

DRAFT ENVIRONMENTAL IMPACT STATEMENT
NorthMet Project
PolyMet Mining, Inc.

RESPONSIBLE GOVERNMENTAL UNITS

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**COMMENTS OF WATERLEGACY
ON THE POLYMET NORTHMET
DRAFT ENVIRONMENTAL IMPACT
STATEMENT**

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I. INTRODUCTION

WaterLegacy is a non-profit organization founded to protect and enhance Minnesota's precious waters and to ensure effective public participation in government and regulatory process that impact Minnesota's water and the communities who rely on them. WaterLegacy's more than 400 members include persons who hunt, fish, swim, harvest wild rice and drink from areas potentially affected by the PolyMet NorthMet mine and processing plant, persons who live and engage in recreation in areas that would be affected by local deposition of air emissions from the project and individual tribal members who have tribal, environmental justice and cultural rights and concerns.

For purposes of potential future litigation, these comments explicitly include by reference the positions of tribal cooperating agencies reflected in Appendix D of the Draft Environmental Impact Statement (DEIS), additional comments on the DEIS submitted by the tribal cooperating agencies, comments made by the United States Environmental Protection Agency (U.S. EPA) on the preliminary draft environmental impact statement (PDEIS) released for agency review in July 2009 and comments of other environmental organizations regarding the DEIS, specifically Minnesota Center for Environmental Advocacy, Friends of the Boundary Waters Wilderness, Center for Biologic Diversity, Sierra Club North Star Chapter. WaterLegacy also incorporates by reference for purposes of future litigation any and all individual comments submitted pertaining to the PolyMet NorthMet DEIS by WaterLegacy members and by other attorneys who may represent individual WaterLegacy members, including but not limited to comments of Bruce Johnson, Len Anderson, Joel Roberts, Alphonse Gerhardstein and Matt Tyler, whether or not such comments are specifically cited in these Comments.

Although some legal citations are provided in the succeeding pages, WaterLegacy's comments focus primarily on scientific, factual and analytic deficiencies of the DEIS. WaterLegacy expressly reserves the right, in any potential future litigation related to this matter to raise any and all legal issues raised by the asserted deficiencies, whether or not the specific argument is made in the succeeding comments or comments incorporated by reference.

II. DEFICIENCIES AND FURTHER ANALYSIS REQUIRED

A(1) Land Exchange Analysis Must be Included in the EIS.

SUMMARY

The EIS must include a detailed and comprehensive environmental review, with separate notice and public comment period, of the proposed land exchange of non-federal land for the 6,700

acres of Superior National Forest land on which the PolyMet project would be located. This “connected action” is required to be part of the EIS under law, and knowing what lands would be exchanged is important to evaluate the environmental and cultural resources impacts of the PolyMet NorthMet Project.

DISCUSSION

The PolyMet “NorthMet” copper-nickel open-pit mine project is proposed to be sited on approximately 6,700 acres of United States Forest Service lands in the Superior National Forest. These lands are within the 1854 Ceded Territory and tribes retain usufructuary rights to the use of the lands. In addition, the Superior National Forest lands proposed to be removed from public management contain pristine areas, high quality wetlands that drain through rivers to Lake Superior and wildlife habitat for endangered species, among other valuable natural resources.

Pursuant to law, the project depends on the completion of a successful land exchange of Superior National Forest lands for non-federal lands. According to the DEIS, the NorthMet Project “assumes the successful completion of a land exchange” of approximately 6,700 acres of non-federal land of similar ecological value, the location of which is not identified in the DEIS. (DEIS, p. S-1, 1-3). Since the location of the proposed non-federal land is not identified, it is not possible to evaluate the environmental characteristics of the land, the value of the land to the public or the impacts of the proposed land exchange on cultural resources.

The DEIS acknowledges, that depending on the private lands proposed for this exchange there could be an impact on cultural resources due to “loss of access to public lands for tribal use due to the land exchange.” (DEIS, p. S-10). This is an issue where there is substantial disagreement between the positions taken in the DEIS and the position of tribal cooperating agencies, who have raised concerns about potential environmental, social and economic impacts of a land exchange on tribal land use within the 1854 Treaty Ceded Territory. (DEIS, p. S-18). Tribal agencies have noted that, since land exchange is based on monetary value, not acreage, there could be a net loss. In addition, “there could be other types of losses based on the natural resources found on the original versus exchanged lands.” (DEIS, Appendix D, Tribal Positions on July 2009 PDEIS, hereinafter “Tribal Positions,” p. 4.9-2).

The DEIS suggests that, once a feasible land exchange proposal has been identified, the United States Forest Service (USFS) will be initiating a separate EIS evaluating the proposed land exchange. (DEIS, p. 1-3). However, under applicable law, this environmental review must be included in the EIS for the PolyMet project since it is a “connected action” and may determine the nature of project impacts on environmental and cultural resources. As explained by

the U.S. EPA in comments to the preliminary draft environmental impact statement (PDEIS) released to agencies in July 2009,

EPA finds it difficult to consider the U.S. Forest Service (USFS) land exchange as a separate action. Based on the interpretation of its authorities, USFS maintains that a land sale or transfer must occur for the applicant to access the mineral body, currently on public land. The PDEIS indicates that effects of land transfer will be addressed in a separate analysis prepared by the USFS. We further note that some direct impacts to tribal uses are related to the transfer of public land out of the Ceded Territory. We question how assessing the impacts of the connected action can be deferred to a separate analysis. (U.S. EPA Region 5 Comments on PDEIS, attached with August 25, 2009 letter from Kenneth Westlake, Supervisor of NEPA Implementation, hereinafter "USEPA PDEIS Comments," p. 5)

Federal Regulations require that connected actions must be discussed together in the same EIS. (40 C.F.R. § 1508.25(1)). The connection between the land exchange and the NorthMet project is clear. The entire NorthMet project is predicated on the occurrence of a successful land exchange between PolyMet and the USFS, which land exchange would not take place independent of the PolyMet project. The courts have defined connected actions as actions that would not take place independently of one another. *Native Ecosystems Council v. Dombeck*, 304 F.3d 886, 894 (9th Cir. 2003). Case law makes it clear that connected actions must be addressed in the same EIS. *Klamath-Siskiyou Wildlands Ctr. v. B.L.M.*, 387 F.3d 989, 998-999 (9th Cir. 2004) ("[R]egulations implementing NEPA require that an agency consider 'connected actions' and 'cumulative actions' within a single EA or EIS.")

The final EIS for the PolyMet NorthMet project must be deferred until a comprehensive supplement to the DEIS has been prepared, with appropriate scoping, notice and public comment, which supplement would perform a detailed analysis of the specific lands proposed to be exchanged for the NorthMet mine site and the impact of this exchange on the public interest, the environment and cultural resources of affected tribes with usufructuary rights in the 1854 Ceded Territory.

A(2) Detailed Financial Assurance Information Must be Included in the EIS.

SUMMARY

As recommended by the EPA, the EIS must include an evaluation of the financial assurance that would be provided to ensure post-closure reclamation of the PolyMet NorthMet mine and plant. Due to the history of sulfide mining placing huge pollution remediation burdens on taxpayers, the likelihood of long-term if not perpetual pollution and treatment required by the NorthMet project, and PolyMet's absence of assets or history, inadequate financial assurance may mean that the post-closure treatment, monitoring and maintenance required for the PolyMet project

will be inadequate, resulting in significant and irreparable environmental harms.

DISCUSSION

The U.S. EPA NEPA Implementation staff explicitly recommended that the EIS for the PolyMet NorthMet project include information on financial assurance:

The PDEIS does not include information on financial assurance. EPA recommends including financial assurance information because one key component to determining the environmental impacts of a mine is the effectiveness of reclamation and closure activities. EPA has found the amount and viability of financial assurance are critical factors in determining the effectiveness of closure and reclamation and therefore the significance of environmental impacts. EPA has recognized the importance of disclosing financial assurance in EISs in the “National Hardrock Mining Framework (USEPA PDEIS Comments, *supra*, p. 5).

New national rules for financial assurance from mining projects are under development by EPA, because “Given the history of adverse environmental effects resulting from some hard rock mines, and the expenditure of public funds used in some cases to address environmental problems caused by mining, EPA believes it is necessary to analyze these factors in the DEIS.” (DEIS, Tribal Positions, p. 3-48 citing *InsideEPA.com*, Tuesday, August 25, 2009).

Tribal cooperating agencies have emphasized the need for a thorough exploration of financial assurance in the PolyMet NorthMet EIS based on the need for “long-term/perpetual treatment, maintenance and monitoring” post-closure to address potentially perpetual pollution from the PolyMet project. (DEIS, Tribal Positions, pp. 2-6, 3-48). Tribal agencies have noted the likelihood that the west pit lake will remain at the site “in perpetuity and will exceed water quality standards” (DEIS, Tribal Positions p. 3-19) that pumping and water treatment of pollutants from hydrometallurgical residue drainage would have to be conducted in perpetuity (DEIS, Tribal Positions pp. 3-47, 4.1-52) and that other post-closure activities, such as repair of stockpile slope erosion, tree removal on stockpiles and hydrometallurgical cells with membranes, and seepage collection from the tailings basin would also have to be conducted in perpetuity. (DEIS, Tribal Positions, p. 3-49). Based on data on pollution from stockpile drainage, tribal agencies also concluded that the PolyMet wastewater treatment facility would have to operate for a minimum of 2000 years. (DEIS, Tribal Positions, pp. 4.1-97 to 4.1-98).

DEIS data demonstrates that various pollutants in drainage from waste rock stockpiles would exceed groundwater criteria for up to 2000 years after the mine is opened under the Proposed, although numerous references to extended periods of pollution were deleted in the few weeks between the release of tribal positions and the release of the DEIS. (Compare DEIS, p.

4.1-80, Table 4.1-45 with Appendix D, p. 4.1-72, Table 4.1-41). The DEIS states that the pumps, pipeline and wastewater treatment facility would remain in place post-closure until drainage water quality meets water discharge limits (DEIS, p. 3-41) and that the NorthMet wastewater treatment facility would be required to operate after closure, because waste rock stockpile drainage and leachate from the hydrometallurgical residue would continue to require treatment. (DEIS, pp. 4.1-56, 4.1-67).

The DEIS acknowledges that monitoring, inspection and maintenance would be required at the mine site and plant site post-closure; that mine site process water and, potentially, water from the hydrometallurgical residue facility at the plant would require treatment at the wastewater treatment facility and a constructed wetland in the east pit post-closure, and that chemical precipitates from wastewater operation would require off-site disposal in a licensed solid waste disposal facility post-closure. The DEIS also acknowledges that repair of stockpile and tailings dike slope erosion, wetland and outflow structure; removal of woody species and tree removal from stockpiles and hydrometallurgical cells with membranes, tailings pond maintenance, and seepage collection from the tailings basin would all be required post-closure. (DEIS, p. 3-49). The Tailings Basin Alternative would also require maintenance of vertical wells at the tailings basin, collection of seepage and pumping of seepage to the Partridge River post-closure. (DEIS, p. 3-53).

Tribal agencies conclude that many of these activities would be required for hundreds or thousands of years (DEIS, p. 3-49), and the DEIS provides no alternative schedule definitely limiting the time requirements for post-closure treatment and operations.

