated higher sulfur concentrations will result in pockets of acidity, higher reactivity and higher concentrations than the modeling based on average sulfate concentrations. WaterLegacy believes that the PolyMet SDEIS assessment of the Category 1 waste rock leachate potential should be revised based on the following comments in Bruce Johnson's technical review:

- Duluth Complex mineralogy, including the Partridge River intrusion where the NorthMet deposit is located, is highly disseminated both in terms of metals and in its sulfur levels.
- Unlike many other copper deposits, the NorthMet deposit also includes significant and disseminated quantities of nickel, cobalt and zinc, which can be released in circumneutral pH and can be toxic to aquatic life.
- SDEIS humidity cell tests with 89 samples, which were not randomly selected, are insufficient to categorize sulfur levels in 300 million tons of waste rock.
- Averaging in humidity cell testing conceals the effect of high sulfur inclusions that will be present in the Category 1 waste rock stockpile.
- High sulfur "seed" inclusions in the waste rock are of environmental concern, since they will initiate acid formation and leach higher quantities of metals.
- Over time, some of the acid formed by these high sulfur inclusions may not be neutralized. Even where acidity is neutralized, the presence of the inclusion will result in higher rates of metals leachate than predicted by a model using average concentrations.
- Block modeling to segregate waste rock by average sulfur concentration will not be able to identify the highest sulfur level in a block given the disseminated nature of the deposit and the practical aspects of 10-foot drill analyses in large 50x50x20 foot, 3500-ton blocks.
- Proposed use of GPS tracking would not resolve the issue of averages failing to identify higher concentration seed rock.
- It is likely that waste rock blocks and/or portions of blocks with higher than 0.12 percent sulfur will be transported to the Category 1 pile.
- Overall, as a consequence of scale-up from theoretical modeling to field operations, high sulfur inclusions will be placed in the Category 1 stockpile, producing pockets of acid leachates and increasing metals leachate values above those predicted by the model.

The PolyMet SDEIS acknowledges that if "if the pore-water pH were to shift from neutral to acidic, then the rate of sulfide mineral oxidation and associated release of some metal cations (e.g., nickel and copper) would increase dramatically." The SDEIS suggests that

reactions would increase by a factor of 8.2 compared to non-acidic conditions. (SDEIS, p. 5-51).

The SDEIS also fails to substantiate the efficacy of subaqueous disposal in preventing acid mine drainage and high levels of solutes in the East Pit and West Pit during reclamation. No field experience at other mines is cited. The SDEIS claims that “The pore water in the initially saturated backfill would have relatively high solute concentrations . . . but once submerged, oxygen transport would be limited and there would be a systematic decrease in oxidation and associated dissolution of sulfide minerals.” (SDEIS, p. 5-102) The SDEIS presents a P50 illustration of sulfate reduction from 2,500 mg/L to 250 mg/L in this modeling. (SDEIS, p. 5-103). A figure that also showed P90 results was included in the preliminary SDEIS, but deleted in the editing process. This figure, Exhibit 14 attached, shows sulfate levels of approximately 3,800 mg/L. Even if subaqueous disposal could reduce sulfates by 90 percent as suggested above, sulfate seeping from the East Pit in this model run would still violate groundwater standards of 250 mg/L.

Although the chemical composition of pit water is not presented in the SDEIS, a similar claim is made that flooding the West Pit will markedly reduce oxidation reactions. “The water in the West Pit is expected to contain dissolved oxygen with initial concentrations as high as 15 mg/L. This oxygen would be initially reactive with the pit wall rock, but the reactivity would decrease over time as the material exposed to water oxidizes.” (SDEIS, p. 5-104) The possibility of cycling East Pit pore water through the plant site WWTP or West Pit lake water through the mine site WWTF is also proposed as a way to reduce solute concentrations. (SDEIS, pp. 5-104, 5-110). The potential that cycling water through treatment facilities would increase oxidation and, thus, increase chemical reactivity is not discussed in the SDEIS.

The lack of transparency about the effectiveness of in-pit underwater disposal of Category 2/3 and Category 4 waste rock is compounded by the contradictory claim made in connection with the West Pit Backfill alternative, which was proposed to mitigate the impacts of the permanent Category 1 waste rock stockpile. In advocating that the Co-Lead Agencies eliminate the West Pit Backfill alternative from consideration, PolyMet argued that placing Category 1 waste rock in the West Pit “would add a substantial load of constituents to the West Pit Lake compared to the Proposed Project,” which “increased load is derived from oxidation products on the surface of the backfilled waste rock.” (Co-lead Agencies’ Consideration of a West Pit Backfill Alternative, SDEIS reference MDNR et al. 2013b).

Since untreated releases from the East and West Pit would “continue in perpetuity,” (SDEIS, p. 5-122), it is important to understand the loading and changes in reactivity that result from subaqueous disposal of waste rock.

**4. The PolyMet SDEIS’ assessment of mine site compliance with water quality standards is misleading. Scrutiny suggests that standards will not be met.**

The PolyMet SDEIS doesn’t state that the proposed action will comply with Minnesota water quality standards. The SDEIS states that NorthMet Project Proposed Action P90 values for antimony, arsenic, cadmium, cobalt, copper, lead, nickel, and selenium at SW-004a, SW-004b, SW-005, and SW-006 are noticeably higher than the Continuation of Existing Conditions Scenario maximum P90 values, but “remain well below the applicable evaluation criteria.” (SDEIS, p. 5-131). The SDEIS goes on to say that Proposed Action maximum P90 concentrations “do not exceed the applicable evaluation criteria for any of the constituents except aluminum (at all locations) and sulfate (at SW-005 and SW-006), for any time during the 200-year modeling period.” (*Id.*)

As discussed above, the SDEIS minimizes potential discharge from mine site contaminant sources by underestimating Partridge River base flow through the site, by denying the potential for propagation through higher conductivity pathways in surficial materials and bedrock, by excluding flow paths to the north and northeast of the mine site, by imposing concentration caps, and by assuming collection and reduction of seepage based on models unsubstantiated by field experience.

Other sections of WaterLegacy’s comments demonstrate that the SDEIS fails to analyze mercury discharge either from the mine site or plant and that sulfate discharge and its impacts on wild rice are inadequately and improperly assessed. The SDEIS also does not analyze specific conductance, or potential impacts of degradation of water quality on aquatic life

Throughout our review of the SDEIS, WaterLegacy has been concerned that the SDEIS reflects advocacy for the project, rather an independent “hard look” at scientific evidence. Some specific instances of misleading edits, phrasing and omissions are highlighted in this section. In addition, despite gaps and assumptions in the SDEIS that serve to minimize potential water quality violations, WaterLegacy believes there is sufficient evidence related to mine site contaminant sources to identify excursions from water quality standards.



**A. The PolyMet SDEIS' analysis of whether discharge to shallow groundwater will meet surface water quality requirements is misleading.**

Federal law applies Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) requirements when discharge to groundwater is connected to surface water. EPA comments on the preliminary SDEIS underscored the necessity that the SDEIS “reflect the understanding that one or more NPDES permit(s) will be required for the Mine Site in order for this project to comply with the CWA” since “Section 301 of the CWA prohibits point source discharge to surface waters, either directly or via directly connected ground water, unless the discharge complies with a NPDES permit.”<sup>18</sup>

The SDEIS' language and analysis undermines the ability of either decision-makers or the public to evaluate whether PolyMet's discharge of pollutants to shallow groundwater connected to surface water will comply with surface water quality standards. The SDEIS provides an inadequate basis for regulation to protect surface water quality. This deficiency is also reflected in SDEIS analysis of seepage from the tailings basin, where only groundwater standards are applied as evaluation criteria. (SDEIS, Table 5.2.2-38, p. 169).

For the mine site, SDEIS language discounts the application of surface water quality standards (WQS) to discharges, stating, “PolyMet does not propose any surface water discharges to the Upper Partridge River until the West Pit floods around year 40.” (SDEIS, p. 5-121). The SDEIS suggests that the only time when mine site discharge “would need to meet applicable water quality standards” is when the “WWTF would begin in closure to discharge effluent to the West Pit Outlet Creek.” (SDEIS, p. 5-125). Co-Lead Agency “dispositions” in response to tribal comments are even more explicit:

No discharges are planned from the Mine Site during operations and reclamation. During long-term closure, West Pit water will be pumped to the Mine Site WWTF, the effluent from which will require an NPDES/SDS permit to discharge to the Partridge River. The WWTF, when it starts discharging to the PR, will be designed to meet an effluent target of <10 mg/L SO<sub>4</sub> (RC).  
(SDEIS, Co-Lead Agencies' Dispositions, pdf page 2122)

The SDEIS' analysis of mine site pollutants discharged to the surficial aquifer only identifies groundwater standards as evaluation criteria -- even when the modeled pollution

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<sup>18</sup> E. Walts, EPA letter to USFS, MDNR, USACE, Aug. 7, 2013, Comments on PSDEIS, attached as Exhibit 15, p. 9.

arrives at the Partridge River. (SDEIS, Table 5.2.2-22, p. 109) And the SDEIS contains no analysis of where pollutants discharged at either the mine site or the tailings site will first daylight to groundwater.

Perhaps most troubling, in light of the requirement that the SDEIS provide a “hard look” at water quality impacts, Co-Lead Agency edits to the preliminary SDEIS, reflected in the PSDEIS Track Changes Draft Chapter 5.02.02 Water, attached as Exhibit 16, seem designed to undermine any claim that surface water quality standards will apply to polluted seepage at either the mine site or the plant site.

Co-Lead Agencies edited the preliminary SDEIS to change the word “discharge” to the word “release” implying that only deliberate discharge of effluent from the mine site or plant site treatment plant would be evaluated as “discharge.” We counted at least 44 examples of this type of revision. (Examples of this edit can be found in the Track Changes PSDEIS, *supra*, pp. 5-17, 5-25, 5-39, 5-48, 5-66, 5-88, 5-119, 5-142, and 5-202).

In addition to changing the word “discharge” to “release,” many sentences in the preliminary SDEIS that had used the word “discharge” to refer to groundwater seepage, propagation of constituents through the surficial aquifer, “groundwater seepage to surface water” or locations “where groundwater is predicted to discharge to the surface” were deleted. We identified at least 29 deletions of the term “discharge” in a sentence addressing potential water quality impacts of pollutants indirectly discharging to surface waters. (Examples of this edit can be found in the Track Changes PSDEIS, *supra*, pp. 5-90, 5-188, 5-189, 5-201).

Review of “track changes” revisions to the preliminary SDEIS raises additional concerns regarding its objectivity in presenting information regarding water quality impacts. A figure analyzing P90 cobalt levels in the West Pit surficial groundwater flowpath at the Partridge River was deleted in the editing process, and only the P50 chart used in the SDEIS. The cobalt standard of 5 µg/L applicable to the Partridge River as a Class 2B water was not illustrated on the chart, and the fact that cobalt in the West Pit flowpath would exceed this standard is not discussed in the text. (See Track Changes PSDEIS, *supra*, pp. 5-116, 5-117; SDEIS, p. 5-104). The attached Exhibit 17 superimposes a red line for the cobalt surface water quality standard on both the P90 and P50 charts from the “track changes” preliminary SDEIS. Other illustrations of solute concentrations are also only supplied in the SDEIS at a P50 median probability (e.g. SDEIS, Figure 5.2.2-18, p. 5-103) or are supplied at surface discharge points without indicating surface

water quality standards. (SDEIS, Figure 5.2.2-41b, p. 5-167).

Other decisions as to which data is presented in the SDEIS may also conceal rather than disclose water quality risks. For example, critical information on the amount of groundwater flow from various mine site contaminant sources and the time it would take for pollution migration is only disclosed for the P50 model, not the foreseeable P90 greater risk. (SDEIS, Table 5.2.2-8, p. 5-37; Table 5.2.2-21, p. 5-106; Table 5.2.2-26, p. 5-123).

**B. The PolyMet SDEIS does not evaluate water quality at the nearest points where compliance with surface water quality standards would be required.**

As previously discussed, the PolyMet SDEIS does not evaluate seepage from the Category 1 waste rock pile toward the Hundred Mile Swamp or north or northwest to the Partridge River. Even for the flowpaths from mine site contaminants on the south of the site, “evaluation locations” are not equivalent to CWA compliance points.

Rather than evaluating the nearest points where shallow groundwater would daylight to wetlands or streams, the modeling assumes away closer points of compliance. “In the water quality model, it is assumed that the leakage/seepage from mine features discharges to the Partridge River; there is assumed to be no groundwater discharge to surface water or wetlands along intermediate portions of the flow paths.” (Wetlands Data Package, Mar. 7, 2013, SDEIS reference PolyMet 2013b, p. 40).

There is a significant distance between the property boundary, used as an evaluation location for groundwater standards, and the assumed “surface water release” where contaminants arrive at the Partridge River. For the West Pit flowpath, the property boundary is 860 meters from the contaminant source, while the Partridge River is 1,505 meters away. For the East Pit, the distance to the property boundary is 1,345 meters and the distance to the Partridge River 2,120 meters away. For the Category 2/3 waste rock flowpath, the property boundary is 140 meters from the contaminant source, while the Partridge River is 955 meters away. For the OSLA, the distance to the property boundary is 235 meters and the distance to the Partridge River 1,225 meters. (SDEIS, Table 5.2.2-8, p. 5-37).

It is undisputed that there are wetlands on the mine site and at or near the property boundary within surficial flowpaths for contaminants. These wetlands are identifiable on several maps in the SDEIS. (See SDEIS, Figure 5.2.3-1, p. 5-231; Figure 5.2.3-3, p. 5-237). In analyzing

indirect impacts of pollutants on wetlands, the SDEIS concluded, “There are 515.8 acres of wetland resources within the groundwater flowpaths.” The SDEIS classified approximately 66 percent of these wetlands within the flowpaths as “dominantly minerotrophic (groundwater-fed),” acknowledging the connection with surficial groundwater. (SDEIS, p. 5-283).

Not only does the SDEIS fail to analyze compliance with surface water quality standards where contaminants from mine site first daylight to wetlands. Yet more striking, the SDEIS fails to assess compliance with water quality standards at the “surface water release” points, as defined in the text of Table 5.2.2-8 above, where contaminants first reach the Partridge River.

The SDEIS only compares pollutants with surface water quality standards at “evaluation locations” SW-002, SW-003, SW-004, SW-004a, SW-004b, SW-005 and SW-006. (Table 5.2.2-30, p. 5-129). As illustrated on Figure 5.2.2-4, Mine Site Surficial Groundwater Flowpaths, these “evaluation locations” are not even the Partridge River discharge sites closest to mine site contamination. As this map demonstrates, for every flowpath -- East Pit Category 2/3, Ore Surge Pile, WWTF, OSLA and West Pit -- there is a point that the map legend identifies as “groundwater discharge to surface water” that is closer to the contaminant source than the nearest “surface water evaluation location.” (SDEIS Figure 5.2.2-4, p. 5-35).

**C. Even with the PolyMet SDEIS’ incomplete analysis, modeling shows mine site discharge excursions from water quality standards.**

As detailed above, the SDEIS model of pollutants from mine site contaminant sources understates the concentrations likely to be found in mine site surficial flowpaths. However, even using only the data that the SDEIS has provided, modeling indicates that mine site discharge would cause or contribute to violations of surface water quality standards. The SDEIS either fails to identify these excursions or attributes them to another source. In its primary data table, the SDEIS also fails to provide information about contaminant levels from the West Pit flowpath at the Partridge River location where it is clear that groundwater discharges to surface water.

Table 5.2.2-22 on page 5-109 of the SDEIS indicates that East Pit Category 2/3 flowpath discharge to the Partridge River would cause or contribute to exceedance of numerical water quality standards for aluminum and cobalt. Aluminum levels modeled at P90 for the PolyMet proposed action in the East Pit Category 2/3 flowpath would be 177 µg/L as compared with continuation of existing conditions, modeled at 66.9 µg/L, a 265 percent increase. This

discharge would exceed Minnesota's 125 µg/L surface water quality standard (WQS) for aluminum. Cobalt under the proposed action scenario would increase to 7.6 µg/L as compared with 1.0 µg/L under the continuation of existing conditions scenario, a 760 percent increase. This discharge would exceed Minnesota's 5 µg/L surface WQS for cobalt. (SDEIS, Table 5.2.2-22, p. 5-109).

Table 5.2.2-22 does not report contaminant levels when West Pit flowpath pollutants are discharged to the Partridge River. However, using other data in the record, West Pit discharges to the Partridge River would cause or contribute to exceedances of lead and cobalt. As shown in Table 5.2.2-23, lead discharge at the Partridge River would increase at a 4.1 ratio as compared to existing conditions (modeled in Table 5.2.2-23 at all locations as 0.93 µg/L for lead) resulting in lead discharge of approximately 3.8 µg/L, exceeding either the WQS at hardness levels of 50 mg/L (1.3 µg/L) or the WQS for hardness of 100 mg/L (3.2 µg/L). Cobalt levels would increase 19.9 times over existing conditions. Whether calculated from the existing concentration of 1.0 µg/L in Table 5.2.2-22 or shown on the deleted figure in Exhibit 9, the West Pit would discharge cobalt to the Partridge River at approximately 20 µg/L, four times the cobalt WQS. (SDEIS, Table 5.2.2-22, p. 109, Table 5.2.2-23, p. 5-111).

Depending on the location of the nearest jurisdictional wetlands and the way in which hardness is calculated, mine site discharge may also violate standards for cadmium and zinc. Under P90 modeling, cadmium levels in West Pit flowpath discharge at the property boundary would be 1.8 µg/L, above the WQS of 1.4 µg/L in background hardness of 50 µg/L. Zinc levels in the West Pit flowpath discharge at the property boundary would be 108 µg/L, above the WQS of 67 µg/L for background hardness of 50 mg/L.

The SDEIS seems to misdirect attention away from, rather than candidly disclose, these violations of numeric WQS.

### **Recommendations – Mine Site Water Quality**

- The SDEIS must be redone to accurately model Partridge River baseflow, using all reasonably available data and the range of minimum flows calculated by tribal and MDNR scientists.
- The SDEIS must be redone to revise modeled predictions of inflows and outflows, water quality and wetlands impacts at the mine site, showing the effects that a change in Partridge River baseflow has had on these modeled outcomes.

- The SDEIS must be revised to disclose changes in the volume and chemistry of water inputs to the mine site WWTF, tailings piles and plant site WWTP based on revised predictions of baseflow, identifying any planned changes in treatment facilities.
- The SDEIS must be revised to consider the presence of known bedrock fractures transecting mine pits and beneath mine site contamination sources in calculating potential water quality impacts.
- The SDEIS must be revised to assess the hydrologic significance of bedrock fractures, faults and secondary porosity features at the mine site.
- The SDEIS must be revised to consider blasting and weathering impacts on propagation and access of contaminated groundwater to bedrock fractures.
- The SDEIS must be revised to provide more robust assessment of the connection between deep groundwater and surficial waters, including additional deep borehole sampling as well as pump testing.
- The SDEIS must be revised to assess surficial materials, such as zones of outwash sand and gravel that may provide high conductivity pathways for contaminants.
- The SDEIS must be revised to consider the full range of hydraulic conductivities of surficial materials, not just an average based on excluding the most conductive samples.
- The SDEIS must be revised to analyze propagation of seepage from all mine site contaminant sources through shallow groundwater and bedrock secondary porosity features in multiple directions, including flow north and northeast to Yelp Creek, the Hundred Mile Swamp and the Partridge River.
- The SDEIS must be redone to analyze the Category 1 waste rock pile as an independent contaminant source, propagating pollutants in various directions through shallow groundwater and bedrock secondary porosity features.
- The SDEIS must be revised to analyze alternatives to minimize seepage from the Category 1 waste rock pile, including liners and a seepage collection system.
- The SDEIS must be revised to disclose the volume and concentration of Category 1 waste rock pile seepage at various mine years and stages, stating clearly what volume of seepage reduction and collection has been modeled to make water quality predictions.
- The SDEIS must be revised to use a reasonable range of input assumptions to model uncaptured seepage from the Category 1 waste rock stockpile. This reasonable range of input values must be based on site-specific hydrogeology, climate, change over time, and field experience.

- The SDEIS must consider a broader range of input assumptions for the efficacy of the geomembrane system over time in preventing introduction of precipitation to the Category 1 waste rock pile.
- The SDEIS must be revised to modify the concentration cap assumption for the Category 1 waste rock pile, considering the variability of sulfur concentrations and the potential for pockets of acidity and high metals leachate in this waste rock.
- The SDEIS must be revised to remove the potential use of Category 1 waste rock for construction materials given its potential to generate acids and leach metals.
- The SDEIS must disclose solute concentrations within the mine pits at representative years and identify the nature and extent of reduction in solute concentrations predicted to result from subaqueous disposal, any proposed treatment method and from attenuation.
- The SDEIS must be revised to substantiate claims for the efficacy of subaqueous disposal in preventing acid mine drainage and reducing solute concentrations and to discuss the relationship between cycling of pit water for treatment and maintaining anoxic conditions.
- The SDEIS must reconcile the apparent contradiction between statements that in-pit disposal in the West Pit Backfill alternative provides no environmental advantage and assertions for the proposed action that subaqueous disposal is highly beneficial.
- The SDEIS must be revised to analyze the nearest point of connection to surface water for all discharges to groundwater from any mine site contamination source.
- The SDEIS must be revised to disclose at P90 probabilities the levels of all regulated parameters at the closest location where they would be discharged to surface water from any mine site contamination source.
- The SDEIS must be revised to clearly state that the proposed action would have significant adverse effects on the environment, including violation of numeric surface water quality standards as a result of mine site discharge.

### III. TAILINGS SITE WATER QUALITY

#### Introduction

The PolyMet SDEIS provides unsubstantiated and unreasonable predictions of seepage of untreated contaminants from the tailings piles. This flawed and overly optimistic analysis affects predictions of drinking water contamination, compliance with surface water quality standards, impacts on aquatic life, effects on natural stands of wild rice and increases in downstream mercury methylation due to sulfate loading in the St. Louis River as well as the Partridge River and Embarrass River watersheds.

In addition, SDEIS disclosure of solute levels and of the assumptions behind its modeling of seepage concentrations is opaque and insufficient. The concentration of solutes in seepage is likely to affect predictions of contaminants in treated effluent as well as in untreated seepage escaping the tailings basin. Even with current modeling, discharge of treated effluent is likely to cause or contribute to excursions from water quality standards for aluminum, lead and selenium.

NEPA requires that an EIS must use “high quality” information and “accurate scientific analysis.” 40 C.F.R. §1500.1(b). The PolyMet SDEIS water quality predictions from tailings basin seepage do not meet this test. The SDEIS must be rejected as inadequate on this basis alone, and supplemental and transparent modeling on tailings water quality issues must be included in a revised SDEIS, available for public review and comment.

#### **1. SDEIS tailings seepage collection assumptions are unsubstantiated and unreasonable.**

The PolyMet SDEIS claims that, during operations of the PolyMet sulfide mine and processing facility, more than 99 percent of the total seepage from the tailings piles will be collected and treated in a reverse osmosis treatment plant. This claim is made for a tailings site approximately 2,900 acres (about four-and-a-half square miles) in size, which is completely unlined. The SDEIS confirms that PolyMet tailings will be extruded to an unlined facility located on top of existing unlined LTVSMC tailings piles: “PolyMet does not propose to line the Tailings Basin, nor is the existing LTVSMC Tailings Basin lined.” (SDEIS, p. 5-161)

The SDEIS assumption of nearly perfect seepage collection is the critical foundation upon which all claims that PolyMet might comply with water quality standards downstream of the tailings piles rely. This assumption is unreasonable, unfounded, inconsistent with site



conditions and inconsistent with the Modeling Work Plan methodology adopted by PolyMet and the Co-Lead Agencies.

The claim that 99.38 percent of total seepage from the tailings piles will be collected and treated is reflected in Table 5.2.2-36 on page 5-159 of the PolyMet SDEIS. This table states that, under existing conditions, there is a total of 2,020 gallons per minute (gpm) of seepage through the north, west and northwest flow paths; 1,811 gpm in surface seepage and 209 gpm in groundwater seepage. This Table and accompanying narrative then predicts that during operations, total seepage in these flow paths will increase to 3,380 gallons per minute, of which only 21 gpm will bypass the groundwater containment system.

The PolyMet SDEIS modeling explicitly assumes that its row of pumps will capture 100 percent of the surface seepage and 90 percent of the 209 gpm of groundwater seepage on the north, northwest and west sides of the tailings site. (SDEIS, p. 5-159). By analyzing no other release of untreated seeps from the tailings site, the SDEIS also assumes that no seepage will be released into Second Creek and that no seepage will drain into groundwater beneath the vast, unlined tailings piles through fractures, and that neither historic streams nor changes in topography will carry seepage to the east of the tailings piles as tailings are deposited. Each of these claims is unreasonable and unfounded.

**A. PolyMet tailings pile seepage collection claims are not supported by field experience.**

The PolyMet SDEIS assumes that the construction of the groundwater containment system along the north, northwest and west sides of its unlined tailings piles with “would capture virtually all of the Tailings Basin seepage presently flowing in those directions to restore water quality.” (SDEIS, p. 5-174). The SDEIS claims that this assumption is “conservative” since the model used by PolyMet has already assumed that bedrock hydraulic conductivity is “negligible.” (SDEIS, p. 5-68 to 5-69).

The PolyMet SDEIS does not explain how construction of a slurry wall at the existing tailings site could be “keyed” into bedrock as it might be in a new mine site. (SDEIS, Figure 3.2-28, p. 3-121). As explained in J.D. Lehr’s technical memorandum, given ongoing seepage and the presence of granite below the tailings site deposits, complete dewatering of the tailings perimeter and blasting a trench into granite to serve as the slurry wall key would be required to create the cutoff system proposed.

When the preliminary SDEIS was circulated in the summer of 2013, tribal staff questioned whether the claims for capture and treatment of groundwater were realistic. The Co-Lead agencies responded in their “dispositions” on August 19, 2013:

Groundwater containment with slurry walls and permeable trenches has been routinely performed at mine and industrial sites over the last 50 years. There are hundreds of currently operating systems. When geologic conditions are favorable (particularly the presence of a low permeability basal unit that can be keyed into), it is typical to achieve greater than 90 percent groundwater capture. (SDEIS, Appx. C, pdf page 2119).

On September 16, 2013, after reviewing these dispositions, WaterLegacy made a Data Practices Act (“DPA”) request to the MDNR for all “documents reflecting field experience with tailings basin pump-back rates in Minnesota or in other states.” On October 7, 2013, the MDNR confirmed that they had no data reflecting field experience with tailings seepage pump-back other than a 2007 study prepared to estimate possible seepage collection at the Minntac tailings basin. The DPA response explained, “The agency does not possess any other pump-back related documents reflecting field experience with other tailings basins in Minnesota or other states.”<sup>19</sup>

Since the MDNR cited Minntac’s efforts to collect tailings basin seepage, WaterLegacy researched the efficacy of that system. The Minnesota Pollution Control Agency (MPCA) reviewed the 2007 Seep Collection Feasibility Report for the Minntac tailings basin and determined that “the maximum estimated percentage of seepage to the Sandy River watershed that could be collected is approximately 55 to 60 percent.” The MPCA noted that feasible collection was significantly below the 95 percent capture rate necessary for the existing taconite tailings basin to comply with Minnesota’s wild rice sulfate standard.<sup>20</sup>

WaterLegacy sought more current information about Minntac in a Freedom of Information Act (“FOIA”) request to the United States Army Corps of Engineers (“USACE”). We learned that U.S. Steel Corp. implemented a seep collection and return system on the east side of its tailings basin in 2010, which became fully operational in June 2011. By U.S. Steel’s own estimate in July 2013, this seepage collection system on the east side of the Minntac tailings basin collects “approximately 50 percent of the total seepage reporting to the Sand River Watershed” and reduces sulfate load from the tailings by about 50 percent.<sup>21</sup>

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<sup>19</sup> B. Johnson, MDNR email to P. Maccabee, WaterLegacy DPA request re seepage collection field experience, Oct. 7, 2013 and Nov. 12, 2013, Exhibit 18.

<sup>20</sup> J. Thomas, MPCA letter to T. Moe, U.S. Steel Corp., Jan. 8, 2008, Exhibit 19.

<sup>21</sup> C. Bartovich, U.S. Steel Corp. letter to J. Bathke, USACE, July 9, 2013, Excerpts, pp. 12 and 21, Exhibit 20.

United States Environmental Protection Agency (“EPA”) experience at the Zortman-Landusky mine Superfund site in Montana suggests that containment and pump-back systems cannot capture all surface and subsurface drainage.<sup>22</sup> With respect to field experience at the MolyCorp, Inc. tailings basin Superfund site, the EPA also concluded, “The pathway for contaminant migration is the leaching of tailing seepage downward from the tailing facility to ground water that migrates through fractures to surface water.”<sup>23</sup>

Despite formal requests for substantiation, the Lead Agencies have provided no documentation verifying that field experience supports their claim that virtually all seepage can be captured with a pump collection system at an unlined tailing basin. The cited Minntac field experience would predict approximately 50 percent reduction in sulfate and other solutes as a result of a seepage collection system.

**B. Water inflow to the tailings site during PolyMet’s operations will increase groundwater seepage.**

The PolyMet SDEIS provides no water balance information from which to determine the volume of water that would be in the tailings piles during operation and closure. No information is provided from which one might calculate the downward pressure or “head” that would result from the height of the water. Ongoing review of the hydraulic conductivity and storage coefficients of surficial and bedrock materials suggest that PolyMet SDEIS models may be erroneous.

The PolyMet SDEIS does not permit verification of the total quantity of seepage anticipated under various conditions. However, the implicit assumption that total groundwater seepage at the tailings site would be 209 gpm (and, thus, that total uncaptured groundwater would be 21 gpm during PolyMet’s operations) is incongruous given the volume of water in the tailings system. During operations, the tailings site would receive a total of 7,241.9 million gallons per year (MGAL/yr) or 13,769 gpm from Beneficiation Plant discharge to the tailings beaches and tailings pond. (Water Modeling Data Package - Plant Site, Mar. 2013, SDEIS reference PolyMet 2013j, p. 92). Other inflows to the tailings piles include 2,580 gpm of

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<sup>22</sup> U.S. EPA, *Costs of Remediation at Mine Sites* (January 1997), 4.2.12 Case Study No. 12, page 34 of 65, describing the Zortman-Landusky Mine, Montana, <http://www.epa.gov/wastes/hazard/tsd/ldr/mine/costs.pdf>

<sup>23</sup> EPA, *MolyCorp, Inc. Site (currently Chevron Mining Inc.) Proposed Cleanup Plan* (December 2009), page 17, [http://www.epa.gov/region6/6sf/newmexico/molycorp/nm\\_molycorp\\_proposed\\_cleanup\\_plan.pdf](http://www.epa.gov/region6/6sf/newmexico/molycorp/nm_molycorp_proposed_cleanup_plan.pdf)

untreated water from the tailings seepage capture systems and 1,250 gpm of mine site process water effluent from the WWTF in addition to approximately 4,600 to 4,800 gpm from precipitation. (*Id.*, pp. 126, 138).

The final height of PolyMet and LTVSMC tailings in Cell 1E and 2E will be 200 feet (SDEIS, p. 4-368), generating downward pressure to increase flow through groundwater pathways. The PolyMet SDEIS acknowledges that during LTVSMC operations, as the LTVSMC Tailings Basin was built up over time, “a groundwater mound formed beneath the basin due to seepage from tailings ponds located within the various cells.” Groundwater flowed in various directions and surface seeps were evident on the south, west, and north sides of the tailings piles. (SDEIS, p. 4-99). WaterLegacy’s advisors have explained that building a containment structure would create pressure to redirect water under and around the structure and to other flow paths.

**C. Seepage from PolyMet’s tailings will discharge untreated through fractures, faults and historic streams beneath the tailings.**

Technical documents prepared for PolyMet acknowledge that groundwater seepage is likely to flow beneath the tailings piles in at least three directions. A Barr Engineering memorandum states, “In addition to the visible seeps, groundwater likely flows out from beneath the tailing basin into the surrounding glacial deposits to the south, west, and north of the basin.” (Barr, Technical Memorandum - Tailings Basin Area Geologic and Hydrogeologic Setting, Apr. 2, 2009, SDEIS reference Barr 2009f, p. 3) Yet, studies were not done to map or characterize these deposits, “Site specific geologic studies of the glacial deposits have not been conducted” at the tailings site. (*Id.*, p. 1). Although the PolyMet SDEIS assumes that untreated seepage would not flow through bedrock under the tailings piles, this assumption is not based on testing. The PolyMet SDEIS acknowledges, “Hydraulic testing in the bedrock has not been performed in the Tailings Basin area.” (SDEIS pp. 4-94 to 4-95)

As demonstrated in the mapping and examination of the geologic literature provided in the technical memorandum of geologist J.D. Lehr, the existing LTVSMC tailings site is underlain in places by sand and gravel, peat layers, historic streams and faults in the bedrock that would facilitate propagation of groundwater seepage beneath the unlined tailings piles.

The PolyMet SDEIS misrepresents and overlooks available information regarding tailings site geology. The SDEIS states, “Jennings and Reynolds (2005) mapped the surficial deposits around and beneath the Tailings Basin as Rainy Lobe Till, which functions as the

surficial aquifer and is generally a boulder-rich till with high clay content” (SDEIS p. 4-95). However, the cited reference reports the surficial Rainy lobe till mapped in the vicinity of the proposed NorthMet project as “clay-poor.” Till matrix textures are reported to range from 48 to 87% sand, 9 to 40% silt and 0 to 13% clay, but “generally much less than 10% clay.” (Jennings and Reynolds, 2005). This is a sandy till, not a till with high clay content.

The PolyMet SDEIS does not mention the historic location of commercial gravel pits beneath the tailings piles or that outwash sand and gravel are present beneath the northeastern portions of the existing tailings basin, as shown on the attached map.<sup>24</sup> Commercial grade gravel excavation is not consistent with high clay content. Surficial deposits of sand and gravel would have hydraulic conductivity values orders of magnitude higher than clay.

Although the preliminary SDEIS referred to “fractured bedrock” beneath the tailings site (Preliminary SDEIS, May 2013, p. 5.2.2-58), the SDEIS released to the public in December 2013 does not contain a single reference to fractures that may be present at the tailings site. The map prepared by geologist J.D. Lehr, using Minnesota Geological Survey data and a 2011 statewide compilation of bedrock geology, shows several faults in the bedrock beneath the tailings site and the hydrometallurgical residue facility.<sup>25</sup> The SDEIS should have analyzed these fractures and their hydrologic relationship with surficial materials and shallow groundwater.

Historical records demonstrate the presence of wetlands and streams beneath the tailings site prior to construction of the LTVSMC tailings basin. In the 1949 U.S. Geological Survey map attached, an unnamed creek beneath the tailings site drained to the northwest, and Second Creek drained a significant area of the tailings site toward the south. Creeks also appear to have drained into the tailings site from Spring Mine Lake.<sup>26</sup> Calculations based on delineation of the natural upper reaches of the Second Creek watershed suggest that historically, approximately 34 percent of the entire current tailings basin drained to Second Creek in the Partridge River watershed. With new PolyMet tailings deposited in Cells 1E and 2E, it is possible that as much as half of the drainage beneath the tailings piles would flow south. This potential is shown in the attached map of drainage and topography prepared by J.D. Lehr.<sup>27</sup>

Dr. Don Lee has advised WaterLegacy that drainage through ephemeral creeks would

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<sup>24</sup> Map, Selected Glacial Landforms, LTVSMC Tailings Basin Vicinity, prepared by geologist J.D. Lehr, Exhibit 21.