The PolyMet Mining Company has no history or assets suggesting that it would be capable of funding or sustaining closure and post-closure activities. The Company's 2009 Annual Report, Form 20-F filed with the U.S. SEC, characterizes the venture as a development stage company with no assets, an accumulated deficit and uncertain profitability:

As a development stage company with no holdings in any producing mines, we continue to incur losses and expect to incur losses in the future. As of January 31, 2009, we had an accumulated deficit of \$60,825,000. We may not be able to achieve or sustain profitability in the future. If we do not begin to generate revenues or find alternate sources of capital, we may either have to suspend or cease operations. (PolyMet 2009 Annual Report, p. 6)

As reported in its Annual Report, PolyMet Mining Corporation is little more than a shell organization with a handful of employees:

As of January 31, 2009 we had 20 full-time employees, with three located in our

Vancouver office and the 15 located in our Hoyt Lakes office. None of our employees are covered by a collective bargaining agreement. (PolyMet 2009 Annual Report, p. 38).

Based on the EPA's recommendations, the post-closure activities required by the project and the characteristics of its proponent, it would be irresponsible to prepare a final EIS for the PolyMet NorthMet project without a clear and specific financial assurance analysis based on a schedule and costs for closure and post-closure reclamation, maintenance and treatment. If no such specific assurance is provided, the final EIS should provide a detailed analysis of adverse environmental impacts assuming that no closure or post-closure reclamation can or will be sustained.

A(3) A Complete and Detailed Post-Closure Reclamation Plan Consistent with State Law, along with an Updated Cost assessment, Must be Included in the EIS.

SUMMARY

Minnesota statutes require reclamation of lands subjected to the mining of metallic minerals and that closure be stable and maintenance free. The Closure Plan identified in the DEIS fails to meet these requirements and is inadequate either to assess the duration and schedule of activities needed post-closure, the costs of closure and post-closure reclamation and pollution control or the likely environmental impacts post-closure, potentially continuing for thousands of years.

DISCUSSION

Minnesota Statutes require reclamation of lands subjected to the mining of metallic minerals. (Minn. Stat. §93.44). Rules require that that the mining area must be closed so that it is stable and maintenance free. (Minn. R. 6132.3200).

The DEIS Closure Plan provides an incomplete assessment of the environmental impacts, schedule, activities and costs of the closure period, year 20 to year 65 (DEIS, e.g., p. 4.1-55) and the post-closure period, from the time the west pit begins to overflow to the Partridge River, estimated to occur around year 65. (DEIS, p. 4.1-56, *see also* Appendix A, Figure 4.1-21)

The DEIS closure cost estimate has not been updated from a January 2007 preliminary estimate which did not include any costs for post-closure treatment, assumed that the facility would be closed at the end of the 20-year proposed mine life, and was not updated to reflect any changes to the project since 2007. (DEIS, p. 3-48). It is obviously inadequate and must be completely updated prior to the final EIS. (*See* DEIS, Appendix B, Final Scoping Decision Document, hereinafter "Final Scoping Decision," p. 40).

Schedules for closure and post-closure activities are vague and incomplete. The DEIS admits that many activities would be "expected to be ongoing until such time as the various facility features are deemed environmentally acceptable, in a self-sustaining and stable

condition,” including:

- Inspection, maintenance, and reporting;
- Treatment at the existing wastewater treatment facility of mine site process water and possibly, pore water from the plant site hydrometallurgical residue facility;
- Treatment at the constructed wetland in the east pit of mine site process water and possibly, pore water from the plant site hydrometallurgical residue facility;
- Daily and monthly monitoring of effluent from the wastewater treatment facility;
- Characterization and off-site disposal in a licensed solid waste facility of the chemical precipitates generated from wastewater treatment operations;
- Repair of stockpile and tailings dike slope erosion;
- Wetland and outflow structure up-keep to ensure they are functioning properly;
- Woody species and tree removal on stockpiles and hydrometallurgical cells with membranes;
- Tailings pond maintenance;
- Seepage collection from the Tailings Basin. (DEIS, 3-49)

The Tailings Basin Alternative would also require maintenance of vertical wells at the tailings basin, collection of seepage and pumping of seepage to the Partridge River during closure and post-closure. (DEIS, p. 3-53).

Tribal agencies note that the duration required for these post-closure activities may be hundreds or thousands of years and that estimates contained in various sections of the DEIS are overly optimistic. (DEIS, Tribal Positions, pp. 3-48 to 3-49). For example, it is unlikely that seepage from the hydrometallurgical residue cell in the tailings basin will end in year 34, allowing pumping and treatment in the wastewater treatment facility to cease. (DEIS, Tribal Positions, p. 4.1-52; DEIS, p. 4.1-55). To address high concentrations of pollutants in drainage from hydrometallurgical residue “pumping and water treatment activities would have to be conducted in perpetuity” and the “cover and liner would require perpetual maintenance.” (DEIS, Tribal Positions pp. 3-47, 4.1-52).

Other post-closure activities, such as repair of stockpile slope erosion, tree removal on stockpiles and hydrometallurgical cells with membranes, and seepage collection from the tailings basin would also have to be conducted in perpetuity, according to tribal cooperating agencies. (DEIS, Tribal Positions, p. 3-49). Based on data on pollution from stockpile leachate, tribal agencies suggest that the PolyMet wastewater treatment facility would have to operate for a minimum of 2000 years. (DEIS, Tribal Positions, pp. 4.1-97 to 4.1-98).

The final EIS must specifically analyze how the closure and post closure activities required by the PolyMet project comply with Minnesota statutes and rules requiring stable and maintenance free closure and reclamation. For at least the following, the EIS should specify how

maintenance or treatment at closure and post-closure would meet water quality standards and comply with non-ferrous mining reclamation rules:

- *Waste Rock Stockpiles.* Pollutants in drainage from stockpiles have the potential to exceed groundwater criteria for up to 2000 years after the mine is opened under the Proposed (DEIS, p. 4.1-84).¹ Maintenance, collection of drainage and potential treatment should be discussed in terms of water quality and conformity with post-closure rules.
- *West Pit Lake.* The west pit lake will overflow post-closure, discharging water predicted to exceed water quality standards for arsenic, cobalt, copper and nickel and containing significant sulfate levels. West pit lake overflow is also likely to exceed mercury water quality standards. Tribal agencies have noted the likelihood that the west pit lake will remain at the site “in perpetuity and will exceed water quality standards” (DEIS, Tribal Positions p. 3-19). The EIS requires a plan to prevent long-term water quality exceedances, not just a monitoring plan.
- *East Pit Wetland.* The DEIS has not characterized water quality of east pit outflow or overflow. (DEIS, p. 4.1-72) or what measures would be taken to address potential inefficacy of constructed wetlands reduction of pollutants.
- *Tailings Basin.* Maintenance of tailings saturation to reduce oxidation, maintenance of embankments to prevent catastrophic dam failure, treatment of seepage collected from the toe of the tailings basin and treatment of discharge once the seepage barrier is removed from Second Creek all require explicit discussion in terms of post-closure costs and legal compliance.
- *Hydrometallurgical Residue Cell Closure.* Maintenance of a geomembrane barrier, geosynthetic clay barrier cover and liner system to control impacts over highly contaminated material over time should be discussed in terms of activities, costs, and the potential need to replace containment materials.

A(4) The EIS Must Identify Designs that Assure Geotechnical Stability of Waste Rock Stockpiles, Tailings and Hydrometallurgical Residues and Analyze Impacts of their Catastrophic Failure.

SUMMARY

The DEIS acknowledges that there is no facility design available meeting geotechnical stability requirements for any of the key components storing wastes for the PolyMet NorthMet project – neither the waste rock stockpiles at the mine site, the flotation tailings basin at the plant site, or the hydrometallurgical residue facility containing the most contaminated wastes at the plant site. If geotechnical stability cannot be assured, there is a potential for catastrophic failure and uncontrolled release of pollutants from these waste sites. The question of geotechnical stability and the risk of catastrophic contamination cannot be deferred to the permitting phase, but must be addressed in the EIS before permitting may even be contemplated. Alternative project designs or project scope must be analyzed until a stable waste disposal design is identified. In addition, the EIS must provide specific information regarding risks of catastrophic failure of waste rock stockpiles, the tailings basin and/or the hydrometallurgical residue disposal facility, including a Dam Break analysis. This analysis should include impacts on water quality, wetlands and other natural resources and estimated additional costs for reclamation and remediation.

¹ An explanation should also be provided for reduction in references to pollutants with the potential to exceed standards for 2000 years between July 2009 PDEIS and the public release of the DEIS. (Compare DEIS, p. 4.1-80, Table 4.1-45 with Appendix D, p. 4.1-72, Table 4.1-41).

DISCUSSION

It is puzzling that a draft environmental impact statement was even released to the public given the recognized and ongoing problem that geotechnical stability for the PolyMet NorthMet waste rock stockpiles, tailings basin and hydrometallurgical residue disposal facility has not been demonstrated.

Waste Rock Piles

It is likely that vertical infiltration (seepage) rate for the Category 1 and 2 stockpiles will be higher than predicted. In addition, despite the passage of five years since the project was announced “a slope stability analysis has not been completed.” (DEIS, pp. 4.13-1, 4.13-2). The DEIS suggests that issues regarding slope stability can be addressed at permitting, potentially changing liners, installation methods, seepage collection systems, reduced heights and increased bench widths of the waste rock piles. (DEIS, p. 4.13-4).

However, each of these theoretical changes in design may have environmental impacts. For example, changes in liner permeability to increase stability could increase acid leaching; reduced heights and increased bench widths to increase stability could impact additional wetlands and increase hydrologic impacts from surface alterations. It is also possible that even mitigation designs will be insufficient to prevent catastrophic collapse of rock piles given underlying soil conditions on the mine site, which is predominantly composed of wetlands.

For these reasons, an EIS may not defer fundamental questions of design to a potential permitting process. As explained by tribal cooperating agencies, “The lack of a stability analysis for the stockpiles is a serious data gap given the serious environmental consequences of a structural failure of a stockpile.” (DEIS, p. 4.13-2).

Tailings Basin

The existing LTVSMC tailings basin perimeter embankments are constructed from rock and coarse tailings. (DEIS, p. 3-32) Even before NorthMet tailings are deposited, the existing tailings basin dam is potentially unstable:

Geotechnical investigations of this tailings basin (Sitka 1995 & 1997) indicate a significant portion of the peat and clay soils under the dam have the potential to develop instability under certain loading conditions. There are also layers of loose saturated slimes (fine silty tailings) within the LTVSMC stored tailings material that extend from the central portion of Cell 2E northward and connect with the perimeter embankment, which are subject to liquefaction under certain conditions and therefore may create instability of the perimeter dam. (DEIS, p. 4.13-1)

While saturation of tailings is promoted in the DEIS to limit acid drainage and metals leachate,

see Section B(2), saturation conditions pose a risk for failure of the NorthMet tailings basin:

Review of the proposed NorthMet Tailings Basin preliminary design (Barr 2009, FTMP) geotechnical stability analysis indicates the perimeter embankments would be stable for unsaturated conditions, but have a low margin of safety for stability for saturated or static liquefaction conditions. Previous studies (Sitka 1995) have showed that slimes close to the dam face and clay beneath the peat in the foundation are the primary reasons for the lower factors of safety. This is a special concern for Cell 2E, the area where the NorthMet tailings would be deposited, as it contains the thickest and most extensive peat in the foundation and has the weak slimes close to the dam face. (4.13-2)

The DEIS notes that the Minnesota Department of Natural Resources recommends that a “Dam Break analysis and risk assessment” be done, but suggests that the analysis could be deferred until permitting. If the design is still deemed unstable, the DEIS suggests that additional rock buttress and dewatering of tailings could be evaluated. (DEIS, p. 4.13-4).

However, reducing the saturation of tailings may increase acid and leachate generation within the tailings basin, creating adverse water quality impacts. In addition, there is no indication that either of these mitigation measures would be sufficient to prevent a dam break at the tailings basin, with potentially catastrophic consequences for water quality in the Embarrass and Partridge Rivers and in groundwater impacting residential drinking wells. This long-standing concern must be solved before a final EIS is released. Explain tribal agencies:

The structural stability of the tailings basin has been a serious concern since the Polymet project was first proposed. This concern has led to the development of at least 3 different tailings basin designs that have been presented in various draft documents. Contractors reviewing these designs have expressed serious concerns with both the short-term and the long-term stability of the facility. Tribal cooperators take the position that given the history of design problems, it is irresponsible to postpone a serious analysis of the structural integrity of the latest tailings basin design until the permitting stage. A complete stability analysis must be included in the DEIS to comply with NEPA and so that the public can review a complete set of possible environmental impacts associated with this project. (DEIS, Tribal Positions, 4.13-2)

Hydrometallurgical Facility

The hydrometallurgical residue disposal facility, where the most toxic and corrosive chemicals are proposed to be stored would be located on the same peat and clay soils as the tailings basin. “It is unknown if the slimes layer exists under the facility” and the DEIS notes that further design and analysis would be needed “to ensure that construction meets acceptable design standards.” (DEIS, p. 13-2). The DEIS proposes no measures that might provide assurance of hazardous waste containment if the hydrometallurgical facility is found to be located on slimes

and suggests no alternative methods of dealing with these waste materials if unstable materials underlie the disposal site. Tribal agencies stressed the need for data on stability of this hazardous facility:

The hydrometallurgical residue facility would contain the most hazardous waste materials produced by this project that, if released to the environment, would cause serious and long lasting contamination. The unknowns listed in the previous paragraph are a serious data gap and the tribal cooperating agency position is that the analysis should be conducted and included in the DEIS to comply with NEPA and so that the public can review a complete set of possible environmental impacts associated with this project. (DEIS, Tribal Positions, 4.13-2)

The United States Supreme Court has recognized slope failure, among the harms of surface mining that have imposed large social costs on the public. *Hodel v. Va. Surface Mining & Reclamation Ass'n*, 452 U.S. 264, 279 (1981). The stability of a tailings dam alternative to disposal into Lake Superior was a critical issue supporting the initial injunction against Reserve Mining discharge. *United States v. Reserve Mining Co.*, 380 F. Supp. 11, 78-81 (U.S. D. C. 1974). Courts have also held that impounding water and slimes from mining behind earthen walls is an ultrahazardous activity for which strict liability should be imposed “due to the magnitude of the activity and the attendant risk of enormous damage.” *Cities Service Co. v. Florida*, 312 So. 2d 799, 803 (Fla. App. Ct. 1975)

The failure of any of the waste disposal sites – the waste rock stockpiles, the tailings basin or the hydrometallurgical residue disposal facility -- could result in uncontrolled release of acids, leachates and mining wastes into either Partridge or Embarrass River waters with devastating ecological consequences.

The PolyMet NorthMet project should not proceed to release of a final EIS unless and until objective and reasonable engineering demonstrates that there is a design or set of designs capable of demonstrating geotechnical stability under all reasonably predicted conditions, including water saturation. Among the mitigation measures and designs that should be considered to provide reasonable assurance that there would be no catastrophic release of contaminants should be at least the following:

- Storage of waste rock in an off-site location (proposed in Final Scoping Decision);
- Reduction in the scope of the project;
- Construction of a new fully lined and structurally sound basin for tailings;
- Construction of a new structurally sound hazardous waste facility for hydrometallurgical residues.

Even once a design has been developed that meets requirements for geotechnical stability, the final EIS should analyze a “worst case” scenario categorizing the risk that each of these structures will fail catastrophically. This analysis should both be specific to each major source of contaminants and cumulative, if there is a multiple failure. Historic information on slope instability and dam breaks at other mines should be used to identify factors, whether related to weather or maintenance issues, that increase or decrease the risks so that members of the public as well as regulators can better appreciate the degree to which uncontrolled release of pollutants may or may not be controlled.

A(5) The EIS Must Analyze Existing and Cumulative Contamination from the LTVSMC Brownfield Site and Describe the Plan for Its Remediation and Closure with and without the PolyMet Project.

SUMMARY

The EIS must include a thorough analysis of the extent of contamination from the LTVSMC tailings basin site, the site proposed for disposal of polluted water and wastes from the PolyMet NorthMet project. The LTVSMC site continues to contaminate groundwater and surface water more than 20 years after operations have ceased. Investigation must fully characterize the contamination plume, including impacts on wells and aquifers with iron, sulfate, manganese, aluminum, arsenic and mercury and address the cumulative impacts of existing contamination on seeps and surface discharge, along with the additional loadings proposed by the PolyMet project. In addition, whether or not the PolyMet NorthMet mine and processing facility are built, there is a legal requirement that the current LTVSMC tailings basin be remediated to address ongoing seeps and discharge in violation of water quality standards. The final EIS must detail the closure, reclamation and pollution remediation plan applicable to the tailings basin site both to determine what the financial assurance needs would be if the PolyMet project were built and to assess the conditions in groundwater and surface water in the “no action” situation where the LTVSMC contamination would be remediated without additional source inputs from a new copper sulfide mining and processing facility.

DISCUSSION

The EIS must include a thorough analysis of the extent of contamination from the LTVSMC site, a 60,000 acre contaminated brownfield site proposed for the PolyMet NorthMet plant and for disposal of polluted water, sludge and residue from the PolyMet NorthMet project. The LTVSMC tailings basin continues to contaminate groundwater and surface water more than 20 years after operations have ceased. In the wells that do exist near the tailings basin, pollutants including iron, manganese, and aluminum exceed drinking water standards, while mercury exceeds Great Lakes Initiative limits. (DEIS, Table 4.1-7, p. 4.1-13) Wells near the northern property line show substantial contamination of the groundwater aquifer, and recent well data show that the plume extends in some areas at least as far as private wells along the Embarrass

River. (DEIS, Tribal Positions, pp. 4.1-2 to 4.1-3) Surface water discharges at the tailings basin also demonstrate exceedances of mercury, pH and hardness as well as several metals. (DEIS, Table 4.1-30, p. 4.1-43).

The EIS must fully characterize the existing contamination plume, including impacts on wells, aquifers and surface waters and evaluate the cumulative impacts of existing contamination along with the additional loadings proposed by the PolyMet project. As recommended by tribal cooperating agencies, the EIS must at least do the following:

- Develop a groundwater flow model to show the direction and rate of groundwater flow;
- Provide a complete characterization of contaminant plumes to groundwater, including impacts on private wells along the Embarrass River;
- Provide a detailed characterization of background contamination and an accurate prediction of groundwater water quality including the PolyMet inputs;
- Conduct water samples from lakes near the tailings basin (Hiekkilla, Mud, Kaunonen, or Hay Lakes) to determine if the pollutants at the existing tailings pile have caused contamination;
- Provide a detailed characterization of background contamination and an accurate prediction of surface water quality including the PolyMet inputs;
- Develop an up to date closure plan, including remediation of groundwater seepage from the tailings basin. (DEIS, Tribal Positions, pp. 4.1-2, 4.1-3, 4.1-118)

The gaps in information are more striking because the PolyMet plant and tailings basin site are proposed to be located on a contaminated brownfield that, for the most part, has neither been investigated nor remediated. The DEIS states that PolyMet has “acquired surface ownership of approximately 7,000 acres of real property and portions of the taconite processing facility formerly owned by LTVSMC, and approximately 8,100 additional acres from Cleveland-Cliffs, Inc.” (DEIS, p. 3-19). Under applicable law, to the extent that unremediated contamination remains on this property, if the property has already been acquired PolyMet would be legally responsible for remediation whether or not the PolyMet NorthMet mine and processing facility are developed.

The DEIS lists 62 Areas of Concern at the LTVSMC brownfield Plant site, based on a Phase I Site Assessment. (DEIS, p. 4.1-16) Under the Voluntary Investigation and Cleanup (VIC) Program, responsible parties would be required to conduct additional Phase II detailed investigation and perform closure and remediation activities according to an approved response action plan in order to prevent classification of the site as a superfund polluted site.

According to summary information in the DEIS, PolyMet is responsible for 29 of the 62 areas of concern at the LTVSMC brownfield site. Of these 29 areas of concern, 22 require further investigation and action. (DEIS, Table 4.1-9, p. 4.1-17) Not only has closure and remediation not been completed, but in many case no Phase II investigation of the extent of contamination has been prepared or response action plan approved.

The remainder of the areas of concern at the LTVSMC brownfield site, for which PolyMet would not be in the chain of title, similarly, are only in the early stages of VIC investigation, having neither completed Phase II investigations, obtained approval of response action plans or conducted remediation and closure activities. (DEIS, Table 4.1-10, p. 4.1-18).

The DEIS fails to provide detailed information on the extent of contamination of groundwater, surface water and wells, the nature of remediation required and the cost and schedule of remediation and closure, all of which and more would be developed through the VIC program prior to acceptance of a response action plan for a brownfield site.

Perhaps most troubling, even as compared with earlier drafts, the DEIS contains less information about the LTVSMC brownfield site, in some cases removing pertinent information about contamination and effectively concealing this critical issue from the public. An example is provided below regarding the Emergency Basin, the area of the site containing material that overflowed from sumps in the concentrator during LTVSMC operations. The information in italics was contained in the PDEIS draft (DEIS, Appendix D, pp. 3-45 to 3-46), but was removed from the DEIS released to the public three months later (DEIS, p. 3-46):

Emergency Basin (PDEIS July 2009 Text)

As part of the LTVSMC Closure process, the Emergency Basin was identified as an Area of Concern under the MPCA's Voluntary Investigation and Cleanup (VIC) program. Based on a Sampling and Analysis Plan submitted to the MPCA, PolyMet plans to collect multiple samples from the sediments and the groundwater in the Emergency Basin for analysis. These samples would determine if any further work would be required to identify possible contamination. If no contamination requiring cleanup is found, the area would be contoured to create wetlands and vegetated according to Minnesota Rules, part 6132.2700. If contamination requiring cleanup is found, a Corrective Action Plan to address the contamination would be developed and submitted to the MPCA for approval. PolyMet's concept for the plan would be to minimize the amount of stormwater reaching the contaminated soil and, therefore, reduce the potential for contamination to be transported out of the Emergency Basin area.

Regardless of whether contamination is found, detailed plans for any required drainage channels and/or outfall structure would be based on relevant hydrologic data and would be submitted to the MPCA for approval. The Emergency Basin stormwater outflow would be monitored and inspected as approved by the MPCA or as defined in the SDS permit

for the Hydrometallurgical Residue Facility.

As with other areas of critical environmental concern, the DEIS defers consideration of remediation of the contaminated LTVSMC site proposed to be used by PolyMet for disposal of tailings and hydrometallurgical wastes to a potential permit process. The DEIS defers the nature of the activities required for clean-up, the environmental impacts of legacy pollution and corresponding requirements for financial expenditures. (DEIS, 4.1-116). As emphasized by tribal agencies (*See* DEIS, Tribal Positions, pp. 4.1-2, 4.1-3; DEIS, p. 4.1-19), this approach is contrary to the purpose of environmental review.

Knowing the extent of LTVSMC site contamination and the likely costs for remediation is critical to understand the likely environmental impacts of a mining and processing project dumping materials on a site that is already contaminated. This information must be included in the EIS to provide reliable information on water quality impacts from the plant site.