<sup>25</sup> Map, Faulted Bedrock and Surface Topography, *supra*, Exhibit 6.

<sup>26</sup> Map, Historic USGS Quadrangle Map Vicinity of LTVSMC Tailings Basin 1949, Exhibit 22.

<sup>27</sup> Map, Original Surface Drainage and Current Topography, Vicinity of LTVSMC Tailings Basin, prepared by geologist J.D. Lehr, Exhibit 23.

persist even if the creeks were covered by tailings.

Creeks at the top of watersheds are generally ephemeral. While they can be covered with overburden, tailings, a liner, or whatever, they continue to function as ephemeral creeks. As long as the geologic materials associated with the ephemeral creeks are not relocated, they will continue to function as they have for thousands of years. This means the tailings pile will continue to drain through the ephemeral creeks unless the tailings pile perimeter drains intercept the ephemeral creek waters, which would necessitate setting the tailings pile perimeter drains well below the depth of the ephemeral creeks. The depth to intercept the ephemeral creeks would require drilling to determine the depth in the geologic cross section that the creeks are associated with.<sup>28</sup>

The PolyMet SDEIS states that water drains into the tailings site from the east, and then proposes a surface drainage swale to reroute runoff in the Mud Lake Creek watershed east of the tailings site. (SDEIS, p. 5-174). However, the SDEIS does not discuss how the historic branches of the creek connected to Spring Mine Lake may affect groundwater flow beneath the tailings or how the increased height of the water table in PolyMet tailings may affect flow patterns on the east side.

As PolyMet tailings are deposited, the tailings and tailings pond in Cells 1E and 2E would increase from heights of approximately 1,660 and 1,595 feet above sea level respectively, to a single cell 1,735 feet above sea level by the time of closure. (SDEIS, p. 3-102; Figure 3.2-25, p. 3-106). J.D. Lehr has advised WaterLegacy that the elevation of Spring Mine Lake is 1,676 feet above sea level. Although the current Cell 1E and Cell 2E tailings piles are lower than Spring Mine Lake, the new water table in the PolyMet tailings would be higher than that of Spring Mine Lake, reversing the topography and potentially changing the flow of groundwater in sediments of the historic creek branching beneath the east side of the tailings. The PolyMet SDEIS fails to discuss or assess how increased tailings water table elevation would affect seepage toward the east of the tailings piles.

In addition, in its discussions of tailings seepage, the PolyMet SDEIS neither describes the historic location of Second Creek beneath the LTVSMC tailings site nor the effect on drainage that would result from piling PolyMet tailings on Cells 1E and 2E. The PolyMet SDEIS should have disclosed historical drainage patterns and analyzed potential seepage from the south side of its tailings piles to Second Creek and the Partridge River. Second Creek is a headwater stream for the Partridge River, and the MPCA has confirmed that portions of Second Creek are

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<sup>28</sup> D. Lee email to P. Maccabee, WaterLegacy regarding ephemeral streams, Jan. 4, 2014, Exhibit 24.

wild rice waters. (SDEIS, pp. 4-173, 5-21).

**D. Seepage from PolyMet's tailings will discharge untreated to Second Creek, on the southeast side of the tailings piles.**

The PolyMet SDEIS acknowledges that seepage from the existing LTVSMC tailings continues to drain from the south of the tailings piles to Second Creek through a surface seep, even though LTVSMC terminated tailings deposition in January 2001. (SDEIS, p. 4-99, *see also* Figure 4.2.2-11, p. 4-91). However, the PolyMet SDEIS then claims that the seepage collection system installed at the south side of the existing tailings pile “essentially eliminated the flow of Tailings Basin seepage into Second Creek.” (SDEIS, p. 5-121, *see also* 5-158). The SDEIS states that, since this seepage will continue to be pumped back under the PolyMet Proposed Action, it “is not considered further in this discussion.” (SDEIS, p. 5-89).

Statements in the SDEIS regarding *groundwater* seepage on the south side of the tailings site appear to be inconsistent. In one section, the SDEIS states, “Groundwater currently seeps from the existing LTVSMC Tailings Basin to the headwaters of Second Creek.” (SDEIS, p. 5-153) In another narrative, the SDEIS claims that there would be no impacts on wetlands resulting from changes in groundwater flow since, “All of the seepage from the south side of the Plant Site is surface water.” (SDEIS, p. 5-297).

WaterLegacy reviewed documents pertaining to the surface seepage collection and pump-back system from the existing LTVSMC to determine if claims that this collection system collects *all* of the surface seepage to Second Creek, so potential impacts to the south of the tailings site need not be considered by PolyMet, could be substantiated. Cliffs Erie documents confirm that a seepage collection and pump-back system upstream of surface discharge location SD026 was implemented in 2011. However, even according to Cliffs Erie’s own representations, this system captures 75 percent of the seepage from tailings Cell 1E. “The remainder of the flow continues to discharge as Second Creek”<sup>29</sup>

The PolyMet Proposed Action would increase the volume and concentration of chemical constituents seeping from Cell 1E and 2E to Second Creek. At a minimum, the SDEIS must calculate the volume of tailings seepage that would drain to the south as a result of depositing PolyMet tailings in Cells 1E and 2E. Next, the SDEIS must project the volume and chemical

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<sup>29</sup> Cliffs Erie, *NPDES Permit #MN0042536 Hoyt Lakes Mine Area NPDES/SDS Permit Supplemental Information & Request for Variance* Apr. 2012, p. 4.; *Variance Addendum* Dec. 10, 2012, p. 20; Excerpts attached in Exhibit 25.

concentrations of tailings seepage impacting Second Creek and the Partridge River. The most optimistic “best-case” projection might accept Cliffs Erie’s claims and predict that approximately 25 percent of the seepage would escape surface seepage containment, and release contaminated process water to Second Creek.

However, it is likely that seepage at the southern side of the tailings piles drains to groundwater as well as through the surface discharge location at SD026. Impacts to water quality in Second Creek and the Partridge River are likely to exceed the 25 percent of seepage claimed by Cliffs Erie. The SDEIS must investigate both the impacts of uncaptured surface seepage and the potential for a groundwater seep pathway for pollutants from PolyMet’s tailings pile south, impacting Second Creek, nearby wetlands and the Partridge River.

**E. The SDEIS’ deterministic assumption of nearly perfect tailings seepage collection conflicts with work plan requirements.**

Modeling of tailings seepage collection is not only inconsistent with field experience and site conditions, but is inconsistent with the Water Modeling Work Plans to which PolyMet and the Co-Lead Agencies agreed. Consistent with customary scientific practice, the Work Plans for the Mine Site and Plant Site required that “uncertain inputs,” including the “performance of engineered systems,” must be modeled with a probability distribution rather than with a single deterministic value. (Mine Site Water Modeling Work Plan, Feb. 14, 2012, SDEIS reference Barr 2012d, p. 1; Plant Site Water Modeling Work Plan, July 2, 2012, SDEIS reference Barr 2012e, p. 1). In lay terms, a range of best-case to worst-case scenarios must be used when predicting results that depend on engineered systems.

In an effort to find out what effect a less optimistic rate of seepage collection might have on PolyMet water quality predictions, WaterLegacy asked Co-Lead Agencies where we might find a probabilistic analysis of effectiveness of performance of Category 1 waste rock pile and tailings seepage collection systems. The Co-Lead Agencies’ responded: “For the two containment structures listed, which are the Mine Site Category 1 Waste Rock Stockpiles and the Flotation Tailings Basin, the modeling for these two features was deterministic, not probabilistic.”<sup>30</sup>

A range of best-case and worst-case assumptions based on field experience is needed to

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<sup>30</sup> B. Johnson, MDNR, email re Probabilities Modeling, *supra*, Exhibit 5.



comply with the NorthMet Work Plan and is customary practice due to the uncertainty of inputs that depend on the performance of an engineered system. Using a range of percentages in modeling tailings seepage would allow regulators and the public to determine to what degree claims in the PolyMet SDEIS depend on the unsubstantiated rosy prediction that only 21 gpm of seepage will escape untreated from PolyMet tailings piles. It is virtually certain that predictions of groundwater and surface water quality, aquatic life, downstream wild rice and methylation of mercury in the Partridge River, Embarrass River and St. Louis River watersheds will all be significantly affected if the assumption of nearly perfect tailings seep collection is varied.

**2. SDEIS disclosure of solute concentrations at the tailings site is opaque and unreliable, preventing verification of seepage concentration rates or concentration rates in treated effluent.**

The SDEIS provides very little information as to the concentration of contaminants at the tailings site. The SDEIS states in general terms that the tailings basin pond would receive solute loadings from tailings, process water from the mine site treated by the WWTF filtration plant from years 1 to 11, and possibly through year 20, and also from tailings seepage captured from the groundwater containment system. This contaminated pond water would, then “become a primary source of contaminants as its water seeps into the tailings.” (SDEIS, p. 5-161). The tailings basin would also receive untreated runoff from the mine site Overburden Storage and Laydown Area. (SDEIS, p. 5-79). SDEIS modeling assumes that process water from the WWTF meets its “target” concentrations, but neither the SDEIS nor its references describe the means by which the mine site WWTF filtration plant will achieve these desired targets given the concentration of influents. As discussed previously, in part 1B of this section, the tailings pond and pore water would also receive a large volume of process water from the beneficiation plant.

The SDEIS does not provide information on the volume of inputs and outputs to the tailings pond, tailings piles or WWTP. The SDEIS does not disclose modeled solute concentrations in the tailings pond, tailings pore water, tailings seepage or WWTP influent. The SDEIS does not specify the treatment or pre-treatment that will be used at the WWTP. Overall, even with the help of citizen chemists and engineers, it was not possible to understand, let alone verify, the key SDEIS assumptions regarding contaminant sources at the tailings site.

The SDEIS states that its predictions included a concentration cap, based on the assumption that tailings would have less than 0.12 percent sulfide and would never produce acid

drainage. (SDEIS, p. 5-61, 5-160). Without disclosing predicted inputs to the tailings basin, the SDEIS provides insufficient information to substantiate this assumption. No explanation is provided as to the way in which a constant concentration would be maintained in several square miles of tailings piles receiving mine process water, tailings seepage, and beneficiation slurries at various times.

The SDEIS acknowledges the importance of its assumption that averages pH and fixes the concentration cap where neither high acidity nor high alkalinity can facilitate chemical reactions. “Pore water metal concentrations could increase dramatically if pH were to decrease, especially for nickel and cobalt (SRK 2007c). The oxyanions (arsenic, antimony, and selenium), however, tend to have increasing solubility with higher pHs.” (SDEIS, p. 5-160)

In addition to its unsupported assumptions of a concentration cap and of the capacity of tailings to sequester 95 percent of mercury, discussed previously in section I, the SDEIS fails to analyze the chemical interactions resulting from depositing PolyMet tailings on top of LTVSMC tailings. The SDEIS summary of the effects of LTVSMC tailings is uninformative. “These underlying tailings may attenuate metals leached from the NorthMet Project Proposed Action tailings, and/or may contribute additional solutes to seepage.” (SDEIS, p. 5-161) The SDEIS discusses the use of bentonite to reduce pond seepage over time, but provides no data to support its efficacy in mitigating seepage.

The SDEIS statement that the proposed action “contaminant release parameters are based on a combination of laboratory tests and water quality observations at similar tailings facilities in northern Minnesota,” (SDEIS, p. 5-63) is un reassuring. Minnesota has no other tailings facilities for copper-nickel mines.

The SDEIS discussion of the application of “calibration factors” when it was discovered that modeling overestimated sulfate releases from existing LTVSMC tailings raises additional concerns. These new calibration factors reduced the concentration of 11 constituents by more than 90 percent and reduced the predicted concentration of 7 more constituents by 99 percent. (SDEIS, p. 5-62). Without further explanation of why the model was not scrapped rather than adjusted or the way in which other solute estimates were verified, the SDEIS provides insufficient basis to rely on its predictions of solute concentrations in seepage.

The SDEIS predicts a volume of WWTP discharge to the Embarrass River watershed during operations and long-term closure high enough that maintenance of water quality in the

Embarrass River would shift from a natural ecosystem to a mechanical system. (SDEIS, p. 6-61 to 6-62). As discussed in the next section, WWTP effluent is a significant contributor to increases in surface water contaminants. Yet the plan presented for the WWTP in the SDEIS is indefinite.

The SDEIS states, “the operating configuration and requirements of the process units within the WWTP or the capacity of the WWTP could be modified to accommodate varying influent streams and discharge requirements.” (SDEIS, pp. ES-24, 5-214). The SDEIS may refer to this as “an adaptive engineering control,” but for either a decision-maker or a member of the public, this conceptual approach is insufficient to demonstrate water quality would be protected.

**3. It is likely that PolyMet tailings basin seepage and WWTP effluent would cause or contribute to excursions from water quality standards.**

Even under the assumption that more than 99 percent of tailings seepage would be contained, the SDEIS models increased contamination in shallow groundwater flowpaths and in tributaries downstream of the tailings site.

***a) Tailings Basin Seepage to Shallow Groundwater***

As described at length in the preceding sections, modeling assumptions for uncaptured seepage are unreasonable underestimates of volume. Concentrations of solutes in seepage are undisclosed, and may also be unreliable. Even within the limits of this model, tailings seepage in the North flowpath would violate the surface WQS for lead. The incremental increase in North flowpath manganese would also exceed Minnesota’s groundwater health risk limit.

Discharge of lead under the PolyMet proposed action would result in an excursion from the surface water quality standards in the North flowpath, near new tailings cells 1E and 2E. At the property boundary, about 1,132 meters from the tailings seepage containment system, lead concentrations in North flowpath shallow groundwater are modeled at 5.8 µg/L, a 527 percent increase compared to the 1.1 µg/L concentration modeled if existing conditions continue. At the surface discharge point where the North flowpath discharges to Mud Lake Creek, about 3,191 meters from the seepage containment system, lead concentrations under the PolyMet action would be 2.5 µg/L, a 287 percent increase compared to the 0.87 µg/L concentration if existing conditions continue. (SDEIS, Table 5.2.2-11, p. 5-45 for flowpath distances; Table 5.2.2-38, p. 5-169 for flowpath concentrations).

Lead and other contaminants are likely to surface in wetlands “within the surface watersheds immediately downstream of the Tailings Basin, which includes watersheds upstream of modeling locations.” (SDEIS, p. 5-308). But, even without considering the nearest point where lead would daylight to surface water, lead discharge from the North flowpath at Mud Lake Creek (2.5 µg/L) would exceed the applicable 1.3 µg/L chronic standard for lead in 50 mg/L hardness waters. Minn. R. 7050.0110, subp. 4.

In the North flowpath, manganese concentrations at the property boundary are modeled at 759 µg/L in comparison to 522 µg/L under continuation of existing conditions. At the property boundary, where groundwater standards apply, not only is the modeled concentration seven-and-a-half times the manganese health risk limit (HRL), but the 237 µg/L modeled increase in manganese exceeds Minnesota’s 100 µg/L HRL set to protect infants from harm.

***b) Tributary Water Quality***

For several constituents, levels of contaminants in Embarrass River tributaries downstream of the tailings site as augmented with effluent from the plant site WWTP are modeled to increase over existing levels. The primary driver for these increases is the level of contaminants in effluent discharged from the plant site WWTP. Even after treatment, “the concentrations of these metals in the WWTP effluent would be significantly higher than concentrations in the current Tailings Basin seepage (assumed for Continuation of Existing Conditions Scenario).” (SDEIS, p. 5-182)

As reflected in Table 5.2.2-42 on page 5-183, aluminum, lead and possibly selenium discharge may cause or contribute to an excursion above applicable water quality standards. Other increases in contaminants resulting from the PolyMet project may be significant, even if they do not violate WQS.

Aluminum levels in the tributaries downstream of the WWTP discharge are modeled to exceed Minnesota’s 125 µg/L WQS at every location, and also to increase at every tributary site in comparison to continuation of existing conditions. At Trimble Creek site TC-1, continuation of existing conditions is modeled at 112.5 mg/L, which complies with Minnesota’s standard, where the proposed action would result in aluminum levels of 151.1 mg/L, an excursion from

Minnesota's WQS.<sup>31</sup>

The SDEIS suggests that aluminum exceedance is an artifact of the modeling. (SDEIS, p. 5-189). This may or may not be the case. The GoldSim model assumes that effluent from the mine site WWTF will meet the “target” of 125 µg/L. But this assumption may be unrealistic for the WWTF filtration plant. During mining operations, concentrations of aluminum in the west equalization basin for the WWTF would range as high as 530,000 µg/L of aluminum.<sup>32</sup> Without a more transparent disclosure of aluminum inputs to the tailings piles and the WWTP, it is not possible to discount the modeled exceedance from aluminum standards.

Lead levels modeled for the PolyMet proposed action would cause or contribute to excursions from Minnesota's WQS for lead. Lead concentrations for the proposed action increase in every tributary as compared with continuing existing conditions. Under the proposed action, lead levels at Mud Lake Creek MLC-3 (1.9 µg/L), Trimble Creek TC-1 (3 µg/L) and PM-19 (2.9 µg/L), and Unnamed Creek PM-11 (3 µg/L) would *all* exceed the 1.3 µg/L chronic WQS for lead in Lake Superior Basin waters with hardness of 50 mg/L.

The SDEIS attempts to dismiss this exceedance by stating that the excursion results from decreasing the hardness of the tributary waters. (SDEIS, pp. 5-8, 5-191). This decrease in hardness may provide part of the explanation, but none of the lead concentrations modeled for the existing conditions scenario in Mud Lake Creek, Trimble Creek, or Unnamed Creek exceed 1.3 µg/L. (SDEIS, Table 5.2.2-42, p. 5-183) In addition, the stringency of chronic standards for lead in low hardness waters is based on the sensitivity of aquatic life. If the factors resulting in an excursion are synergistic, they are still an excursion from water quality standards.

Under the PolyMet proposed action, selenium would reach if not exceed the applicable chronic WQS of 5 µg/L for Class 2B waters in the Lake Superior Basin. Minn. R. 7050.0110, subp. 4. Selenium is modeled at precisely 5 µg/L in both Trimble Creek TC-1 and Unnamed Creek PM-11, an increase of 555 percent over continuation of existing conditions in Trimble Creek and 455 percent over the existing conditions scenario in Unnamed Creek. With this magnitude of increase in concentrations, concluding that no excursion would occur seems insufficiently conservative.

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<sup>31</sup> The SDEIS states, “The aluminum criterion would be exceeded at all locations for both the Continuation of Existing Conditions Scenario and the NorthMet Proposed Action.” (SDEIS, p. 5-181). With respect to this Trimble Creek location, this statement is inaccurate.

<sup>32</sup> PolyMet, Mine Site WWTF Treatment Facility Design Plan, Nov. 30, 2012, attached as Exhibit 26, Table 2-2 states concentration as 5.3E+2 mg/L.

Additional contaminants are modeled to significantly increase under the PolyMet proposed action, even though they are not predicted to reach or exceed water quality standards. For example, in Trimble Creek, antimony levels at TC-1 are modeled at 6,200 percent as compared to existing conditions, and cadmium levels at 1,250 percent of existing conditions. Nickel levels are modeled at 900 percent or more as compared to continuing existing levels in both Trimble Creek TC-1 and PM-19. Zinc levels would be 700 percent as compared to continuation of existing levels in Trimble Creek. Modeled copper levels more than triple in Unnamed Creek PM-11 and nearly triple in Trimble Creek PM-19. Modeled arsenic levels more than quadruple at Unnamed Creek PM-11. (SDEIS, Table 5.2.2-42, p. 5-183).

### **Conclusion**

The PolyMet SDEIS provides unsubstantiated and unreasonable predictions of seepage of untreated contaminants from the tailings piles. This flawed and overly optimistic analysis affects predictions of drinking water contamination, compliance with surface water quality standards, impacts on aquatic life, effects on natural stands of wild rice and increases in downstream mercury methylation due to sulfate loading in the St. Louis River as well as the Partridge River and Embarrass River watersheds. The PolyMet SDEIS must be rejected as inadequate on this basis alone. It is highly probable that if assumptions regarding collection and untreated release of tailings seeps were changed to be more consistent with field experience and site conditions, the results would substantially change all water quality predictions downstream of the tailings site.

The concentrations both in untreated seepage and in WWTP effluent depend on the levels of solutes in tailings site process water. In addition to revision of water quality models to include a realistic volume for untreated seepage, the concentration of solutes in tailings seepage, plant site pond and process water, and WWTP influent must be disclosed in a revised SDEIS so that models of water quality downstream of effluent can be verified.

### **Recommendations – Tailings Site Water Quality**

- The SDEIS must be revised to include a clear and intelligible water balance for the tailings basin and WWTP.
- The SDEIS must be revised to consider the presence of known bedrock fractures beneath the tailings basin.
- The SDEIS must be revised provide a reasonable assessment of tailings seepage through

faults, fractures and other secondary porosity features beneath the tailings basin.

- The SDEIS must be revised to use a reasonable range of assumptions based on site-specific conditions and field experience to model containment and release of untreated seepage to surface water and groundwater.
- The SDEIS must be revised to assess potential seepage toward the east based on changes in the topography and water table height in tailings Cell 1E and Cell 2E.
- The SDEIS must be revised to provide a reasonable assessment of seepage toward the south and Second Creek based on hydrological testing, LTVSMC experience and increased storage of tailings and process water.
- The SDEIS must be revised to specify concentrations of constituents in plant process water, tailings basin pore water, untreated seepage and WWTP influent, using numbers that allow easy comparison with applicable surface and groundwater quality standards.
- The SDEIS must be revised to specify concentrations of constituents in mine site process water and to verify the capacity of the WWTF to reduce contaminants to meet “targets.”
- The SDEIS must be revised to disclose its assumptions regarding the capacity of the tailings site to contain water, the water pressure exerted, and what increase in the volume of groundwater is predicted during operations and closure.
- Where field experience has demonstrated the insufficiency of water quality models, the SDEIS must demonstrate that models have been revised to verify their accuracy.
- The SDEIS must be revised to disclose its assumptions regarding concentration caps, explaining what concentrations of solutes would be predicted absent a cap, and how uniform pH and sulfate would be maintained with varying inputs over thousands of acres.
- The SDEIS must be revised to disclose and substantiate its assumptions regarding burial, sorption or retention in tailings and reduction in chemical reactivity resulting from bentonite placement, including field experience that supports those assumptions.
- The PolyMet revised SDEIS must consider alternative methods of avoiding or mitigating impacts of tailings seepage on water quality, including but not limited to constructing a new and completely lined tailings facility on a properly prepared bedrock surface.

## **IV. Hydrometallurgical Residue Facility**

### **Introduction**

The Hydrometallurgical Residue Facility (HRF) will contain some of the most concentrated and toxic wastes produced by the PolyMet project. Yet, the SDEIS fails to disclose the chemical composition of these materials or explain the analysis that was done to determine whether or not they would pose hazards to the environment. The PolyMet plan selects an unsuitable location for the HRF, increasing risks of liner failure and instability at this permanent waste storage facility. The SDEIS inappropriately denies the potential for releases as result of liner leakage from the HRF. Planned management of the HRF is insufficient to reduce risks of significant releases.

#### **1. The PolyMet SDEIS provides inadequate information as to the nature and chemical characterization of HRF wastes.**

The HRF has been designed as a single cell structure with a design capacity of 6,400,000 cubic yards to be located on top of the existing LTVSMC Emergency Basin. (SDEIS, p. 5-570). The maximum height of the HRF would be approximately 85 feet. (SDEIS, p. 5-571). If all nickel flotation concentrate were used as feedstock, the projected hydrometallurgical residue generation rate would be 313,000 tons annually or a total of 6,170,000 tons with a 20-year mine life. (SDEIS, p. 3-114 to 3-115). The process water portion of the slurry that would be deposited from the Hydrometallurgical Plant to the HRF totals 117 million gallons per year. (Water Modeling Data Package – Plant Site, included as SDEIS reference 2013j, pdf p. 116). The HRF would be a permanent waste disposal feature on the PolyMet plant site.

The HRF would contain wastes from hydrometallurgical processing of concentrates. This process would involve high-pressure and high-temperature autoclave leaching followed by solution purification steps to extract and isolate platinum group, precious metals, and base metals. (SDEIS, p. 3-107)

The SDEIS lists the materials that will be consumed by the hydrometallurgical process, including hazardous materials: Sulfuric Acid (1500 tons per year “tpy”), Hydrochloric acid (3,590 tpy), Sulfur dioxide (1,433 tpy), Sodium hydrosulfide (513 tpy), Limestone (125,000 tpy) Lime (4,344 tpy), Magnesium hydroxide (4,866 tpy), Caustic (NaOH)(33 tpy) and various



flocculants. (SDEIS, Table 3.2-13, pp. 3-112 to 113). The SDEIS explains that calcium in the form of either limestone or lime would be used to neutralize acids formed in the process, resulting in gypsum waste residue. (SDEIS, p. 3-111). Gold and platinum group metals would dissolve as chloride salts. Acid would be generated from the oxidation of major sulfide materials in the process. (*Id.*)

During the 20 years of mine operation, wastewater treatment facility (WWTF) sludge would also be deposited in the HRF. (SDEIS Figure 3.2-12, p. 3-55; SDEIS, Figure 3.2-13, p. 3-57). WWTF sludge would include dewatered reject concentrate received from the plant site reverse osmosis WWTP.

The SDEIS does not tell decision-makers or the public what concentration of acids, salts and metals is predicted for the hydrometallurgical process wastes and filtered sludge that would be deposited in the HRF. No documents among the SDEIS references model the overall chemistry of the hydrometallurgical residue facility at any relevant time period. Neither the SDEIS nor any document identified to date explains the analysis that was done by any regulatory agency to determine whether the HRF should or should not be characterized as hazardous waste.

Humidity cell tests reported in the 2007 RS33/RS65 PolyMet report, using water, rather than wastewater, predicted that solid form residues would not reach the level of corrosiveness to be characterized as hazardous.<sup>33</sup> However, leach residues were highly acidic, with individual leach residues as low as 2.1 pH. (RS33/RS65, pp. 17-18). After 20 weeks, arsenic and selenium leaching showed an increasing trend, with arsenic in residue leachate increasing to 7.5 µg/L (drinking water health cancer risk at 1/100,000 of 0.18 µg/L) and selenium increasing to 7 µg/L (surface water quality standard of 5 µg/L). (*Id.*, p. 20). The waste generated by nickel processing contained 63 percent natrojarosite, (*Id.*, p. 13) a compound known to be unstable and to yield sulfates and acidic leachate as it breaks down. This report concluded, “Eventually, it is expected that acid buffering minerals will be exhausted and the residues will become acidic unless additional buffering capacity is added. (*Id.*, p. 28, 29).

PolyMet’s Waste Characterization Data Package reported that leachates in these tests had sulfate levels of 7,347 mg/L -- 740 times the wild rice sulfate standard. Combined residues were non-acidic, although buffering capacity by leach residues could be consumed over time

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<sup>33</sup> PolyMet, Hydrometallurgical Residue Characterization and Water Quality Model Draft Report RS33/RS65 (Feb. 2007), narrative attached as Exhibit 27.

“resulting in acidic conditions of the combined residues in the future.” (SDEIS reference PolyMet 2013l, p. 41, 42). The PolyMet plan does not propose treating the residue in the HRF in order to prevent long-term acidity. Apparently, theoretical calculations will be used to combine lime or limestone with residue prior to disposal in the HRF in the hope that this addition will prevent acid generation from exceeding the neutralization capacity of the residue. (Residue Management Plan, Dec. 14, 2012, SDEIS reference, PolyMet 2012e, p. 6).

These 2007 humidity cell and leaching reports are unlikely to be definitive, particularly since, even when the DEIS was written in 2009, it was acknowledged that the proposed hydrometallurgical process had “not been employed at a commercial scale.” (PolyMet DEIS, SDEIS reference MDNR and USACE 2009, p. 4.1-95) The DEIS noted that residue composition of this experimental process at an operational scale might differ from laboratory and small-scale pilot tests. (*Id.*)

The SDEIS does not discuss the chemical composition or process by which the WWTF will produce filtered sludge. The Mine Site WWTF Design Plan, attached as Exhibit 26, explains the process by which metals and sulfates will be removed from highly concentrated waste streams from the West Equalization Basin, the WWTF membrane filtration system and WWTP reject concentrate and dewatered to form sludge that will be managed at the hydrometallurgical plant during operations. (Mine Site WWTF Plan, *supra*, pp. 13-14). Sludge will contain extremely high levels of metals, sulfates and calcium:

Removal of metals, including nickel, copper and cobalt, is accomplished in an HDS metals precipitation system. . . Metals are removed from the system as sludge. (*Id.*, p. 15)

Sulfate removal is achieved through the addition of lime to precipitate gypsum. . . Sulfate is removed from the system as gypsum sludge. (*Id.*)

The excess calcium is removed from the system as calcite sludge. (*Id.*, p. 16)

The chemical precipitation treatment train processes result in the production of solid residuals in the form of chemical sludges, including a metal/iron sludge, gypsum sludge, and calcite sludge. (*Id.*)

We’ve found no analysis of the volume or chemistry of the filtered sludge proposed to be deposited in the HRF. However, levels of sulfates and metals in reject concentrate, even before dewatering to form sludge, indicate that sludge may pose a hazard if released to the environment. For example, reject concentrate would contain up to 12,300 mg/L of sulfates; up to 8,190 µg/L of

copper and 729 µg/L of arsenic, several orders of magnitude above standards that protect the environment and human health. (See Water Modeling Data Package – Mine Site, SDEIS reference PolyMet 2013i, Large Table 22 on pdf p. 430).

The HRF would be a repository for a substantial quantity of mercury. The SDEIS states, “Overall, about 95 percent of the mercury originating in the ore is expected to remain within—or be adsorbed to—the tailings and the hydrometallurgical residue.” (SDEIS, p. 5-431). The RS33/RS65 Report, above, determined that the total composition of mercury in residues was 0.11 parts per million. (RS33/RS65 Report, *supra*, Table 5-2, p. 14). If the full 6,170,000 tons of residue from the Hydrometallurgical Plant were produced, total mercury deposited in the HRF would approximate 1,357 pounds. The mercury mass balance reported in the RS66, the Mercury Mass Balance Analysis excerpted in Exhibit 4, concluded that about 164 pounds per year of mercury would be deposited in the hydrometallurgical residue cells. Over a 20-year mine life, up to 3,280 pounds of mercury could be deposited in the HRF.

The PolyMet SDEIS does not include a requirement that the HRF obtain a permit as a hazardous waste facility. Neither does the SDEIS contain any analysis of whether the HRF should be treated as a facility for storing hazardous wastes. This analysis is long overdue.

The Minnesota Pollution Control Agency (MPCA) has the delegated authority to enforce Resource Conservation and Recovery Act (RCRA) regulations in Minnesota. No generator can treat, store, or dispose of hazardous wastes in Minnesota without a hazardous wastes facility permit. Minn. R. 7045.0211, subp. 1; Minn. R. 7001.0520, subp. 1.

The definition of hazardous wastes under Minnesota Statutes includes any refuse, sludge or other waste materials which “may (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment” if improperly treated, stored, transported, disposed of or otherwise managed. Hazardous waste materials include, but are not limited to “explosives, flammables, oxidizers, poisons, irritants, and corrosives.” Minn. Stat. §116.06, Subd. 11. Minnesota Rules further elaborate that a waste is hazardous if it exhibits “toxicity or lethality.” Minn. R. 7045.0131, Subp. 1.

Rules define wastes as “corrosive” if pH is less than or equal to 2.0. Minn. R. 7045.0131, Subp. 4(A). A mixture of wastes that contains a waste that is toxic or lethal is considered to be a hazardous waste. Minn. R. 7045.0102, Subp. 2(C). Humidity cell leach residues approached

caustic levels. Wastes have not been tested for lethality.

**2. The proposed location for the PolyMet hydrometallurgical residue facility is an unsuitable site.**

The PolyMet SDEIS proposes to construct the PolyMet hydrometallurgical residue facility on two shallow marsh wetlands totaling 36.1 acres. (SDEIS, p. 5-285; Figure 5.2.3-19, p. 5-289). The HRF would be built on top of compressed peat (SDEIS, p. 4-383) and unconsolidated tailings, fines and slimes from taconite tailings discharge. (SDEIS, p. 4-378). There is also a fault running directly beneath the proposed HRF location. (See Map of Faulted Bedrock and Surface Topography, *supra*, in Exhibit 6). Little testing has been done on the bedrock hydraulic conductivity underlying the HRF site. (SDEIS, p. 4-378)

Minnesota law precludes establishment or construction of either a hazardous waste facility or an industrial solid waste facility in a “wetland” or in a location “where the topography, geology, hydrology, or soil is unsuitable for the protection of the ground water and the surface water.” Minn. R. 7045.0460, subp. 2; Minn. R. 7035.1600. Location of the HRF on top of wetlands is prohibited pursuant to Minnesota rules.

Given the high concentrations of sulfates, metals and mercury slated for disposal in the HRF, its proposed location on top of wetlands, compressed peat, slimes and unconsolidated materials is unsuitable, even without further investigation of the bedrock fault underlying the site. The risk of instability resulting from this underlying material is explained in the Geotechnical Data Package, SDEIS reference 2012(a). “The LTVSMC slimes and the compressed peat underlying the HRF location have the potential to develop excess pore water pressures and reduced strength as stresses are imposed on these materials by construction of the overlying HRF.” (PolyMet 2012a, p. 13).

Although wick drains and a surcharge load would be used to help consolidation of materials, the underlying material will settle differentially depending on the depth of residue. The resulting deformed surface of the HRF would be concave, with the greatest deformation in areas of greatest residue thickness. (SDEIS, p. 5-575). The SDEIS predicts that strain would be well within the range of acceptable limits of most geosynthetic liners, but notes that “strain in the Hydrometallurgical Residue Facility liner system would result from differential settlement between points along the liner.” (SDEIS, p. 5-575) The stability of the liner system at the interface of the geosynthetic clay liner over granular soil is calculated at 1.56, barely above the

minimum safety factor of 1.5 (SDEIS, Table 5.2.14-5, p. 5-576).

**3. The PolyMet SDEIS inappropriately fails to consider liner leakage both within an expected leakage range and under conditions of liner integrity failure.**

The SDEIS fails to provide any analysis of the impacts of liner leakage on modeled water quality. At some point in the process since the DEIS was released in 2009, the Co-Lead Agencies apparently made the strategic decision that, with a double liner system, it can be assumed “that the Hydromet Facility will have no leakage.” (Water Resources/Groundwater IAP Memo, SDEIS reference MDNR et al 2011b, pdf p. 13). As reports were prepared for the SDEIS, PolyMet concluded that leakage “can be ignored.” (Water Modeling Data Package – Plant Site, SDEIS reference PolyMet 2013j, p. 110). Because “it is assumed that the HRF will have negligible leakage . . . there is no reason to model the chemical loading from the HRF.” Thus, “the HRF will not be included as a source in the probabilistic water quality modeling.” (Waste Characterization Data Package, Mar. 7, 2013, SDEIS reference PolyMet 2013l, pp. 43, 155) This position is indefensible.