Detailed Phase II, response action and remediation information is also critical to provide a credible analysis of the “no action” alternative in the EIS. A “no action” scenario would require investigation and remediation of the LTVSMC site in a timely fashion and would provide environmental benefits as a result of this clean-up. If the use of the LTVSMC site for additional waste disposal by PolyMet would delay site investigation and remediation for many decades until mine closure or post-closure, the environmental harm due to this delay as well as due to the incremental wastes dumped by PolyMet must be investigated.

The EIS must also contain detailed information on the extent of contamination and the costs of remediation to determine the level of financial assurance that will be required for the PolyMet project. The economics of the project itself might be affected by knowledge of the nature and level of response needed to address existing contamination at the LTVSMC site. Particularly since the PolyMet Corporation has few obvious assets and no history of production, it would seem irresponsible to proceed with the EIS without detailed information on the extent of resources needed to address brownfield contamination.

A(6) The EIS Must Provide a Life Cycle Analysis of Hazardous Materials Used by the PolyMet Project and Assess whether Hydrometallurgical Residues Constitute Hazardous Wastes under Applicable Laws.

SUMMARY

Although the DEIS identifies many toxic and hazardous chemicals that will be used by the project at a rate of thousands of tons per year, the DEIS provides no life cycle analysis describing how these hazardous chemicals will be used, and how their residues, reactants or by-products will be handled, whether through off-site or on-site hazardous waste disposal. In the case of the hydrometallurgical residue facility, which is virtually certain to include toxic or corrosive wastes,

the failure to characterize these wastes and the way in which their handling will comply with federal and state law pertaining to hazardous waste disposal is particularly troubling. A complete life cycle analysis of hazardous materials and an evaluation of the volume, characterization, and disposal of hazardous materials from the project must be provided in the EIS.

DISCUSSION

In its listing of permits that will be sought for the PolyMet NorthMet project, the DEIS neither references the need to comply with federal Resource Conservation and Recovery Act (RCRA) or Minnesota Hazardous Waste statutes or rules pertaining to regulation and permitting of hazardous waste disposal. (*See* DEIS, pp. S-2 to S-3) The DEIS identifies no mitigation measures for hazardous materials. (DEIS, S-17).

Perhaps most striking, although the DEIS acknowledges that the project would use or generate thousands of tons of hazardous materials including mine site waste water treatment facility chemicals – (calcium hydroxide or hydrated lime, aluminum hydroxide, sodium hydrosulfide) and plant reagents (sodium hydrosulfide, sodium hydroxide, acids, flocculants and anti-scalants) (DEIS, p. 4.12-1), the DEIS provides little explanation of how the identified hazardous materials will be utilized or the way in which hazardous residues, reactants, or by products of these hazardous chemicals would be disposed of, consistent with federal and state hazardous waste disposal statutes and rules.

The DEIS states that the PolyMet project will use many hazardous chemicals in substantial quantities (DEIS, Table 4.12-1, pp. 4.12-3 to 4.12-6), including the following:

2,998 tons per year of Sulfuric Acid. Sulfuric Acid is a corrosive, and a skin and eye irritant. It is toxic to some species of if released into waters.

6,173 tons per year of Hydrochloric Acid, which is a corrosive and skin and eye irritant. When released into the soil, Hydrochloric Acid does not biodegrade and may leach into groundwater.

2,866 tons per year of Liquid Sulfur Dioxide, which is extremely corrosive to exposed tissues, and classified as a Poison Gas. Liquid Sulfur Dioxide is toxic to some plants and animals if released into waters.

847 tons per year of Sodium Hydrosulfide, which is extremely corrosive to exposed tissues and releases toxic gas in contact with acid. Sodium Hydrosulfide is toxic to aquatic organisms if released into waters and is classified as Corrosive.

1,075 short tons Potassium Amyl Xanthate (PAX), classified as Spontaneously Combustible. PAX is toxic to animals in large quantities. Contact of PAX with water liberates extremely flammable gases, which can cause rapid burning and release of toxins into the air.

24 tons per year of SX Extractant, which is a combustible material or mild corrosive. When released, SX Extractant material may cause contamination of soil, surface water, or groundwater.

130 tons per year of SX Diluent, which is flammable, fatal if swallowed and an eye, skin, and respiratory irritant. When released, SX Diluent may cause contamination of soil, surface water, or groundwater.

250,000 tons per year of Limestone, which will be stockpiled in bulk on site. Limestone is an eye, skin, and respiratory irritant and airborne particulates may cause harm to environment.

58,100 tons per year of Lime, which will be stored in a bulk silo. Lime is an eye and skin irritant and may create hazardous long-term degradation products.

17,500 tons per year of Magnesium Hydroxide, which is harmful if swallowed and an eye, skin, and respiratory irritant and may create hazardous long-term degradation products.

650 tons per year of Copper Sulfate Flotation Activators, which are harmful if swallowed, an eye and respiratory irritant and toxic to fish and plants if released into waters.

The wastewater treatment facility will use chemical precipitation technologies, resulting in chemical precipitates and solids that may be processed in the hydrometallurgical plant. (DEIS, p. 3-10). Hazardous materials used in the hydrometallurgical process will be included in the materials pumped to the hydrometallurgical residue facility. (DEIS, Table 3.1-12, p. 3-30, p. 3-25). Based on the chemical constituents of these processes, it is likely that precipitates and residues would have at least one of the characteristics by which hazardous wastes are identified under federal and state law: ignitability, corrosivity, reactivity, toxicity, oxidizers, lethality. (See 40 C.F.R. §261; Minn. R. 7045.0131)

The DEIS section on hazardous materials provides no discussion of the process and life cycles for the hazardous chemicals described above, or their reactants, residues or by-products. Without this discussion, it is not possible to determine whether either wastewater facility effluent or tailings will contain corrosive or other hazardous material. This gap is yet more troubling for the hydrometallurgical residue waste facility. Although it is clear that the hydrometallurgical residue facility will be a disposal site for hazardous wastes, the DEIS does not use the term “hazardous waste” and does not describe either the regulatory, permitting or environmental consequences of creating a waste facility at the plant site, particularly on an existing contaminated brownfield site with potentially unstable soils.

The EIS must include a complete life cycle analysis of hazardous wastes and permitting and disposal requirements under applicable laws. Assessment of the potential for leakage, seepage or geotechnical failure of the hydrometallurgical residue disposal facility must consider the implications of release of hazardous and toxic materials.

A(7) Prior to Completion of the Final EIS, the U.S. Army Corps of Engineers Should Reissue its Section 404 Notice for the PolyMet Project to Allow State Determination under Section 401 of the Clean Water Act.

SUMMARY

Both state and federal laws regulate wetlands, and all of the wetlands impacted by the PolyMet NorthMet project would be protect under state and/or federal laws. The Clean Water Act allows states to exercise jurisdiction to determine compliance with clean water laws when wetlands are impacted if they act to do so within a year. At the time when the U.S. Army Corps of Engineers provided public notice for the project’s wetlands permit in 2005, the Minnesota Pollution Control Agency did not act to preserve jurisdiction. This “waiver” of the right to certify compliance with clean water standards resulted from budget constraints, not State policy, and changes in the project since 2005 make it appropriate for the Corps of Engineers to re-notice the project and allow the MPCA to exercise Clean Water Act jurisdiction.

DISCUSSION

The DEIS for the PolyMet Project explains that wetlands in the State of Minnesota are protected under both federal and state laws including the Federal Clean Water Act (CWA), containing Section 404 permits and Section 401 certificates of compliance with CWA standards. All of the wetlands on the project site and downstream on the Partridge and Embarrass Rivers would be regulated under either federal or state law. (DEIS, p. 4.2-1).

In May 2005, the United States Corps of Engineers (USACE) issued a public notice for its Section 404 permit. The Clean Water Act allows states to assume jurisdiction for Section 401 water quality certification if they act within a year of the notice. The Minnesota Pollution Control Agency did not do so, so Section 201 certification by the MPCA was waived by default. (DEIS, p. 4.2-1).

WaterLegacy and the tribal agencies have taken the position that the public notice for the Section 404 permit should be reissued and the MPCA should be given the opportunity to analyze and make a determination under Section 401 of the Clean Water Act. The tribes site significant changes in the design of the project and adverse impacts identified in the environmental review process among their reasons for requesting a reissuance of the notice. (DEIS, p. 4.2-1, fn 1) Project designs, impacts and policies of the Minnesota Pollution Control Agency have changed since 2005. Providing an up-to-date notice of the Section 404 permit for the PolyMet NorthMet project would ensure that Section 401 water quality certification proceeds consistent with federal laws and policy guidance, making the most effective use of resources.

The intent of Section 404 of the Clean Water Act and implementing rules is to give both early and comprehensive notice of projects that may result in discharge of dredged or fill materials to navigable waters. Notice is designed to be published when an applicant “submits *all*

the information required to complete an application for a permit under this subsection.” (33 USCS §1344(a)), emphasis added) including “a complete description of the proposed activity,” and “all activities which the applicant plans to undertake which are reasonably related to the same project (33 CFR 325.1(d)(1)(2)), a description of the “type, composition and quantity” of any material discharges into waters of the United States, (33 CFR 325.1 (d)(4)), and a statement explaining avoidance, minimization and compensatory mitigation of impacts to waters of the United States. (33 CFR 325.3(d)(7)).

Rules implementing Section 404 of the Clean Water Act require that the USACE’s notice must, “include sufficient information to give a clear understanding of the nature and magnitude of the activity to generate meaningful comment.” (33 CFR 325.3(a)). The notice must include a plan and elevation drawing showing the specific site location and character of all proposed activities, (33 CFR 325.3(a)(6)), and any other available information which may assist interested parties in evaluating the likely impact of the proposed activity on factors affecting the public interest. (33 CFR 325.3(a)(13)).

The nature and magnitude of the project and the character of proposed activities and discharges have changed or only become evident since the May 2005 notice. Since May 2005, specifically,

It has been determined that the PolyMet project will directly and indirectly impact 1,522 acres of wetlands on and adjacent to the mine and tailings basin site.

It has been determined that of these 1,522 acres of impacted wetlands only 300 acres of the wetlands (175 of which would only be replaced post-closure) will be replaced within the St. Louis River watershed or even the Lake Superior Basin watershed.

It has been determined that sulfate discharge, seeps through the tailings basin and hydrological changes create the risk of mercury methylation and that the proposed wastewater and constructed wetlands treatment methods at the project will be ineffective in removing mercury.

It has been proposed as an alternative that wells be dug and seepage pumped from the toe of the tailings basin for direct discharge to the Partridge River.

Creation of a west pit lake has been proposed and it has been determined that this pit lake will exceed water quality standards and will overflow post-closure.

Wild rice production areas downstream of the project have only recently been surveyed, implicating Minnesota’s unique water quality standards to protect this resource.

In addition, it should be emphasized that the MPCA’s waiver of Section 401 certification did not reflect a policy determination, but the severity of budget constraints. Since late 2006, the

MPCA has changed its practice of systematically waiving Section 401 authority, and has established criteria to identify projects where Section 401 authority will be exercised to ensure that projects comply with state water quality standards. Those criteria would strongly support exercise of MPCA Section 401 authority in connection with the PolyMet project.

(<http://www.pca.state.mn.us/water/401.html>)

Federal policy favors states' exercise of Clean Water Act Section 401 authority to protect wetlands and water quality. (<http://www.epa.gov/owow/wetlands/facts/fact24.html>). In addition, particularly with respect to mercury releases and methylmercury, the MPCA has developed important expertise that could be applied if an opportunity to exercise Section 401 jurisdiction were afforded by reissuance of notice. Since 2005, the MPCA has completed a Statewide Mercury TMDL, which was approved by the U.S. EPA in 2007 and has analyzed waters impacted by the PolyMet project for fish tissue methylmercury and impaired under Section 303(d) of the Clean Water Act.

Reissuance of the Section 404 notice would be appropriate under applicable law and allow an efficient use of expertise related to mercury, methylmercury, sulfates in wild rice waters and other important water quality issues under federal and state law.

A(8) The EIS Must be Revised to Reflect Appropriate Application of the Clean Water Act, NPDES Permit Requirements, the Great Lakes Initiative and Nondegradation Standards.

SUMMARY

The DEIS relies on a number of inappropriate assumptions regarding the Clean Water Act, NPDES permits and applicable standards preventing degradation of surface water and groundwater quality. Whether the Proposed Action, the Mine Site Alternative or the Tailings Basin Alternative is implemented, the PolyMet project will require an NPDES permit for industrial discharge. That permit may only be issued in compliance with statutes, rules and regulations protecting water quality, many of which the DEIS misinterprets or disregards. The DEIS needs to be revised consistent with NPDES permitting requirements and consistent with water quality standards and nondegradation regulations for both surface water and groundwater.

DISCUSSION

Throughout the document, the DEIS relies on a number of inappropriate assumptions regarding the application of the Clean Water Act, nondegradation rules and Great Lakes Initiative mercury standards for impaired waters. Applicable laws for mercury and methylmercury are discussed in more detail in Sections B (4), B (5) and B (6), which highlight inadequacies of the DEIS in addressing mercury violations of federal and state law standards.

This section provides a brief summary of key discrepancies between the DEIS and applicable laws.

NPDES Permits

The DEIS suggests that the only National Pollutant Discharge Elimination System (NPDES) permit required by the PolyMet NorthMet project is a stormwater permit for construction activity disturbing an acre or more of land and then diminishes the significance of a discharge of stormwater in implicating Clean Water Act requirements. Neither assumption is consistent with facts or with law. Although the DEIS attempts to suggest that there is no direct surface water discharge until the west pit overflows in approximately year 65 (DEIS, pp. 4.1-107, 4.1-108, 4.1-109), facts belie this assumption:

- Under all alternative scenarios, tailings basin seepage will upwell into wetlands draining into the Embarrass River, which wetlands as well as the river are navigable waters under federal law as well as waters of the state. Even if the Tailing Basin Alternative were to recover 95 percent of NorthMet groundwater seepage, total seepage from the NorthMet and LTVSMC tailings from Cell 2W would still significantly exceed aquifer flux capacity. (DEIS, p. 4.1-129).
- Tribal agencies have identified a direct surface water connection between the northwest corner of Cell 2W of the tailings basin, through wetlands and to the Embarrass River. (DEIS, pp. 4.1-95, 4.1-107).
- Water levels in the east pit and west pit after year 20 would be established by “outlet structures” used to route surface water overflows from the east pit to the west pit and from the west pit to wetlands west of the pit draining into the Partridge River. (DEIS, p. 4.1-64)
- The Tailings Basin Alternative proposes direct discharge of collected tailings basin seeps to the Partridge River. (DEIS, pp. 4.1-139, 4.1-141)

As acknowledged in the DEIS:

[S]everal potential pathways for surface water quality impacts remain, including non-contact stormwater runoff; seepage from rock stockpile liners, the hydrometallurgical residue storage area, the Tailings Basin; and pit lake overflows. Recent hydrogeologic investigations of the Tailings Basin area show that there is not sufficient transmissivity in the downgradient aquifer to transmit the predicted seepage from the basin. As a result, the seepage upwells to the surface and affects surface water quality. (DEIS, p. 4.1-107)

[N]on-contact stormwater runoff; unrecoverable groundwater seepage from the temporary and permanent waste rock/lean ore stockpiles, mine pits, overburden storage/laydown areas, various sumps, process water ponds, and the WWTF equalization ponds; and the ultimate overflow of the West Pit represent potential pathways for the Project to affect water quality in the Partridge River. (DEIS, pp. 4.1-108, 4.1-109)

NPDES permits will apply to all potential sources of discharge to surface waters from various pathways, irrespective of PolyMet’s attempts at characterization. In addition, “non-

contact” stormwater runoff must meet water quality standards, including non-degradation standards for Great Lakes Initiative waters as well as numeric concentration limits.

The final EIS should be rewritten to acknowledge the application of NPDES permits to a variety of pathways for surface water discharge and to assess the potential for each and all cumulatively to violate water quality standards. To the extent that the effort to preserve a fiction that there are “no direct discharges” of surface water under the proposed alternatives has constrained a robust and candid consideration of alternatives to mitigate water quality impacts (*See* Section G (2), *infra*), the recognition that NPDES compliance is non-discretionary may improve the quality of DEIS analysis.

Great Lakes Initiative and Water Quality Standards

The DEIS contains additional errors and omissions in the application of water quality standards. For example, the DEIS states that Great Lakes Initiative standards supersede health-based water quality standards in Minnesota rules (DEIS, p. 4.1-33), disregards nondegradation standards applicable to both Minnesota surface water and groundwater and suggests that compliance with mercury standards requires only a demonstration that water column concentrations of discharge will not exceed 1.3 ng/L.

The DEIS should be revised in light of the following, more accurate highlights from federal and state water quality laws:

- Where receiving surface waters do not meet applicable water quality standards for any pollutant, no discharge is permitted that will cause or contribute to the violation of water quality standards, unless there are sufficient remaining pollutant load allocations to allow for the discharge and the existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards. (40 C.F. R. §122.4(i))
- Where a pollutant in the Great Lakes System exceeds a fish tissue based standard for that pollutant, it is provided in law that any facility that discharges a *detectable* level of such pollutant to the water has the reasonable potential to cause or contribute to an excursion above water quality standards. (40 C.F.F. §132, Appendix F, Procedure 5, F.4; Minn. R. 7052.0220, Subp. 7).
- Minnesota’s health based standards, including specifically the health-based standard of 0.2 mg/kg for mercury in fish tissue is not superceded by Great Lakes Initiative water column standards. (Minn. R. 7052.0100, Subp. 1; Minn. R. 7050.0150, Subp. 2; Minnesota Statewide Mercury TMDL (2007).
- Federal and Minnesota nondegradation requirements apply both to Great Lakes Initiative pollutants (Minn. R. 7052.0300, Subp. 2) and generally to pollutants that may affect uses of the surface waters in question. (40 C.F.R. §131.12(a)(1); Minn. R. 7050.0185).

- Minnesota nondegradation requirements apply to groundwater as well as surface water. (Minn. R. 7060.0500).
- More stringent requirements for demonstration of nondegradation apply to Great Lakes Initiative bioaccumulative chemicals of concern (BCCs) and bioaccumulative substances of immediate concern (BSICs). Mercury is both. (40 C.F.R. 132.2, Table 6 (BCC); Appendix E, II.A (BSIC)).
- By definition, a significant lowering of water quality for purposes of nondegradation occurs when there is a new or increased loading of any BCC (including mercury) from any new facility, whether from a point or nonpoint source. (40 C.F.R. 132, Appendix E, IIA).
- Any discharger of BSICs such as mercury, into outstanding international resource waters including surface waters of the Lake Superior Basin must provide a complete nondegradation demonstration, including an analysis of best technology in process and treatment to eliminate or reduce the extent of the new or expanded discharge. (Minn. R. 7052.0010, Subp. 34, defining outstanding resource waters; Minn. 7052.0320, Subp. 3).
- No variances apply to new discharges of mercury to Great Lakes Initiative waters. (40 C.F.R. 132, Appendix F, Procedure 2.A.1; Minn. R. 7052.0280, Subp. 1).
- No mixing zones apply to new discharges of mercury to Great Lakes Initiative waters. (40 C.F.R. § 132, Appendix F, Procedure 3, C.1, C.4; Minn. R. 7052.0210, Subp. 3).

Many of the DEIS discussions of possible impacts to surface water and groundwater inadequately or inappropriately apply the Clean Water Act and federal regulations and State rules implementing the CWA. The DEIS needs to be revised consistent with NPDES permitting requirements with respect to water quality standards and nondegradation regulations for both surface water and groundwater.

B(1) The EIS Must Revise Modeling of Water Quality Impacts Based on More Reasonable Assumptions Regarding Acid Formation, Solute Loading and Efficacy of Containment and Treatment.

SUMMARY

The DEIS contains assumptions at every stage of its water quality modeling that reduce or eliminate the potential for acid rock drainage and the concentration of metallic (copper, nickel, cobalt, zinc) and metalloid (arsenic, antimony) contaminants of water. These assumptions are sometimes made on the basis of limited small-scale laboratory tests and sometimes contain no rationale or scientific citation. Real-world experience and research on variability of rock and pH, formation of leachate, failure of liners, inefficacy of treatment and variability of outcomes from subaqueous disposal are not included in the modeling of water quality. Taken as a whole, and without underlying realistic data, it seems that the assumptions pertaining to water quality modeling for the Proposed Action, the Mine Site Alternative and the Tailings Basin Alternative have been manipulated in order to result in a prediction that impacts on water quality will be minimal rather than to predict with candor and scientific rigor the nature of environmental impacts of the project on water quality. The current water quality assumptions are fundamentally flawed, and the final EIS must thoroughly and candidly revise the analysis.

DISCUSSION

It has been recognized that environmental review documents frequently fail to predict the acid mine drainage and water quality violations that later ensue. (J. Kuipers et al, *Comparison of Predicted and Actual Water Quality at Hardrock Mines* (2006), p. ES-9 (“[N]early all the mines that developed acid drainage either underestimated or ignored the potential for acid drainage in their EISs.”) The PolyMet DEIS takes this flaw a step further.

The PolyMet NorthMet DEIS minimizes the primary risks of sulfide mining on water quality. The term “acid mine drainage” is contained only in the definition section, it is not used in the DEIS. Even the more euphemistic term “acid rock drainage” is used only to explain the sorting of waste rock into piles (DEIS, pp. 3-13, 4.1-65). There is no discussion in the DEIS of the risk of acid rock drainage from sulfide mines, and the experiences of other mines, including the nearby Dunka Mine, that have had this type of environmental pollution. (See e.g. U.S. EPA, *Technical Resource Document Extraction and Beneficiation of Ores and Minerals*, Vol. 3, August 1994, “U.S. EPA Tech. Report Ores,” pp. 1-35,1-39)

The PolyMet DEIS also contains no discussion of the impacts of copper, nickel and other metal leachates separately or in combination on aquatic toxicity. The Regional Copper Nickel Study data and experience at the Dunka mine underline the risk of metals releases to the aquatic food chain.² The DEIS Section on fish and macroinvertebrates (Section 4.5) does not mention the potential for copper, nickel or other metals toxicity. Yet, since at least 1981, Dunka Pit leachate has exceeded aquatic toxicity standards:

The Minnesota Department of Natural Resources (DNR) found that more than 95 percent of all leachate samples taken from the mine site between 1976 and 1980 had pH values between 6.0 and 8.5, but values as low as 4.5 were reported. Specific information regarding sampling procedures was not provided. Concentrations of trace metals (copper, nickel, cobalt, zinc) exceeded ambient levels by 10 to 10,000 times. Toxicity testing showed that copper and nickel concentrations exceeded the 48-hour lethal concentration (LC50) for *Daphnia pulex*, while nickel concentrations also exceeded the 96-hour LC50 for fathead minnow. . . .