The “double liner” system proposed for the hydrometallurgical residue facility in the SDEIS is a geomembrane liner above a geosynthetic clay liner, with an unspecified leakage collection system between the liners. (SDEIS, p. 3-123) Similarly, the PolyMet DEIS proposed that hydrometallurgical residue cells would be placed on a geomembrane liner overlying a geosynthetic clay liner. (PolyMet DEIS, SDEIS reference MDNR and USACE 2009, p. 4.1-64). However, the DEIS acknowledged and modeled the imperfection of this double liner system: “All liners leak to some extent and the modeling considered low, average, and high rates of liner leakage.” (*Id.*)

The DEIS predicted the rate of liner leakage (unrecoverable groundwater seepage) from the proposed double liner system for the HRF cells to range from 0.5 gpm to 8.7 gpm, if only a single cell representing one fourth of the HRF volume were open at a time. The DEIS included this leakage in surface water modeling (*Id.*) and recognized that surface water quality impacts could result from the hydrometallurgical residue storage area. (*Id.*, p. 4.1-107).

In comments on the preliminary SDEIS released in May 2013, MDNR Fish and Wildlife/Fisheries staff raised concerns about potential seepage through the liners beneath the HRF. These comments are attached in Exhibit 28:

Where does Hydrometallurgical Residue Facility fit in here? If there was a failure in the integrity of the double liner, where would seepage flow? Towards Embarrass R or Second Cr? HRF also missing on Fig. 5.2.2-6 (Comment 3)

HydroMet residue facility. . Zero seepage forever? (Comment 6)

Discussion should include Hydrometallurgical Residue Facility (HRF) which is to have a "permanent" liner system. Leakage from the HRF has potential to impact the Partridge R watershed. (Comment 19)

Even under normal operations, liners leak. The HRF leakage collection system would reduce the amount of leakage in contact with the geosynthetic clay liner, but any leakage through that lower liner would be unrecoverable groundwater seepage. It is also likely not be detected, since the SDEIS has proposed no monitoring specific to the HRF.

As a result of the liner stress posed by the proposed location of the HRF on top of shallow marshland, peat, slimes and other unconsolidated materials, failure of liner integrity is more likely. In addition, both the HRF process and the chemical trains for filtered sludge involved limestone or lime, creating high concentrations of calcium. The presence of these ions will increase the likelihood of failure of the second liner, the geosynthetic clay liner. "Ions such as those of calcium and sodium are known to have potentially detrimental effects on the long-term permeability of GCLs [geosynthetic clay liners]; the GCL permeability has the potential to increase in the presence of such ions, particularly when these ions are present in high concentrations." (Geotechnical Data Package – Hydrometallurgical Residue Facility, SDEIS reference PolyMet 2012a, p. 54)

**4. Management of the hydrometallurgical residue facility is insufficient to reduce the risk of liner loss of integrity or impoundment failure.**

Minnesota rules ensure that a facility issued a hazardous waste permit or a state disposal system permit will be properly inspected and maintained and that long-term closure will reduce the risks that caustic or toxic wastes will be released. There is no such assurance for the HRF. Under rules for a hazardous waste disposal facility, the freeboard level must be inspected every day, and the “surface impoundment, including dikes and vegetation surrounding the dike, at least once a week to detect any leaks, deterioration, or failures in the impoundment.” During operation and closure, the amount of liquids removed from leak detection must be recorded at least once a

week. Minn. R. 7045.0630, Subp. 5. If the owner or operator does not remove or decontaminate all of the impoundment materials after closure, Minnesota law requires that liquid wastes be removed or wastes be solidified; that wastes be stabilized, and that wastes be covered to preserve the cover's integrity. Minn. R. 7045.0630, Subp. 6.

Under the PolyMet reclamation plan, ponded water would be decanted from the HRF and water volume would decline, depending on the efficacy of the membrane cover system. (SDEIS, p. 3-130, 5-82) Once the membrane cover system is installed and the top revegetated, the HRF would be inspected "at least twice per year." (SDEIS reference PolyMet 2013a, p. 28). Turf and final cover would be inspected and maintained by "mowing once per year or as needed, fertilizing when visual inspection indicates poor vegetation growth, and implementing repairs." (SDEIS, p. 5-358). The SDEIS does not propose any schedule for monitoring liquids removed from the leak detection system, or for inspections to ensure that the pumping system is not clogged due to solids accumulation.

Although the SDEIS claims, "mitigation measures would be undertaken if there was any indication of potential solute releases to groundwater or surface water" from the HRF (SDEIS, pp. 5-89, 5-157), the nature of these measures is not specified. Short of excavating the hydrometallurgical residue facility, there is no mitigation that would restore the patency of a liner that has lost its integrity.

### **Recommendations – Hydrometallurgical Residue Facility**

- The SDEIS must be revised to provide detailed disclosure of the chemical composition and pH of all individual wastes proposed for disposal in the HRF, including but not limited to hydrometallurgical process wastes and WWTF sludge.
- SDEIS must be revised to analyze the chemical composition of all HRF wastes based on additional leachate testing that reflects the current hydrometallurgical and WWTF sludge formation processes, and must evaluate chemical changes over time.
- The SDEIS must be revised to provide a current mass balance for mercury, including a current analysis of the mass of mercury that would be deposited in the HRF from all wastes, including but not limited to hydrometallurgical process wastes and WWTF sludge.
- The SDEIS must be revised to provide a rigorous analysis of whether the HRF wastes or any part of them are hazardous wastes under Minnesota law, requiring issuance of a hazardous waste disposal permit.
- The SDEIS must be revised to reject any location for the HRF on top of wetlands, compressed peat, slimes or unconsolidated materials, and to reject any location on top of

faults or fractures, unless detailed hydrologic analysis has demonstrated lack of hydraulic conductivity to shallow groundwater.

- The SDEIS must be revised to conclude that the location for the HRF in the PolyMet proposed action is unacceptable.
- The SDEIS must be revised to model water quality impacts from the HRF based on a reasonable and conservative range of liner leakages under normal conditions.
- The SDEIS must be revised to model water quality impacts from HRF discharge in the reasonably foreseeable event of liner failure or stability failure.
- The SDEIS must be revised to evaluate alternatives to mitigate leakage from the HRF including completely dewatering and solidifying HRF materials.
- The SDEIS must be revised to evaluate the potential that materials deterioration and maintenance lapses over time would increase liner leakage and water quality impacts.



## V. WETLANDS & ARNI

### Introduction

The PolyMet SDEIS states that the NorthMet proposed action would directly destroy 913 acres of wetlands and could indirectly impact up to 7,351 additional acres of wetlands in the Partridge River and Embarrass River watersheds of the Lake Superior Basin. Wetlands in and around the mine site are high quality peatlands and headwaters vital to downstream water quality and internationally important aquatic systems, supporting threatened, rare and endangered species. They are aquatic resources of national importance.

The PolyMet SDEIS uses an unverified analog for indirect impacts on wetlands and unsubstantiated assumptions about impacts of mine drawdown, fragmentation, and pollution to understate the reasonably foreseeable indirect effects of the PolyMet open-pit mine, mine wastes, processing and tailings facilities. Despite these understatements, the PolyMet proposed action would have substantial and unacceptable impacts on aquatic resources of national importance.

In addition, the PolyMet SDEIS plan for wetlands mitigation is inadequate. The SDEIS proposes wetlands mitigation for only 27 of up to 7,351 acres of wetlands that would be indirectly impacted by the proposed action. Even where mitigation is proposed, more than two-thirds of the compensatory acres and credits are outside the Lake Superior Basin. From a functional perspective, wetlands at the proposed PolyMet mine site are irreplaceable.

Finally, no alternatives are analyzed in the PolyMet SDEIS, although both the underground mine project alternative and several mitigation alternatives discussed in Section XI of these comments would have the potential to reduce impacts on project area wetlands, including aquatic resources of national importance.

The PolyMet SDEIS must be revised to model indirect wetlands impacts. The Clean Water Act Section 404 wetlands dredge and fill permit must be denied due to substantial and unacceptable impacts on wetlands, an inadequate mitigation plan and the failure to demonstrate that the proposed action is the least environmentally damaging practicable alternative.

#### **1. The SDEIS acknowledges that the PolyMet proposed action could have a direct or indirect adverse impact on up to 8,264 acres of wetlands.**

There are approximately 11,201 acres of wetland identified in the PolyMet mine area and 8,622 acres of wetlands identified in the tailings basin area. (Wetlands Data Package, Mar. 7, 2013, SDEIS reference PolyMet 2013b, p. 7). A total of 87 wetlands covering approximately

1,298 acres have been identified within the boundaries of the PolyMet mine site. Approximately 92 percent of these wetlands are of high quality and the remaining 8 percent are of moderate quality. (SDES, p. 4-157). If one includes wetlands that are partially or completely within the site boundary, there are 3,325 acres of wetlands at the PolyMet mine site. (SDEIS, p. 5-239)

Direct effects from mining-related activities of the PolyMet proposed action, such as filling and excavating wetlands would permanently destroy 912.5 acres of wetlands, including 758.2 at the mine site, 147.1 at the plant site and 7.2 acres along the transportation and utility corridor. (SDEIS, pp. 5-223, 5-230). At the PolyMet mine site, approximately 99 percent of the directly impacted wetlands are rated high quality. (SDEIS, p. 5-230).

The PolyMet SDEIS acknowledges that there will be indirect wetlands effects from the proposed action as a result of the following factors:

- 1) wetland fragmentation,
- 2) change in wetland hydrology resulting from changes in watershed area,
- 3) changes in wetland hydrology due to groundwater drawdown,
- 4) water quality changes related to deposition of dust,
- 5) water quality changes related to ore spillage along the Transportation and Utility Corridor, and
- 6) changes in water quality related to leakage from stockpiles/mine features and seepage from mine pits. (SDEIS, p. 5-224)

Construction of open pits, stockpiles and haul roads at the mine site could fragment wetlands. Groundwater drawdown from mine dewatering, groundwater mounding/drawdown from tailings basin seepage containment, and changes in stream flow could create hydrological effects converting one wetland type to another or converting a wetland to an upland. Changes in wetland water quality could impact the functions and values of remaining wetlands. (SDEIS, p. 225). As a result of all of these factors, in addition to direct destruction of wetlands, the PolyMet proposed action could indirectly affect up to 7,351 acres of wetlands at the mine site and tailings basin site (SDEIS, p. 5-224, 5-309), resulting in a total potential impact on 8,264 acres of wetlands.

**2. Wetlands that would be adversely impacted by the PolyMet proposed action are Aquatic Resources of National Importance (ARNI) under the Clean Water Act.**

Under Section 404(c) of the Clean Water Act, a permit to dredge and fill wetlands cannot be issued if the project would have an “unacceptable adverse effect” on municipal water supplies, fishery areas and wildlife. 33 U.S.C. § 1344(c). Aquatic resources of national importance (ARNI) are governed by an August 1992 Memorandum of Agreement between the

EPA and the Department of the Army, Part IV, paragraph 3(b) regarding Section 404(q) of the Clean Water Act. Protection of these special aquatic sites is a high national priority for the EPA:

From a national perspective, the degradation or destruction of special aquatic sites, such as filling operations in wetlands, is considered to be among the most severe environmental impacts covered by these Guidelines. The guiding principle should be that degradation or destruction of special sites may represent an irreversible loss of valuable aquatic resources. 40 C.F.R. § 230.1(d).

Wetlands that possess “special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values” or which “are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region” are protected as ARNI. 40 C.F.R. § 230.3(q-1).

In commenting on the draft EIS, EPA provided notice that water resources in the Partridge River impacted by the PolyMet were believed to be ARNI:

EPA believes the coniferous and open bogs, comprising a large percentage of the approximately 33,880 total wetland acres, within the Partridge River Watershed to be an ARNI due to the values they provide in terms of unique habitat, biodiversity, downstream water quality, and flood control specifically, to the Lake Superior Watershed and the Great Lakes Basin.<sup>34</sup>

All wetlands in the Partridge River watershed impacted by the PolyMet project should be considered ARNI. Minnesota Biological Survey mapping shows that the Hundred Mile Swamp, Upper Partridge River and Partridge River Peatlands sites are all areas of high biological diversity. (See map attached as Exhibit 30). The MDNR’s MBS site database states that the high biodiversity significance rank of the Hundred Mile Swamp and Partridge River Peatlands sites are based on “high quality peatlands,” while the rank of the Upper Partridge River site is based on “the numerous rare species, including several rare Botrychiums, recorded in the site.”

The SDEIS recognizes that mine site vegetation types “are indicative of pre-settlement conditions and lack hydrologic disturbance.” (SDEIS, p. 4-149). As tribal agencies noted in comments on the draft EIS, more than 390 acres of wetlands on the PolyMet mine site have a significant white cedar component.<sup>35</sup> White cedar swamps, tamarack swamps and lowland

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<sup>34</sup> B. Mathur, EPA to Col. J. L. Christensen, USACE, p. 3 (Feb. 18, 2010), “EPA DEIS Comment,” attached as Exhibit 29.

<sup>35</sup> PolyMet DEIS, Appx. D, p. 4.2-9, appendices are not included in SDEIS references, but are available at [http://files.dnr.state.mn.us/input/environmentalreview/polymet/draft\\_eis/volume\\_iii\\_appendices\\_deis\\_10\\_19\\_09.pdf](http://files.dnr.state.mn.us/input/environmentalreview/polymet/draft_eis/volume_iii_appendices_deis_10_19_09.pdf)

forested peatlands are identified in the MDNR's *Comprehensive Wildlife Conservation Strategy* as habitat features important to sustain species in greatest conservation need, including various species of birds, butterflies and mammals.<sup>36</sup> The SDEIS recognizes the exceptional value of wetlands that would be affected by the PolyMet project:

Most of the wetlands that would be affected by the NorthMet Project Proposed Action would be of pre-European settlement condition and rate at the highest Floristic Quality Assessment levels for those plant communities in Minnesota. MnRAM vegetative diversity/integrity ratings would be "exceptional" for these pre-European settlement condition wetlands. (SDEIS, p. 5-313)

The PolyMet mine site would also impact ephemeral streams and headwater resources in the Partridge River watershed. The mine site lands encompass 6,864 linear feet of first order streams. (SDEIS, Table 5.3.6-2, p. 5-644). The EPA has recognized the ecological importance of these beginnings of rivers, the uppermost streams in the river network endpoint or confluence with another stream. "Headwater streams trap floodwaters, recharge groundwater supplies, remove pollution, provide fish and wildlife habitat, and sustain the health of downstream rivers, lakes and bays."<sup>37</sup>

In addition to the aquatic resources in the Partridge River Watershed, it is likely that there are wetlands near the tailings basin that should be considered aquatic resources of national importance. "In areas outside the toe of the Tailings Basin, natural or "virgin" peat, relatively unaltered by the construction of the Tailings Basin, still exists." (Geotechnical Data Package – Flotation Tailings Basin, Apr. 12, 2013, SDEIS reference PolyMet 2013n, p. 47).

Under the no action alternative, wetlands in the Partridge River and Embarrass River watersheds would retain the capacity to protect water quality and sequester mercury, reducing impacts on water quality and on fish consumption uses from the project site downstream to the St Louis River, the St. Louis River estuary and Lake Superior.

The national and international importance of waters within the Lake Superior Basin is established by agreements entered into by the United States of America and Canada in 1972 and 1978 pertaining to Great Lakes Basin water quality,<sup>38</sup> agreements by governors of the states

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<sup>36</sup> MDNR, *Tomorrow's Habitat for the Wild and Rare An Action Plan for Minnesota Wildlife Comprehensive Wildlife Conservation Strategy*, ("Comprehensive Wildlife Conservation Strategy"), p. 240-243, available at <http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/habitats/02.pdf>

<sup>37</sup> EPA, Water: Rivers & Streams, Types of Streams, <http://water.epa.gov/type/rsl/streams.cfm>

<sup>38</sup> See Agreement on Great Lakes Water Quality, U.S.-Can., Nov. 22 1978, 30 U.S.T. 1383, available at <http://www.epa.gov/glnpo/glwqa/1978/articles.html#AGREEMENT%20BETWEEN%20CANADA>

surrounding the Great Lakes,<sup>39</sup> and by federal legislation enacted as the Great Lakes Critical Programs Act of 1990, which amended section 118 of the Clean Water Act and instructed the EPA to promulgate regulations to protect the Great Lakes System. 33 U.S.C. §1268(2010).

Under these regulations, often referred to as the “Great Lakes Initiative,” bioaccumulative chemicals of concern (“BCCs”) and bioaccumulative substances of immediate concern (“BSICs”) are strictly regulated. Mercury is both. 40 C.F.R. § 132.2, Table 6 (BCC); app. E, II.A (BSIC)(2010). Water resources potentially affected by the PolyMet project and pollutants of concern which could be reduced through wetland preservation at the proposed project site have been designated in federal law to be of national and international importance.

**3. The PolyMet proposed action would have substantial and unacceptable adverse impacts on ARNI, which are poorly estimated and understated in the SDEIS.**

**A. Direct impacts of the PolyMet project are environmentally significant.**

The PolyMet SDEIS acknowledges that approximately 353.6 acres of the One Hundred Mile Swamp MBS Site of High Biodiversity Significance and 1,364.9 acres of the Upper Partridge River MBS Site of High Biodiversity Significance would be affected by the PolyMet project and land exchange. (SDEIS, p. 5-341). Approximately 698.2 acres of the “impaired-vulnerable” or “vulnerable” native plant communities would be affected, including 202.7 acres of rich black spruce swamp. (SDEIS, p. 5-341).

Direct wetlands destruction alone resulting from the PolyMet proposed action would constitute substantial adverse impacts on aquatic resources of national importance in the Partridge River watershed. Even before indirect wetlands effects are considered, net destruction of wetlands in the Partridge River watershed from the PolyMet project would result in net loss of 666 acres. According to the PolyMet SDEIS, this direct wetlands destruction from the proposed action would be 26 percent of the total historical and predicted loss of wetlands in the Partridge River watershed from *all* other sources.<sup>40</sup> This is a substantial and unacceptable loss of ARNI from a single project.

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<sup>39</sup> See The Great Lakes Charter (1985), available at <http://www.cglg.org/projects/water/docs/GreatLakesCharter.pdf>

<sup>40</sup> Comparing pre-settlement wetlands (SDEIS, Table 6.2-9, p. 6-38) to the No Action alternative (SDEIS, Table 6.2-12, p. 6-41) total wetlands loss from all other past and predicted activities is 2,557 acres.

**B. The PolyMet SDEIS’ analysis of reasonably foreseeable adverse indirect impacts on wetlands is inadequate and understates indirect impacts.**

Federal law requires consideration of both direct and secondary impacts on special aquatic resources. Regulations state that potential impacts on wetlands that should be considered include dewatering, altering substrate elevation or water movement, destroying wetland vegetation, degrading water quality, flushing wetland systems, interfering with filtration or changing aquifer recharge capability. Federal regulations specifically recognize that pollution discharges can change wetland habitat value for fish and wildlife and modify the capacity of wetlands to retain and store floodwaters. 40 C.F.R. § 230.41(b).

The discussion of indirect wetlands impacts in the PolyMet SDEIS is inadequate and potentially misleading. The comparability of the Canisteo pit to the PolyMet mine pits for purposes of the “analog” estimates is unverified. Even applying the Canisteo pit proxy, the SDEIS’ use of data seems selected to understate impacts.

When incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, NEPA requires that the information be secured and included in an EIS. 40 § C.F.R. 22(a). In addition, under 40 C.F.R. §1500.1(b), an EIS must use “high quality” information and “accurate scientific analysis.” The PolyMet SDEIS’ analysis of indirect wetlands effects doesn’t meet these tests.

In his expert review, hydrologist Dr. Don Lee suggests that conducting additional hydrological testing (more than one 30-day pump test) would have been feasible, and that PolyMet’s reliance on MODFLOW and XP-SWMM to predict water quality effects and hydrology effects in groundwater and surface water (*See e.g.* SDEIS, pp. 5-7, 5-26, 5-27, 5-90, 5-91, 5-228), while denying the availability of models to quantify mine drawdown due to “due to complex mixes of bedrock, glacial till, and wetland soils at the Mine Site” (SDEIS, pp. 5-92, 5-227) is contradictory, if not disingenuous. If additional testing is needed to accurately assess complex systems and quantify PolyMet mine drawdown and tailings basin impacts based on actual site conditions, under NEPA regulations that testing should be done and a site-specific analysis performed.

The SDEIS’ heavy reliance on the Canisteo pit proxy to predict indirect wetland impacts also fails the accurate analysis test 40 C.F.R. §1500.1(b). In *Lands Council v. Forester of Region*

*One of the U.S. Forest Service, 395 F.3d 1019(9<sup>th</sup> Cir. 2005)* the court overturned a Forest Service decision that heavily relied on a flawed model. The court held that NEPA “requires up-front disclosures of relevant shortcomings in the data or models” and there was “inadequate disclosure that the model's consideration of relevant variables is incomplete.” *Id.*, at 1032. The court went on to say that the scientific methodology, to be reliable “required that the hypothesis and prediction of the model be verified with observation.” Without such verification, the decision-maker and the public at large would have no way to know whether the projection is “dead on” or “dead wrong.” This lack of verification rendered the final Forest Service EIS inadequate. *Id.*, at 1035.

The record is insufficient to verify the reliability of the Canisteo pit “analog” to estimate mine drawdown at the PolyMet mine site. Although the SDEIS claims that that the “geologic and hydrogeologic settings of the Mine Site are relatively similar to the Canisteo and Minntac sites.” (SDEIS, p. 5-92), data does not support this conclusion. The PolyMet East pit would be 630 feet deep and the West Pit would be 696 feet deep, (SDEIS, p. ES-17), while the Canisteo pit averages 100 feet deep.<sup>41</sup> The PolyMet mine is underlain by Duluth Complex and Virginia Formation, while the Canisteo pit has thicker glacial till and is underlain by Biwabik Formation rock. (SDEIS, p. 5-92). Absent rigorous site-specific characterization of geology and hydrogeology at the mine site – which might obviate the need for an analog at all – there is no verification that mine drawdown at the Canisteo pit would be comparable to the PolyMet site.

Expert Brian Branfireun concluded that the “analog” model was both unnecessary and unsatisfactory. “The reliance on the analog case to evaluate the potential extent and magnitude of the cone of depression and dewatering impact of surface wetlands and streams is completely unsatisfactory. . . given the availability of robust hydrogeological models that could reasonably evaluate potential impact scenarios.” (Branfireun 2014, p. 14)

In addition, the Canisteo model has been misused in the PolyMet SDEIS. The SDEIS excludes wetlands from impact “zones” based on distance from the open-pit so that no impacts were deemed “likely” more than 1,000 feet away. (See SDEIS, p. 5-227; Table 5.3.3-3, p. 5-247). The Canisteo pit, however, resulted in 3-foot hydrological impacts in 60 percent of wells 1300 to 1925 feet away from the pit. Near Canisteo, at least one well showed a notable effect on the surficial aquifer 2,625 feet away from the pit. (Analogue Information Relating to Mine Pit

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<sup>41</sup> MDNR, Canisteo Mine Pit Overflow Project, [http://www.dnr.state.mn.us/waters/mine\\_pit/canisteo.html](http://www.dnr.state.mn.us/waters/mine_pit/canisteo.html)

Cone of Depression Impacts on Surficial Aquifer, p. 5, SDEIS reference ERM and MDNR 2011). The SDEIS fails to mention that MDNR concluded there is “no solution” to rectify influences of the Canisteo pit on its local water table, and that proposed perpetual pumping is not “viable, not cost effective.”<sup>42</sup> Even applying the “analog,” the SDEIS underestimates drawdown impacts.

Apart from the inappropriate use of a Canisteo pit “analog” to estimate mine drawdown impacts, the SDEIS’ assumptions underestimate reasonably foreseeable indirect impacts on wetlands. The SDEIS assumes that ombrotrophic coniferous bogs and open bogs would not be impacted by mine drawdown because their hydrology is supported by precipitation. (SDEIS, p. 5-243). But, “no data or research was used from actual wetlands responding to groundwater drawdown” was used in the SDEIS for conclusions regarding wetlands sensitivities. (SDEIS, p. 5-271). Dr. Branfireun describes in detail the enhanced vertical hydraulic gradients imposed by pit dewatering and the resulting impacts on ombrotrophic bogs. (Branfireun 2014, p. 13-14)

The SDEIS further states that the permanent drawdown resulting from reducing surficial groundwater levels at West Pit by 21 feet and reducing groundwater elevation at East Pit by 8 feet would only affect 20 feet around West Pit and 10 feet around the East Pit. (SDEIS, p. 5-93). Again, no data or references are supplied to support this conclusion.

The SDEIS also apparently assumes that if changes in the average annual flow of the Partridge River would not diverge from naturally occurring variation, one could conclude that there were no potential indirect wetland effects for wetlands abutting the Partridge River. (SDEIS, p. 5-273). Finally, with respect to wetlands effects, the SDEIS concludes that the Partridge River “is likely to act as a natural barrier to the expansion of the cone of depression” for mine site drawdown. (SDEIS, p. 5-243). The PolyMet provided no testing data or research to support any of these assumptions. WaterLegacy has been advised that all of these assumptions are scientifically unsupportable and are likely to improperly underestimate foreseeable indirect effects of hydrological changes from the PolyMet proposed action on wetlands in the Partridge River watershed.<sup>43</sup>

Even with these highly limiting assumptions, the PolyMet SDEIS estimates that, in addition to 913 acres of direct destruction of wetlands, there would be 870 acres of wetlands

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<sup>42</sup> MDNR, Canisteo Mine Pit Overflow Project, *supra*.

<sup>43</sup> See also Comments of Paul H. Glaser on the PolyMet DEIS, Feb. 1, 2010, pp. 5-8, attached as Exhibit 31.



where there is a “high likelihood” of impacts from potential changes in hydrology and an additional 531 acres of wetlands where such impacts are “moderately” likely. (SDEIS, Table 5.2.3-3, p. 5-247).<sup>44</sup>

As discussed in other sections of these comments, water quality impacts from seeps, leaks and spills at PolyMet mine pits, waste rock piles, overburden and peat storage, sumps and ponds, rail corridor ore transport, plant site tailings piles and hydrometallurgical residue are all underestimated due to a number of unsupported assumptions. Even with these limits, the SDEIS identifies 515.8 acres of wetland resources within the groundwater flowpaths for seeps and leaks from mine pit contaminant sources. (SDEIS, pp. 5-283 to 5-284).

At the tailings basin site, without considering potential impacts to the south and east of tailings piles, the SDEIS identifies a total of 4,068.3 acres of wetlands within plant site seepage flowpaths. (SDEIS, Table 5.2.3-10, p. 5-297). Wetland areas that the SDEIS states are potentially indirectly affected by groundwater quality (1,972.7 acres) or groundwater and surface water quality (2,665.7 acres) total 4,638.4 acres. (SDEIS, Table 5.2.3-13, p. 5-307). If the assumptions of low hydraulic conductivities and high seepage capture made throughout the PolyMet SDEIS are inaccurate, all of these wetlands acres would be threatened.

The PolyMet SDEIS does not consider the levels of sulfates or metals in “dust” deposited or the effects these specific chemicals might have on wetlands. The SDEIS assumes that there would be no effects on wetlands unless dust levels were sufficient to interfere with photosynthesis, and set the threshold for this effect at *doubling* the existing levels of background deposition. (SDEIS, pp. 5-274, 5-302). Even so, the SDEIS estimates that sulfur and metals containing deposition will double in 234 acres of wetlands at the mine site and 194 acres of wetlands at the plant site. (SDEIS, p. 5-302; see also maps on pp. 5-303, 5-305).

Perhaps the clearest example of the SDEIS’ inadequacy in characterizing reasonably foreseeable wetlands impacts is on the mine site itself. On the mine site alone, 540 acres of wetlands would remain vulnerable to impairment and destruction after 758 acres of mine site wetlands are destroyed as a result of constructing mine pits, waste rock piles and other mine features. (SDEIS, p. 5-224). It is likely that *all* of these wetlands would be adversely affected by fragmentation, hydrologic changes, water pollution, air deposition or a combination of the above.

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<sup>44</sup> Between the May 2013 Wetlands Data Package, SDEIS reference PolyMet 2013b, p. 103 and the SDEIS, the number of wetland acres with a “high likelihood” of impacts from potential changes in hydrology was reduced by 62.25 acres. This change is not explained.

**C. The PolyMet proposed action would have substantial and unacceptable adverse impacts on ARNI as a result of fragmentation, mine drawdown, hydrologic changes, water and air pollution.**

EPA's comments on the draft EIS for the PolyMet proposed action stated, "EPA finds this project may have substantial and unacceptable adverse impacts on aquatic resources of national importance (ARNI)."<sup>45</sup> EPA comments on the preliminary SDEIS on August 7, 2013 raised concerns about estimation of indirect impacts to wetlands. EPA stated that the indirect impacts to mine site wetlands from fragmentation should not be underestimated, and the "co-lead agencies should identify a majority of wetlands within the Mine Site boundary as being indirectly impacted by mine features." The EPA suggested that additional refinement was needed to assess wetlands impacts from aquifer drawdown and that the co-lead agencies explain its threshold for deposition impacts and "why a lesser percentage of background deposition would pose no adverse effects."<sup>46</sup> The SDEIS has followed none of these recommendations.

The SDEIS also fails to identify the total acres of wetlands in the Partridge River and Embarrass River watersheds where adverse impacts are "reasonably foreseeable," whether as a result of fragmentation, mine drawdown, hydrologic changes, seepages, leaks, spills or deposition of contaminants. The SDEIS is inadequate without this assessment and must be revised to clearly state and justify on a sound scientific basis the reasonably foreseeable direct and indirect effects on wetlands from the PolyMet proposed action.<sup>47</sup> Until that time, no mitigation plan can be evaluated and no Section 404 permit issued.

WaterLegacy believes that the PolyMet project would have substantial and unacceptable adverse impacts on wetlands and ARNI, in particular. The PolyMet project's potential direct and indirect impact to 8,264 acres of wetlands would dwarf both the historic wetlands destruction and the projected cumulative wetlands destruction from all other sources in the Partridge River watershed (2,557 acres) and the Embarrass River watershed (402 acres). (SDEIS, Table 6.2-9, p. 6-38; Table 6.2-12, p. 6-41).

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<sup>45</sup> EPA DEIS Comment, *supra*, p. 3.

<sup>46</sup> A. Walts, EPA letter to USFS, MDNR, and USACE re PolyMet PSDEIS, Aug. 7, 2013, attached as Exhibit 32.

<sup>47</sup> The "rating" system on p. 5-310 is pseudoscience, and helps neither decision-makers nor the public determine reasonably foreseeable wetlands impacts.

**4. The PolyMet plan for wetlands mitigation is plainly inadequate.**

**A. The PolyMet plan fails to compensate for indirect adverse impacts on wetlands.**

The PolyMet SDEIS, which apparently also serves as the applicant's proposal for its Section 404 permit mitigation plan (SDEIS, p. 5-33) only proposes specific or up front mitigation for direct adverse effects on wetlands and 26.9 of the acres of wetland fragmentation that would result from the PolyMet proposed action. (SDEIS, pp. 5-321, 5-333)

For thousands of additional acres of wetlands for which adverse impacts are reasonably foreseeable, the PolyMet SDEIS proposed only that *if* it was determined that monitoring would cause future wetlands effects, wetland monitoring would be conducted. Then, "additional compensation *could* be required if determined necessary by the permitting agencies" or "*may be required if determined necessary.*" (SDEIS, pp. 5-225, 5-310, 5-316, emphasis added). The weak and disputable future requirement to mitigate indirect wetlands impacts is summarize as follows:

The Section 404 permit application includes criteria on how effects would be assessed. *If* indirect wetland effects, *based on the criteria presented in the Section 404 permit application*, were to occur, PolyMet would work with the USACE and MDNR to respond, *which may include the option* to provide compensatory mitigation for any documented indirect effects. (SDEIS, p. 5-336, emphasis added)

The PolyMet SDEIS contains no discussion of where or how additional compensatory mitigation would be provided for indirect wetlands impacts. WaterLegacy made an FOIA request to the U.S. Army Corps for documents reflecting any instance where the Army Corps had required compensatory mitigation for indirect wetlands impacts from a mining facility subsequent to permit issuance. The Army Corps responded that, after conducting a search of District records, "we were unable to locate any records responsive to your request."<sup>48</sup>

In *Ky. Riverkeeper, Inc. v. Rowlette*, 714 F. 3d 402, 411-412 (6<sup>th</sup> Cir. 2013) the Court ruled against the U.S. Army Corps on a coal-mining waste-discharge permit holding that failure to provide "analysis or documentation" for its determination that post-issuance compensatory mitigation would ensure cumulatively minimal adverse effects. The court held that the Corps' "unsupported belief in the success of mitigation measures" was insufficient protection of water resources under Clean Water Act Section 404. Similarly, in *Ohio Valley Environmental*

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<sup>48</sup> J. Willging, USACE letter to P. Maccabee, WaterLegacy, re wetlands FOIA request, Dec. 11, 2013, attached as Exhibit 33.

*Coalition v. Hurst*, 604 F. Supp. 2d 860, 887 (S. D. W Va. 2009), where the Army Corps contended that stream loss from coal mining in Appalachia would be minimal, the court held, “the Corps’ cumulative impacts determination was conclusory because it relied on an unsupported belief in the success of mitigation measures.” The Court explained that the “‘mere listing’ of mitigation measures and processes, without any analysis, cannot support a cumulative impacts determination.” *Id.*, citing *Nat’l Parks & Conservation Ass’n v. Babbitt*, 241 F.3d 722, 734 (9th Cir. 2001).

The vague and indefinite possibility of subsequent compensation for adverse impacts on wetlands resulting from fragmentation, mine drawdown, hydrologic changes, water pollution and air deposition in the PolyMet SDEIS fails to adequately protect ARNI and other wetlands resources under the Clean Water Act.

**B. The PolyMet plan fails to provide mitigation for direct adverse impacts on wetlands within the Lake Superior Basin.**

The PolyMet SDEIS states that there are opportunities for wetland compensation within the St. Louis River Watershed and northeastern Minnesota due to tens of thousands of acres of peatlands adversely affected by ditch systems. (SDEIS, p. 5-319). The SDEIS also states, “permanent functional loss of wetlands within the St. Louis River Watershed/Great Lakes Basin is “particularly critical in that 8-digit HUC watersheds adjacent to the Great Lakes—including the St. Louis River Watershed” since these watersheds “have been identified as coastal watersheds for purposes of the federal Mitigation Rule.” The SDEIS goes on to explain that this federal Mitigation Rule “places additional emphasis on replacing coastal wetland losses within a coastal watershed” and may require that a higher percentage of compensation be accomplished with the St. Louis River Watershed/Great Lakes Basin. (SDEIS, p. 5-333).

PolyMet’s mitigation plan for direct destruction of wetlands, as reflected in the SDEIS, proposes 101.8 acres of on-site future restoration, plus 530.9 acres of restoration or preservation at the Zim wetlands bank in the St. Louis River/Great Lakes Basin. The balance of mitigation project acreage —68 percent of the total – are proposed are in Aitkin and Hinckley, both geographically and ecologically remote from the project impacts. (SDEIS, Table 5.2.3-18, p. 5-327). When wetlands restoration credits are evaluated, even a higher percentage – 72 percent of the total – are located outside the 8-digit HUC watershed where the PolyMet proposed action

would destroy wetlands in the Partridge and Embarrass River watersheds. (*Id.*) The SDEIS plan for wetlands compensation is inadequate, even for direct wetlands impacts.

**C. The PolyMet wetlands compensation plan does not provide ecologically equivalent wetlands functionality within the Lake Superior Basin.**

The PolyMet SDEIS appears to acknowledge that wetlands compensation would not replace the resource or functions of PolyMet wetlands. The SDEIS cites the Federal Mitigation Rule for the proposition that “difficult to replace” wetlands/aquatic resources include bogs and forested wetlands. (SDEIS, p. 5-3-1, *citing* 33 C.F. R §332.3(e)(3) and 73 Fed. Reg.19633, Apr. 10, 2008, citations corrected). The SDEIS states, “The majority of wetlands that would be affected by the NorthMet Project Proposed Action would be ‘difficult to replace’ (coniferous bog, open bog, coniferous swamp, and hardwood swamp).” (SDEIS, p. 5-313)

Although the SDEIS discussion of the “exceptional” nature of wetlands affected by the PolyMet proposed action focuses on the discretion to use higher mitigation ratios (*Id.*), federal regulations prioritize preventing harm to these valuable aquatic resources. The Federal Mitigation Rule “emphasizes avoidance and minimization of impacts to difficult-to replace resources.” 73 Fed. Reg. 19605 (Apr. 10, 2008); 33 C.F.R. § 332.3(e)(3).

**5. The PolyMet proposed action is not the least environmentally damaging practicable alternative as required under the Clean Water Act Section 404.**

As explained in Section XI of these comments, which focused on alternatives, a Section 404 dredge and fill permit may not be issued under the Clean Water Act unless it is the least environmentally damaging practicable alternative to a dredge and fill project that would impact wetlands and headwaters streams. The PolyMet proposed action does not meet this test.

EPA Region 5 objected to a Section 404 permit for an Ohio Valley Coal Company slurry impoundment due to significant and unacceptable adverse effects on headwaters streams determined to be ARNI and because all practicable opportunities had not been taken to minimize adverse environmental impacts of the project.<sup>49</sup> In Minnesota, EPA objected to issuance of a permit that would have allowed Unamin Corp. to directly destroy 5.37 acres of wetland and indirectly impact calcareous fens as a result of floodplain dewatering.<sup>50</sup> EPA also considered

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<sup>49</sup> B. Mathur, EPA letter to Col. M.P. Crall, USACE re Ohio Valley Coal Co., Jan. 4, 2010, Exhibit 34.

<sup>50</sup> S. Hedman, EPA letter to Col. D. Koprowski, USACE re Unamin Corp. Aug. 20, 2013, Exhibit 35.

direct and indirect impacts of the proposed expansion of Hawkes Peat mining operation in objecting to a Section 404 as inconsistent with the Federal Mitigation Rule and due to its substantial and unacceptable impacts on 211 acres of ARNI.<sup>51</sup>

Project and mitigation alternatives described in Section XI of these comments would reduce the direct or indirect impacts to wetlands and ARNI. An underground mining alternative would greatly minimize wetlands destruction. The West Pit Backfill alternative would allow for wetlands restoration, and placement of permanent sources of contaminants above liners would reduce seepage impacts on adjacent wetlands. Construction of Mine Site Reverse Osmosis in Year One would allow mitigation of both pollution and drawdown impacts to Partridge River watershed high-value wetlands and ARNI.

### **Recommendations – Wetlands & ARNI**

- The Section 404 permit for the PolyMet project must be denied because the proposed action has substantial and unacceptable impacts on aquatic resources of national importance (ARNI).
- The Section 404 permit for the PolyMet project must be denied because the proposed action has substantial and unacceptable impacts on wetlands in the Partridge and Embarrass River watersheds, impacting drinking water quality, fisheries and wildlife in the Lake Superior Basin.
- The Section 404 permit for the PolyMet project must be denied because the applicant's mitigation plan fails to compensate for reasonably foreseeable indirect adverse impacts on wetlands.
- The Section 404 permit for the PolyMet project must be denied because the applicant's mitigation plan proposes compensation for direct destruction of wetlands outside the Lake Superior Basin.
- The Section 404 permit for the PolyMet project must be denied because the applicant's mitigation plan fails to minimize and avoid impacts on irreplaceable wetlands in the Lake Superior Basin.
- The Section 404 permit for the PolyMet project must be denied because the SDEIS fails to consider project and mitigation alternatives that would reduce impacts on wetlands and ARNI.
- The Section 404 permit for the PolyMet project must be denied because it has not been demonstrated that the proposed action is the least environmentally damaging practicable alternative.

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<sup>51</sup> S. Hedman, EPA letter to Col. D. Koprowski, USACE re Hawkes Peat, Aug. 9, 2013, Exhibit 36.

- The SDEIS must be revised to employ a valid site-specific model and provide high quality information on the indirect adverse impacts on wetlands from all of the following: a) mine drawdown; b) tailings area hydrological change; c) water quality impacts; d) air deposition of pollutants.
- The SDEIS must be revised to specifically state the number of wetland acres where indirect wetlands impacts are reasonably foreseeable, providing a scientific basis for its conclusions.

## **VI. LAND EXCHANGE**

### **Introduction**

The SDEIS proposes a land exchange as a necessary precondition for PolyMet's open-pit mine project. Although this project meets PolyMet's interest in an open-pit mine and may reduce "conflict" between the U.S. Forest Service and the company, the proposed land exchange is unlikely to meet the financial requirements of the Federal Land Planning and Management Act, is not in the public interest, conflicts with the Forest Plan, and would adversely impact environmental and tribal resources.

The PolyMet SDEIS fails to disclose appraisal information to confirm that the exchange would not give a favorable deal for PolyMet - at taxpayers' expense - and fails to evaluate impacts on aquatic resources of national importance within the Lake Superior Basin.

The Proposed Action would transfer 6,650 acres of federal land in the Superior National Forest to the PolyMet company. (SDEIS, p. 3-160) These federal lands include a large black spruce, tamarack, and cedar wetland overlapping the Hundred Mile Swamp and Upper Partridge River MCBS sites, and also contain Mud Lake. Yelp Creek and the Partridge River also flow through the property. (SDEIS, pp. ES-31, 4-429). The SDEIS also discusses an Alternative B, which would convey 4,900.7 acres to PolyMet. (SDEIS, p. 3-166).

### **1. The PolyMet SDEIS does not demonstrate that the land exchange would comply with law written to protect the public from unfair trades.**

The SDEIS provides no information demonstrating that either the proposed or the alternative land exchange would comply with Federal Land Planning and Management Act (FLPMA) requirements. The FLPMA and rules promulgated under the Act require that National Forest System lands may only be exchanged for lands of equal value. If values are not equal, they may only be equalized with a cash payment if the discrepancy in value does not exceed 25 percent. 43 U.S.C. §1716(a); 36 C.F.R. §254.12(a) and (b).

In simple terms, a trade must provide fair market value. 36 C.F.R. §254.3(c). The policy behind this law is to avoid conferring an untoward private benefit and resulting public loss in exchanging federal for non-federal estates. Undervaluation of federal lands for proposed land exchanges has been a national scandal, resulting in extensive federal investigations. The



Government Accounting Office report concluded that many trades of public lands by the BLM and the forest service failed to protect the public interest:

Specifically, the agencies have given more than fair market value for nonfederal land they acquired, accepted less than fair market value for federal land they conveyed, and have not demonstrated that the public benefits of acquiring the nonfederal land matched or exceeded the public benefits of retaining the federal land — thereby raising doubts about whether these exchanges served the public interest.<sup>52</sup>

Despite requests by WaterLegacy both in the scoping process and pursuant to the FOIA, the Forest Service has declined to provide appraisal information to allow members of the public to verify that the PolyMet exchange would be equitable. Particularly in light of the Forest Service's definition of its interest solely in terms of furthering minerals production, disclosure of appraisals for early and public scrutiny is necessary to ascertain whether the proposed exchange is an unequal trade, benefitting PolyMet at the expense of citizens and taxpayers.

**2. The PolyMet land exchange is inconsistent with federal regulations, federal policies, the Superior National Forest Plan, tribal rights and the public interest.**

The FLPMA forbids land exchanges unless the "public interest will be well served." 43 U.S.C. §1716(a). Rules promulgated under the FLPMA explain that in determining whether the public interest will be well served, natural resource values and objectives must be considered including, "protection of fish and wildlife habitats, cultural resources, watersheds, and wilderness and aesthetic values." 36 C.F.R. §254.3(b)(1). Determining that an exchange would serve the public interest requires the following specific findings:

- (i) The resource values and the public objectives served by the non-Federal lands or interests to be acquired must equal or exceed the resource values and the public objectives served by the Federal lands to be conveyed, and
- (ii) The intended use of the conveyed Federal land will not substantially conflict with established management objectives on adjacent Federal lands, including Indian Trust lands. 36 C.F.R. §254.3(b)(2).

The Forest Service Handbook reflects these federal rules in requiring:

The public interest determination must show that the resource values and the public objectives of the non-Federal lands equal or exceed the resource values and the public objectives of the Federal lands and that the intended use of the conveyed Federal land

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<sup>52</sup> See GAO Report, *Land Exchanges Need to Reflect Appropriate Value and Serve the Public Interest* (2000), p. 32, available at <http://www.gao.gov/archive/2000/rc00073.pdf>

would not substantially conflict with established management objectives on adjacent Federal lands, including Indian trust lands. F.S.H. 5409.13, § 33.41b.

Land exchanges are discretionary and may not be approved if the intended use of the conveyed federal land will substantially conflict with established management objectives on adjacent federal lands, including Indian trust lands. “The Secretary is not required to exchange any Federal lands. Land exchanges are discretionary, voluntary real estate transactions between the Federal and non-Federal parties.” 36 C.F.R. §254.3(a). In addition, if a federal land exchange is inconsistent with forest resource management plans, it must be rejected under 36 C.F.R. §254.3(f), which states, “The authorized officer shall consider only those exchange proposals that are consistent with land and resource management plans.”

**A. The purpose and need for the land exchange asserted in the SDEIS serves a single private interest, not the public interest.**

The purpose and need for the PolyMet land exchange stated in the PolyMet SDEIS reflects a singular interest of the PolyMet corporation in open-pit mining in a certain location, not the broad range of uses and values that would serve the public interest. The SDEIS states:

The purpose for the USFS is to meet desired conditions in the Superior National Forest Land and Resource Management Plan (Forest Plan), including ensuring the proposed land exchange Proposed Action eliminates existing conflict and ensuring mineral resources are produced in an environmentally sound manner contributing to economic growth. (SDEIS, p. 1-11)

The “conflict” referenced in this statement is between PolyMet’s desires and the deed restrictions on the federal estate. This land was purchased by the Forest Service for National Forest purposes under the authority of the Weeks Act. The mineral rights reserved do not include the right to surface mine as proposed by PolyMet. (SDEIS, p. 2-12) The “conflict” results from PolyMet’s selection of open-pit mining to develop copper and nickel mineral resources.

The Superior National Forest Resource Management Plan (Forest Plan) does not support the PolyMet land exchange. The Forest Plan does state that the Forest Service, should “Ensure that exploring, developing, and producing mineral resources are conducted in an environmentally sound manner so that they may contribute to economic growth and national defense.” (Forest Plan, Minerals, D-MN-2, p. 2-9). However the Forest Plan’s overarching principle, as required by the Multiple-Use Sustained Yield Act and the National Forest Management Act, “requires

that National Forest System land be managed for a variety of uses on a sustained basis to ensure in perpetuity a continued supply of goods and services to the American people.” (Forest Plan, Ch. 1, p. 1-5). Under this authority, the Forest Plan states, “The Forest Service will manage the Superior National Forest for multiple uses. (Forest Plan, Principle 4, p. 1-9)

**B. The exchange of federal lands for private lands with split ownership and severed mineral rights would be contrary to federal regulations and the public interest.**

All of the non-federal lands except Tract 4 have severed mineral and surface ownership. (SDEIS, p. 3-163). In the proposed land swap, 6,612.5 out of the 6,772.5 acres of private lands -- or 97.6 percent of the acres proposed for exchange -- would have split ownership and severed mineral rights. (SDEIS, Table 3.3-2, p. 3-160). Should the PolyMet land exchange proceed, the Forest Service would only acquire the surface of these lands.

Consolidation of split estates is one of the factors that should be considered in determining whether a land exchange is in the public interest. 36 C.F.R. §254(b)(i). Federal regulations strongly disfavor accepting lands with reserved mineral rights:

The United States shall not accept lands in which there are reserved or outstanding interests that would interfere with the use and management of the land by the United States or would otherwise be inconsistent with the authority under which, or the purpose for which, the lands are to be acquired. 36 C.F.R. §254.15(c)(ii).

Reserved mineral interests on the 5 tracts proposed to be exchanged for Superior National Forest lands to facilitate PolyMet’s open pit mine would foreseeably interfere with the use and management of the land by the Forest Service. For the Hay Lake tract 1, based purely on currently known aggregate mineral resources, the SDEIS states that the risk of conflicts between Forest Service management and future mineral exploitation is “moderate.” (SDEIS, Table 5.3.1-3, p. 5-586). The Hay Lake tract comprises 4,651.5 acres or 69 percent of the total acres to be exchanged for the federal estate. No Weeks Act constraint would apply to the Hay Lake tract or any of the other private land exchange tracts to limit the potential for open-pit mining affecting the new federal surface use.

Exchanging Superior National Forest land with legal restrictions on surface mining for tracts with split estates and no legal constraints on exploitation of reserved minerals is contrary to federal regulations and the public interest.

**C. The proposed land exchange would be inconsistent with provisions of the Superior National Forest Plan that protect ecological values and would diminish the environmental value of the federal estate.**

The PolyMet SDEIS does not discuss various Forest Plan provisions that pose conflicts with the PolyMet proposed action. The land exchange and the PolyMet open-pit mine would be inconsistent with these provisions protecting water, wetlands, wildlife and forest resources:

- “Management activities do not reduce existing quality of surface or groundwater or impair designated uses of surface and ground water.” (Forest Plan D-WS-4, p. 2-10)
- “Water in lakes, streams, and wetlands meets or exceeds State water quality requirements.” (Forest Plan, D-WS-5 p. 2-10)
- “Improve and protect watershed conditions to provide the water quality, water quantity, and soil productivity necessary to support ecological functions and intended beneficial water uses.” (Forest Plan, O-WS-1, p. 2-12)
- “Wetland impacts will be avoided whenever possible. Where impacts are unavoidable, minimize and compensate for loss when undertaking projects.” (Forest Plan, G-WS-13, p. 2-15)
- “Wetlands will be managed to prevent the reduction of their water quality, fish and wildlife habitat, and aesthetic values. Management actions will not reduce water quality within a wetland, or upstream or downstream of a wetland, unless restoration of natural conditions is the primary goal of the activity.” (Forest Plan, G-WS-15, p. 2-15)
- “Increase acres of old-growth lowland black spruce and tamarack forest communities.” (Forest Plan, O-VG-16, p. 2-24)
- “[M]aintain the characteristics of mature or older native upland forest vegetation communities and promote the maintenance or development of interior forest habitat conditions.” (Forest Plan, O-VG-17, p. 2-24)
- “Contribute to the conservation and recovery of federally-listed, proposed, or candidate threatened and endangered species and the habitats upon which these species depend.” (Forest Plan, D-WL-3(c), p. 2-27)
- “Maintain, protect, or improve habitat for all threatened and endangered species by emphasizing and working toward the goals and objectives of federal recovery plans and management direction in the Forest Plan. (Forest Plan, O-WL-4, p. 2-29)
- “Avoid or minimize negative impacts to known occurrences of sensitive species. (Forest Plan, G-WL-11, p. 2-31)

From WaterLegacy's perspective, these conflicts with the Forest Plan and sustainable multiple use management of federal forest resources are irreconcilable.

If the PolyMet land exchange were to be approved, the following losses to the federal estate would result (SDEIS, pp. 3-160, 5-596, 5-597, 5-607):

- Net loss of 6026 acres of areas with High Biodiversity Significance,
- Net loss of 2,030 acres of mature forest,
- Net loss of 1,400 acres of floodplains,
- Losses of 13 populations of 11 endangered, threatened or special concern species.

The land exchange would decrease upland conifer forest by 919.5 acres and Jack Pine-Black Spruce landscape ecosystem by 2,016.6 acres. (SDEIS, pp. 5-605, 5-607, 5-709). The SDEIS acknowledges, "The decrease of upland conifer forest is contrary to a goal of the 2004 Forest Plan. The Forest Plan calls for an increase in the acreage of red, white, and jack pine habitats (and a decrease in the acreage of aspen vegetation communities)." (SDEIS, p. 5-609)

The SDEIS states, "There are fewer occurrences of state-listed ETSC plant species on the non-federal lands (two species on Tract 5) than on the federal lands (11 species), so the USFS would have fewer populations as a result of the Land Exchange Proposed Action." (SDEIS, p. 5-614). Although the SDEIS claims that effects of the land exchange for the Canada lynx would be mixed, since the proposed actions would increase suitable habitat for prey species on the federal estate, the land exchange would decrease denning habitat and lynx analysis unit acreage within the federal estate. (SDEIS, pp. 5-625, 5-628).

Overall, the SDEIS concludes, "There would be both irreversible and irretrievable loss of federally managed wildlife habitat under the NorthMet Project Proposed Action and Land Exchange Proposed Action." (SDEIS, p. 7-10).

Although other aspects of the land exchange are analyzed in some detail, the PolyMet SDEIS provides little discussion of the effects of the proposed land exchange on wetlands and headwater streams within the Lake Superior Basin that serve critical functions for nationally and internationally important waters. SDEIS land exchange sections don't explain that losses of first-order headwaters streams, second-order streams and wetlands can have significant impacts on downstream water quality, wildlife, and fisheries.

As a result of the proposed land exchange, the federal estate would lose these important stream resources:

- Net loss of 1,584 linear feet of first-order streams; and
- Net loss of 21,120 linear feet of second order streams. (SDEIS, Table 5.3.6-2, p. 5-644)

These headwater stream resources are all within the Partridge River watershed of the Lake Superior Basin. Although this issue is not discussed in the SDEIS, replacement water resources on Tract 1, most of Tract 3 (Wolf Lands 2, 3 and 4), Tract 4 and Tract 5 are all *outside* the Lake Superior Basin. This can be seen by comparing the SDEIS map of these tracts (Figure 3.3-1, p. 3-161) with a map from the earlier land exchange Feasibility Analysis (Exhibit 37) showing the watershed boundaries.

As a result of the land exchange, there would also be a net loss of 3,791 acres of federal wetlands within the Lake Superior Basin.<sup>53</sup> Loss of federal management of Partridge River aquatic resources would impact water quality and fisheries in the Lake Superior Basin.

**D. The PolyMet land exchange would impair tribal resources in the Ceded Territories and conflict with tribal land resource management.**

Federal regulations state that land exchange proposals shall not be considered if they are inconsistent with land and resource management plans. 36 C.F.R. §254.3 In addition to the ecological provisions cited above in Section C, the Superior National Forest Resource Management Plan (Forest Plan) contains provisions requiring that forest management sustain and minimize adverse impacts on tribal culture, economic well-being, rights to hunt, fish and gather plants, as follows:

- “Lands within the Forest serve to help sustain American Indians’ way of life, cultural integrity, social cohesion, and economic well-being.” (Forest Plan, D-TR-1, p. 2-37)
- “Superior National Forest facilitates the exercise of the right to hunt, fish and gather as retained by Ojibwe whose homelands were subject to treaty in 1854 and 1866 (10 Stat. 1109 and 14 Stat. 765). Ongoing opportunities for such use and constraints necessary for resource protection are determined in consultation with the following Ojibwe Bands: Fond du Lac, Grand Portage, and Bois Forte.” (Forest Plan, D-TR-3, p. 2-37)
- “Forest management activities will be conducted in a manner to minimize impacts to the

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<sup>53</sup> Calculated from Table 5.3.3-4, p. 5-598. Federal lands provide 4,164.4 acres of wetlands within the Lake Superior basin. Of the 4,669.9 total wetlands acres on the non-federal tracts, there are 373.3 acres of wetlands within the Basin to offset the loss from the federal estate.

ability of Tribal members to hunt, fish, and gather plants and animals on Forest Service administered lands. (Forest Plan, S-TR-3, p. 2-38)

Although the cultural resources analysis has not yet been completed (SDEIS, p. 5-673), the PolyMet SDEIS acknowledges that the land exchange proposal could have direct and indirect effects on tribal cultural resources by creating noise, impeding access to area that are traditionally or culturally important to the bands and affecting species of importance to the Bands. (SDEIS, pp. 5-661, 5-674). There are no known cultural resources on the non-federal lands. (SDEIS, p. 5-674). The SDEIS acknowledges that the land exchange alone could create irretrievable losses for tribes:

The federal lands may contain natural resources culturally important to tribal entities, including access to the land itself, which would be irreversibly lost following the Land Exchange Proposed Action and conversion of the land from public to private ownership. (SDEIS, p. 7-10).

Compliance with the Forest Plan and federal fiduciary obligations under the 1854 Treaty (described in more detail in Cumulative Impacts Section XII) require protection of mature forests, high-biodiversity habitats, wetlands and water quality as cultural resources. As a starting point, the land exchange proposed action must at least protect hunting, fishing and gathering resources identified in tribal resource management plans. The Fond du Lac Integrated Resource Management Plan,<sup>54</sup> discusses the need to protect and improve wild rice harvest (p. 6), the importance of improving in-stream habitat for fishing (p. 29), the need to preserve traditional hunting, fishing and gathering rights in the 1854 and 1837 Ceded Territories (p. 53), the need to ensure that the quality and quantity of wildlife and wildlife habitat is not depleted in the Ceded Territories (p. 54, p. 57) and the importance of environmental protection such as enforcement of water quality standards affecting the Reservation. (p. 63).

The proposed land exchange would neither protect access to cultural resources nor protect the ecosystems upon which tribal rights to fish, hunt and gather plants depend.

### **Recommendations – Land Exchange**

- The United States Forest Service (USFS) should reject the proposed land exchange as inconsistent with federal laws requiring that exchange of public lands be in the public interest and for fair value.

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<sup>54</sup> Fond du Lac Resource Management, Integrated Resource Management Plan (2008), available at <http://www.fdlrez.com/newnr/IRMP.pdf>

- The USFS should reject the proposed land exchange since it conflicts with federal regulations disapproving exchanges of land with split estates and reserved mineral rights.
- The USFS should reject the proposed land exchange as inconsistent with the Forest Plan, due to water quality and wetlands impacts, and losses of mature forests and high diversity habitats for rare and endangered species and species of special concern.
- The USFS should reject the proposed land exchange due to losses of wetlands, headwaters and higher order streams in the Lake Superior Basin and adverse impacts on high priority national and international waters.
- The USFS should reject the PolyMet project and proposed land exchange as inconsistent with provisions of the Forest Plan and obligations of the federal government to protect tribal rights to fish, hunt and gather plants.
- The USFS should immediately disclose all appraisal information for the land exchange and allow public review and comment.
- The SDEIS should be revised to analyze the impacts of loss of wetlands, headwaters and higher order streams in the Lake Superior Basin.
- The SDEIS should be revised to analyze cumulative impacts of the land exchange and the PolyMet project on tribal rights to hunt, fish and gather wild rice and other plants in the Ceded Territories, Reservation waters, the St. Louis River, and the Lake Superior Basin.



## **VII. AQUATIC LIFE**

### **Introduction**

The PolyMet SDEIS fails to analyze specific conductivity, a pollutant limited by Minnesota water quality standards, which is known to be a stressor for aquatic life. Even though existing tailings basin seeps have exceeded standards for specific conductivity, the SDEIS neither reports existing conditions nor models impacts of the proposed action on specific conductivity.

The SDEIS recognizes that levels of many pollutants would increase were the proposed action approved, and that the proposed project would have a potential cumulative adverse impact on aquatic life. What is lacking in this analysis is a discussion of the significance of this adverse impact and its relationship to legal standards preventing degradation of water quality.

Both Minnesota rules and federal regulations prevent degradation of water quality from new sources in the outstanding international resource value waters of the Lake Superior Basin. Minn. R. 7052.0301, subp. 4; 40 C.F.R. 132, Appendix E. In addition, Minnesota Rule 7050.0150, Subpart 3 protects aquatic life through application of narrative standards:

For all Class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters.

### **Aquatic Life Impairments**

Several waters near the project area have recently (2012) been listed as impaired for aquatic life. The Embarrass River is impaired from its headwaters to Embarrass Lake as a result of fishes bioassessments; Wyman Creek is impaired from its headwaters to Colby Lake as a result of fishes bioassessments; and Spring Mine Creek is impaired from Ridge Creek to the Embarrass River as a result of both fishes and aquatic macroinvertebrates bioassessments.<sup>55</sup>

The SDEIS acknowledges potential cumulative impacts of the PolyMet project on aquatic

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<sup>55</sup> MPCA, Minnesota Final 2012 Impaired Waters List, <http://www.pca.state.mn.us/index.php/view-document.html?gid=20346>.

life, “The placement of the Embarrass River headwaters and Spring Mine Creek on the MPCA 2012 Impaired Waters list indicates that aquatic biota are already under stress in this system. Although stressors have not been identified, the water quality change predicted under the NorthMet Project Proposed Action would have potential to add to these stressors.” (SDEIS, p. 6-31 to 6-32)

**1. The SDEIS fails to analyze specific conductance, a regulated pollutant that adversely impacts aquatic life.**

Minnesota Rules limit specific conductivity in wetlands as well as in waters used for agricultural irrigation to 1000 micromhos per centimeter (“μmhos/cm” or “μS/cm”). Minn. R. 7050.0224, subp. 2, subp. 4.<sup>56</sup> Specific conductance is an indicator for ionic concentrations that can affect plants and aquatic ecosystems.

Although Minnesota’s specific conductance standard is not specifically calibrated to protect aquatic life, in other ecoregions impacted by mining, EPA has set benchmark limits on specific conductance to protect aquatic life from salt mixtures that elevate conductivity. EPA set the chronic aquatic life benchmark value for conductivity derived from all-year data at 300 μS/cm (equivalent to 300 μmhos/cm) for West Virginia and Kentucky, stating that this standard is also expected to be applicable to ecoregions extending into Ohio, Pennsylvania, Tennessee, Virginia, Alabama, and Maryland.

EPA noted that this benchmark is likely to apply when dissolved ions are dominated by salts of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{SO}_4^{2-}$  and  $\text{HCO}_3^-$  particularly where natural background levels are lower. EPA explained, “the salt mixture dominated by salts of  $\text{SO}_4^{2-}$  and  $\text{HCO}_3^-$  is believed to be an insurmountable physiological challenge for some species.” (EPA, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*, Final Report, EPA/600/R-10/023F, March 2011, p. xv<sup>57</sup>).

EPA has also stated as a general rule that specific conductance above 500 μhos/cm may impair aquatic life. EPA’s web site summarizes, “Studies of inland fresh waters indicate that streams supporting good mixed fisheries have a range between 150 and 500 μhos/cm. Conductivity outside this range could indicate that the water is not suitable for certain species of

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<sup>56</sup> The limit is set in Minn. R. 7050.0224, subp. 2 pertaining to Class 4A irrigation waters, and subp. 4, pertaining to Class 4C wetlands states, “The standards for Classes 4A and 4B waters shall apply to these waters except as listed below.” No exception is made for specific conductance.

<sup>57</sup> <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=233809#Download>

fish or macroinvertebrates.”<sup>58</sup>

EPA objected to the Reylas Surface Mine’s Section 404 dredge and fill permit on the grounds that increased specific conductance downstream of mining sites “impairs aquatic life use and is persistent over time. This impact can not be easily mitigated or removed from stream channels.” EPA stated that in its dataset, using a genus-level multi-metric, “all mined sites with the specific conductance greater than 500  $\mu\text{S}/\text{cm}$  were rated as impaired.” Even without a numeric standard for specific conductivity to use as a reference point, the EPA concluded that the Reylas surface mine dredge and fill permit would result in "significant degradation" to the aquatic ecosystem in violation of federal regulations.<sup>59</sup>

The SDEIS provides no data on specific conductivity in waters near the PolyMet site and no information to help decision-makers evaluate whether the PolyMet surface mine would impair aquatic life at or downstream of the project site as a result of high conductance. However, Barr reports included as references to the SDEIS demonstrate that discharge from the existing LTVSMC tailings basin violates Minnesota’s specific conductance standard and that specific conductance is elevated in streams near the project area with aquatic life impairments.

Recent measurements of specific conductance in LTVSMC tailings basin discharge to Second Creek - 1,206  $\mu\text{mhos}/\text{cm}$  in 2010 and 1,019  $\mu\text{mhos}/\text{cm}$  in 2011 – violate Minnesota’s 1,000  $\mu\text{mhos}/\text{cm}$  standard. Compared to Bear Creek’s average conductivity of 80.18, average tailings basin discharge of 1144.17 was 14 times the reference stream level. (NPDES Field Studies Report – SD026, Sept. 2011, SDEIS reference Barr 2011i, pp. 16-17, Table 3-4 on pdf p. 49)

Specific conductance was also elevated in local impaired waters. Conductivity in Lower Spring Mine Creek was 1,062  $\mu\text{mhos}/\text{cm}$  in 2010 and 664  $\mu\text{mhos}/\text{cm}$  in 2011, exceeding the EPA benchmark both years and the Minnesota rule in 2010. Conductivity in Upper Spring Mine Creek was 2,340  $\mu\text{mhos}/\text{cm}$  in 2010 and 2,006  $\mu\text{mhos}/\text{cm}$  in 2011, far exceeding Minnesota’s standard both years. (NPDES Field Studies Report – Tailings Basin, Sept. 2011, SDEIS reference Barr 2011m, p. 45).

At tributaries near the tailings basin, specific conductivity was significantly higher than in the Bear Creek reference stream, although not above the 1,000  $\mu\text{mhos}/\text{cm}$  standard.

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<sup>58</sup> EPA, *What is conductivity and why is it important?* <http://water.epa.gov/type/rsl/monitoring/vms59.cfm>

<sup>59</sup> J. R. Pomponio, EPA letter to Col. D.R. Hurst, USACE re Highland Mining Company, Reylas Surface Mine (Mar. 23, 2009), attached as Exhibit 38.

Conductivity at Unnamed Creek was 985 µmhos/cm in 2010 and 618 µmhos/cm in 2011. Conductivity in Trimble Creek was 628 µmhos/cm in 2010 and 435 µmhos/cm in 2011. (Barr 2011n NPDES Field Studies Report – Tailings Basin Sept. 2011, included as SDEIS reference Barr 2011n, pp. 32-33).

These sampling results correlate aquatic life impairments with elevated specific conductance. They confirm that discharge from the existing LTVSMC tailings basin site exceeds Minnesota’s standards and that streams near the tailings basin have elevated levels of conductivity that may serve as a stressor for aquatic life. In order for the SDEIS to evaluate impacts of the PolyMet proposed action on aquatic life, both specific conductance in the affected environment and predicted levels of this pollutant resulting from the proposed action must be analyzed.

The downstream cumulative impacts of specific conductance must also be analyzed in the SDEIS. Tribal Cooperating Agencies have demonstrated that elevated levels of specific conductance from existing mining discharges only gradually decrease downstream. The distance required for attenuation suggested that conductivity impacts of the PolyMet proposed action and other mines should be evaluated for their cumulative impact on the St. Louis River. (SDEIS, Appx. C, pdf pp. 2054-2056).

**2. The SDEIS must assess the significance of water quality degradation from the PolyMet proposed action to aquatic life and test leachates for aquatic toxicity.**

The SDEIS acknowledges that, at the PolyMet mine site, levels of a number of metals – including antimony, arsenic, cadmium, cobalt, copper, lead, nickel, and selenium – will be “noticeably higher than the Continuation of Existing Conditions Scenario” even at Partridge River locations significantly downstream of the contamination sources. (SDEIS, p. 5-113; Table 5.2.2-30, p. 5-129; Table 5.2.2-33, p. 5-156). As detailed in Section III, seepage and effluent from the plant site, will also substantially increase metal concentrations in surface waters, even if water quality standards are not exceeded. The SDEIS does not reach a conclusion as to the significance of the impacts of these increased pollutants on aquatic life. This evaluation must be addressed in the SDEIS, not passed off for possible consideration in permitting (SDEIS, p. 6-61).

In comments on the preliminary SDEIS, MDNR Fish and Wildlife/Fisheries staff highlighted the differences between the PolyMet proposal and a No Action scenario in terms of water chemistry and risks to aquatic life:

Under No Action, heavy metals and other solutes would remain 2 to 30 times lower. Hydrological regime changes would be minimal therefore habitat would be expected to remain relatively stable. No risk of water chemistry changes and Class 2 exceedances due to holding facilities where water requires perpetual treatment for heavy metals and other processing by-products. (Exhibit 28, *supra*, Comment 51)

Another concern is the increases in solutes such as copper, nickel, lead, arsenic and metals and other water chemistry. Although most solute concentrations are predicted to remain below standards, there is still the effect of increasing metal solutes 2 to 30 times above existing conditions. There is uncertainty both in the models and in our understanding of impacts to invertebrates and fish species from these solutes, particularly in combination. An increase in solutes, particularly in streams that already have indication of stressors (Embarrass River), increases the possibility of negative impacts to fish populations either directly or by impacting prey sources. (*Id.*, Comment 56)

Although increased solute loadings will meet Class 2 standards there will still be increased loading of solutes relative to existing conditions (Copper, Nickel, etc.) particularly at Site SW-004. Predicted increases of 17 solutes are from 2 to almost 30 times the existing levels. This should be recognized here. Fish response to heavy metals, particularly in combination with other changes in water chemistry, is little researched so impacts are possible particularly in streams where there already is indication of biological stressors (Embarrass R). There is also data that indicated that TDS would be exceeded for decades initially (5.2.2-159). There is concern that conductivity increases have negative impacts on aquatic life (MPCA- Spring Mine Cr evaluation). IBI evaluation helps address some of the shortcomings of our knowledge of solutes threshold concentrations and aquatic life impacts. . . Impacts to aquatic life are possible due to changes in water chemistry, including increases in heavy metals particularly lead, although it is expected that Class 2 standards will be met in most cases. (*Id.*, Comment 60)

The SDEIS concludes there is a potential for cumulative impacts on aquatic life. For the Embarrass River, the SDEIS states, “aquatic biota are already under stress in this system. Although stressors have not been identified, the water quality change predicted under the NorthMet Project Proposed Action would have potential to add to these stressors.”(SDEIS, p. 6-32). The SDEIS continues, “there is potential for cumulative effects on aquatic biota due to changes in water quality, especially in impaired waters for the Embarrass River.” (SDEIS, p. 6-61).

The SDEIS states there would also be potential cumulative effects on aquatic biota in the Upper Partridge River upon cessation of Northshore Mine dewatering post-closure. (*Id.*) Overall,

the SDEIS recognizes that the PolyMet proposed action could pose cumulative risks to aquatic life since the project, to some extent in combination with other reasonably foreseeable actions, “would shift maintenance of water quality in the Partridge River and Embarrass River from natural systems (i.e., essentially an ecosystem service) to mechanical systems (e.g., the NorthMet Project Proposed Action WWTF and WWTP).” (SDEIS, p. 6-61 to 6-2).

The SDEIS’ analysis of potential adverse effects to aquatic life from increased metal releases has two important gaps. The SDEIS does not assess the significance of degradation of downstream waters on aquatic life. In addition, the SDEIS does not discuss the potential toxicity of leachates from sulfide mine wastes, tailings and residues. Discharge from the Dunka Mine, where Duluth Complex rock was encountered in taconite mining, has remained toxic to aquatic life for decades as a result of copper, nickel, cobalt and zinc concentrations.<sup>60</sup> Toxicity testing of mine waste, tailings basin and hydrometallurgical residue facility leachates prior to finalizing the SDEIS would identify risks to aquatic life from inorganic ions as well as from metals solutes.

### **3. The SDEIS provides insufficient analysis and mitigation for hydrologic changes, particularly to the Partridge River watershed.**

The PolyMet SDEIS claims, “The NorthMet Project Proposed Action is also not predicted to result in any significant changes to groundwater and surface water flows when compared to existing conditions.” (SDEIS, p. 5-8) In the Embarrass River watershed, support for this conclusion is questionable. In the Partridge River watershed, support for this conclusion is non-existent.