Copper and nickel concentrations as high as 1.7 and 40 mg/L, respectively, have been observed in seepage/runoff from Duluth Complex waste rock stockpiles at the site. Toxicity testing of the leachate showed that copper and nickel concentrations exceeded the 48-hour lethal concentration (LC50) for *Daphnia pulex*; nickel concentrations also exceeded the 96-hour LC50 for fathead minnow. Concentrations of calcium, magnesium, and sulfate in the stockpile drainage were also elevated (MDNR, 1990). (U.S. EPA Tech. Report Ores,” supra, p. 2-43)

² See also DEIS Comments of Bruce Johnson, which WaterLegacy has incorporated by reference.

Discharge from the Dunka Pit, in 2009, still fails to comply with additive toxicity (copper, nickel and zinc are combined to calculate additive toxicity) limits and Cliffs Erie continues to request variances from the Minnesota Pollution Control Agency for additive toxicity calculation, hardness and specific conductance.

The extraordinary failure of the PolyMet NorthMet DEIS to address additive toxicity to the aquatic environment or acid rock drainage and the DEIS' sanguine predictions regarding water quality result from assumptions made in the modeling, rather than the lack of real world risks from the PolyMet mine and processing facility. The next section of this comment explains some of the ways in which the PolyMet DEIS seems to assume away, rather than disclose water quality impacts.

Two particular issues regarding modeling assumptions – the lack of data supporting the hydrological models used and the incomplete analysis used to predict outcomes from pouring effluent into the tailings basin – are addressed separately as critical areas of concern.

Mine Site Overburden

Stockpiling would expose overburden to oxidation and could result in acidic conditions and release of metals, especially cobalt, copper, nickel and zinc. NorthMet saturated overburden produced low pH in laboratory tests; although median sulfur concentrations were 0.06 percent, overburden has some areas of sulfur concentration of as high as 0.63 percent, equivalent to Category 4 waste rock reactivity. (DEIS, pp. 4.1-65 to 4.1-66).

Despite areas of high sulfur concentration, the DEIS suggests that PolyMet would not sample overburden, but would place all saturated overburden in Category 1 and 2 waste rock stockpile. PolyMet would compact the overburden as it is placed “to limit oxidation and infiltration, although “*the effectiveness of compaction to limit oxidation is uncertain.*” (DEIS, p. 4.1-66). The DEIS does not state what quantity, acid formation or metals leachate is assumed from overburden or how compaction is considered in this calculation. The DEIS does not discuss how compaction of overburden might affect liner integrity and leachate.

Without this data transparently provided, it is not possible to determine whether (for purposes of all of the water quality calculations thenceforth) the DEIS has accurately modeled or has underestimated the potential for acid and metals pollution from the overburden.

Waste Rock Stockpiles

Oxidation of sulfide minerals in waste rock releases sulfuric acid and metals. Blasting and excavation increase oxidation by increasing the surface area and porosity of the rock, which

allows rapid introduction of atmospheric oxygen and flushing of solutes by water. Metals of concern, including copper, nickel, cobalt and zinc are bound as sulfides so oxidation will release soluble metals. Rain and snow will percolate through waste rock piles flushing metals and sulfates from the rock. (DEIS, p. 4.1-69) The magnitude of waste rock from the NorthMet project is approximately 394 million tons over the duration of the mine. (DEIS, p. S-5, 1-1).

In the St. Louis River watershed, waste rock pile drainage has been estimated to be the most significant contributor to sulfates. (Berndt & Bavin, *Sulfate and Mercury Chemistry of the St. Louis River in Northeastern Minnesota: A Report to the Minerals Coordinating Committee*, 2009). Both sulfate release and metal solute release from waste rock piles are key determinants of the water quality impacts of the PolyMet project. Assumptions in the DEIS create artificial and highly questionable limits on the predictions of this impact:

- ***The DEIS assumes uniform sulfur concentrations and uniform levels of solute production throughout waste rock.***

The DEIS assumes uniform sulfur concentrations within waste rock piles and uniform solute production throughout the rock. (DEIS, pp. 4.1-70, 4.1-71). These assumptions conflict with reports going back to the 1970s characterizing Duluth Complex rock as containing disseminated mineralization that may leach heavy metals even when it does not create low pH and acid drainage. (See Bruce Johnson DEIS Comments).

The DEIS did not disclose the assumptions about pH made in deterministic modeling for the Proposed Action, stating only that the caps were based on the concentration in a water chemistry database for a given pH. (DEIS, p. 4.1-70). For the uncertainty analysis, the DEIS assumed a neutral pH range of 6.6 to 8.0 for Category 1 and 2 waste rock stockpiles and a pH of less than 4 for Category 3 lean ore. The DEIS states that copper and cobalt concentrations were higher in the uncertainty analysis as a result of using the pH range from 6.6 to 8.0 (which is a neutral rather than acidic range) and that “the maximum concentration for each of these metals is very sensitive to changes in pH.” (DEIS, p. 4.1-83).

The DEIS also used an acidification factor of 10 to account for the effect of a drop in pH in copper and nickel, even while admitting that this factor is very low for copper and nickel based on real-world data from the AMAX test piles. (DEIS, p. 4.1-85). The assumed rates of leaching used as inputs were based on less than six months of data, and did not predict changes in solution rate that may occur over decades or even hundreds of years. (DEIS, p. 4.1-85).

The model’s improbable assumptions about uniform sulfur content and uniform solute

production at a specified pH are critical to the Mine Site Alternative, where the DEIS assumes that permanent stockpiles of Category 1 waste rock overburden will only contain materials with a sulfur concentration of less than 0.12 percent. (DEIS, p. 4.1-135). The DEIS does not explain how PolyMet would propose to test the 292 million tons of Category 1 waste rock piled as high as a 20 story building (74 percent of 394 million tons, DEIS, p. 3-13; maximum height of 240 feet, DEIS, p. 3-16) to ensure that no disseminated areas of higher mineralization are contained in these piles. As for the overburden, the Mine Site Alternative does not contradict the fact noted above that overburden may contain areas of high sulfur concentration and that PolyMet does not intend to test its sulfur content before stockpiling.

For the Mine Site Alternative, an additional improbable assumption is then made that adding limestone to reactive waste rock stockpiles (Category 2, 3, 4 and lean ore) will maintain a uniform pH of 8 in order to limit metal solubility. (DEIS, pp. 4.1-135).

- ***The DEIS limits the prediction of leachates from waste rock using “concentration caps.”***

The DEIS deterministic and uncertainty analysis models both used concentration caps to place an upper limit on the leachate concentrations that would otherwise have been predicted from scaling up smaller scale waste rock/lean ore stockpiles. (DEIS, pp. 4.169, 4.1-70, 4.1-82).

The DEIS admits that the concentration caps require further evaluation and “may not be conservative as the amount of mineral surface area contacted by water passing through the full height of a waste rock stockpile is much greater than the surface area contacted by water passing through a humidity cell.” (DEIS, p. 4.1-85). The DEIS also acknowledges that the vertical infiltration (seepage) rate for the Category 1 and 2 stockpiles will be higher than predicted. (DEIS, pp. 4.13-1, 4.13-2). Yet the water quality predictions in the DEIS are based on these questionable assumptions.

- ***The DEIS’ assumptions of liner leakage do not include the potential for disruption or effective failure of liners to contain leachate.***

The Poly Met proposed design, if achieved, is asserted to result in leakage at the “low” or “average” rate. Concern regarding the ability of this system to maintain design criteria resulted in modeling a “high” liner leakage rate in the deterministic model. However, even the “high” liner leakage rate is based on defects per acre, rather than a wholesale or catastrophic failure. (DEIS, pp. 4.1-71, 4.1-75, 4.1-76). The assumptions in the uncertainty analysis regarding leakage are less transparent, but it is clear that liner failure was not among the range of probabilities analyzed. (DEIS, pp. 4.1-82 to 4.1-83).

The DEIS does not state the total volume of contaminated water proposed to be contained by each liner system for each type of waste material so that the percentage of leakage from the liners that was assumed can be transparent. This is particularly problematic given the history of catastrophic failure at the Dunka Mine and some of the AMAX test plots. (See Bruce Johnson DEIS Comments).

The proposed Mine Site Alternative makes even more questionable assumptions regarding liners. First this alternative appears to assume that tens of tons of Category 2, 3 and 4 waste rock can be removed to the east pit and the stockpiles where this material was piled “converted” to store hundreds of tons of Category 1 waste rock without tearing the liner system for the waste rock piles remaining in perpetuity. (DEIS, p. 4.1-135).

Second, the Mine Site Alternative assumes (without citation or reference) that concerns about higher rates of liner leakage no longer apply to the more reactive waste rock since the stockpiles existing for more than a decade are temporary, so groundwater quality modeling results were evaluated using only “low” and “average” liner leakage rates. (DEIS, p. 4.1-136).

The Mine Site Alternative also appears to assume that in the 10 to 20 years during which the “temporary” stockpiles of Category 2, 3 and 4 waste rock and lean ore are stockpiled, the absence of the geomembrane and overliner drainage layers in the Proposed Action would not affect oxidation, acid generation and metals leachate to groundwater from any of the stockpiles. (DEIS, p. 4.1-135). No data is provided to justify this assumption. The only cap system for waste rock in the Mine Site Alternative is a layer of soil and vegetation placed over the Category 1 rock (DEIS, pp. 3-17, 3-52)

• The DEIS calculation of exceedances from the mine site appear to be disaggregated, without providing an analysis of cumulative impacts from all project flow paths.

In addition to the above assumptions that would tend to reduce predicted water quality impacts, the PolyMet DEIS appears to disaggregate the total impacts on groundwater by analyzing each flow path from waste rock piles separately. (DEIS, pp. 4.1-79, 4.1-80, 4.1-85). It is possible that solutes from a single flow path might comply with water quality standards, while the total flow, once aggregated would not.

Mine Pit Solute Loading

Mine pits could affect groundwater quality as a result of oxidation and solutes leached from exposed pit sidewalls. Acid generating rocks (ore and Category 3 and 4 rock) are believed to comprise 65 percent of the wall rock in both the east and west pits. Mine pit blasting also

produces fractures and physical weathering creates greater hydraulic permeability, increasing oxidation of sulfates. (DEIS, p. 4.1-71). Solute loading assumptions in the DEIS are also questionable, particularly the assumption of exponential decay used in the uncertainty analysis for predicting solute loading. (See Joel Roberts DEIS Comments, pp. 5-7).

- ***The DEIS assumes that submerged wall rock or waste rock are not a source of contaminants.***

The DEIS states that submerged wall rock “is not a substantial source of contaminants.” (DEIS, p. 4.1-71). This analysis is flawed. Although it is highly probable that submerging wall rock reduces oxidation, it is virtually certain that it doesn’t eliminate leaching of metals and acid. Inundated bulk samples in Minnesota and underground mines nationally have demonstrated leaching of both metals and acid. Seasonal turn over of water, wind and wave action will raise dissolved oxygen in open pits. In addition, even if oxidation is reduced, submerged rock will leach metals far above water quality standards. (See Bruce Johnson DEIS Comments).

The Mine Site Alternative compounds the flaws in this assumption, asserting that filling the east pit with all Category 2, 3 and 4 waste rock (rather than providing liners, covers and leachate collection) will have the result of “virtually eliminating long-term sulfide oxidation and associated solute release.” (DEIS, p. 4.1-134). The modeling then assumed, without references or citations, that “all backfill rock would not oxidize further once submerged.” (DEIS, p. 4.1-137).

- ***The DEIS fails to address the solute loading attributable to exposed acid-generating rock.***

It is proposed both that the east and west mine pit will fill slowly over time and that, even when the pit lakes reach their final elevation, the water level will be 10 to 20 feet below the pit rim. (DEIS, p. 4.1-71). Although the DEIS seems to suggest that there will be a static water elevation (DEIS, p. 4.1-71), it is likely that precipitation and evaporation will cause variability in pit lake elevations, oxidizing and flushing solutes from the exposed pit rock. The DEIS fails to describe the level of solute loading from the exposed portions of the mine pits.

- ***The DEIS assumes that limestone and covering of the east pit wall will effectively mitigate solute loading, although the success of these measures is not demonstrated.***

The DEIS proposes that PolyMet will apply limestone to the pit wall rock face while backfill is being placed during pit flooding and will place overburden and a low permeability cover against the exposed Virginia Formation high wall after flooding. The DEIS admits that “successful application of this measure has not been demonstrated.” Despite the lack of evidence

of efficacy the DEIS states that the groundwater quality modeling in subsequent sections “assumes that these mitigation measures are successfully implemented.” (DEIS, p. 4.1-66)

- ***The DEIS limits predicted solute loading from mine pits using “concentration caps.”***

In addition to capping solute loading from waste rock piles, the DEIS imposes limits on the prediction of solute loading from mine pits using concentration caps (DEIS, p. 4.1-72), apparently relying short-term testing of small rock piles. No specific pH, duration or chemical composition variables are explained and no scientific literature or real world verification of this assumption is provided.

The Mine Site Alternative applied a concentration cap based on a pH of 8 (basic) to the oxidized solutes that would be leached during the flooding of the east pit, stating that lime would be added to the stockpiles or the pit if necessary. (DEIS, p. 4.1-137). The DEIS provided no empirical basis for the assumption that a uniform basic pH could be maintained in a sulfide rock stockpile or mine pit, yet its conclusions reflected markedly diminished predictions of leachate from many of the metals of greatest concern (copper, nickel, zinc, cobalt).

Wastewater Treatment Facility

The DEIS provides no information on the sulfates or solute concentrations in contaminated water entering the wastewater treatment facility (WWTF) or the specific chemical reactions and efficacy levels assumed in order to reach WWTF targets. Although the DEIS states that the WWTF will be designed for a maximum flow of 3,000 gpm, it does not disclose the volumes of contaminated waters that would be directed to the WWTF or the way in which “equalization ponds” would store contaminated water if the WWTF were operating at full capacity. (DEIS, p. 4.1-67). The DEIS, thus, provides no information from which it could be verified that WWTF effluent would attain its target concentrations and no way to estimate the size and pollutant levels of ponds storing excess contaminated water on site.

The DEIS asserts that the PolyMet DEIS “targets” for treated process water need not meet state surface and groundwater standards, “since the facility does not actually discharge directly to either surface or groundwaters.” (DEIS, p. 4.1-68) In fact, many of the salient water quality targets for the WWTF fail to meet one or more of Minnesota’s water quality standards. The pH target (6.0-9.0) exceeds the acceptable range of both the groundwater criteria and surface water standards (6.5-8.5). The total dissolved solids target (700 mg/L) exceeds the groundwater criteria (500 mg/L). Antimony (31 µ/L) and beryllium (4 µ/L) targets exceed groundwater criteria (6.0 µ/L and 0.08 µ/L, respectively). The target for lead (19 µ/L) exceeds both the

groundwater (15µ/L) and the surface water (3.2 µ/L) criteria! For several metals of concern, WWTF water quality targets exceed surface water standards as follows:

	WWTF Target (µ/L)	Surface Water Standard (µ/L) ³
Cadmium	4.0	2.5
Copper	30	9.3
Nickel	100	52
Zinc	388	120

Since effluent from the WWTF will affect both groundwater and surface water, treatment targets that exceed standards are highly problematic.

Wetlands “Treatment”

The east pit wetlands is presumed to provide secondary treatment of wastewater treatment plant effluent starting at year 20 and to provide the primary treatment of waste rock stockpile leachate after the WWTF is decommissioned. (DEIS, p. 4-111).

PolyMet’s modeling assumed wetlands removal efficiencies ranging from 50 percent “low” removal to 80-90 percent “high” removal for six key parameters (antimony, arsenic, cobalt, copper, nickel and sulfate). These assumptions are poorly supported even in the data reflected in the DEIS. Constructed wetlands achieved 0 percent arsenic reduction, and highly variable copper and nickel reduction, and reduction rates as low as 25 percent for copper and 0 percent for nickel. Performance at the Dunka Mine wetland, with similar waste rock, was highly variable with as low as 30 percent reductions in cobalt and copper and reduction of nickel and sulfate designated only as “highly variable.” (DEIS, p. 4.1-112). As noted by the tribal cooperating agencies, “the effectiveness of the passive wetland system has not been demonstrated and it is likely that the wetland treatment system would not function as the applicant has suggested.” (DEIS, p. 4.1-112).

West Pit Overflow

The DEIS modeling acknowledges that west pit overflow could exceed surface water quality standards for arsenic, cobalt, copper, nickel and selenium. (DEIS, p. 4.1-113). Concerns about the reliability of modeling used are evident in discrepancies among the data, with cobalt, copper and nickel (released at lower pH) as much as 800 percent higher in the uncertainty analysis model. (DEIS, p. 4.1-114).

Even in the case of west pit overflow, despite the continued presence of oxygen in the water and the perpetual exposure of the mine pit rim, the DEIS predicts, without citation to any

³ These figures, taken from the DEIS assume hardness of 100 mg/L.

authority, “Water quality in the West Pit is expected to improve as oxidation would be negligible once the pit walls are submerged.” (DEIS, p. 4.1-114).

Significance of Assumptions for Predicting Water Quality

In terms of the primary legal objective of an EIS – the cumulative effect of these assumptions is to contaminate all assessment of the impacts of the PolyMet NorthMet project on groundwater and surface water quality. Predictions of stockpile acid drainage and leachate, mine pit acid drainage and leachate and the ability of the wastewater treatment facility to achieve design concentrations prior to pumping to the tailings basin all affect the level of solutes at the tailings basin. (DEIS, p. 4.1-86). Prediction that concentrations of key chemicals will meet surface water quality standards at all locations at the Partridge River is based on the assumptions of solute loading from overburden, waste rock/lean ore stockpiles, mine pits and WWTF equalization ponds described above. (DEIS, pp. 4.1-109, 4.1-110).

In practice, the failure of the wetlands “passive treatment” system could require use of an active wastewater treatment in perpetuity, as discussed previously in Section A(3).

Even with all of the above assumptions that minimize predicted water quality impacts, the DEIS predicted that waste rock stockpiles in the Proposed Action have the potential to exceed groundwater criteria for antimony, manganese, nickel and sulfate and to leach solutes for over 2,000 years. (DEIS, p. 4.1-84). However, the DEIS predicts no exceedance of surface water quality standards in the Upper Partridge River, except “initially” when the west pit overflows and no surface water quality exceedances in the Lower Partridge River, Colby Lake, Whitewater Reservoir or the Embarrass River. The DEIS minimizes the exceedance of groundwater quality downgradient from the tailings basin is for aluminum. (DEIS, pp. 4.1-130).

Unsurprisingly, since the Mine Site Alternative assumed away most sources of acid drainage and metals leachate, the only remaining potential groundwater exceedance at the mine site was for antimony (DEIS, pp. 4.1-138 to 4.1-140). The DEIS could thus conclude, based on insufficient if not contrived information, that the Mine Site Alternative would significantly improve groundwater quality at the mine site as compared with the Proposed Alternative.

The Tailings Basin Alternative does not affect predictions regarding mine site impacts. (DEIS, pp. 4.1-148, 4.1-149). Assumptions regarding the Tailings Basin Alternative as well as the tailings basin disposal system are addressed in Section B(2).

The final EIS must re-evaluate the potential for acid drainage, metals leachate and solute loading carried through all of the models for water quality in the Proposed Action and the alternatives, including but not limited to the following:

- The final EIS must discuss the risks of acid mine drainage/acid rock drainage and summarize the nature of conditions at sulfide mines that increase or diminish acid production;
- The final EIS must discuss metal leachates as related to aquatic toxicity, particularly salient metals such as copper, and nickel, cobalt and zinc;
- The final EIS must model and disclose probable acid and leachate (metals and metalloids) generation from overburden, assuming the presence of uneven levels of sulfur, localized high acid and solute generation and the risks of liner rupture, potentially exacerbated by compaction;
- The final EIS must model and disclose probable acid and leachate generation from waste rock piles, assuming disseminated mineralization and non-uniform solute formation at areas of higher mineralization even in rock that has a lower average sulfur content. It should not be assumed that any category of rock or overburden will not generate some level of acids or leachates;
- Whether or not lime is applied, the final EIS models should not assume uniformity of pH throughout any waste rock pile, particularly a uniformly basic pH. The effectiveness of lime in neutralizing pH in Duluth Complex rock is known to be highly variable. (K. Lapakko, MDNR Duluth Complex Mine Waste Drainage Research, presentation 3/4/09)/
- The final EIS must disclose leachates from dissolution rate inputs without imposing “concentration caps” and must verify that results are adequately conservative by comparing levels of leachate observed in real-world sulfide mine waste rock and lean ore piles.
- The prediction of both groundwater and surface water contamination at every stage of the project must be revised based on solute concentrations that are not artificially capped.
- The final EIS must explain the differential acid and metal leachates likely to be produced in Category 2, 3 and 4 waste rock piles and the lean ore pile in the Mine Site Alternative as a result of having no geomembrane.
- The final EIS must detail the total water volumes proposed to be contained in waste rock stockpiles liners and provide a justification based on real-world experience for presumed leakage rates, including a transparent statement of the percentage of leakage assumed.
- The final EIS must also include modeling of water quality impacts based on catastrophic failure of and release from waste rock and lean ore liners and estimate the increased risk of liner failure due to removal of waste rock in the Mine Site Alternative.
- The final EIS must also explain how each alternative complies with the requirements of Minnesota’s non-ferrous rules (Minn. R. 6132.2200) stating that substantially all water should be prevented from moving through or over waste rock.
- The final EIS must address cumulative impacts on groundwater quality in addition to any separate analysis by flow path.

- The final EIS must detail, based on peer-reviewed literature and real-world experience with submerged mine walls and reactive waste rock, the levels of acid and metals likely to continue to leach and contaminate water if pit walls and waste rock are submerged.
- The final EIS must explain the levels of solute loading from pit walls above water levels, including the volume of contaminated water and the concentrations of acids and leached metals.
- The final EIS must candidly disclose the impacts of pit wall exposure on acid and leachates predicting a range of results that include inefficacy of limestone application and cover and the potential that some metals leaching would continue under a wide range of pH conditions.
- As with the waste rock pile solute caps, the final EIS must provide an analysis of solute loading from mine pits under the Proposed Action and the Mine Site Alternative without concentration caps.
- If any caps are to applied, the final EIS must provide transparent information justifying the caps given the mineralization, fragmentation and pH in the mine pits over decades and even hundreds of years. The final EIS may not assume a uniform pH of 8 throughout a mine pit in which reactive waste rock has been disposed.
- The final EIS must provide detailed information on the volume and characteristics of all inputs to the wastewater treatment facility, including solute concentrations and the treatment efficacy levels and treatment methods proposed to achieve WWTF targets.
- Unless specific proof is provided that a proposed secondary treatment will reduce pollutants to a level sufficient to meet both surface and groundwater standards, the final EIS must demonstrate that WWTF effluent will meet all groundwater and surface water quality standards.
- The final EIS must explain the size, construction and chemical composition of ponds storing contaminated water at the WWTF, including the extent of seeps to groundwater, the surficial aquifer or discharge to wetlands or surface waters likely to result from this storage.
- The final EIS must revise modeling of water quality impacts to reflect inefficacy of constructed wetlands to remove pollutants of concern, including copper, nickel, arsenic and sulfates as well as mercury.
- The final EIS must discuss the impacts of potential exceedances, including exceedances of iron, manganese or aluminum, on human health and on aquatic life. The need for this data was specifically highlighted by the EPA. (USEPA, PDEIS Comments, pp. 3-4).