In the Embarrass River watershed, the SDEIS models the changes in flow for tributary streams resulting from the PolyMet project tailings basin containment system. During operations, this system is modeled to reduce average annual flow relative to existing conditions in Mud Lake Creek by 37 percent, in Unnamed Creek by 46 percent and in Trimble Creek by 65 percent. (SDEIS, p. 5-174). The SDEIS proposes that distributing effluent from the plant site WWTP through multiple spigot points would maintain average annual flow to within 20 percent of existing conditions. (SDEIS, p. 5-177). The SDEIS states that this stream augmentation would prevent significant effects in the Embarrass River watershed. “The decrease in groundwater seepage would not be expected to have a significant effect on groundwater or wetlands

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<sup>60</sup> Dunka Mine NPDES/SDS permit MN004257, issued Oct. 30, 2001, expired June 30, 2005, p. 18.

downgradient of the groundwater containment system because of the proposed flow augmentation, which would maintain hydrology within 20 percent of existing conditions.” (SDEIS, p. 5-159).

The SDEIS acknowledges that its prediction of minimal impact on the Embarrass River watershed was made lacking seasonal flow data for this watershed. (SDEIS, p. 5-391). “Dampening of the hydrologic curve could have a negative effect on aquatic biota due to stream aggradation, degradation, and resultant loss of habitat. Maintenance of spring bankfull flow is particularly important for the success of fish spawning in tributaries because high flows trigger spawning runs and maintain spawning habitat.” The SDEIS proposes that these effects on fish spawning could be mitigated in the Embarrass River watershed by maintaining seasonal, bankfull flows over the life of the proposed action (*Id.*), presumably for hundreds of years during which tailings seepage must be contained.

The SDEIS’ assessment and mitigation strategy for hydrologic impacts to the Embarrass River watershed may be incomplete or unrealistic. However, even this level of evaluation is lacking for the Partridge River watershed.

The PolyMet SDEIS provides no assessment of effects of the project on the mine site Unnamed Creek, Wetlegs Creek, Longnose Creek, Wyman Creek or Yelp Creek. For Wetlegs, Wyman and Longnose, the SDEIS states that a lack of hydrologic impact was assumed, rather than analyzed. “No baseline flow data collection or hydrologic modeling was conducted for Wetlegs, Longnose, and Wyman creeks as the NorthMet Project Proposed Action is not expected to affect the hydrology of these streams.” (SDEIS, p. 4-79). We were unable to locate any discussion in the SDEIS of hydrological impacts of the PolyMet project on Yelp Creek, immediately to the north of the mine site. We also found no discussion in the SDEIS of how mine drawdown during operations and WWTF discharge after approximately year 40 would affect aquatic functions in the Unnamed Creek on the PolyMet mine site.

PolyMet SDEIS XP-SWMM modeling concluded that “the changes in average annual flow (and therefore stage) of the Partridge River would be within the naturally occurring annual variation for the Partridge River” so impacts on abutting wetlands need not be considered. (SDEIS, p. 5-273). The assumption that change in flow would not affect abutting wetlands, may or may not have been defensible using the baseflow estimates in the SDEIS. The potential for adverse impacts on abutting wetlands must be assessed with new, more realistic baseflow data.

Actual flow reductions in Upper Partridge River during mine operations are modeled to range from about 5 percent (average flow conditions) to 8 percent (low-flow conditions). (SDEIS, p. 6-25). For the Lower Partridge River, the average effect of the PolyMet project would be a reduction of up to 5.5 cfs through year 40, resulting in a maximum net reduction in flow in the Lower Partridge River of 12.8 cfs when combined with other existing and foreseeable activities. This would constitute about an 11 percent reduction in stream flow. (SDEIS, p. 6-26) The SDEIS must analyze impacts on aquatic systems from these changes in Partridge River hydrology during operations.

In addition, once the WWTF is converted and discharge begins, there will be another change to the hydrologic regime. In addition to degrading the water quality of the Partridge River, as discussed above, the effluent from the WWTF facility will increase the Partridge River flow at the point of discharge from 78 gpm to 300 gpm, almost quadrupling its flow. (SDEIS, p. 5-143). The impacts of this substantial change in water quantity on aquatic life must be analyzed.

The SDEIS does not propose any stream augmentation to mitigate impacts on the Partridge River watershed. MDNR Fish and Wildlife/Fisheries staff comments on the preliminary SDEIS highlighted the concern that using averaging to model flow reduction would not address seasonal impacts on spawning habitat:

The NorthMet Project will alter the hydrological regime with the potential for altering stream geomorphology and consequently reducing fish habitat. Stream aggradation is a concern if reduction in groundwater flow and watershed area results in loss of channel-forming bankfull flow events (2-yr flood events). Averaged water models do not give enough seasonal detail to ascertain if there will be no impacts even with supplemental flow from WWTP and WWTF discharge. Reduced flows, especially in the spring time, have the potential to alter spawning habitat access and availability for fish. For example, spring flooding is important for gamefish such as northern pike, both to travel upstream and to find suitable spawning areas in flooded vegetation. (MDNR – FAW Comments, *supra*, Exhibit 28, Comment 30)

MDNR Fish and Wildlife/Fisheries staff made additional comments specific to impacts to fisheries in the Partridge River watershed that have yet to be addressed in the SDEIS. The staff requested that all sites in the Partridge River upstream of SW-004 be analyzed for potential aquatic biota impacts (*Id.*, Comment 39) and that a new analysis “since this is flawed” address the timing of seasonal flows. (*Id.*, Comment 40).

### **Recommendations – Aquatic Life**

- The SDEIS must be revised to assess specific conductivity, including background levels



from reference streams, elevations in project waters resulting from existing mining impacts, improvements in water quality predicted from attenuation and enforcement, and impacts from the PolyMet proposed action.

- The SDEIS must be revised to assess cumulative impacts of the specific conductivity from the PolyMet project on aquatic life in downstream waters, including the St. Louis River.
- The SDEIS must be revised to evaluate the significance of the potential impacts on aquatic life from increased metal solutes under the proposed action, including solutes not predicted to exceed numeric water quality standards.
- The SDEIS must be revised to include results from toxicity testing of leachates from PolyMet project wastes and tailings to evaluate risks to aquatic life from uncaptured seepage.
- The SDEIS must be revised to evaluate impacts on aquatic ecosystems from hydrologic changes resulting from the PolyMet project in the Partridge River watershed, including Yelp, Wetlegs, Wyman, Longnose and Unnamed Creek as well as the Partridge River. This consideration must include revised and accurate baseflow inputs.
- The SDEIS must be revised to evaluate impacts on aquatic ecosystems from the volume as well as chemical composition of WWTF effluent that would be discharged to the Partridge River during closure.
- The SDEIS must evaluate the impacts of hydrologic changes to the Partridge River watershed resulting from the PolyMet proposed action, considering seasonal and climatic variations, not just averages.
- The SDEIS must evaluate an alternative where reverse osmosis is constructed on the PolyMet mine site in year one and augmentation provided to Partridge River watershed streams to mitigate impacts on aquatic ecosystems.

## **VIII. ASSESSMENT OF HEALTH RISKS**

### **Introduction**

The PolyMet SDEIS contains an inadequate and incomplete assessment of the potential health impacts of the proposed action. In the case of mercury and methylmercury, as described at length in Section I of these comments, data regarding emissions, mercury and sulfate discharge and hydrologic change is missing or inaccurately represented, and the SDEIS fails to evaluate the potential risk of increased methylmercury bioaccumulation in the food chain. In addition to its inadequate analysis of mercury, the SDEIS completely avoids analysis of certain risks of both air emissions and water discharge, distorts the evaluation of pollutants by using criteria that are not reflective of health risks, considers cumulative impacts of prior industry pollution as “background” and, over all, reflects an insufficient concern and transparency regarding health risks to workers and members of the public.

In addition to correcting specific deficits in analysis of health risks identified in these comments, WaterLegacy proposes that the SDEIS be revised to include a comprehensive Health Risk Assessment, prepared in consultation with the Minnesota Department of Health.

#### **1. The PolyMet SDEIS fails to analyze pertinent health risks posed by air emissions and water discharge from the proposed action.**

##### **A. The SDEIS does not analyze health risks for on-site workers.**

The PolyMet SDEIS fails to consider any health impacts to workers who actually work on the mine site or plant site. Any references to worker health in the SDEIS only pertain to “off-site workers.” (See SDEIS, pp. 5-421, 5-422, 5-423, 5-425, 5-426). This is an inappropriate omission.

Many of the pollutants emitted at the PolyMet mine and plant site are carcinogens. The SDEIS’ failure to assess risks from mineral fibers is discussed below. Apart from mineral fibers, pollutants contributing to cancer and non-cancer health risks at the mine site included arsenic, cobalt, nickel, manganese, diesel particulates, crystalline silica, nitrogen dioxide, acetaldehyde, indeno (1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and dioxins/furans. (SDEIS, Table 5.2.7-19, p. 5-422). Even for an off-site person, the SDEIS predicts that multi-pathway exposure to PolyMet’s mine site emissions would reach Minnesota’s (1 in 100,000) cancer health risk threshold. (SDEIS, pp. 5-423, 5-424). Primary on-site risk drivers for mine site cancer would be

dioxins and dibenzo(a,h)anthracene related to mine vehicle emissions. (SDEIS, p. 5-423). If risks to on-site workers were calculated, it is likely that they would be above Minnesota's air emissions health threshold.

At the plant site, again without analyzing mineral fibers, risk drivers for cancer and non-cancer health risks were similar to those at the mine site, excluding indeno(1,2,3-cd)pyrene and adding the additional risk of hydrochloric acid. (SDEIS, Table 5.2.7-21, p. 5-425). Even at the edge of PolyMet's plant site property boundary, chronic risk from inhalation of pollutants would reach Minnesota's non-cancer health risk threshold. (SDEIS, pp. 5-425; Table 5.2.7-22, p. 5-426).

The major drivers for inhalation risks at the PolyMet plant site would be cobalt and nickel emissions. (SDEIS, p. 5-426). Nitrogen dioxides can cause or worsen respiratory disease and heart disease, leading to premature death.<sup>61</sup> Chronic nickel inhalation can also result in asthma, decreased lung function and respiratory effects.<sup>62</sup>

If risks to PolyMet's on-site plant personnel were calculated, it is likely that they would exceed Minnesota thresholds for both cancer and non-cancer risks. Additional mitigation measures might be required to reduce on-site health risks. For example, the proposal to vent air exhaust from the crushing plant back into the plant (SDEIS, p. 5-442) might be re-considered.

Even where other federal standards govern worker exposures, it is appropriate for both federal and state environmental impact statements to consider the impacts of a proposed project on the health of on-site workers. In *Chem. Weapons Working Group v. United States Dept. of Defense*, 655 F. Supp. 2d 18, 42, 65 (D. D. C. 2009), the court's conclusion that the EIS was adequate included a specific finding that the project would not pose a significant health risk to workers. When Minnesota recently considered extending the use of the Prairie Island Nuclear Generating Plant, the EIS evaluated cancer health risks both risks to the public and to on-site plant personnel.<sup>63</sup> For cleanup of the Molycorp Inc. (Chevron Mining, Inc. Site), the EPA assessed both cancer and non-cancer health risks to on-site construction workers and on-site commercial/industrial workers, as well as to residents and recreational visitors.<sup>64</sup>

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<sup>61</sup> EPA, Health <http://www.epa.gov/oaqps001/nitrogenoxides/health.html>

<sup>62</sup> EPA, Nickel Compounds, <http://www.epa.gov/ttnatw01/hlthef/nickel.html>

<sup>63</sup> Final EIS, Xcel Prairie Island Nuclear Generating Plant, PUC Dockets E002/CN-08-509, E002/GS-08-690, E002/CN-08-510 (July 31, 2009)

<sup>64</sup> EPA, *Molycorp, Inc. Site (currently Chevron Mining Inc.) Proposed Cleanup Plan* (December 2009), pages 26-29, available at [http://www.epa.gov/region6/6sf/newmexico/molycorp/nm\\_molycorp\\_proposed\\_cleanup\\_plan.pdf](http://www.epa.gov/region6/6sf/newmexico/molycorp/nm_molycorp_proposed_cleanup_plan.pdf)

**B. The SDEIS fails to analyze the health risks from mineral fibers.**

The PolyMet SDEIS' discussion of the risks of mineral fibers minimizes their health risks and avoids any analysis of potential morbidity and mortality increases from exposure to fine particulates containing these materials. First, the SDEIS implies that the PolyMet NorthMet deposit is unlikely to be associated with amphibole fibers since the Duluth Complex is different from Northshore's Biwabik Iron Formation. (SDEIS, p. 5-438). However, as EPA Senior Research Chemist Phillip Cook explained, "Amphiboles are uniquely present near the Duluth complex."<sup>65</sup> In fact, PolyMet's NorthMet deposit is known to be associated with asbestiform mineral fibers. The SDEIS reports that approximately 9 percent of the fibers in ore, tailings and process water are amphibole fibers and about 2 percent of the waste rock minerals are serpentine. (SDEIS, pp. 5-438, 5-439).

The SDEIS does not quantify total potential exposures, but the SDEIS suggests that PM<sub>2.5</sub> fine particulates could be used as a surrogate for all mineral fibers, including amphibole and serpentine fibers. (SDEIS, p. 5-439). There are 190 tons per year of PM<sub>2.5</sub> emissions from the processing plant. (SDEIS, p. 5-403) Excluding fugitive dust, since the SDEIS does not differentiate between fugitive and mobile source emissions, at least 17.1 tons per year of amphibole fibers alone would be released by the PolyMet processing plant.

The SDEIS mischaracterizes the University of Minnesota (U of M) taconite worker study, saying the study concluded that "the worker exposure resulting in the increase in mortality is primarily due to commercial asbestos exposure and not the rock being mined (University of Minnesota 2013)." (5-439 to 5-440). Although the U of M study noted that the study could not completely control for the presence of commercial asbestos where data was lacking, the study clearly associate the risk of mesothelioma with exposure to elongate mineral particles (EMP) measured in taconite dust. As the study explained,

The risk for mesothelioma was associated with cumulative EMP (NIOSH 7400 definition; EMP/cc-years) exposure. For each EMP/cc-year of exposure the risk of mesothelioma increased approximately 7 percent. . . There was also more than a two-fold increase in risk for higher exposed workers when the exposures were classified as high or low at the median of exposure. While the magnitude of this estimate can be susceptible to changes in the exposure category cut point, this analysis lends support to the hypothesis

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<sup>65</sup> P. Cook, EPA, Can Amphibole Fibers/Particles Contribute to Mesothelioma and Other Asbestos Related Diseases in Northeast Minnesota? April 2013 Slide Presentation, attached as Exhibit 39, p. 3.

that workers who had higher cumulative exposure to long EMP had a higher risk for mesothelioma.<sup>66</sup>

The U of M taconite workers study concluded that mesothelioma risk was associated with a 3 percent increase in risk for each additional year of employment in taconite operations. The authors noted, “While this may appear to be a minimal risk, when the model estimates are applied to a 20 or 30 year career, the risk of mesothelioma would increase approximately 75 and 130 percent respectively compared to similar people who worked only one year in the industry. (U of M Study, *supra*, p. 36). In addition to mesothelioma, which was nearly 200 percent higher than expected, non-mesothelioma lung cancers were 20 percent higher among taconite workers than expected and heart disease 11 percent higher than expected. Six percent of workers had evidence of non-cancerous lung disease, commonly associated with dust exposure. (*Id.* p. 5).

The SDEIS states, “the potential exists for the release of amphibole mineral fibers from the proposed operations, which could pose a potential public health risk of uncertain magnitude.” (SDEIS, p. 5-439). This is insufficient analysis in a situation where a proposed action may pose a significant risk to workers and to public health.

NIOSH data shows that, among Minnesota taconite mines, the highest level of exposure to elongate mineral particles is at the Northshore mine, the deposit closest to PolyMet. Workers in crushing and concentrating operations at that mine, for example, have higher exposures to elongate mineral particles than the Mine Safety and Health Administration Permissible Exposure Limit.<sup>67</sup>

The PolyMet SDEIS must provide a detailed analysis of mesothelioma risks in consultation with the EPA and U of M researchers. This analysis could begin by estimating exposures to elongate mineral particles for workers at the PolyMet plant and evaluating those exposures in light of the U of M data that correlates EMP exposure with higher rates of mesothelioma. An effort should also be made to model other adverse health effects.

In addition to evaluating the mesothelioma risks to workers, the SDEIS should also estimate the volume and concentrations of fibers emitted in fine particulate matter and discharged with seepage to groundwater and surface water. Although the SDEIS appears to

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<sup>66</sup> J. Finnegan, J. Mandel, U of M, Annual Report to the Legislature Minnesota Taconite Workers Health Study, Apr. 19, 2013, “U of M Study” attached as Exhibit 40, p. 37.

<sup>67</sup> U of M, Minnesota Taconite Workers Health Study, Minnesota Taconite Workers Lung Health Partnership, April 12, 2013 Mountain Iron, MN, slides 54, 71, attached as Exhibit 41.

discount health risks from fibers in drinking water, the EPA has set a maximum contaminant level for asbestos fibers due to intestinal health risks.<sup>68</sup>

**C. The SDEIS fails to assess potential impacts of tailings basin discharge to water in residential wells.**

The PolyMet SDEIS does not analyze the impacts of tailings basin discharge on residential wells located between the tailings site and the Embarrass River. The SDEIS acknowledges that “There are 27 known domestic wells between the Tailings Basin and the Embarrass River, with the closest being approximately 1.6 miles from the toe of Cell 2E.” (SDEIS, p. 4-114). PolyMet conducted a single round of sampling on 15 of these 27 wells to assess groundwater quality. PolyMet also conducted between 8 and 12 rounds of groundwater sampling in 3 downgradient monitoring wells. (SDEIS, p. 4-114; sampling locations on Figure 4.2.2-14, p. 4-105).

Testing results from downgradient monitoring wells had high levels of manganese, arsenic, aluminum and iron. Residential wells had high manganese levels, averaging 579 µg/L and test results ranging as high as 4,710 µg/L, compared to Minnesota’s health risk level of 100 µg/L to protect infants from neurological harm. The residential wells also had mean arsenic levels of 2.8 µg/L and test results up to 7.5 µg/L. As explained in the next part of this Section, these levels are far above the 0.18 µg/L threshold that signifies a 1/100,000 cancer risk resulting from arsenic in drinking water. The 15 residential wells sampled were not tested for lead, mercury or methylmercury, and the locations where higher levels of metals were found were not correlated with either the location or depth of wells in bedrock or alluvium. (SDEIS, Table 4.2.2-24, p. 4-112 to 4-113).

PolyMet’s new tailings piles would seep high levels of manganese and lead into groundwater. In the North flowpath at the property boundary, lead levels from the PolyMet tailings would be more than 5 times as high as continuing existing conditions and aluminum levels would exceed existing conditions by 74 percent. In the North flowpath, groundwater manganese would be 45 percent higher under the PolyMet proposed action than if existing conditions continued. (SDEIS, Table 5.2.2-38, p. 5-169).

Although residential wells were identified as part of PolyMet’s “affected environment,” the SDEIS failed to evaluate the effects of tailings basin seepage nor the cumulative effects of

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<sup>68</sup> EPA, Drinking Water Contaminants (“MCLs”) <http://water.epa.gov/drink/contaminants/index.cfm#List>

the PolyMet project and other past, present and foreseeable discharge on residential wells. The potential health impacts resulting from cumulative increases in heavy metals was completely omitted.

**D. The SDEIS fails to evaluate cumulative health risks from coal combustion resulting from the PolyMet proposed action.**

The SDEIS briefly discusses the energy demands of the PolyMet proposed action in the context of global climate change and greenhouse gas emissions. Over the course of 20 years, the PolyMet project is predicted to result in 10,220,000 metric tons of greenhouse gas equivalent emissions, principally from coal combustion to meet energy demands of the project. (SDEIS, Table 5.2.7-9, p. 5-406). The SDEIS also states that the cumulative inhalation risk from the PolyMet proposed action and other industrial facilities is 4 times the Minnesota cancer risk threshold. The PolyMet mine and plant together would contribute 7 percent of the estimated potential cumulative chronic cancer risk. (SDEIS, Table 6.2-22, p. 6-88).

However, the SDEIS fails to assess the cumulative health risks from air emissions resulting from coal combustion required to meet PolyMet project energy demands. It is well-known that coal combustion emissions, including nitrogen oxides, sulfur dioxide, particulate matter, fine particulate matter, mercury and lead significantly impact human health. These impacts may not be experienced at the PolyMet property boundary, but they are project impacts that should be quantified and disclosed in the PolyMet SDEIS.

**2. The PolyMet SDEIS inadequately assesses the impacts of its proposed action on drinking water and health.**

**A. The SDEIS inadequately evaluates the health risks from arsenic discharge.**

The SDEIS' discussion of the impacts of the PolyMet project on arsenic is incomplete and fails to consider the adverse health impacts of this Group A human carcinogen (IRIS 2007). The SDEIS' assumptions regarding sorption determine that arsenic would not increase in any seepage flowpath at either the mine site or the plant site. (See SDEIS, Table 5.2.2-22, p. 5-109; Table 5.2.2-38, p. 5-169). As discussed in Section II, transport through fractures or high porosity soils may function differently.

However, the SDEIS indicates that the PolyMet proposed action would increase arsenic levels in the Partridge River, the Embarrass River tributaries, the Embarrass River and Colby

Lake. In the Partridge River, at P90, arsenic at SW-004a, just below the WWTF discharge location, is predicted to reach 5.6 µg/L, 40 percent higher than if existing conditions continued. Further downstream, at SW-004b, maximum arsenic levels would be 4.47 µg/L, 55 percent higher than continuing existing conditions; at SW-005 arsenic concentrations would be 2.88 µg/L and at SW-006, just above Colby Lake, maximum arsenic levels would be 2.48 µg/L, a 63 percent increase over continuing existing conditions. (SDEIS, Table 5.2.2-30, p. 5-129).

The SDEIS states that the elevated concentrations at SW-006 could raise concerns for potential exceedances of the 2 µg/L standard applicable to Colby Lake drinking water, but seems to dismiss this risk as overly conservative modeling of the arsenic load from the WWTF. (SDEIS, p. 5-152) At a basic level, the levels of arsenic in influent to the mine site WWTF suggest that conservative modeling may be appropriate. Average P90 arsenic concentrations in mine site WWTF influent are predicted to reach 167 µg/L in year 25 and remain over 100 µg/L until year 40. (Water Modeling Data Package Mine site, SDEIS reference, PolyMet 2013i, Large Table 23, pdf p. 431).

Arsenic concentrations are also predicted to increase in the tributaries downstream of the tailings basin as a result of WWTP effluent. In Trimble Creek at TC-1, for example, arsenic concentrations could reach 10 µg/L, a 263 percent increase over existing conditions, and at Trimble Creek PM-19, arsenic could reach 9.8 µg/L, a 272 percent increase over existing conditions. (SDEIS, Table 5.2.2-42, p. 5-183) During both operations and long-term closure concentrations of arsenic downstream in the Embarrass River would be elevated as much as 294 percent over continuation of existing conditions. (SDEIS, Tables 5.2.2-43 to 5.2.2-46, pp. 5-185 to 5-187).

At Colby Lake, modeling additional dilution, arsenic would increase 38.5 percent as a result of the proposed action. PolyMet models continuation of existing arsenic conditions in Colby Lake at 0.65 µg/L of arsenic, so the predicted concentration would be 0.90 µg/L, well below Minnesota's arsenic standard of 2 µg/L for Class 2A and Class 2Bd waters. (SDEIS, Table 5.2.2-34, p. 5-145, p. 5-150). But, if existing conditions were modeled from MPCA and Minnesota Power data, both of which measured arsenic at a mean of 1.4 µg/L (SDEIS, Table 4.2.2-18, p. 4-87) a 38.5 percent increase would bring arsenic in Colby Lake above 1.9 µg/L, closely approaching the legal limit.

With respect to arsenic, it is widely recognized that rules may not reflect a current



understanding of health risks or may result from political compromise. To evaluate the risks of the PolyMet proposal, the SDEIS must analyze actual increased risk of cancer as well as compliance with legal requirements.

The EPA has adopted rules calculating how much arsenic in water unacceptably increases the risk of cancer. EPA's national recommended water quality criterion for arsenic in surface waters to protect human health is 0.018 µg/L, based on a 1 in 1,000,000 cancer risk threshold. 40 C.F.R. §131.36. States like Washington, which protect human health based on a 1 in 1,000,000 cancer risk, have used the 0.018 µg/L arsenic criterion in setting TMDL limits for mining pollution.<sup>69</sup> The draft TMDL for arsenic in Iowa's Mississippi River prepared by EPA Region 7 in 2010 was based on a standard of 0.18 µg/L for arsenic, since Iowa, like Minnesota, sets limits on carcinogens based on a 1 in 100,000 cancer risk.<sup>70</sup>

Even with all of the limiting assumptions in the SDEIS, PolyMet's modeled increase in arsenic (0.25 µg/L) for Colby Lake drinking water would increase cancer risk by more than Minnesota's 1 in 100,000 health threshold. Minn. R. 4717.7840, subp. 2B.

The risk of cancer due to arsenic exposure from the PolyMet proposed action is likely to be even greater if arsenic in wild rice is also considered. The FDA has recently tested Minnesota wild rice and has found arsenic levels of 6 µg/L.<sup>71</sup> Waters downstream of PolyMet effluent, at PM-13 in the Embarrass River, have been identified by the MPCA as wild rice waters. (SDEIS, Figure 5.2.2-1, p. 5-24). At PM-13, arsenic could increase to 5.3 µg/L, a 294 percent increase over continuation of existing conditions. (SDEIS, p. 5-185). Arsenic risks would be magnified for persons who rely on wild rice and fish for subsistence, in addition to drinking Hoyt Lakes municipal water.

#### **B. The SDEIS inadequately evaluates the health risks from discharge of manganese and other pollutants to groundwater.**

The PolyMet SDEIS' inadequately evaluates the human health risks of discharge of pollutants that may affect drinking water. Under Minnesota Rule 7060.0200, it is the policy of

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<sup>69</sup> Washington State Department of Ecology, *A Total Maximum Daily Load Evaluation for Arsenic in the Similkameen River*, November 2002, p. 8 <http://www.ecy.wa.gov/biblio/0203044.html>

<sup>70</sup> EPA Region 7, TMDL Mississippi River (IA 01-NEM-0010\_2, IA 03-SKM-0010\_1) for Total Arsenic Draft March 2010, pp. 1-3 [http://www.epa.gov/region7/water/pdf/mississippi\\_river\\_ia\\_draft\\_tmdl.pdf](http://www.epa.gov/region7/water/pdf/mississippi_river_ia_draft_tmdl.pdf)

<sup>71</sup> FDA, Analytical Results from Inorganic Arsenic in Rice and Rice Products Sampling, September 2013. <http://www.fda.gov/downloads/Food/FoodborneIllnessContaminants/Metals/UCM352467.pdf>

the State of Minnesota to consider the actual or potential use of groundwater for potable water supply as its highest priority use. All groundwater is considered to have one beneficial use, domestic consumption (Class 1).

Minnesota Health Risk Limits (HRLs) reflect analysis by the Minnesota Department of Health (MDH) of the levels of contaminants that pose a significant risk to human health. For manganese, Minnesota's HRL is 100 µg/L, based on the level of contamination where bottle-fed infants would suffer neurological injury.<sup>72</sup> At 300 µg/L of manganese, the risk of neurologic harm would apply to children as well, where concentrations have been associated with subtle learning (IQ and memory) and behavioral (ADHD) adverse effects, and to adults.<sup>73</sup> Minnesota has set HRLs for other parameters of concern for the PolyMet project, including an HRL for beryllium of 0.08 µg/L, due to a cancer endpoint, and an HRL for thallium of 0.6 µg/L, due to damage to the liver, kidney, testicular and intestinal tissues.<sup>74</sup>

EPA maximum contaminant levels also address health risks. EPA has set a maximum contaminant level of 6 µg/L for antimony due to increases in blood cholesterol and has concluded that there is no safe level of lead or arsenic in drinking water. (EPA, MCLs, *supra*)

The PolyMet SDEIS does not provide either decision-makers or the public with information regarding potential health risks of PolyMet discharge. In fact, its "evaluation criteria" explicitly diverge from the applicable health-based standards. The most significant example of this divergence pertains to manganese.

Rather than applying the 100 µg/L HRL to evaluate manganese discharge to groundwater, the SDEIS evaluates whether PolyMet's modeled discharge would exceed 95 percent of the Upper Prediction Limit. (SDEIS, p. 5-11). For tailings basin discharge to groundwater, the SDEIS "evaluation criterion" for manganese is 1,506 µg/L, more than 15 times the applicable health-based risk limit. (SDEIS, Table 5.2.2-38, p. 5-169). As a result of using this criterion, even where use of the new tailings cells 1E/2E are modeled to result in groundwater contamination through the North flowpath of 759 µg/L of manganese – a level 237 µg/L greater

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<sup>72</sup> MDH, Manganese: Tiered Health Based Guidance for Water, May 2012, <http://www.health.state.mn.us/divs/eh/risk/guidance/gw/manganese.html>

<sup>73</sup> MDH, Toxicological Assessment Manganese, May 2012, <http://www.health.state.mn.us/divs/eh/risk/guidance/gw/manganese.pdf>

<sup>74</sup> MDH, Human Health-Based Water Guidance Table, <http://www.health.state.mn.us/divs/eh/risk/guidance/gw/table.html>; MDH, Drinking Water Standards for Contaminants, <http://www.health.state.mn.us/divs/eh/water/factsheet/com/ioc.pdf>

than the model for continuation of existing conditions -- the SDEIS raises no concern about pollution exceeding Minnesota's manganese HRL.

The SDEIS' comparison of modeled concentrations from PolyMet's discharge to a "continuation of existing conditions" scenario may also distort analysis of pollutants relevant to human health. As discussed in terms of sulfate discharge in Section I, by comparing the PolyMet proposed action to "existing" conditions at the LTVSMC, the SDEIS has predicted that no pollution will attenuate over time and that discharge won't be mitigated under a consent decree.

For manganese, although natural levels in bedrock or surficial materials may also be somewhat elevated, evidence of tailings basin pollution is clear. Monitoring demonstrates a very high level of manganese contamination from LTVSMC tailings seepage. At surface seep PM-10, based on 93 samples, the average level of manganese found was 100,192 µg/L, four orders of magnitude higher than Minnesota's HRL, while the highest concentration sampled was 2,950,000 µg/L. (SDEIS, Table 4.2.2-34, p. 4-129).

At the mine site and Colby Lake, the SDEIS comparison of manganese levels from the PolyMet project to continuation of "existing conditions" also requires additional scrutiny. The SDEIS modeled continuation of existing conditions in Colby Lake manganese at 240.6 µg/L, although recent sampling in Colby Lake had an average manganese concentration of 66.2 µg/L, with no samples exceeding 125 µg/L. (SDEIS, Table 5.2.2-34, p. 5-145 for modeling; Table 4.2.2-18, p. 4-88). By averaging three decades of MPCA sampling as a single mean and range, it is not possible to determine whether high manganese levels in the data resulted from a past facility discharge that has since attenuated. If 66.2 µg/L manganese levels from 2008 and 2010 more accurately represent existing conditions, manganese discharge from the PolyMet project may have a more significant impact on Colby Lake water quality.

### **Recommendations – Assessment of Health Risks**

- As detailed in Section I, the SDEIS must be revised to provide a comprehensive assessment of the risks of methylmercury resulting from the PolyMet project to fetuses, infants, children and adults, including people who rely on fish for subsistence as a result of fish consumption in the Embarrass River and Partridge River watersheds and in the St. Louis River.
- The SDEIS must be revised to assess impacts of air emissions at the PolyMet mine site and plant site for on-site workers both for cancer and non-cancer health risks.

- The SDEIS must be revised to model exposure of PolyMet on-site workers to mineral fibers and estimate the health risk to workers from mineral fibers based on the best protocols and research available, including the U of M 2013 data.
- The SDEIS must be revised to model the volume and concentrations of mineral fibers in air emissions from the PolyMet mine site and plant site and in water discharge to groundwater and surface water to assess health risks to the public.
- The SDEIS must be revised to disclose all parameters of concern, including lead, mercury and methylmercury in all residential wells between the tailings basin and the Embarrass River, sampling multiple times and correlating results with location and depth of wells.
- The SDEIS must be revised to analyze potential impacts of tailings basin seepage on residential wells, using reasonable assumptions regarding the volume and concentrations of seepage that would be released untreated from the PolyMet tailings piles.
- The SDEIS must be revised to evaluate health risks from coal combustion emissions resulting from the PolyMet proposed action.
- The SDEIS must be revised to state that increased discharge of arsenic from the PolyMet project would increase cancer risks beyond Minnesota's cancer risk threshold of 1 in 100,000.
- The SDEIS must be revised to state that increased manganese discharge at the tailings basin would exceed Minnesota's health risk limit of 100 µg/L.
- The SDEIS must be revised to provide a Health Risk Assessment for air emissions, discharge to surface water and groundwater and, where applicable, bioaccumulation of pollutants that may pose a risk to human health from the PolyMet proposed action. This Health Risk Assessment, prepared in conjunction with the Minnesota Department of Health, must:
  1. Explain health risks of pollutants in terms intelligible to decision-makers and the public;
  2. Use reasonable assumptions about emissions, seepage and transport of pollutants;
  3. Evaluate cancer and non-cancer risks for vulnerable populations, including fetuses, infants, children and the elderly;
  4. Evaluate cancer and non-cancer risks to populations with highest levels of exposure, including on-site workers, persons with residential drinking wells downstream of the site, and persons who rely on fishing, hunting and gathering for subsistence.
  5. Evaluate cumulative risks of multiple chemicals and exposure routes.
  6. Evaluate past, existing and reasonably foreseeable impacts of pollutants in assessing health risks.
- Upon completion of a Health Risk Assessment, the SDEIS must quantify as socioeconomic costs all costs related to health impacts, including medical treatment costs, lost productivity and costs from reduction of neurological and other functions in infants, children and adults.

## **IX. FAILURE & FLOOD RISKS**

### **Introduction**

The PolyMet SDEIS provides no information on environmental impacts if facilities at the mine site and plant site do not perform precisely as desired. When an agency is evaluating reasonably foreseeable significant adverse effects, risks of failure should be included in the analysis. Federal NEPA regulations state that for the purposes of EIS analysis, “‘reasonably foreseeable’ includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.” 40 C.F.R. §1501.22.

The Bristol Bay Assessment released by the EPA in January 2014 for the proposed Pebble Mine contained a substantial discussion of environmental risks from accidents and failures.<sup>75</sup> The Assessment evaluated tailings facility dam failure, spills of chemicals and pipeline failures along a transportation corridor, and short and long-term water collection and treatment failures. For each potential failure in the mine plan, the Assessment estimated the probability of the risk and its predictable environmental consequences. The Executive Summary of the Assessment is attached as Exhibit 42, and a chart summarizing the risks of failure evaluated can be found on page 17.

The PolyMet SDEIS provides no evaluation of the probability or consequences of failure, accidents, or unanticipated effects of severe weather. Such an assessment must be provided to evaluate reasonably foreseeable significant adverse effects of the PolyMet mine, waste rock storage, tailings storage, and transportation and storage of contaminated process water, concentrates and sludge. The assessment of risks of failure would provide a factual foundation for financial assurance and to evaluate mitigation alternatives, both of which are currently lacking in the PolyMet SDEIS.

#### **1. The SDEIS must evaluate the risks of slope or dam failure at the Category 1 waste rock stockpile and the tailings storage facility.**

The PolyMet SDEIS identifies the risk of slope failure at the “large-scale waste material storage facilities” proposed for the PolyMet project. “If incorrectly designed, constructed, and/or managed, or from other unforeseen circumstances, waste material storage facilities would have

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<sup>75</sup> See EPA, Bristol Bay Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska, for full text, [http://www.epa.gov/ncea/pdfs/bristolbay/bristol\\_bay\\_assessment\\_final\\_2014\\_vol1.pdf](http://www.epa.gov/ncea/pdfs/bristolbay/bristol_bay_assessment_final_2014_vol1.pdf)

the potential to result in increased hydrologic and/or water quality effects and may be unstable (potentially leading to slope or dam failure)." (SDEIS, p. 5-545)

However, as soon as the risk is identified, the SDEIS concludes that it need not be assessed: "The potential effects of hypothetical failure scenarios have not been assessed in this SDEIS, as the risk of failure is mitigated through application of design and safety requirements including adaptive management procedures." (SDEIS, p. 5-546).

Just a few pages later, without saying whether these adaptations would be made before or after a waste rock stockpile slope collapsed, the SDEIS suggests that "adaptive" measures could include expanding the footprint of waste rock stockpiles or disposing of Category 1 waste rock as backfill to the West Pit. (SDEIS, p. 5-556).

These examples of adaptive measures underscore the importance of knowing the probabilities and consequences of slope failure of the waste rock stockpiles. If failures are not improbable and risks are significant, expanded waste rock piles must be factored into wetlands compensation. Similarly, foreseeable environmental consequences of slope failure of the permanent Category 1 waste rock pile may require reconsideration of the West Pit Backfill alternative to eliminate that impact.

Evaluation of the probability and consequences of tailings dam failure may result in assessment of alternatives to the modeled tailings storage design. The SDEIS states that the tailings design "meets the minimum Factor of Safety." (SDEIS, p. 5-566). The SDEIS does not demonstrate or even assert that the tailings storage design is optimized to reduce the risk of catastrophic failure.

Although terms used in the SDEIS, such as "tailings basin" and "rock buttress" may convey the impression that tailings would be contained in a solid structure, that is not the case. Figure 5.2.14-5 on page 5-563 of the SDEIS illustrates the mounds of tailings rising on top of LTVSMC tailings and slimes with the buttress far below. PolyMet tailings would crest 1732 feet above mean sea level (AMSL) -- nearly 200 feet above the buttress, which will have a top elevation of 1538 AMSL. (Geotechnical Data Package – Flotation Tailings Basin Apr. 12, 2013, SDEIS reference PolyMet 2013n, pp. 68, 69). PolyMet's geotechnical analysis explains that tailings may liquefy and lose strength. "The potential for LTVSMC coarse tailings, fine tailings and slimes or the Flotation Tailings to liquefy in response to triggering events is due to the fact that some of these materials are hydraulically deposited and come to equilibrium under very

loose to loose conditions.” (*Id.*, p. 72).

Although the potential for liquefaction, “where a triggering event changes the stress state of the material such that it loses a significant amount of its strength,” was assessed in the geotechnical report, neither the report nor the SDEIS discuss the probability of dam failure or the environmental consequences of dam failure and tailings release. The SDEIS suggests that if monitoring or modeling indicates the dam no longer meets design standards (presumably before a collapse) modifications could include increasing the size of the rock buttress, increasing slope setbacks or improving the performance of the coarse gravel/tailings underdrain beneath the tailings piles in some unspecified way. (SDEIS, p. 5-569).

## **2. The SDEIS must evaluate the risks from severe weather events at the mine site and plant site**

From June 19 to 20, 2012, parts of Northeast Minnesota experienced a 10-inch rainfall. This came on top of 2-4 inches of rain earlier that week. The official NOAA Weather Service Atlas for the Hoyt Lake station lists the amount of rain for a 10-year 24-hour event as 3.54 inches and for a 100-year 24-hour event as 5.69 inches. The rain experienced in Northeast Minnesota in June of 2012 is simply off the chart. Even a 1,000-year rain is only listed in the NOAA Weather Service Atlas at 8.33 inches.

In Northeast Minnesota, the probability of extreme weather events is high – and increasing. The sumps and ponds at the mine site and the tailings and hydrometallurgical residue storage facilities at the plant site are vulnerable to flooding. PolyMet’s geotechnical report does not say what level of rainfall was modeled as the “probable maximum precipitation” in evaluating tailings basin slope or dam failure.

At the mine site, contaminated sumps for the Category 2/3 and Category 4 waste rock piles and the Ore Surge pile are designed for 10-year 24-hour rain events, with a 100-year overflow to the west equalization basin. The OSLA overburden and peat storage facility is designed for a 25-year event, with no overflow pond. (Water Management Plan – Mine Site, Jan. 9, 2012, SDEIS reference PolyMet 2013e, p. 9).

The west equalization basin, on the southern part of the mine site near the Partridge River, would receive contaminated process water from the Category 2/3 and Category 4 waste rock piles, the ore surge pile, the OSLA and the mine pits. (*Id.*, p. 19) Until approximately year 35,

the west equalization basin would also receive reject concentrate from the plant site wastewater treatment plant (WWTP). The SDEIS suggests that the equalization basins are designed for the spring snowmelt. In the event of an “extreme event,” which the SDEIS defines as a 100-year storm, mine operations in the pits could shut down and excess water remain in the pits. (SDEIS, p. 5-124).

The SDEIS does not explain how stopping the additional flow of mine process water would prevent releases of the highly contaminated wastes already contained in the west equalization pond and does not discuss the probability of flooding under reasonably foreseeable weather events exceeding a 100-year storm. The SDEIS fails to discuss the risk of environmental harm if untreated pollutants were released from the west equalization basin. During operations, the west equalization basin is modeled to contain up to 8,700 mg/L of sulfate -- 870 times the wild rice sulfate standard; and 390,000 µg/L of nickel -- more than 10,000 times the chronic water quality standard that protects aquatic life. (Mine Site WWTF Design Plan, *supra*, Exhibit 26, p. 9).

**3. The SDEIS must evaluate the risks of rail accidents and pipeline breaches in the transportation corridor.**

The PolyMet SDEIS proposes that mine site process water would be piped nine miles from the mine site to the plant site and WWTP effluent piped from the plant site. Even if the mine site WWTF were able to operate as planned, its treated effluent would exceed water quality standards for sulfates and metals. (SDEIS, Table 5.2.2-28, p. 5-126). Untreated process water from the OSLA and from the East Pit would also be sent to the plant site. The SDEIS does not explain the volume or concentrations of solutes that will flow through pipelines in the transportation corridor back and forth between the mine and plant site. No estimate is made of the probability of pipeline rupture or spill or the consequences for wetlands and creeks along the corridor.

The SDEIS estimates routine ore spillage from rail cars along the transportation corridor, but does not mention the risk of a rail accident. The SDEIS also does not estimate the probability or potential adverse impacts of a spill of reject concentrate, which will also be transported by rail along the corridor via tank cars for approximately 35 years. (SDEIS, pp. 5-79, 5-81, 5-163).

During operations, up to 150 gallons per minute or 78,890,000 gallons per year of reject



concentrate would be transported by rail and stored on the mine site. During reclamation, that volume would increase to 175 gallons per minute or 92,040,000 gallons per year. (SDEIS, p. 5-124). Reject concentrate would contain extremely high levels of sulfates and toxic metals. At P90 levels, for example, sulfates in mine year 14 would be 12,300 mg/L -- 1,230 times the 10 mg/L wild rice sulfate standard. Copper in mine year 11 would be 8,190 µg/L – 1,575 times the surface water quality standard of 5.2 µg/L in background hardness levels of 50 mg/L. Nickel in mine year 14 would be 9,900 µg/L – 341 times the nickel water quality standard of 29 µg/L in background hardness of 50 mg/L. Arsenic in mine year 14 would be 729 µg/L – 4,050 times the 0.18 µg/L level that EPA has calculated would lead to a 1/100,000 cancer risk in surface water used for drinking. (Water Modeling Data Package – Mine Site, Mar. 8, 2013, SDEIS reference PolyMet 2013i, Large Table 22 on pdf p. 430).

Since the Deepwater Horizon oil spill, it has become customary to assess the risk of oil spills in an EIS. See e.g. *Native Vill. of Point Hope v. Jewell*, 740 F.3d 489, 495 (9<sup>th</sup> Cir. 2014). Rail accidents and derailments nationwide underscore the need for an assessment of probabilities and impacts of rail spillage at the PolyMet project.

**4. The SDEIS must evaluate the risks of imperfection in collection and treatment of seepage and wastewater at the mine site and plant site.**

As the Bristol Bay Assessment and the analysis in previous sections of these comments demonstrates, failure of a mine site scenario need not be as dramatic as a dam failure or flood. Even when PolyMet's modeling is redone to provide some reasonable range of probabilities for the performance of leachate collection, it is likely that predictions will still be made assuming that pollution control systems are within the range of effective performance.

For permanent waste storage facilities and hundreds of years of wastewater treatment, the risks of failures and poor performance magnify. Such failures could create impacts on water quality, and must be evaluated as reasonably foreseeable adverse effects of the PolyMet proposal. Section IV of these comments discussed factors that could contribute to failure at the HRF. In comments on the preliminary SDEIS, the MDNR Fish and Wildlife/Fisheries staff highlighted the differences between the PolyMet proposal and a No Action scenario in terms of water quality risks if systems fail to perform as expected:

And lastly as, there is a difference in risk to water quality and fish habitat between the No Action Alternative (status quo) versus the NorthMet Project (an engineered system that is

dependent on water treatment in perpetuity). This increase in risk to water quality and fish habitat is a significant impact of the project. If systems fail to perform as projected (i.e. WWTP and WWTF fail or do not perform as planned), engineered controls fail (i.e. seepage exceeds predictions due to leakage or other issues), or modeled ground and surface water impacts are greater than expected (i.e. if the model was miscalibrated or rainfall overwhelms the storage capacity and pits release untreated water), the NorthMet Project Alternative would have very significant negative effects compared to the No Action Alternative. Some examples of conditions that contribute to risk, that can not be ruled out in perpetuity include: WWTP and WWTF fail or do not perform as planned, engineered seepage exceeds predictions due to leakage or other issues, the model was miscalibrated, or rainfall overwhelms storage capacity and pits release untreated water. These may be very small risks but the time frame is "in perpetuity". (Exhibit 28, *supra*, Comment 57)

### **Recommendations – Failures & Flooding**

- The SDEIS must be revised to assess the probabilities and environmental consequences of partial or complete slope failure of waste rock stockpiles.
- The SDEIS must be revised to assess the probabilities and environmental consequences of partial or complete dam or slope failure at the tailings and hydrometallurgical residue storage facilities.
- The SDEIS must be revised to assess the probabilities and environmental consequences of extreme weather and flooding at the mine site and plant site.
- The SDEIS must be revised to assess the probabilities and environmental consequences of pipeline spills and rail accidents along the transportation corridor.
- The SDEIS must be revised to assess the probabilities and environmental consequences of failure of the integrity of liners beneath sumps, basins, ore surge and waste rock piles and the hydrometallurgical residue facility.
- The SDEIS must be revised to assess the probabilities and environmental consequences of failure of leachate collection and wastewater treatment systems to perform as planned.

## X. FINANCIAL ASSURANCE

### Introduction

The SDEIS provides little information about financial assurance for the PolyMet project. Although a range of preliminary cost numbers are listed (SDEIS, p. 3-138), the SDEIS neither explains the time horizon upon which appropriate calculation of financial assurance would be based or the nature of equipment and operations that would be included in assessing costs. Financial assurance must be analyzed as part of environmental review, not just in permitting. This analysis would increase the likelihood that controls for adverse environmental impacts would be effective during mine operations and for hundreds of years after closure.

#### 1. **Recent attempts by the Co-Lead Agencies and PolyMet to claim that modeled long-term solute exceedances do not imply long term treatment are disingenuous.**

The PolyMet DEIS predicted that waste rock stockpile leachate collection would exceed water quality standards for up to 2,000 years. (DEIS, Table 4.1-45, p. 4.1-80, SDEIS reference MDNR et al. 2009). Tribal comments integrated with the body of the DEIS stated that the tailings site would require “perpetual water treatment to avoid contamination to surface and groundwater resources.” At the mine site, “water treatment would be needed for an unspecified period of time (likely centuries) in order to avoid contamination to the Partridge River.” (DEIS, *supra*, p. 5-2)

The Co-Lead Agencies’ statements that wastewater treatment would be required at the mine site for 200 years and at the tailings basin for 500 years was a response last summer to comments made by Tribal Cooperating Agencies in their review of the preliminary SDEIS. When the preliminary SDEIS was released in May 2013, the tribes commented that the SDEIS text, “should indicate that water treatment and maintenance of permanent facilities would be required in perpetuity.” (SDEIS, pdf p. 2106) The Co-Lead’s “Disposition” provided to this and similar comments was as follows:

Text edited to reflect that the closure objective is to provide mechanical and non-mechanical treatment for as long as necessary to meet regulatory standards at evaluation locations in groundwater and surface water. Both mechanical and nonmechanical treatment will require periodic maintenance and monitoring activities. Modeling predicts that treatment activities will be a minimum 200 years at the Mine Site and a minimum of 500 years at the Plant Site. While long-term, these time frames for water treatment are not necessarily perpetual. The owning company would be held accountable to

maintenance and monitoring required under permit and would not be released until all conditions have been met.” (SDEIS, pdf pages 2106, 2107, 2110, 2115, 2140, 2144, 2145 w/o ownership responsibility text 2114, 2116, 2117, 2118, 2164, 2165, 2169)

The SDEIS currently frames this issue slightly differently, stating that “Mechanical water treatment is part of the modeled NorthMet Project Proposed Action for the duration of the simulations (200 years at the Mine Site, and 500 years at the Plant Site)” and, “It is uncertain how long the NorthMet Project Proposed Action would require water treatment, but it is expected to be long term.” (SDEIS, p. ES-11, ES-24, 5-7) Both the Category 1 waste rock pile and the tailings piles are unlined, permanent facilities. The SDEIS acknowledges that untreated releases from both the East Pit and the West Pit into shallow groundwater “would continue in perpetuity” and that “groundwater in these flowpaths would flow downgradient and eventually reach the Partridge River.” (SDEIS, p. 5-122).

SDEIS modeling of various contaminant sources over time indicates exceedances extending the entire modeling period – 200 years at the mine site and 500 years at the plant site. (*See e.g.* Water Modeling Data Package – Mine Site, SDEIS reference PolyMet 2013i, Figure pdf p. 1267). These same modeling assumptions are used to calculate and cap solute levels in earlier years. They must also be used to calculate the need for long-term wastewater treatment.

**2. Disclosure of financial assurance cost estimates is needed in the SDEIS both to characterize mitigation and to minimize public economic risk.**

There is no dispute that financial assurance will be required if the PolyMet project reaches the permitting stage for either a Clean Water Act Section 404 permit or a state Permit to Mine. (SDEIS, p. 5-314). The question presented is whether the basis for financial assurance will be disclosed in the environmental review process.

The SDEIS notes that “PolyMet has developed preliminary cost estimate ranges” for hypothetical closure at years 1, 11 and 20 and that cost estimates “would be finalized by the MDNR during the permitting process.” (SDEIS, pp. 3-137, 3-138). Reviewing these SDEIS preliminary costs estimates for closure (SDEIS, p. 3-138), it is not possible to determine on what these estimates are based or to assess whether assurances at this level would be sufficient to protect long-term water quality. If the costs for treatment and mitigation are known, they should be disclosed to decision-makers and members of the public.

Inclusion or omission of a cost estimate provides vital information about the nature and likely efficacy of mitigation measures. The inclusion of only a modest capital expenditure for the WWTF would raise questions about its ability to meet “target” concentrations. This concern is not academic. The 43-101 Technical Report prepared by PolyMet in 2012 and updated in January 2013, allocates \$4.55 million in capital costs for a mine site waste water treatment facility in year 1, “based on the use of a portable, modular, treatment facility during the first three years of mine life during which time the characteristics of a permanent treatment facility will be determined.” This 43-101 report suggests that the permanent WWTF will be constructed in year 4 and costs will be based on an Ames quote and a cost estimate by Barr.<sup>76</sup> The 43-101 neither suggests a time nor a cost for the plant site WWTP.

Identifying the level and timing of costs for water treatment could provide specificity on the design for the PolyMet project that is lacking in the SDEIS. In addition, if certain costs are not included in the financial assurance estimate, their absence could indicate lack of a real plan for mitigation. For example, it would be useful to members of the public to know what has been budgeted for indirect wetlands mitigation.

The SDEIS states, “The level of engineering design and planning required to calculate detailed financial assurance amounts is typically made available during the permitting process” (SDEIS, p. 2-10). If the level of engineering design and planning is, in fact, insufficient to calculate financial assurance, it is also insufficient to make the representations about water quality contained throughout the SDEIS. The project proponents cannot have it both ways. Either the PolyMet proposed action is ready for prime time and specific information on treatment and mitigation can be used to develop financial plans and assurances. Or, as suggested in the review by Dr. Don Lee, the PolyMet proposal as described in the SDEIS remains conceptual. In that case, the SDEIS, the project plans, and the cost estimates all need substantially more work.

Requiring financial assurance in an EIS is important to verify the degree to which unanticipated risks have been evaluated. Financial assurance would not only disclose if the potential costs of accidents and severe weather events have been assessed, but whether any budget has been provided for adaptive management and contingency mitigation measures if

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<sup>76</sup> PolyMet 43-101 Technical Report 2012, revised January 2013, pp. 21-8, 21-10.  
<http://www.polymetmining.com/wp-content/uploads/2013/02/2013-Updated-43-101.pdf>

solute concentrations and water quality impacts are greater than anticipated in the SDEIS modeling. (SDEIS, pp. 5-213 to 5-216).

The history of bankruptcy and taxpayer liability for mitigation of environmental impacts of hardrock mining has led the EPA to recommend in its National Hardrock Mining Framework that financial assurance be assessed in evaluating the adequacy of EISs for mining operations. (SDEIS reference U.S. EPA 1997, p. 9) In Minnesota, our own cautionary tale is provided by the Dunka Mine, where a wastewater treatment plant was shut down to reduce annual operating costs, resulting in decades of exceedance of water quality standards despite passive treatment wetlands.

As reflected in the attached analysis, Exhibit 43, presented by Margaret Watkins for the Grand Portage Band in testimony to the Minnesota House Environment, Natural Resources and Agriculture Finance Committee, determining an appropriate amount for financial assurance will require identification of the types of wastewater treatment system that would be used and estimating the duration of treatment. Even under favorable interest assumptions, the up-front costs for financial assurance are likely to be hundreds of millions of dollars. If insufficient resources are provided, risks to Minnesota water quality as well as risks of taxpayer liability greatly increase.

### **Recommendation – Financial Assurance**

- The SDEIS must be revised to provide sufficient detail as to the nature and duration of wastewater treatment, leachate containment, liners, caps, maintenance, monitoring, and wetlands compensation to support mitigation and financial assurance requirements.
- The SDEIS must be revised to provide a detailed projection of capital costs, operating costs, life cycle replacement, adaptive management and contingency costs for unanticipated events to allow determination of financial assurance requirements.

## **XI. ALTERNATIVES**

### **Introduction**

Deficiencies in the presentation of alternatives constituted a significant factor in the U.S. Environmental Protection Agency's (EPA) Category 3 – Inadequate rating of the October 2009 Draft Environmental Impact Statement (DEIS). The SDEIS, if anything, compounds that problem. Although the SDEIS includes an alternative in the size of the proposed land exchange, the SDEIS does not explore or evaluate a single alternative pertaining to the underlying open-pit sulfide mine project or the management or mitigation of potential contamination sources. The PolyMet SDEIS does not demonstrate that the proposed action is the least environmentally damaging practicable alternative. A revised SDEIS is needed to evaluate reasonable alternatives that minimize and mitigate impacts on wetlands and water resources. A Clean Water Act Section 404 permit may not be issued for the Proposed Action due to the inadequacy of alternatives analysis in the SDEIS.

- 1. An EIS that fails to evaluate reasonable alternatives is inadequate, and a Section 404 permit may not be issued for a proposal that is not the least environmentally damaging practicable alternative.**

The purpose of an environmental impact statement is to provide analysis of alternatives to allow decision-makers and the public to make a reasoned choice among options. The PolyMet SDEIS fails to serve this function and must be rejected. The National Environmental Policy Act (NEPA) directs all federal agencies to include “alternatives to the proposed action” in every recommendation for a major federal action significantly affecting the environment and to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” 42 U.S.C. §4332(C)(iii) and (E).

The alternatives section is “the heart of the environmental impact statement.” By law, “it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public.” 40 C.F.R. §1502.14. In the alternatives section of an EIS, agencies must “explore and objectively evaluate all reasonable alternatives,” devote “substantial treatment” to each alternative considered so that reviewers may evaluate their comparative merits

and “include appropriate mitigation measures not already included in the proposed action.” 40 C.F.R. §1502.14(a),(b),(f).

Courts will reject an EIS as inadequate when alternatives are “ignored,” “are not adequately set forth and discussed,” and are “dismissed with a conclusory statement and little or no discussion.” *Nelson v. Butz*, 377 F. Supp. 819, 822 (D. Minn. 1974) (Enjoining dam construction due to failure of the EIS to comply with NEPA). “A ‘viable but unexamined alternative renders [the] environmental impact statement inadequate.’” *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 813 (9<sup>th</sup> Cir. 1999) (Rejecting an EIS for a land exchange prepared in violation of NEPA on the grounds that the Forest Service “failed to consider an adequate range of alternatives”); *Oregon Natural Dessert Ass’n v. BLM*, 625 F. 3d 1092, 1122 (9<sup>th</sup> Cir. 2010)(Reversing judgment for BLM on sufficiency of land plan EIS); *see also Grazing Fields Farm v. Goldschmidt*, 626 F.2d 1068, 1072 (1<sup>st</sup> Cir. 1980)(Reversing judgment for Federal Highway Administration due to inadequacy of EIS alternatives analysis).

“A cursory dismissal of a proposed alternative, unsupported by agency analysis, does not help an agency satisfy its NEPA duty to consider a reasonable range of alternatives.” *Env’tl. Prot. Info. Ctr. V. U. S. Forest Serv.*, 234 Fed. Appx. 440, 442; 64 ERC (BNA) 1573 (9<sup>th</sup> Cir. 2007)(Reversing judgment for U.S. Forest Service and enjoining forest-thinning project). Under NEPA, the agency also has a duty “to study all alternatives that appear reasonable and appropriate for study . . . , as well as significant alternatives suggested by other agencies or the public during the comment period.” *Dubois v. U. S. Dept. of Agr.*, 102 F.3d 1273, 1286-1287 (1<sup>st</sup> Cir. 1996) (Concluding U.S. Forest Service had not explored reasonable alternatives to withdrawing water from and discharging water to an “outstanding resource value” water).

Presenting only alternatives that “would authorize the same underlying action” is insufficient to comply with NEPA requirements. *Western Watersheds Project v. Abbey*, 719 F. 3d 1035, 1051 (9<sup>th</sup> Cir. 2013) (Directing the district court to order the BLM to prepare an EIS that considered meaningfully different grazing alternatives). “It is ‘absolutely essential to the NEPA process that the decisionmaker be provided with a detailed and careful analysis of the relative environmental merits and demerits of the proposed action and possible alternatives, a requirement that we have characterized as ‘the linchpin of the entire impact statement.’” *Dubois*, *supra*, 102 F. 3d at 1286-1287; *citing NRDC v. Callaway*, 524 F.2d 79, 92-93 (2d Cir. 1975)



(Navy EIS inadequate due to failure to provide comparison of alternative dumping sites); *see also Silva v. Lynn*, 482 F.2d 1282, 1285(1<sup>st</sup> Cir. 1973).

"An agency cannot define its objectives in unreasonably narrow terms" *Nat'l Parks & Conservation Ass'n v. BLM*, 606 F.3d 1058, 1070, 1072 (9<sup>th</sup> Cir. 2010). (Ruling that BLM landfill EIS was inadequate on both "purpose and need" and "reasonable range of alternatives grounds.") "An agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative from among the environmentally benign ones in the agency's power would accomplish the goals of the agency's action, and the EIS would become a foreordained formality." *Id.*, at 1070; *see also City of Carmel-By-The-Sea v. United States Dep't of Transp.*, 123 F.3d 1142, 1155 (9<sup>th</sup> Cir 1997); *Friends of Southeast's Future v Morrison*, 153 F.3d 1059, 1066 (9<sup>th</sup> Cir 1998).

In addition, "A federal agency may not adopt a private party's interests as its own and exclude alternatives that fail to meet specific private objectives." *Nat'l Parks & Conservation Ass'n v. BLM*, *supra*, 606 F. 3d at 1072. "If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role." *Simmons v. United States Army Corps of Eng'rs*, 120 F.3d 664, 666 (7<sup>th</sup> Cir. 1997). In *Simmons*, the court found that the U.S. Army Corps "failed to examine the full range of reasonable alternatives and vitiated the EIS." *Id.*, at 667. The Army Corps had a "duty under NEPA to exercise a degree of skepticism in dealing with self-serving statements from a prime beneficiary of the project." *Id.*, at 669. The court summarized, "If NEPA mandates anything, it mandates this: a federal agency cannot ram through a project before first weighing the pros and cons of the alternatives." *Id.*, at 670.

The Clean Water Act Section 404 permit process explicitly precludes issuance of permits if there is a practicable alternative that would have less adverse impact on aquatic ecosystems. Section 404 of the Clean Water Act (CWA), 33 U.S.C. §1344(a)-(e) authorizes the United States Army Corps of Engineers (Army Corps) to issue permits for the discharge of dredged or fill materials into waters of the United States. Implementing regulations state that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" 40 C.F.R. § 230.10(a). Regulations define an alternative as "practicable" if it is "available and capable of

being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” The regulations explicitly preclude ownership by a person other than the permit applicant from serving as a barrier to consideration, stating, “If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.” 40 C.F.R. §230.10(a)(2).

The EPA’s EIS rating system reflects the priority of alternatives analysis. An EIS merits a “Category 3 – Inadequate” rating where “EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action,” or “the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts.” On the basis of the potential significant impacts involved, such a proposal could be a candidate for referral to CEQ. (EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment).

EPA’s February 18, 2010 comments rating the PolyMet’s October 2009 DEIS as “inadequate,”<sup>77</sup> cited the failure to analyze alternatives:

EPA believes the DEIS should evaluate alternatives to avoid mine pit overflow and explore additional mitigation for discharges and waste rock management, some of which are identified briefly in the document. (EPA DEIS Comments, Exhibit 29, *supra*, pdf p. 2)

EPA believes that because of deficiencies in the DEIS, additional information, alternatives, and mitigation measures should be evaluated and made available for public comment in a revised or supplemental DEIS. (*Id.*, pdf p. 4)

Insofar as the USACE is using the DEIS to support the CWA Section 404 wetlands fill permit decision, the revised/supplemental DEIS needs to address several wetlands permitting issues, including alternative mine plans . . . Pursuant to the Guidelines, the applicant bears the burden of clearly demonstrating that the preferred alternative is the least environmentally damaging practicable alternative (LEDPA) that achieves the overall project purpose, minimizes impacts to the aquatic environment to the maximum extent practicable, and does not cause or contribute to significant degradation of waters of the U.S” (*Id.*, pdf p. 20)

EPA has objected to Section 404 permit issuance for other projects on the grounds that the proposed action was not the least environmentally damaging practicable alternative (LEDPA).

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<sup>77</sup> EPA Comments on PolyMet NorthMet DEIS (Feb. 18, 2010) are attached as Exhibit 29.

EPA recommended denial of a Section 404 permit for the Reylas Surface mine in West Virginia due to the failure to consider alternatives to avoid or minimize project impacts;<sup>78</sup> and rated the *Revised* Draft EIS for Nevada's Emigrant Mine Category 3 – Inadequate on the basis that “additional alternatives should be evaluated and made available for public comment in a revised or supplemental Draft EIS” as well as the failure of the Revised EIS to discuss financial assurance.<sup>79</sup> EPA Region 5 objected to the issuance of a Section 404 permit for a Michigan highway project since the proponent had neither demonstrated that the preferred alternative was the LEDPA or that it had “avoided and minimized impacts to the maximum extent possible and compensated for any unavoidable impacts.” EPA cautioned that the project purpose “should not be too narrowly defined so as to limit alternatives.”<sup>80</sup>

**2. The PolyMet SDEIS does not evaluate alternatives and does not propose the least environmentally damaging practical alternative to protect aquatic resources.**

Construction of the PolyMet Proposed Action would directly impact 913 acres of wetlands from mining-related activities such as filling or excavation of wetlands, and “these wetlands would be permanently lost.” (SDEIS, p. 5-223) The SDEIS acknowledges that the Proposed Action could also indirectly impact as many as 7,351 acres of wetlands as a result of one or more of the following factors: 1) wetland fragmentation, 2) change in wetland hydrology resulting from changes in watershed area, 3) changes in wetland hydrology due to groundwater drawdown, 4) water quality changes related to deposition of dust, 5) water quality changes related to ore spillage along the Transportation and Utility Corridor, and 6) changes in water quality related to leakage from stockpiles/mine features and seepage from mine pits. (SDEIS, p. 5-224). In addition, “Approximately 353.6 acres of the One Hundred Mile Swamp MBS Site of High Biodiversity Significance and 1,364.9 acres of the Upper Partridge River MBS Site of High Biodiversity Significance would be affected by the NorthMet Project Proposed Action.” (SDEIS, p. 5-341)

Aquatic resources downstream of the proposed PolyMet mine site and PolyMet tailings basin site include impaired waters. The Embarrass River, downstream of the tailings site, has

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<sup>78</sup> EPA, letter to USACE re Reylas Surface Mine, *supra*, Exhibit 38.

<sup>79</sup> L. Yoshii, EPA, letter to R. Wenker, Bureau of Land Management, re Emigrant Project Revised Draft EIS, Elko County, Nevada, Mar. 23, 2009, attached as Exhibit 44.

<sup>80</sup> T. Hyde, EPA, Letter to C. O’Keefe, Mich. Dept. of Environmental Quality re Marquette County Road Commission, Apr. 23, 2012, p.2, attached as Exhibit 45.

recently been listed on Minnesota's Section 303(d) list as impaired for aquatic life. Water bodies impaired for excessive mercury that would be affected by air deposition and water discharge from the PolyMet proposed action include Heikkila Lake, Embarrass Lake, Esquagama Lake, Sabin Lake, Wynne Lake, Colby Lake, the Whitewater Reservoir and the St. Louis River.<sup>81</sup> "All of the PolyMet area wetlands and waters and waters downstream of the PolyMet project are designated Outstanding International Resource Waters (Minnesota Rules, parts 7050.0460 and 7052.0300)." (SDEIS, p. 4-24) The PolyMet SDEIS does not discuss any alternatives to minimize or mitigate effects on these aquatic resources.

The "alternatives" section of the PolyMet SDEIS is inadequate on its face. It constitutes less than 10 pages out of a massive 2,169-page document, most of which are used to assert that alternatives need not be investigated. The SDEIS explores no alternatives other than a "B" choice for the land exchange, which does not affect the underlying mine project, beneficiation or mine waste disposal plan and "would have the same effects" as the NorthMet Project Proposed Action. (SDEIS, p. 7-3) Co-Lead Agencies' responses to DEIS comments confirm that no alternatives are evaluated in the SDEIS:

The 'Mine Site Alternative' was incorporated into the Proposed Action and is no longer applicable as an alternative (refer to Section 3.2.3 of the SDEIS for more information). (SDEIS, Appx. A, pdf p. 1864)

The underground mining alternative was revisited and determined not to be a viable alternative; therefore, it remains eliminated from further evaluation. (*Id.*)

There is no longer a tailings basin alternative. (*Id.*)

"The NorthMet Project Proposed Action in the SDEIS represents a project that has incorporated a number of previous alternatives and mitigation measures considered as alternatives at earlier stages of the EIS process. Many other alternatives have been identified but eliminated from detailed analysis because they didn't offer potentially significant environmental benefits, did not meet the project's purpose and need, or were not otherwise reasonable (technically or financially viable). (*Id.*, pdf p. 1865)

Dr. Don Lee, an engineer who spent three decades working on environmental analysis for the Oak Ridge National Laboratory, summarizes the state of the record: "the SDEIS cannot be considered compliant with the regulations in 40 CFR 1500 – 1508 for the consideration of

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<sup>81</sup> MPCA, Minnesota Final 2012 Impaired Waters List, <http://www.pca.state.mn.us/index.php/view-document.html?gid=20346>.

alternatives for the mining project.” Dr. Lee continues, “The SDEIS needs to consider all reasonable alternatives. Having not done so is a significant flaw in the SDEIS.” (Lee 2014, p. 2)

Several reasonable alternatives have the potential to reduce impacts of the PolyMet Proposed Action on wetlands and water quality. The Underground Mining alternative and West Pit Backfill mitigation alternative were improperly eliminated from consideration. WaterLegacy proposes a Mine Site Year One Reverse Osmosis alternative that would be a less environmentally damaging practicable alternative to the PolyMet proposed action and identifies several mitigation alternatives for management of wastes and contaminant sources that must also be assessed. These alternatives should be evaluated and made available for public comment in a revised SDEIS before a Final EIS is prepared.

**3. The PolyMet SDEIS improperly eliminated alternatives that should be explored to minimize and mitigate environmental harm to aquatic resources.**

The PolyMet SDEIS improperly eliminated both the underground mining alternative and the West Pit Backfill alternative based on an unreasonably narrow definition of the objectives of the Proposed Action, a confusion of public and private purposes, and an insufficiently skeptical examination of statements and reports from the project’s main beneficiary.

**A. Elimination of the Underground Mining alternative was unreasonable.**

The Scoping Decision for the PolyMet proposal required evaluation of underground mining, specifying that underground mining could be eliminated only if it were infeasible, but if underground mining merely provided a lower economic return, a detailed assessment must be prepared. (PolyMet DEIS Appx. B, Final Scoping Decision Document, “PolyMet Scoping Decision”, p. 5 of 45)<sup>82</sup> The SDEIS states that underground mining was eliminated as an alternative to the Proposed Action “because it was found to be economically infeasible.” (SDEIS, p. 3-174). On first blush, this conclusion would seem to dispose of the issue.

However, closer scrutiny demonstrates that underground mining could be technically feasible and less environmentally damaging than the Proposed Action and that the “independent” analysis of its economic feasibility was based on an unreasonably narrow definition of the potential project and unrealistic project costs. This analysis is sufficiently unreliable that it

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<sup>82</sup> The PolyMet SDEIS reference, MDNR and USACE 2009, does not include the appendices to the DEIS. They can be found at [http://www.dnr.state.mn.us/input/environmentalreview/polymet/eis\\_toc.html](http://www.dnr.state.mn.us/input/environmentalreview/polymet/eis_toc.html).

cannot support rejection of the underground mining alternative.

The underground mining alternative is available and technically feasible. (SDEIS Appendix B, Underground Mining Alternative Assessment for the NorthMet Mining Project and Land Exchange Environmental Impact Statement, Sept. 27, 2013, “Revised Underground Mining Assessment,” p. 4, SDEIS pdf p. 1903). It is undisputed that underground mining would offer significant environmental benefits over the proposed open-pit mine. The Co-Lead Agencies agree:

Compared to the proposed open pit mine, the underground mining alternative would offer some significant environmental benefits, including:

- fewer direct effects on surface resources, including wetlands;
- less mine dewatering and, therefore, less water to be managed;
- less waste rock, which would result in:
  - a smaller surface footprint; and
  - reduced effects on surface water and groundwater.
- less ore mined at a slower rate, which would result in:
  - less tailings and hydrometallurgical residue to be managed;
  - fewer effects on surface water and groundwater; and
  - reduced air emissions from mining, transporting, and processing the ore, and constructing the Tailings Basin and Hydrometallurgical Residue Facility.

(*Id.*, p. 3, SDEIS pdf p. 1902)

Statements by PolyMet and the Co-Lead Agencies that underground mining is not economically feasible have been controversial. On May 15, 2012, the EPA cautioned that mine capital and operating cost numbers previously used to determine feasibility were out-of-date and did not consider PolyMet’s mitigation and treatment costs. The EPA also noted that the Co-Leads’ position paper did not factor into its analysis the potential that the applicant would in the future “mine higher-grade minerals that are located deeper than the proposed mine pit.”<sup>83</sup> EPA’s letter sent two weeks later stated that this Co-Leads’ position paper should be revised so that “updated environmental and economic data that compares costs of both pit mining and underground mining options” could inform the selection of a preferred project alternative.<sup>84</sup>

The Revised Underground Mining Assessment and the October 2012 report, “Economic Assessment of Conceptual Underground Mining Option for the NorthMet Project” prepared for PolyMet by Theodore J. Bornhorst, a consultant to Foth Infrastructure & Environment, LLC (“Bornhorst Report”) narrowly defines the mineral resource so as to render an underground

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<sup>83</sup> M. Sedlacek, EPA Letter to Co-Lead Agencies re underground mining, May. 15, 2012, p. 2, Exhibit 46.

<sup>84</sup> K. Westlake, EPA Letter to Co-Lead Agencies re underground mining, May. 31, 2012, p. 2, Exhibit 47.

mining alternative infeasible and fails to compare either environmental or economic data for both open pit mining and underground mining options. This analysis fails the basic tests set by case law and by the EPA.

The Bornhorst Report constrains its analysis of “NorthMet deposit” potential resources for underground mining to include only the measured and indicated resources within the open pit identified by PolyMet. (Bornhorst Report, p. 3, SDEIS pdf p. 1920). The Report acknowledges that it excludes mineralized rock that could be available for underground mining:

There is mineralized rock outside of the volume of rock contained within the proposed open-pit. This mineralized rock occurs below the open-pit. While this mineralized rock is excluded from this report, speculatively it may be possible for it to be economically viable to extract decades in the future. Only approximately 10% of the measured and indicated resource is below the open-pit (Poly Met, 2007). The majority of inferred resource defined by Poly Met (2007) is below the open-pit. (*Id.*).

The extent of mineralized rock that occurs below the open-pit is illustrated in the attached slide presented by PolyMet to investors in May 2012.<sup>85</sup> The majority of the Unit 1 Main Ore Body is plainly evident outside the open-pit boundary line. Restriction of alternatives analysis to the mineral resources within the open pit specified by PolyMet resulted in a failure to examine the full range of reasonable alternatives.

In addition, the cost parameters used by PolyMet’s consultant and by the Lead Agencies are inadequate. No operating or pre-production capital costs from the PolyMet mine project are used in the analysis; all are published cost models. (Revised Underground Mine Assessment, p. 6, SDEIS pdf p. 1905). While adjustments are made from the cost models, such as InfoMine, to account for obvious differences with a possible NorthMet setting, “there is no assurance these adjustments are adequate.” (Bornhorst Report, p. 6, SDEIS pdf p. 1923).

Neither the Revised Underground Mining Assessment, the Bornhorst Report nor the PolyMet SDEIS make any attempt to compare the economic feasibility of underground mining with projections of profit or loss for open-pit mining based on PolyMet’s actual costs for land exchange, construction, operations, treatment, reclamation, mitigation and financial assurance. There is, thus, no way for decision-makers or the public to determine whether underground mining, in fact, is less economically feasible than PolyMet’s actual open-pit mining proposal.

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<sup>85</sup> PolyMet, Presentation to InvestMNt Conference, Minneapolis, May 14, 2012, Excerpts, NorthMet Ore Body slide, p. 2 of Exhibit 48.

In order to determine if underground mining is the least environmentally damaging practicable alternative, underground and open-pit mining alternatives need to be compared and evaluated in a revised SDEIS -- identifying mineral resources likely to be extracted with each method of mining, projecting reasonable costs including costs for treatment, mitigation and financial assurance, and then comparing environmental and other benefits of both underground and open-pit mining alternatives.

**B. Elimination of the West Pit Backfill alternative was unreasonable.**

The West Pit backfill alternative has been proposed to mitigate some of the long-term impacts on wetlands in the Partridge River watershed. Rather than permanently removing 526 acres from the Hundred Mile Swamp as a result of the permanent Category 1 waste rock pile, the West Pit Backfill alternative would permit restoration of wetlands after the 20-year life of the Project, mitigating some of the losses to wetlands in the Partridge River watershed.

The West Pit Backfill alternative is available and technically feasible and may be economically feasible. (PolyMet DEIS, SDEIS reference MDNR and USACE 2009, p. 3-66). The West Pit Backfill alternative may provide environmental benefits and should be evaluated for that reason. The SDEIS acknowledges that after mining is completed, “Removal of the Category 1 Stockpile would allow for reclamation of the affected surface footprint, including potential to recreate wetland areas and restore function.” (SDEIS, p. 3-151).

Elimination of the West Pit Backfill mitigation alternative without evaluation in the SDEIS appears to be based on PolyMet’s private interests and/or future mineral development:

Backfilling the West Pit would encumber private mineral resources that are deeper than the proposed West Pit. Such an encumbrance is in conflict with the terms of PolyMet’s current private mineral leases. The PolyMet lease agreements could be renegotiated, which might involve monetary compensation for the mineral owners if minerals are encumbered.

[T]he potential environmental benefit is moot or outweighed because encumbrance is not allowed in PolyMet’s private mineral leases and because the costs associated with backfilling. . may affect the ability of PolyMet to secure financing. (SDEIS, p. 3-152)

The reference document in which the Co-Lead Agencies reject the West Pit Backfill alternative concludes that this alternative “would significantly decrease net return on the project.” (Co-Lead Interagency Memorandum, SDEIS reference MDNR et al., Apr. 11, 2013, 2013b, p. 3). PolyMet’s evaluation, which is cited in the Co-Leads’ Memorandum, explicitly rejects the West



Pit Backfill alternative to protect future mineral developments:

There are known extensions of mineralization outside the mine plan both to the south (down dip) and to the west (along strike). A key consideration in the development of an overall mine plan for the Project, including the ability to backfill open pits, is preserving potential future development of these extensions of mineralization. . .backfilling the East Pit will not encumber future development of deeper mineralization associated with the East Pit. In contrast, the mineralization at the western end is much more flat laying . . . and could be developed in the future via expansion of the proposed open pit mining operation and/or underground mining from the base of the West Pit.<sup>86</sup>

Neither federal law nor the PolyMet Scoping Decision support elimination of an alternative from consideration to secure a better rate of return for a project applicant. Minnesota's Environmental Policy Act prohibits the use of economic considerations to reject a feasible and practical alternative that minimizes or mitigates adverse effects on state natural resources. Minn. Stat. § 116D.04, subd. 6.

If the Co-Lead Agencies have, in fact, eliminated the West Pit Backfill from consideration as a mitigation alternative in order to allow future expansion of open-pit and/or underground mining, the underground mining alternative must be evaluated and the SDEIS must also include the potential mining expansion among its cumulative effects.

**4. The PolyMet SDEIS failed to consider mitigation alternatives that would reduce the environmental impacts of the Proposed Action on aquatic resources and water quality.**

**A. A Mine Site Year One Reverse Osmosis alternative could significantly minimize and mitigate project impacts to mine site wetlands and water quality.**

If underground mining is not selected, an alternative that implements mine site reverse osmosis in year one may be the least environmentally damaging practicable alternative (LEDPA) to reduce indirect impacts of the proposed action on the Hundred Mile Swamp and Partridge River Headwaters wetlands and other aquatic resources near the PolyMet mine site. This alternative would allow mitigation of indirect impacts of mine dewatering and seepage from mine pits on high value wetlands and ecosystems on and near the mine site.

The PolyMet SDEIS does not propose to build a reverse osmosis treatment facility at the mine site until approximately year 40, when it is predicted that the West Pit may overflow.

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<sup>86</sup> Foth, Evaluation of Backfilling the NorthMet West Pit, prepared for PolyMet Mining, Dec. 2012. p. 8, attached as Exhibit 49.

(SDEIS, p. 5-6). Until that time, targets for the mine site wastewater treatment facility (WWTF) effluent would be many times higher than surface water quality standards. For example, the WWTF target for lead would be 10.2 micrograms per liter (µg/L) -- more than 7 times the allowable lead level if hardness is 50 milligrams per liter (mg/L) and more than 3 times the allowable level with a hardness of 100 mg/L. The WWTF nickel target would be 113 µg/L -- nearly 4 times the allowable level if hardness is 50 mg/L and more than twice the allowable level if hardness is 100 mg/L. The WWTF target for sulfate would be 250 mg/L -- which is 25 times the standard applicable in waters producing wild rice. (SDEIS, p. 5-126). And the predicted mercury concentration in WWTF effluent would be 5.8 nanograms per liter (ng/L), as compared with the water quality standard of 1.3 ng/L.<sup>87</sup> Water from the mine site WWTF plant, prior to its potential conversion to reverse osmosis in about year 40, could not be released to mitigate hydrologic impacts on surface water in the Partridge River.

It is not disputed that wetlands in the Partridge River watershed would be affected by factors including “change in wetland hydrology resulting from changes in watershed area,” “changes in wetland hydrology due to groundwater drawdown,” and “changes in water quality related to leakage from stockpiles/mine features and seepage from mine pits.” (SDEIS, p. 5-224) The PolyMet Proposed action “could also affect flows in the Partridge River and its tributaries by changing drainage areas (e.g., alteration or reduction in watershed area) and reducing groundwater baseflow contributions during the dewatering and flooding of the East Pit and West Pit (i.e., years 1 to 40).” (SDEIS, p. 5-114)

The PolyMet SDEIS specifies no mitigation for indirect effects on the 7,351 acres of wetlands that could be indirectly impacted by the proposed action other than up-front compensation for 26.9 acres of wetlands fragmentation on the mine site. (SDEIS, p. 5-224). This compensation plan is insufficient, as explained in Section V of these comments. A total of 87 wetlands covering approximately 1,298 acres have been identified within the mine site (Wetlands Data Package, Mar. 7, 2013, SDEIS reference 2013b, p. 9). Approximately 92% of these wetlands are of high quality. (*Id.*, p. 10) Additional wetlands destruction is highly probable and reasonably foreseeable.

The PolyMet SDEIS acknowledges the environmental benefits of releasing treated water to reduce hydrological impacts on wetlands. This type of mitigation is proposed to protect

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<sup>87</sup> PolyMet, Facility Mercury Mass Balance Analysis (RS66), Attachment A, *supra*, Exhibit 4.

wetlands near the tailings basin and “prevent significant hydrologic effects due to reduction in flow.” (SDEIS, p. 5-297) In fact, at the northwest and north of the tailings basin, treated discharge “would be spigotted at multiple locations along the downstream side of the Tailings Basin containment system to add flow to the adjacent wetlands, similar to what occurs under existing conditions.” (*Id.*). In the mitigation effort at the tailings site, discharge to wetlands near the tailings basin “will be designed to closely mimic existing conditions to protect the existing wetlands.” (CDF059 Tributary Flow Augmentation, SDEIS reference Barr 2013a, p. 2)

The PolyMet SDEIS neither proposes nor evaluates a similar alternative to mitigate hydrologic impacts at the mine site, despite the high value and high biodiversity of these Partridge River watershed wetlands. No alternative is proposed to mitigate the impacts of stormwater capture, mine dewatering and drawdown on the international outstanding value aquatic resources on and near the mine site.

In addition, although the SDEIS proposes that the WWTF may be used to treat water used to fill the East Pit “to limit the oxidation of the sulfide minerals in the pit walls and backfilled waste rock and reducing the amount of metals leaching to the pit water” and to “improve pore water quality” (SDEIS, pp. 5-80, 5-81), water treated at the WWTF and reintroduced to the East Pit would not meet water quality standards. East Pit seepage constituents, discharged to the mine site surficial groundwater and daylighting in directly connected surface water would remain at levels far exceeding surface water quality standards. (*See* SDEIS Table 5.2.2-22, p. 5-109).

Mine Site Year One Reverse Osmosis could minimize or mitigate hydrological and water quality impacts on high value mine site wetlands and headwaters. This alternative would:

- Require on-site treatment of mine site stormwater and process water with reverse osmosis to meet surface water quality standards and prevent degradation of water quality starting in year one.
- Employ hydrological testing to assess appropriate quantities and locations for water release to support wetlands and headwaters streams in the Partridge River watershed.
- Release water treated by mine site reverse osmosis through pipe and/or spigot systems to mitigate the impacts of hydrological changes and mine dewatering on high value aquatic resources in the Hundred Mile Swamp and Partridge River Headwaters.
- Treat East Pit water with mine site reverse osmosis starting when reclamation begins (at or about year 11) to limit acidity, oxidation and metals leaching from the East Pit and

seeping to aquatic ecosystems through surficial and bedrock groundwater.

WaterLegacy suggests that the Mine Site Year One Reverse Osmosis alternative is available, technologically feasible and economically feasible. Potential environmental benefits include reduced impairment and destruction of Hundred Mile Swamp and Partridge River Headwaters wetlands and aquatic systems resulting from dewatering, hydrological changes, and seepage of pollutants from the East Pit through surficial and bedrock groundwater.

The Mine Site Year One Reverse Osmosis alternative should be explored and evaluated prior to any decision on the Section 404 wetlands permit, in order to meet the requirements of federal law to select the least environmentally damaging practicable alternative and prior to any state decision on the adequacy of the EIS, in order to comply with MEPA's prohibition on state action that is likely to cause pollution, impairment or destruction of natural resources when there is a feasible and prudent alternative that may prevent or mitigate such adverse impacts.

**B. Additional alternatives should be evaluated in the SDEIS to mitigate impacts of mine waste management, leaks, seeps, discharges and spills.**

Additional mitigation alternatives should be explored and evaluated to reduce the impacts of mine wastewater, tailings and mine waste rock management, leaks, seeps, discharges and spills. Risks and water quality impairments resulting from discharge of contaminants from mine site wastes, rail corridor spills, tailings seepage and hydrometallurgical residue leaks are described in preceding sections of these comments. The SDEIS must be revised to consider alternatives to mitigate these risks and impairments.

***a. Alternative Management of Plant Site WWTP Reject Concentrates.***

The PolyMet SDEIS proposes that, for at least the first several decades at the mine, reject concentrate from the reverse osmosis stream from the plant site wastewater treatment plant ("WWTP") would be transported to the mine site filtration system wastewater treatment facility ("WWTF") via rail tank cars where it would be added to the West Equalization Basin. (SDEIS, pp., 5-79, 5-81) Seepage through the West Equalization Basin liner would enter the underlying groundwater system (SDEIS, p. 5-98) and flow through surficial groundwater toward the Partridge River. (SDEIS Figure 4.2.2-4, p. 5-35).

During operations, the P90 estimate is that there would be 150 gallons per minute or 78,890,000 gallons per year of reject concentrate transported by rail and stored on the mine site. During reclamation the volume would increase to 175 gallons per minutes or 92,040,000 gallons per year. (SDEIS, p. 5-124). Reject concentrate would contain extremely high levels of sulfates and toxic metals. At P90 levels, for example, sulfates in mine year 14 would be 12,300 mg/L -- 1,230 times the 10 mg/L wild rice sulfate standard. Copper in mine year 11 would be 8,190 µg/L -- 1,575 times the surface water quality standard of 5.2 µg/L in background hardness levels of 50 mg/L. Nickel in mine year 14 would be 9,900 µg/L -- 341 times the nickel water quality standard of 29 µg/L in background hardness levels of 50 mg/L. Arsenic in mine year 14 would be 729 µg/L -- 4,050 times the 0.18 µg/L level that EPA has calculated would lead to a 1/100,000 cancer risk in surface water used for drinking. (Water Modeling Data Package -- Mine Site, Mar. 8, 2013, SDEIS reference PolyMet 2013i, Large Table 22 on pdf p. 430).

The PolyMet SDEIS suggests that, starting in year 35, reject concentrate would be evaporated or disposed of off site. (SDEIS Figure 5.2.2-4, p. 5-163). But the SDEIS proposes no alternative management of reject concentrate prior to that time to minimize or mitigate the impacts of rail car spills, liner leakage or flooding at the West Equalization Basin in the event of extreme weather in excess of a 100-year storm.

***b. Alternative Management of Category 1 Waste Rock.***

In addition to considering the West Pit Backfill alternative, a revised SDEIS should evaluate the alternative of placing liners and a leachate collection system beneath the mine site Category 1 waste rock pile. The PolyMet Scoping Decision contemplated evaluation of this alternative:

The following aspects of stockpile design investigated in the Reactive Waste Segregation report will be incorporated: capping systems to minimize the amount of precipitation passing through the stockpile and liner systems to capture the water flowing through the stockpile and keep groundwater from entering the stockpile. (PolyMet Scoping Decision, *supra*, p. 42 of 45)

The SDEIS proposes a capping system for the 526-acre permanent Category 1 waste rock pile, but does not investigate any liner system beneath the waste rock pile or compare the efficacy of such a system with perimeter containment design it has proposed. (SDEIS, p. 5-101).

Minnesota Geological Survey maps compiled by geologist J.D. Lehr demonstrate the

presence of faults across the PolyMet mine site, including faults beneath the proposed Category 1 waste rock pile location.<sup>88</sup> This geological information further supports the need to reduce seepage through the bottom of the Category 1 waste rock pile, *in addition to* reducing infiltration through the top of the pile. A revised SDEIS should evaluate this mitigation alternative.

***c. Alternative Management of Peat and Overburden Storage.***

The PolyMet SDEIS proposes that peat and other overburden removed from the mine site surface would be stored in an Overburden Storage and Laydown Area (OSLA) on the mine site for at least 20 years. (SDEIS, p. 5-94). This peat storage pile would be in proximity to the southern edge of the mine site property boundary, with a surficial groundwater flowpath to the Partridge River. (SDEIS, Figure 5.2.2-4, p. 5-35). The SDEIS calculates a relatively rapid groundwater infiltration and flow rate from the OSLA; even at P50, contaminants would reach the Partridge River, 1225 meters away, in 17 years. (SDEIS, p. 5-37).

There is no information in the SDEIS as to the time that infiltration would reach the Partridge River under a P90 scenario and no analysis of the potential that contaminants would daylight to wetlands between the OSLA and the Partridge River. Although surface water runoff from the OSLA would be pumped and sent either to the tailing basin or the WWTF (SDEIS, pp. 5-101 to 5-102), the SDEIS neither proposes nor evaluates any liner or leachate collection system to reduce infiltration and seepage from the OSLA. (SDEIS, p. 5-97). The SDEIS also provides no assessment of the concentration of mercury in the OSLA surficial aquifer flowpath. (PSDES, Table 5.2.2-22, p. 5-109)

Overburden leaching tests at 95<sup>th</sup> percentile results showed mercury levels of .018 µg/L in the peat and .016 µg/L in unsaturated overburden. (Waste Characterization Data Package, Mar. 7, 2013, SDEIS reference PolyMet 2013l, p. 4) These results are equivalent to 18 nanograms per liter (ng/L) and 16 ng/L respectively, an order of magnitude higher than Minnesota's 1.3 ng/L mercury water quality standard applicable in the Lake Superior Basin. PolyMet's Waste Characterization reference concluded that saturated overburden had the potential to release constituents that "could have significant environmental impact," that saturated overburden should be treated as Category 2, 3 or 4 waste rock, and that peat had the potential to release mercury in drainage water. (*Id.*, p. 6).

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<sup>88</sup> Map, Faulted Bedrock and Surface Topography, *supra*, Exhibit 6.

***d. Alternative Management of Tailings.***

PolyMet tailings are likely to be a significant source of contaminants to surficial and bedrock groundwater. A detailed discussion of the potential for seepage and the unsubstantiated and unrealistic containment assumptions in the SDEIS is contained in Section III of these comments. The Scoping Decision for the NorthMet project suggested that the EIS should include an evaluation of alternatives for design, construction and siting of tailings basin, including the possible use of a liner. (PolyMet Scoping Decision, *supra*, p.18 of 45).

However the PolyMet SDEIS contains no evaluation of any other location for the tailings, or any design that might use liners and seepage collection to minimize tailings basin impacts on water quality. The SDEIS must be revised to provide alternatives to the proposed deposition of tailings in unlined piles in Cells 1E and 2E on top of the existing unlined LTVSMC tailings basin.

***e. Alternative Management of Hydrometallurgical Waste.***

Section IV of these comments details deficiencies in the planned location, design and maintenance of PolyMet's proposed hydrometallurgical residue facility (HRF). HRF waste or a portion of that waste may be considered hazardous under applicable law. Location of a waste facility with elevated levels of mercury, sulfates, and other heavy metals on top of wetlands and bedrock faults and reliance of a liner system to contain all leachate in perpetuity in the presence of ions known to degrade liner materials creates unacceptable risks to water quality.

The SDEIS neither considers alternative locations and management practices for the hydrometallurgical waste and sludge proposed for deposit in the HRF, nor considers the alternative of an off-site location in a facility designed to contain these wastes. Both alternatives should be discussed in a revised SDEIS.

***f. Alternative Management to Prevent Rail Spillage.***

The PolyMet SDEIS admits, even without an accidental spill or significant incident, 55.7 kilograms of ore for every square meter of track could be released from rail cars within the first 1,000 meters of the Transportation and Utility Corridor over the 20-year life of the NorthMet Project Proposed Action. This is equivalent to 1.25 inches of spilled material blanketing a 2,000 square meter area (SDEIS, p. 5-98) or approximately 3,875,000 cubic inches of spilled ore potentially impacting wetlands and watersheds in the railway corridor. Ore fines spillage is

estimated in the SDEIS as 2.14 kilograms per square meter over 20-year mining project (SDEIS, p. 5-276) or approximately 19,093 pounds per acre. WaterLegacy believes that these projections are likely to be underestimates, since the rail cars will be transporting 228,000,000 tons of ore over the 20-year life of the project.

Rainfall contacting spilled ore and fines has the potential to release solutes. The PolyMet SDEIS states that wetlands immediately abutting the railway and whose watersheds included the rail centerline would potentially be affected by this spillage. The SDEIS states, “Approximately 543 acres of wetlands along the railroad corridor could be potentially indirectly affected by the NorthMet Project Proposed Action.” (SDEIS, p. 5-277).

Tribal Cooperating Agencies have noted that the rail line between the mine and the processing plant is approximately 8 miles long, 1 mile of which is over wetlands, and that the rail line crosses at least 3 creeks. Tribal comments suggest that use of the existing rail cars for ore hauling may result in an ecologically significant amount of spillage, which could be avoided by using new rail cars with sealed compartments. (SDEIS, Appx. C, pdf p. 2098).

## **Conclusion**

The PolyMet SDEIS improperly eliminates the underground mining and West Pit Backfill alternatives from consideration and fails to consider a range of additional reasonable alternatives that would mitigate environment harm to wetlands and water quality. These reasonable alternatives include a new Mine Site Year One Reverse Osmosis alternative and various proposals to provide better management of mine wastes and sources of water contamination. The PolyMet SDEIS remains inadequate and a revised SDEIS should be required for public comment, to allow for appropriate consideration of alternatives.

In addition, as a result of its failure to evaluate alternatives, the PolyMet SDEIS also fails to demonstrate that PolyMet’s proposed action is the least environmentally damaging practicable alternative, as required under the Clean Water Act. A Section 404 permit may not issue for this project until an alternatives analysis identifies the LEDPA to the proposed action that would mitigate water quality and wetlands impacts of the PolyMet mine, processing and waste disposal project on the Hundred Mile Swamp and other wetlands and aquatic resources in the Partridge River and Embarrass River watersheds.



### **Recommendations - Alternatives**

- The SDEIS must be revised to evaluate the Underground Mining project alternative based on the full scope of mineral resources at the site and the reasonable costs of both Underground Mining and the proposed action, including long-term mitigation costs.
- The SDEIS must be revised to evaluate the West Pit Backfill mitigation alternative, explaining any environmental concerns posed by in-pit disposal of waste rock.
- The SDEIS must be revised to evaluate the Mine Site Reverse Osmosis in Year One alternative, including the following components:
  1. Require on-site treatment of mine site stormwater and process water with reverse osmosis to meet surface water quality standards and prevent degradation of water quality starting in year one.
  2. Employ hydrological testing to assess appropriate quantities and locations for water release to support wetlands and headwaters streams in the Partridge River watershed.
  3. Release water treated by mine site reverse osmosis through pipe and/or spigot systems to mitigate the impacts of hydrological changes and mine dewatering on high value aquatic resources in the Hundred Mile Swamp and Partridge River Headwaters.
  4. Treat East Pit water with mine site reverse osmosis starting when reclamation begins, to limit acidity and metals seepage from the East Pit to aquatic ecosystems.
- The SDEIS must be revised to evaluate alternatives for the management of reject concentrate, including but not limited to evaporation or disposing of reject concentrate off site.
- The SDEIS must be revised to evaluate alternatives for the Category 1 waste rock pile that seal faults and fractures, construct the pile over a compacted subgrade, and place liner and leak detection systems under the waste rock pile.
- The SDEIS must be revised to evaluate an alternative for the Overburden Storage Laydown Area that seals any faults and fractures, constructs the pile over a compacted subgrade, and places liner and leak detection systems under the OSLA
- The SDEIS must be revised to evaluate alternatives that place PolyMet tailings in a new tailings facility excavated to bedrock and constructed on a compacted subgrade above liners and a leak detection system.
- The SDEIS must be revised to evaluate additional alternatives that reduce seepage from tailings, including post-closure dewatering and dry tailings disposal.
- The SDEIS must be revised to evaluate alternative locations for HRF, excluding sites

located above an existing landfill, compressed peat, wetlands, or bedrock faults and fractures.

- The SDEIS must be revised to evaluate an alternative where HRF wastes are managed and monitored as hazardous wastes, including active dewatering and stabilization at closure.
- The SDEIS must be revised to evaluate the alternative of disposing of hydrometallurgical wastes and sludge off-site in a facility designed and maintained to manage this material.
- The SDEIS must be revised to evaluate an alternative using new rail cars with sealed compartments to transport ore and fines.

## **XII. CUMULATIVE IMPACTS**

### **Introduction**

Cumulative impacts result from the incremental impact of the proposed action when added to other past, present and reasonably foreseeable future actions, regardless of what agency undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. 40 C.F.R. §1508.8. EPA guidance on cumulative impacts analysis states that review should determine “whether the NEPA analysis has used geographic and time boundaries large enough to include all potentially significant effects on the resources of concern.” The NEPA document must delineate appropriate geographic and ecological boundaries and the time period of the project’s effects, and “Spatial and temporal boundaries should not be overly restricted in cumulative impact analysis.”<sup>89</sup>

Some of the deficiencies in the PolyMet SDEIS cumulative impacts analysis magnify problems in the underlying analysis of the project’s impacts on water quality. As discussed in Section I, one of the consequences of errors and omissions in modeling sulfate and mercury and failing to model methylmercury was that the SDEIS denied that the cumulative effects assessment area (CEAA) for the project extends to the St. Louis River. Based on these comments and the expert opinion of Dr. Brian Branfireun, this error in the scope of analysis must be rectified. Cumulative water quality impacts to the St. Louis River, including but not limited to mercury, methylmercury and sulfates must be analyzed. This deficiency alone is significant enough to require that a revised SDEIS be produced and made available for public comment.

Comments in this section highlight where information in the SDEIS has identified potentially significant cumulative impacts, such as those on aquatic life and the Canada lynx, as well as where analysis is incomplete or inadequate. Overall, inadequacies in the underlying water quality analysis prevent an accurate cumulative assessment of water quality impacts, including impacts of sulfates on wild rice, of methylmercury contamination of fish and of the PolyMet project on environmental justice and tribal resources. WaterLegacy believes that all federal agencies have a fiduciary obligation to protect these resources.

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<sup>89</sup> EPA, Consideration Of Cumulative Impacts In EPA Review of NEPA Documents U.S. Environmental Protection Agency, Office of Federal Activities (2252A) EPA 315-R-99-002/May 1999, p. 2, <http://www.epa.gov/compliance/resources/policies/nepa/cumulative.pdf>

WaterLegacy also believes that the scope of projects considered in the SDEIS cumulative impacts analysis is inappropriately narrow. The SDEIS fails to consider impacts from other reasonably foreseeable mine projects. Most important, as reflected in PolyMet's technical reports and commissioned reports for investors, it is reasonably foreseeable that, if permitted, PolyMet's mine and processing facilities would expand. The PolyMet SDEIS must analyze the potential impacts of expanded mining and processing on the PolyMet site, even if only to state that such expansion could not be accommodated without substantial and unacceptable impacts on the environment.

**1. The PolyMet proposed action would have significant cumulative impacts on aquatic life and the lynx, a federally-listed species.**

The SDEIS denies that the PolyMet project would "cause or increase any short- or long-term exceedances of surface water chronic standards in the Partridge River, Colby Lake, or the Embarrass River, even under low-flow conditions during operations and closure." (SDEIS, p. 6-61). This conclusion is erroneous. Even with the unsubstantiated assumptions that minimize water pollution, as explained in Section II, modeled cobalt, aluminum and lead in surficial flowpaths would exceed chronic standards when they are discharged to the Partridge River.

Apart from the violation of numeric standards, the SDEIS reflects the potential for cumulative impacts on aquatic life, especially in impaired waters. These adverse cumulative effects would result from the degradation of water quality, the presence of ionic stressors, changes in hydrology, and the shift of the hydrologic regime in the Partridge River and Embarrass River from a natural ecosystem to a mechanical system, as a result of the PolyMet project and past, present and future mining activities. These cumulative impacts are summarized in Section VII of these comments.

The PolyMet project would have a direct impact on the Canada lynx, a federally-listed threatened species protected under the Endangered Species Act (ESA). (SDEIS, p. 4-201). Lynx sign has been observed at the mine site and at least 20 different individual lynx sightings have occurred within 18 miles of the project area, including several radio-collared and reproductive individuals. (SDEIS, p. 4-202) In 2009, it was estimated that there were likely fewer than 200 lynx in Minnesota. (SDEIS 5-364)

The PolyMet project would disturb 1,454 acres of lynx habitat at the mine site, making

them unsuitable for lynx. (SDEIS 5-365). The project would result in “direct decrease and fragmentation of habitat, including designated critical habitat” and the increased, but low, potential for incidental take resulting from vehicular collisions due to project-related traffic. (SDEIS, pp. ES-39, 5-367).

Cumulative impacts of the PolyMet and other mining projects on lynx are even more significant. The PolyMet project, along with other past, present and reasonably foreseeable mining activities, would result in an almost complete disruption of historic wildlife movement from the northwestern to the southeastern sections of the Arrowhead region. As explained in the MDNR’s 2006 report, Cumulative Effects Analysis on Wildlife Habitat and Travel Corridors in the Mesabi Iron Range and Arrowhead Regions of Minnesota,

Historically, prior to the cumulative actions which led to the existing mine features, wildlife travel was unrestricted from northwestern to southeastern sections of the Arrowhead across the Iron Range. Currently travel is restricted because of the extensive change to the landscape, including large mine pits, rock stockpiles, mining infrastructure, regional development associated with the Mesabi Iron Range, and highways. (SDEIS reference Emmons and Oliver 2006, p. 2).

From the wide expanse of landscape allowing wildlife travel across the Mesabi Iron Range, Emmons and Oliver identified only 13 remaining “corridors” ranging from less than 0.1 miles to over 3.2 miles wide. (SDEIS, p. 6-56). The PolyMet project would adversely impact 2 of these 13 corridors, one at the mine site and one at the plant site. (SDEIS, pp. 6-56 to 6-57).

PolyMet has redefined the remaining portions of land allowing wildlife travel across the Mesabi Range as 18, rather than 13 corridors. In its consultants’ analysis, the PolyMet project would impact corridor #17 by reducing habitat and introducing noise and industrial operations, and would impact corridor #18 with “direct loss and fragmentation.” (SDEIS, Table 6.2-16, pp. 6-57 to 6-58). More troubling, looking at the past, present and reasonably foreseeable impacts of other transportation and mining activities, every one of the 18 corridors for lynx and other wildlife have some adverse effects, ranging from complete loss, habitat isolation, fragmentation, increased traffic or other activities that would make the corridor less likely to be used by wildlife. (SDEIS, pp. 6-57 to 6-58). The SDEIS summarizes:

Wildlife could be affected by the NorthMet Project Proposed Action and other actions through a cumulative disruption of their travel corridors. These actions could pose additional barriers to wildlife movement by increasing the number of isolated patches of suitable habitat, increasing mortality during transit, and physically blocking travel. This

may lead to increased population and genetic isolation and decreased meta-population dynamics, which in turn could lead to decreases in overall population stability and persistence. (SDEIS, p. 6-56)

Even though impacts on wildlife of the PolyMet project, if considered alone, may not reduce lynx population or sustainability, the cumulative impacts of the PolyMet action and other mines and roads across and near the Iron Range would result in a significant adverse effect on population stability and persistence of the lynx. The SDEIS should clearly identify cumulative impacts of the PolyMet project on the Canada lynx as a significant adverse effect on a federally-listed species under the ESA.

**2. The SDEIS assessment of cumulative impacts on wetlands is inadequate.**

The PolyMet SDEIS' analysis of wetlands impacts fails to consider wetland functions. It is purely a numerical calculation based on the assessment that, since the time of settlement, the loss of wetland acreage from every past, present and reasonably foreseeable land use other than the PolyMet project totals 2,557 acres in the Partridge River watershed and 402 acres in the Embarrass River watershed. (SDEIS, Tables 6.2-9, 6.2-10, 6.2-11, 6.2-12, pp. 6-38 to 6-41). If these numbers are accurate, it is clear that the PolyMet proposed action, which would directly destroy 913 acres of wetlands and potentially impact a total of 8,264 acres of wetlands, dwarfs all other past, present and reasonably foreseeable wetlands impacts in the Partridge River and Embarrass River watersheds.

In addition to a numeric assessment of cumulative impacts of the PolyMet project on wetlands, the Federal Mitigation Rule for losses to aquatic resources requires analysis of "the nature and degree of effect that the proposed discharge will have, both individually and cumulatively, on the structure and function of the aquatic ecosystem and organisms." This factual analysis must consider "loss of environmental values," not just loss of acreage. 40 C.F. R. 230.11(e). The SDEIS provides no cumulative analysis of impacts on wetlands functions or values. In addition to curing deficiencies discussed in Section V of these comments, the SDEIS must be revised to include a cumulative analysis of the effects of PolyMet proposed action on wetlands values.

**3. The SDEIS' assessments of cumulative impacts on mercury, methylmercury, sulfates and other water quality contaminants is inadequate.**

The PolyMet SDEIS' assessment of mercury and methylmercury impacts is inadequate. These deficiencies are detailed in Section I of these comments and the expert opinion of Dr. Brian Branfireun. Specific claims that mercury and sulfate loading in the Partridge River and Embarrass River would "offset" each other are indefensible. Only the failure to model or consider methylation resulting from hydrologic changes and inputs to ombrotrophic bogs and other wetlands allows the SDEIS to deny impacts of mercury bioaccumulation not only in the project area, but in the St. Louis River. (See SDEIS, p. 6-34) The cumulative effects assessment area (CEAA) for mercury and methylmercury must include the St. Louis River. Both project area and cumulative analyses of mercury and methylmercury in the SDEIS must be redone.

Fish in the St. Louis River are already significantly impacted by anthropogenic activities within the watershed. The St. Louis River is listed as impaired for fish consumption uses as a result of elevated mercury in fish tissue. MPCA's data indicate that fish in the lower reaches of the St. Louis River have significantly higher mercury concentrations than other fish in the region.<sup>90</sup> Mean mercury in walleye in the lower reaches of the St. Louis River is also 85 percent higher than in the River's upper reaches.<sup>91</sup>

Analysis of the cumulative impacts of the PolyMet requires evaluation of all of the past, present and reasonably foreseeable impacts on mercury and mercury methylation in the St. Louis River, including all direct discharges of mercury throughout the watershed, all mining and other industrial projects that contribute sulfates to the watershed, and all ditching activities that affect wetlands in the watershed. A mercury total maximum daily load (TMDL) study is required to determine the factors contributing to these findings of mercury in fish.

The SDEIS failed to identify potential cumulative effects of the PolyMet project on shallow and bedrock groundwater. (SDEIS, p. 6-16). As discussed above in Sections II and III of these comments and in the technical memorandum of geologist J.D. Lehr, failure to identify cumulative effects on groundwater results from unsubstantiated and unreasonable assumptions regarding faults, fractures and other secondary porosity features in mine site and plant site bedrock and regarding the lack of hydrologic connection between shallow and bedrock

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<sup>90</sup> B. Monson, MPCA, St. Louis River Fish Mercury, Feb. 10, 2012, p. 4, attached as Exhibit 50.

<sup>91</sup> *Id.*, pp. 2, 4

groundwater. Once these deficits in evaluating project area geology and hydrogeology are rectified, a cumulative assessment must be provided to include past, present and reasonably foreseeable impacts of other mine projects near the project area, particularly Cliffs Erie and Northshore mining activities.

The SDEIS' denial of the cumulative impacts of the proposed PolyMet sulfate mine on sulfate discharge reflects an elaborate set of unsubstantiated and unreasonable assumptions regarding solute concentrations, contaminant seepage, collection and propagation, described in Sections II and III of these comments. The SDEIS' denial also rests on an inappropriate comparison of the proposed action to continuation of conditions at the tailings basin that are currently in violation of the Clean Water Act and are required to be remediated under a Consent Decree, as discussed in Section I of these comments. The SDEIS needs to be revised to disclose levels of sulfates in all potential contamination sources as well as to model releases and transport based on reasonable and verified assumptions.

Concern that a copper-nickel sulfate mine will increase discharge of sulfates through groundwater to surface water is substantiated by the overwhelming experience with sulfide mines across the country.<sup>92</sup> Even the incomplete data available regarding PolyMet project sulfate suggests that it is likely, once a more rigorous assessment is done, that the proposed action will increase sulfate loading in both the Partridge and Embarrass Rivers:

- Reject Concentrate – West Equalization Basin – up to 12,300 mg/L sulfate. (Water Modeling Data Package – Mine Site, Mar. 8, 2013, SDEIS reference PolyMet 2013i, Large Table 22, pdf p. 430).
- Hydrometallurgical Residue Facility – up to 7,347 mg/L sulfate. (Waste Characterization Data Package PolyMet 2013l, p. 41, 42).
- East Pit - East Pit up to 3,800 mg/L sulfate. (Track Changes PSDEIS, *supra*, Exhibit 26, p. 5-113)
- SDEIS Model Mine Site - West Pit flowpath 41.9 mg/L sulfate (SDEIS, Table 5.2.2-22, p. 5-109).
- SDEIS Model Plant Site - North flowpath, 158 mg/L sulfate; Northwest flowpath, 204 mg/L sulfate; West flowpath, 193 mg/L sulfates (SDEIS, Table 5.2.2-38, p. 5-169).

All of these sulfate concentrations are significantly above the 10 mg/L sulfate standard that would apply to wild rice waters downstream of the project area. Minn. R. 7050.0224.

Loading of sulfates from the tailings basin to the Embarrass River watershed and through

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<sup>92</sup> See e.g. Kuipers et al., Comparison of Predicted and Actual Water Quality at Hardrock Mines (2006), <http://www.earthworksaction.org/files/publications/ComparisonsReportFinal.pdf>



Second Creek to the Partridge River watershed must be compared to a no action scenario that includes both natural attenuation and permit compliance at the LTVSMC tailings basin, as explained in Section I. It is inappropriate for the SDEIS to assume compliance of the PolyMet project “with all applicable federal, state, and local regulations and permit requirements,” (SDEIS, p. 6-2) while modeling the opposite with respect to Cliffs Erie’s compliance at the existing tailings basin.

Increased sulfate loading would have the potential to impact wild rice waters immediately downstream of the PolyMet project, including at least the following waters: Embarrass Lake, Wynne Lake (Embarrass River inlet), the segment of the Embarrass River from Sabin Lake to the Highway 135 bridge, the portion of Upper Partridge River from just upstream of the railroad bridge near Allen Junction to the inlet to Colby Lake, the portion of Lower Partridge River from the outlet of Colby Lake to its confluence with the St. Louis River, and the portion of Second Creek from First Creek to the confluence with Partridge River. (SDEIS, p. 4-33).

Cumulative sulfate loading would also affect wild rice waters further downstream in the St. Louis River. A revised SDEIS must consider the cumulative impacts of sulfate loading to the St. Louis River, including impacts to wild rice and mercury methylation along the full length of the River through the estuary.

The SDEIS also contains insufficient data and analysis to support its conclusion (e.g. SDEIS, p. 6-18, 6-29) that ions and salts measured as specific conductance, and metals leached from mine pits, waste rock, tailings, residue and sludges will not have the potential for cumulative effects on water quality in the St. Louis River. Tribal Cooperating Agencies have analyzed the distance in river miles to attenuate elevated specific conductance from mining facilities in the St. Louis River watershed. (SDEIS, Appx. C, pdf pp. 2054-2056). A revised SDEIS must disclose specific conductance concentrations and more accurately model metals discharged from leachates and determine the degree to which all contaminants would propagate downstream to the St. Louis River, resulting in a cumulative adverse impact on water quality and aquatic life.

**4. The SDEIS’ analysis of the cumulative impacts of the PolyMet project on environmental justice is inadequate.**

The PolyMet SDEIS provides little analysis of the cumulative impacts of the PolyMet project on environmental justice. This is an important concern for WaterLegacy and members we

serve who are low-income persons reliant on fishing, hunting and gathering wild rice for subsistence. A federal executive order and federal policy guidance requires that this deficiency in the SDEIS be remedied

Executive Order 12898 (February 1994) directs each Federal Agency to “make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations,” including tribal populations.” In light of this Executive Order, the Council on Environmental Quality (CEQ) has issued guidance for NEPA analyses to determine environmental justice impacts, including an instruction to “consider relevant public health and industry data concerning the potential for multiple exposures or cumulative exposure to human health or environmental hazards in the affected population, as well as historical patterns of exposure to environmental hazards.”<sup>93</sup>

EPA has interpreted Executive Order 12898 to require fair treatment under environmental laws so that “no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.”<sup>94</sup> The MPCA has adopted EPA’s definitions of environmental justice and fair treatment to protect low-income and tribal population under Minnesota environmental laws.<sup>95</sup>

The SDEIS’ response to this directive is meager. The SDEIS suggests that an increase in housing prices could have minor effects on low-income persons (SDEIS, p. 5-493), that the land exchange may affect tribal access to exercise usufructuary rights (SDEIS, p. 5-680), and that tribal populations affected by changes in subsistence uses may have increased living costs. (SDEIS, p. 7-8). A single sentence addresses a critical issue for environmental justice: “Cumulative increases in mercury concentrations and the resultant increased mercury concentrations in fish tissue could constitute an EJ impact for Band members and other subsistence consumers of fish. (SDEIS, p. 6-101). This impact is discounted with the further statement that environmental effects from increased bioaccumulation of mercury “are within environmental standards yet above current baseline conditions.” (SDEIS, p. 6-95).

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<sup>93</sup> CEQ, Environmental Justice: Guidance Under the National Environmental Policy Act (Dec. 1997), p. 8 [http://www.epa.gov/environmentaljustice/resources/policy/ej\\_guidance\\_nepa\\_ceq1297.pdf](http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf)

<sup>94</sup> USEPA, Environmental Justice, Basic Information, <http://www.epa.gov/environmentaljustice/basics/index.html>

<sup>95</sup> MPCA, Environmental Justice Practices and Principles, <http://www.pca.state.mn.us/index.php/view-document.html?gid=18917>

First, many waters that would be impacted by increased bioaccumulation of mercury, including the St. Louis River as well as waters in the Partridge River and Embarrass River watersheds are formally listed impaired for mercury consumption under Section 303(d) of the Clean Water Act. For such waters lacking a TMDL, *any* increase in mercury bioaccumulation would violate environmental standards. In addition, for waters that may be high in mercury that are not specifically listed, like the Embarrass River, whether increased bioaccumulation is within or outside environmental standards is a question of fact dependent on testing fish tissue or water column mercury. Increased bioaccumulation of mercury is contrary to law and contrary to environmental justice.

The SDEIS environmental justice analysis is inadequate. A revised SDEIS must evaluate cumulative harm to low-income, minority and tribal subsistence consumers resulting from reduced productivity of waters for fish and wild rice downstream of the PolyMet project. In addition, the SDEIS must evaluate disproportionate multiple and cumulative exposures to chemicals that pose a hazard to human health, such as arsenic and methylmercury, as a result of consuming wild rice and fish.

**5. The SDEIS analysis of cumulative impacts on tribal rights and resources is incomplete and insufficient.**

The PolyMet SDEIS provides an incomplete analysis of cumulative effects of the project on tribal rights and resources. The SDEIS provides a narrative description of cultural and historic resources and concludes, “The NorthMet Project Proposed Action would result in both direct and indirect effects on historic properties and culturally important resources.” (SDEIS, p. 6-91) The SDEIS then explains that from the signing of treaties in the 19<sup>th</sup> century to the expansion of mining operations today, “mining activities in the Mesabi Iron Range likely have had substantial cumulative effect on historic properties of traditional religious and cultural significance to the Ojibwe Bands.” (SDEIS, p. 6-93)

Going beyond the analysis of historic properties, however, the SDEIS has significant gaps. The SDEIS discusses cumulative effects on usufructuary rights, but focuses that analysis only on the PolyMet project area, (SDEIS, p. 6-90) rather than considering cumulative impacts of mining activities throughout the 1854 Ceded Territories. The SDEIS states that cumulative effects analysis should focus on plant and animal species that are traditionally or culturally

important to the Bands (SDEIS, p. 6-95), but does not analyze impacts on wild rice, fish or moose. Without considering any impacts to these key resources, the SDEIS concludes that neither the PolyMet project nor the cumulative impacts of other past, present and potential future project are likely to reduce the “availability of 1854 Treaty resources that are typically part of subsistence activities in the 1854 Ceded Territory.” (SDEIS, p. 6-95) This conclusion is unsubstantiated.

WaterLegacy believes that the SDEIS must provide a more rigorous analysis of cumulative impacts of the PolyMet project on tribal resources. In addition, any consideration of a land exchange or permits for the PolyMet project as well as any NEPA review of the adequacy of the SDEIS must reflect federal fiduciary obligations to protect these resources. Our members view protection of tribal resources as a concern for all citizens and taxpayers represented by the government of the United States in signing treaties with Indian tribes.

As the Army Corps clarified in a recent analysis of treaty rights and subsistence fishing in the Great Lakes, treaties like the 1854 Treaty in the project area do not grant rights from the United States Government to tribes. Rights to traditional resources, including fisheries, wildlife, and culturally important plants “are rights that the tribes had traditionally exercised and that they reserved to themselves in treaties. These treaties are binding, unless specifically abrogated by Congress.”<sup>96</sup> Army Corps’ Tribal Policy Principle are clear: “The U.S. Army Corps of Engineers will work to meet trust obligations, protect trust resources, and obtain Tribal views of trust and treaty responsibilities.”<sup>97</sup>

The Forest Service Manual commits the Forest Service to administering “lands subject to off-reservation treaty rights in a manner that protects Tribes’ rights and interests in the resources reserved under treaty.” F.S.M. §1563.01(d). The EPA has recently affirmed that “the United States has a responsibility to honor the rights and resources protected by the treaties” and that EPA should fully consider the importance of protecting and restoring treaty-covered resources within their program responsibilities.”<sup>98</sup>

Federal responsibilities to protect treaty-covered resources require a comprehensive analysis of cumulative impacts of the PolyMet project and past, present and reasonably

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<sup>96</sup> USACE, Treaty Rights and Subsistence Fishing in the U.S. Waters of the Great Lakes, Upper Mississippi River, and Ohio River Basins (June 2012) [http://glmr.is.anl.gov/documents/docs/Subsistence\\_Fishing\\_Report.pdf](http://glmr.is.anl.gov/documents/docs/Subsistence_Fishing_Report.pdf)

<sup>97</sup> USACE, Tribal Policy Principles (2010), <http://www.usace.army.mil/Missions/CivilWorks/TribalNations.aspx>

<sup>98</sup> R. Perciasepe, EPA, Memo to Assistant Administrators re Treaty rights, Jan. 8, 2013, attached as Exhibit 51.

foreseeable future activities on fish, wild rice and game, particularly moose. Federal obligations to protect trust resources in the 1854 Ceded Territories, along with the evidence of significant adverse environmental impacts on water quality, wetlands, mercury contamination of fish, aquatic life and human health described in these comments, also supports denial of a Section 404 wetlands permit and land exchange for the PolyMet project.

Fish, wild rice and game species, particularly the moose, are vital tribal resources in the PolyMet project area. The Army Corps summarized the importance of subsistence fishing to tribes in the Great Lakes basin: “subsistence harvesting is a core value for these bands, and the right to fish and hunt for subsistence is cherished by all, even those who are not presently engaged in the practice. It is part of the tribes’ cultural identity and an indication of their status as sovereign entities.”<sup>99</sup> The report continued, “The value of the fisheries goes beyond a monetary value; it is a cultural value that defines the existence of the Great Lakes tribes.”<sup>100</sup> Should cumulative impacts of the PolyMet project increase mercury bioaccumulation in fisheries extending downstream in the St. Louis River, the extent of harm would be significant.

The SDEIS recognizes, “The Ojibwe people have a special cultural and spiritual tie to natural wild rice.” The SDEIS relates the story that westward migration of the Ojibwe people was based on a tribal prophecy to travel until the people found “the food that grows on water.” That food was wild rice, known as manoomin, the SDEIS continues, and “it is revered to this day by the Ojibwe as a special gift from the Creator. Natural wild rice remains a mainstay of traditional foods for the Ojibwe community and offers significant nutritional value.” (SDEIS, p. 4-30). Once the SDEIS provides a more realistic assessment of sulfate loading from the PolyMet project, a cumulative assessment of sulfate impacts on wild rice from the proposed action and from other mining activities must be completed.

The SDEIS also recognizes, “Game species such as deer, bear, and moose are found in and near the NorthMet Project area, and are of importance to the Bands.” (SDEIS, pp. 4-210, 5-635). In August 2013, moose were listed as a Minnesota species of special concern.<sup>101</sup> The overall moose population in Minnesota declined approximately 35 percent from 2012 to 2013. (SDEIS, p. 5-210).

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<sup>99</sup> USACE, Treaty Rights and Subsistence Fishing, *supra*, p. 2.

<sup>100</sup> *Id.*, p. 68.

<sup>101</sup> MDNR, Amendments to Minnesota Rules, Chapter 6134 (Endangered, Threatened and Special Concern Species)(Aug. 19, 2013).

The proposed action would affect moose individuals in the vicinity of the PolyMet project through habitat loss and fragmentation of 2,775 acres of three key types of moose habitat (mature forest, grassland/brushland, and aquatic environments). (SDEIS, p. 5-377). The SDEIS promised that effects of moose and other wildlife species important to the Bands would be discussed “on a connected ecosystems level,” in the cultural resources section 5.2.9, (*Id.*) but no such discussion was provided. The cumulative impacts section of the SDEIS, similarly, doesn’t even mention moose. Tribal Cooperating Agencies have provided a detailed discussion of both the cultural importance of moose and the species’ vulnerability to additional stress, concluding, “A cumulative impacts analysis must be done for this species of concern that is of particular cultural importance to the Bands.” (SDEIS, Appx. C, pdf pp. 2083-2086).

Cumulative impacts of the proposed PolyMet land exchange, open-pit mine, waste storage and processing facilities on water quality, wetlands destruction and habitat loss, along with the effects of past, present and reasonably foreseeable mining activities in nearby areas of the 1854 Ceded Territories would damage more than individual resources. As the Army Corps' report on subsistence fishing explained, “Tribal traditions generally include a holistic view of the natural world in which natural features and phenomena are often imbued with a life force and in which the various species and features of the natural world are bound together in a web. Damaging one part damages the whole.”<sup>102</sup>

**6. The SDEIS must analyze additional reasonably foreseeable cumulative mining actions, particularly planned expansions of the PolyMet project itself.**

Delineating which future actions should be considered in a cumulative impacts assessment depends on whether the action is reasonably foreseeable. The EPA has stated, “reasonably foreseeable future actions need to be considered even if they are not specific proposals.” Where the future actions are private in nature, planning documents should be analyzed if they are available, but “In all of these cases, the best information should be used to develop scenarios that predict which future actions might reasonably be expected as a result of the proposal.”<sup>103</sup>

The SDEIS states that it has defined “reasonably foreseeable actions” to include actions

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<sup>102</sup> USACE, Treaty Rights and Subsistence Fishing, *supra*, p. 2.

<sup>103</sup> EPA, Consideration Of Cumulative Impacts in NEPA Review, *supra*, p. 13

that are in approved planning documents and have approved funding, are permitted, or have a currently active federal or state permit or site plan under review. (SDEIS, p. 6-2). The criteria used in the SDEIS are not consistently applied and they are both under and over-inclusive. They do not provide a reasonable basis to determine which future actions should be considered in cumulative impacts analysis.

The SDEIS excludes as “speculative” the Cliff Erie UTAC expansion, even though this expansion is already permitted under Section 404 permit 81-172-13, is now undergoing a further permit review process,<sup>104</sup> and the highway relocation for its expansion is already underway in the DEIS process. (SDEIS, p. 6-14). The UTAC would impact another 1,300 acres of wetlands. The SDEIS, however, considers the cumulative impacts of a Mesabi Nugget project despite the fact that it is “currently on indefinite hold by the applicant.” (SDEIS, p. 6-11). The positive net hydrologic effect of this project offsets cumulative flow reduction effects to the Partridge River from the PolyMet project and other existing and foreseeable projects. (SDEIS, p. 6-22)

The SDEIS declines to include the Twin Metals copper-nickel mining project in its cumulative impacts analysis, despite the strong likelihood that this project will proceed if it is environmentally permissible. The recently released Twin Metals prefeasibility study locates the tailings storage facility and buffer just west of the Northshore Peter Mitchell Pit, increasing the likelihood that impacts from Twin Metals would cumulatively affect water quality within the Embarrass River watershed.<sup>105</sup>

EPA guidance suggests the following considerations be used to help identify which actions may relate to a project under review:

- 1) the proximity of the projects to each other either geographically or temporally;
- 2) the probability of actions affecting the same environmental system, especially systems that are susceptible to development pressures;
- 3) the likelihood that the project will lead to a wide range of effects or lead to a number of associated projects;
- 4) whether the effects of other projects are similar to those of the project under review.
- 5) the likelihood that the project will occur -- final approval is the best indicator but long range planning of government agencies and private organizations and trends information should also be used.<sup>106</sup>

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<sup>104</sup> USACE, Public Notice, Modification of Department of the Army Permit 81-172-13 (Oct. 23, 2012) Exhibit 52.

<sup>105</sup> Twin Metals, Mid-Prefeasibility Study PFS Update (January 2014). attached as Exhibit 53, Slide 18.

<sup>106</sup> EPA, Consideration Of Cumulative Impacts in NEPA Review, *supra*, p. 11

By the criteria in EPA guidance, the cumulative impacts of the Twin Metals project should be assessed in the PolyMet SDEIS.

Yet more critical, a revised SDEIS must consider the cumulative impacts of reasonably foreseeable expansions of mining at the PolyMet mine site and processing at the PolyMet plant site. A proponent of mineral development may not choose an arbitrary limit on what is economically recoverable, but must base an EIS on the full range of likely production. In *Native Vill. of Point Hope v. Jewell*, 740 F.3d 489 (9<sup>th</sup> Cir, 2014), the Court remanded a NEPA case to the Department of the Interior, finding that the agency's limit of recoverable oil by estimating production of 1 billion barrels from only the first offshore oil field was unreasonable. The Court noted that the current petroleum assessment indicated a mean recoverable resource of 12 billion barrels. *Id.*, at 501. A later project environmental analysis was deemed an "inadequate substitute for an estimate of total production" during the initial EIS cumulative effects analysis. *Id.*, at 504.

Where there is no reliable study or projection of the potential for future mining, an EIS may decline to consider cumulative impacts of that future mining. *Jones v. Nat'l Marine Fisheries Serv.*, 741 F. 3d 989 (9<sup>th</sup> Cir. 2013). However, an agency decision to consider only a limited time frame for cumulative impacts of foreseeable coal bed methane projects was ruled arbitrary and capricious in *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067 (9<sup>th</sup> Cir. 2005). The Court explained, it is "not appropriate to defer consideration of cumulative impacts to a future date when meaningful consideration can be given now." *Id.*, at 1078. "NEPA requires that an EIS engage in reasonable forecasting. Because speculation is . . . implicit in NEPA, we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry." *Id.*, at 1079. (internal quotation marks and citation omitted).

At the time when PolyMet first came to the agencies, they may have had insufficient reliable information to project the potential for future mining and processing at the PolyMet sites. That is no longer the case. The most recent 43-101 technical report filed by PolyMet on the Canadian stock exchange defines the deposit as 694 million short tons of indicated and measured resources and 230 million tons of inferred resources, or a total of 924 million tons of ore that meets PolyMet's accepted grade within their current lease holdings at NorthMet. (PolyMet 43-101 Report, *supra*, p. 14-38). This volume of resources is defined based on PolyMet's cutoff values for metal percentages contained in the rock and assumed market prices for finished metals.



Although the technical report identifies nearly a billion tons of resources, including 275 million tons of ore within the definitive feasibility study pit shell (PolyMet 43-101 Report, p. 25-3, the PolyMet SDEIS only considers the environmental impacts of mining 225 million tons of ore (SDEIS, p. ES-57). PolyMet's Technical Report also explicitly contemplates mining expansion, "A sustained higher metal price regime has the potential to allow expansion of the existing pit phases both laterally and to depth." (*Id.*, p. 15-3).

The November 2013 Edison Investment Report commissioned by PolyMet to provide information for investors<sup>107</sup> contains more explicit plans for mining and processing expansion. The Edison Report states that the NorthMet ore body (definitive feasibility study pit shell) comprises 275 million tones of proven and provable reserves, but that measured and indicated mineral resources were 694 million tons. "We believe the size and scope of the ore body could support a much larger project, which would create meaningful additional value." (Edison Report, p. 5) The Report continues, "We believe there is a good chance PolyMet will be able to expand the size of its resource by 50-100% based on what we learned on a site visit." (*Id.*)

The Edison Report explains that the PolyMet processing plant had historically operated at 100,00 tons per day (t/d), and that an operating rate of at least 90,000 t/d should be attainable. (*Id.*, p. 3). The Edison Report states, "We believe the most likely follow-on project PolyMet will pursue is the expansion of mining and milling to 90,000 t/d, with the second most likely third-party ore processing of 50,000 t/d or 100,000 t/d." (*Id.*, p. 10) The Report notes that there are 11 mineral properties near PolyMet's mill and that "government permitting agencies may encourage the developers of other mining properties in the area to work out an arrangement with PolyMet to use its pre-existing mill and tailings pond" in order to "limit the footprint of mining and processing in the area." (*Id.*, p. 10)

The Edison Report values PolyMet stock based on the potential expansion of processing to 90,000 tons per day (*Id.*, p. 1), stating "We assume PolyMet would begin working on permitting the expansion to 90,000 t/d within six months of receiving its permits for Phase I, permitting would take two years and construction would take one year. On this basis, it could complete its expansion by May 2018." (*Id.*, p. 12)

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<sup>107</sup> Edison Investment Research, PolyMet Mining Corp. Report, Nov. 13, 2014, attached as Exhibit 54. See p. 16, "This report has been commissioned by PolyMet Mining Corp."

PolyMet's expansion of mining and processing is a planned second phase of development used in its commissioned report to enhance the value of its stock. It may not be assumed that mining or processing expansions would receive comprehensive environmental review. Minntac's continual incremental mining expansion has required no EIS. (SDEIS, p. 6-12). The expansion of PolyMet's mining, processing and tailings storage is a reasonably foreseeable action that must be considered in the PolyMet SDEIS. The cumulative impacts of this expansion on wetlands, water quality and water quantity within the Partridge River, Embarrass River and St. Louis River watersheds of the Lake Superior Basin cannot be deferred for a later day, outside the light of public scrutiny.

### **Recommendations – Cumulative Impacts**

- The SDEIS must be revised to state clearly that the cumulative impacts of the PolyMet project and other past, present and future mining projects would have a significant adverse impact on aquatic life.
- The SDEIS must be revised to state that the cumulative impacts of the PolyMet project and other past, present and future mining projects on wildlife corridors would have a significant adverse impact on the Canada lynx, a federally-listed species.
- The SDEIS must be revised to include a cumulative analysis of the effects of PolyMet proposed action on wetlands values.
- The SDEIS must be revised to analyze the cumulative effects of the PolyMet proposed action on groundwater in the project area, including impacts of Northshore and Cliffs Erie facilities.
- The SDEIS should not be finalized until the mercury TMDL study for the St. Louis River is completed.
- The SDEIS must be revised to analyze cumulative effects of the PolyMet proposed action on mercury and methylmercury in the project area and the St. Louis River.
- The SDEIS must be revised to analyze cumulative effects of the PolyMet proposed action on sulfates and wild rice in the project area and the St. Louis River.
- The SDEIS must be revised to analyze cumulative effects of PolyMet discharge of salts, ions and metals on St. Louis River aquatic life and water quality in the project area and the St. Louis River.

- The SDEIS must be revised to analyze cumulative effects of the PolyMet project on environmental justice, as a result of impacts to natural wild rice, fish abundance and mercury contamination of fish.
- The SDEIS must be revised to analyze cumulative effects of the PolyMet project on tribal trust resources, including fish, wild rice and moose in the project area and the 1854 Ceded Territories.
- The Section 404 permit must be denied due to federal obligations to protect trust resources from wetlands and habitat destruction and increased mercury bioaccumulation in fish.
- The land exchange must be denied due to federal obligations to protect trust resources of high biological diversity that serve as habitat for moose.
- The SDEIS must be revised to analyze cumulative effects of other mining projects based on a current assessment of which projects are reasonably foreseeable.
- The SDEIS must be revised to include planned expansions of mining, processing and tailings disposal at the PolyMet mine site, plant and tailings basin.

### **WaterLegacy Exhibits**

- Exhibit 1 Barr, Flow Augmentation Report (Barr 2013a), Figure 1.
- Exhibit 2 Daniel Engstrom Comments on PolyMet NorthMet DEIS (2010).
- Exhibit 3 Plant Site AERA, Mar. 25, 2013 (Barr 2013k), Large Figure 7.
- Exhibit 4 PolyMet, Facility Mercury Mass Balance Analysis (RS66) Mar. 2007, Attachment A.
- Exhibit 5 B. Johnson, MDNR, email to P. Maccabee, WaterLegacy re Probabilities Modeling DPA, Jan. 10, 2014.
- Exhibit 6 Map, Faulted Bedrock and Surface Topography, Vicinity of the PolyMet Project, compiled by geologist J.D. Lehr.
- Exhibit 7 Water Modeling Data Package – Mine Site, Mar. 8, 2013 (PolyMet 2013i) Large Figure 21.
- Exhibit 8 MPCA and Cliffs Erie, Complaint and Consent Decree, Mar. 25, 2010.
- Exhibit 9 Barr, Reverse Osmosis Pilot Test Report SD026 Active Treatment Evaluation Prepared for Cliffs Erie LLC and PolyMet Mining Inc. June 2013, report narrative.
- Exhibit 10 G. Kruse, MDNR, Memorandum, Partridge River Base Flow Analysis MDNR Gage #H03155002, Dec. 17, 2013.
- Exhibit 11 MDNR, Questions and answers about new river flow data for proposed PolyMet mining project, Jan. 28, 2014.
- Exhibit 12 B. Johnson, MDNR email to P. Maccabee, WaterLegacy re Upper Partridge River Baseflow, DPA request of Jan. 31, 2014.
- Exhibit 13 PolyMet, Rock and Overburden Management Plan (PolyMet 2012s), Figure 2-3.
- Exhibit 14 Track Changes PSDEIS, Draft Chapter 5.02.02 Water, Figure 5.2.2-18, East Pit Sulfate.
- Exhibit 15 E. Walts, EPA letter to USFS, MDNR, USACE, Aug. 7, 2013, Comments on PSDEIS.
- Exhibit 16 Track Changes PSDEIS, Draft Chapter 5.02.02 Water.
- Exhibit 17 Track Changes PSDEIS, Draft Chapter 5.02.02 Water, Figure 5.2.2-19, with WQS for cobalt.

- Exhibit 18 B. Johnson, MDNR email to P. Maccabee, WaterLegacy, DPA request re seepage collection field experience, Oct. 7, 2013 and Nov. 12, 2013.
- Exhibit 19 J. Thomas, MPCA letter to T. Moe, U.S. Steel Corp., re Minntac, Jan. 8, 2008.
- Exhibit 20 C. Bartovich, U.S. Steel Corp. letter to J. Bathke, USACE, July 9, 2013, Excerpts.
- Exhibit 21 Map, Selected Glacial Landforms, LTVSMC Tailings Basin Vicinity, prepared by geologist J.D. Lehr.
- Exhibit 22 Map, Historic USGS Quadrangle Map Vicinity of LTVSMC Tailings Basin 1949.
- Exhibit 23 Map, Original Surface Drainage and Current Topography, Vicinity of LTVSMC Tailings Basin, prepared by geologist J.D. Lehr.
- Exhibit 24 D. Lee email to P. Maccabee, WaterLegacy regarding ephemeral streams, Jan. 4, 2014.
- Exhibit 25 Cliffs Erie, *NPDES Permit #MN0042536 Hoyt Lakes Mine Area Supplemental Information & Request for Variance* Apr. 2012, p. 4; *Variance Addendum* Dec. 10, 2012, p. 20; Excerpts.
- Exhibit 26 PolyMet, Mine Site WWTF Treatment Facility Design Plan, Nov. 30, 2012.
- Exhibit 27 PolyMet, Hydrometallurgical Residue Characterization and Water Quality Model Draft Report RS33/RS65 (Feb. 2007)
- Exhibit 28 MDNR, Fish and Wildlife/Fisheries, Comments on the May 2013 PolyMet PSDEIS (June 7, 2013).
- Exhibit 29 B. Mathur, EPA to Col. J. L. Christensen, USACE, DEIS Comment, (Feb. 18, 2010).
- Exhibit 30 Map, Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance in the Vicinity of the PolyMet Mine Site, prepared by M. Tyler.
- Exhibit 31 Paul H. Glaser Comments on PolyMet NorthMet DEIS (2010).
- Exhibit 32 A. Walts, EPA letter to USFS, MDNR, and USACE re PolyMet PSDEIS, Aug. 7, 2013.
- Exhibit 33 J. Willging, USACE letter to P. Maccabee, WaterLegacy, re wetlands FOIA, Dec. 11, 2013.
- Exhibit 34 B. Mathur, EPA letter to Col. M.P. Crall, USACE re Ohio Valley Coal Co., Jan. 4, 2010.

- Exhibit 35 S. Hedman, EPA letter to Col. D. Koprowsi, USACE re Unamin Corp. Aug. 20, 2013.
- Exhibit 36 S. Hedman, EPA letter to Col. D. Koprowsi, USACE re Hawkes Peat, Aug. 9, 2013.
- Exhibit 37 USFS, PolyMet Land Exchange Feasibility Analysis, Wetland, Lake Shoreline, Stream Frontage, and Floodplain Assessment (2009), Map of Watershed Drainage of Federal & Non-Federal Lands.
- Exhibit 38 J. R. Pomponio, EPA letter to Col. D.R. Hurst, USACE re Highland Mining Company, Reylas Surface Mine (Mar. 23, 2009).
- Exhibit 39 P. Cook, EPA, Can Amphibole Fibers/Particles Contribute to Mesothelioma and Other Asbestos Related Diseases in Northeast Minnesota? April 2013 Presentation.
- Exhibit 40 J. Finnegan, J. Mandel, U of M, Annual Report to the Legislature Minnesota Taconite Workers Health Study, Apr. 19, 2013.
- Exhibit 41 U of M, Minnesota Taconite Workers Health Study, Minnesota Taconite Workers Lung Health Partnership, April 12, 2013 Mountain Iron, MN Presentation.
- Exhibit 42 EPA, An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska, Executive Summary, EPA 910-R-14-001ES, Jan. 2014.
- Exhibit 43 M. Watkins, Grand Portage Band of the Lake Superior Chippewa, testimony to Minnesota House Environment, Natural Resources and Agriculture Finance Committee, Feb. 11, 2014.
- Exhibit 44 L. Yoshii, EPA, letter to R. Wenker, Bureau of Land Management, re Emigrant Project Revised Draft EIS, Elko County, Nevada, Mar. 23, 2009.
- Exhibit 45 T. Hyde, EPA, Letter to C. O'Keefe, Mich. Dept. of Environmental Quality re Marquette County Road Commission, Apr. 23, 2012.
- Exhibit 46 M. Sedlacek, EPA Letter to Co-Lead Agencies re underground mining, May. 15, 2012.
- Exhibit 47 K. Westlake, EPA Letter to Co-Lead Agencies re underground mining, May. 31, 2012.
- Exhibit 48 PolyMet, Presentation to InvestMNt Conference, Minneapolis, May 14, 2012, NorthMet Ore Body slide.

- Exhibit 49      Foth, Evaluation of Backfilling the NorthMet West Pit, prepared for PolyMet Mining, Dec. 2012.
- Exhibit 50      B. Monson, MPCA, St. Louis River Fish Mercury, Feb. 10. 2012.
- Exhibit 51      R. Perciasepe, EPA, Memo to Assistant Administrators re Treaty rights, Jan. 8, 2013.
- Exhibit 52      USACE, Public Notice, Modification of Department of the Army Permit 81-172-13, Oct. 23, 2012.
- Exhibit 53      Twin Metals, Mid-Prefeasibility Study PFS Update, January 2014.
- Exhibit 54      Edison Investment Research, PolyMet Mining Corp. Report, Nov. 13, 2014.

**Expert Materials Submitted with WaterLegacy Comments**

Brian Branfireun, Expert Opinion concerning PolyMet SDEIS with *curriculum vitae*  
Brian Branfireun, Folder of References

Bruce Johnson, Review of PolyMet SDEIS with *curriculum vitae*

Don Lee, Review of PolyMet SDEIS with *curriculum vitae*

J.D. Lehr, Review of PolyMet SDEIS with *curriculum vitae*  
J.D. Lehr, Folder of Maps and Figures