B(2) The EIS Must Re-examine the Assumption that Dumping Contaminated Effluent and Tailings on top of Existing LTVSMC Tailings will Reduce Pollutants and Achieve Compliance with Water Quality Standards.

SUMMARY

The DEIS relies heavily on the assumption that releasing high volumes of polluted water to the existing LTVSMC tailings basin at the plant site will reduce concentrations of pollutants. Seeps

to groundwater and surface discharge from this huge dumping area have historically exceeded water quality standards for mercury and various other metals, hardness and pH, and continue to discharge high levels of sulfates. The DEIS proposes that wastewater effluent and flotation processing constituents will no longer exceed water quality standards or leach metals once they are disposed of on top of other tailings that currently seep sulfates. This illogical but convenient assumption should be replaced, in the final EIS, with realistic predictions considering historical data, impacts of existing LTVSMC seepage and the volume and chemical concentrations of both wastewater effluent and tailings from the processing plant.

DISCUSSION

The concentration of acids, metals and metalloids in seepage from the PolyMet NorthMet tailings basin is a critical aspect of water quality. The DEIS proposes that effluent from the wastewater treatment facility and flotation tailings from the processing plant will be discharged on a section of the LTVSMC tailings basin (DEIS, p. 4.1-7). At least 95 percent of the ore mined (91,000 tons per day) is likely to end up as tailings, mixed with water and finely ground, thus increasing the likelihood of solute release. (Joel Roberts DEIS Comments, p. 13). Poned water from the hydrometallurgical residue facility may also be disposed of at the tailings basin after treatment at an unspecified mobile temporary treatment unit, adding additional chemical contaminants. (DEIS, p. 3-46).

The underlying LTVSMC tailings basin is not lined and PolyMet does not propose to line its tailings basin. (DEIS, p. 4.1-87). Under current conditions, groundwater seepage from the LTVSMC tailings basin exceeds aquifer flux capacity, resulting in upwelling of groundwater to the surface. (DEIS, p. 4.1-7). Groundwater seepage from LTVSMC tailings and NorthMet tailings would exceed aquifer capacity and well up to the surface under either the Proposed Action (and the Mine Site Alternative) or the Tailings Basin Alternative. (DEIS, pp. 4.1-63, 4.1-64, 4.1-149). Tailings basin embankments do not have a clay core or cutoff, allowing for surface seepage through the embankment and groundwater seepage under the embankment. (DEIS, p. 4.1-29). Most tailings basin seeps drain to the Embarrass River, but some also drain to the headwaters of Second Creek, a tributary of the Partridge River. (DEIS, p. 4.1-63).

The DEIS does not explicitly state the volume and concentrations of solutes in flotation tailings or wastewater effluent that would be disposed of in the tailings basin. Flotation tailings may contain flotation activators, such as copper sulfate, which is toxic to fish and other processing chemicals as well as solutes and acids. (DEIS, pp. 3-24, 4.12-6). Even if proposed targets for WWTF effluent were to be met, effluent inputs to the tailings basin would not meet surface water quality standards for pH, cadmium, copper, nickel, zinc and lead, would not meet groundwater criteria for pH, total dissolved solids antimony, beryllium or lead and would have

high sulfate levels. (Section B(1) *supra*). WWTF effluent would also have mercury levels exceeding surface water quality standards, as explained in Section B(5).

The DEIS explicitly excludes liner leakage from the hydrometallurgical residue cells within the tailings basin from groundwater modeling of the area north of the tailings basin in the Proposed Action (DEIS, p. 4.1-64, 4.1-91). Hydrometallurgical cell liner leakage will have very high sulfate concentrations – over 7,300 mg/L (DEIS, p. 4.1-118). Although the DEIS does not describe the chemical composition of hydrometallurgical residue cells and liner leakage, materials used in the hydrometallurgical plant process include toxic, corrosive and hazardous chemicals as well as the non-recoverable metals from the wastewater treatment process. (DEIS, pp. 3-30, 3-33, 4.12-1, 4.12-5, 4.12-6, Section A(6), *supra*).

Existing LTVSMC tailings seeps result in surface water exceedances, contribute to downgradient groundwater quality violations and contain high concentrations of sulfates. Surface discharges from the tailings basin violate water quality standards for pH, hardness and mercury and have concentrations of sulfate as high as 473 mg/L. (DEIS, p. 4.1-43, Table 4.1-30). Downgradient wells from the LTVSMC tailings violate standards for pH, aluminum, beryllium, iron, manganese and mercury and have concentrations of sulfate ranging to 235 mg/L, approaching groundwater limits. (DEIS, p. 4.1-15, Table 4.1-8). LTVSMC tailings represent a significant source of sulfate and arsenic loadings. (DEIS, p. 4.1-168).

Paradoxically, despite the proposed addition of a high volume of contaminants to a tailings basin already seeping and discharging sulfates and metals, the PolyMet DEIS predicts no exceedance of surface water quality standards in the Proposed Action other than for aluminum, which the DEIS explains away (DEIS, pp. 4.1-118, 4.1-119, and none in the Tailings Basin Alternative except for thallium, the significance of which is minimized. (DEIS, p. 4.1-155). The DEIS asserted that the Proposed Action would have “relatively little” adverse effect on downgradient groundwater quality. (DEIS, p 4.1-93)

Tribal cooperating agencies have strongly objected to the modeling of tailings basin seepage and its illogical results:

It is the Tribal cooperating agencies’ position that the existing LTVSMC tailings are contributing substantially to the level of constituents observed in the groundwater. Unfortunately the modeling of PolyMet contaminants at the basins does not take these or other existing constituents adequately into account (RS74 and TB-14). The result of this oversight is that the contaminant modeling done by PolyMet comes to the illogical conclusion that seepage water from PolyMet, after passing through both LTVSMC and PolyMet tailings, will be cleaner than the existing seepage that is passing only through

the LTVSMC tailings. According to PolyMet's consultant "the predicted concentration of seepage from the PolyMet basin is lower than the actual measured concentration of existing seepage". (TB-14, page 9). It is unclear how the addition of mine waste to the basins would cause seepage water quality to improve. (DEIS, Tribal Positions, p. 4.1-16)

Tribal cooperating agencies take the position that the contaminant modeling for the project has not been adequately vetted and consequently produces results that are illogical. For example, the contaminant modeling for the tailings basins (RS74B and TB-14) proposes that adding PolyMet tailings to the existing LTVSMC tailings will improve the quality of seepage coming from the basins for some parameters. The assumption (TB-14 of July 2, 2009, page 9) that PolyMet seepage water from the basins will be of better quality than the current seepage water results in an unexpected modeling result. The modeling proposes that the more PolyMet seepage that PolyMet releases from the basins, the better the water quality will be for Al, Mn and Fe in the Embarrass River (see Tables in TB-15 of June 24, 2009). It appears that the modeling at the basins does not appropriately account for leaching from the LTVSMC tailings when predicting future seepage quality. (DEIS, Tribal Positions, pp. 4.1-50 to 4.1-51)

Although the nature of the modeling exercise used in the DEIS is not transparent, several assumptions may contribute to its paradoxical result:

- ***LTVSMC contribution not characterized.***

PolyMet would be legally responsible for any seepage from LTVSMC tailings and NorthMet and LTVSMC tailings would be physically and chemically combined. As suggested by tribal agencies, the variable pH, increased sulfates and other solutes in LTVSMC leachate must be considered in determining the level of acids, metals and metalloids that would seep from combined wastes in the tailings basin.

- ***Modeling assumes no oxidation of saturated tailings.***

The NorthMet tailings would be deposited with a spigot and a diffuser, which could oxygenate tailings. (DEIS, p. 4.1-87). Yet, as with submerged pit rock, the DEIS assumes that tailings that are saturated with water would be "essentially non-reactive" (DEIS, p. 4.1-86) and that the oxidation rate would be reduced to "essentially 0." (DEIS, p. 4.1-89). No references to either literature or real-world examples are provided to support this assumption. The DEIS model also assumes no segregation of tailings, although it is known that some segregation will occur and increase oxidation. (DEIS, p. 4.1-94).

- ***Modeling assumes sulfur content of tailings is below levels that produce acid drainage.***

The DEIS states that the sulfur content needed to produce acid drainage is between 0.14 percent and 0.17 percent sulfur, and then models releases from the tailings basin based on the average range of sulfur in pilot testing of the processing plant design (range of 0.10 percent to 0.13 percent), which just barely stays below this limit. (DEIS, p. 4.1-86). However, even in the

small scale plant testing, it is acknowledged that some of the tailings exceeded 0.13 percent, so that tailings could produce lower pH and higher release of nickel and cobalt. (DEIS, p. 4.1-95). It appears that the DEIS predictions may assume that sulfur in the tailings basin is below the threshold for acid drainage. Particularly since impacts of sulfates from wastewater effluent, hydrometallurgical liner leakage or LTVSMC tailings are not referenced, the DEIS may artificially limit levels of sulfur and leachate in tailing basin materials.

• ***Modeling may be unreliable.***

For the Proposed Action, the DEIS steady state flow model predicted potential exceedances of groundwater standards for aluminum, antimony, arsenic, fluoride, iron, manganese, and sulfate. (DEIS, p. 4.1-92). The DEIS then altered assumptions in a “transient flow” analysis to predict lower concentrations, suggesting that monitoring would be used to “ensure that actual groundwater concentrations are within model predictions.” (DEIS, pp. 4.1-92, 4.1-93). It appears in this section that modeling assumptions were designed to achieve a prediction of no exceedances and that there is little confidence in its reliability. A similar “transient flow” model is applied for the Tailings Basin Alternative, with similarly sanguine results. (DEIS, pp. 4.1-151, 4.1-152)

DEIS applications of surface water quality standards to tailings basin seepage also require greater transparency. Looking at a single parameter, surface water quality standards for copper, the DEIS cites water quality standards at two locations on the Embarrass River in predictions for the Proposed Action (DEIS, p. 4.1-119, Table 4.1-66), but cites only the less stringent standard (20.7 mg/L at P-13) for the Tailings Basin Alternative (DEIS, p. 4.1-158, Table 4.1-84). The DEIS does not apply a surface water standard for tailings basin seepage even though the seepage would be *directly discharged* to the Partridge River under the Tailings Basin Alternative. Even under the limiting assumptions in the DEIS (as described above) tailings basin seepage would have maximum copper concentrations of 12µg/L to 14 µg/L, exceeding copper standards applied by the DEIS to the Partridge River. (DEIS, pp. 4.1-151, Table 4.1-79; p. 4.1-36, Table 4.1-24 hardness condition of 100 mg/L).

DEIS Comments prepared by Joel Roberts reflect flaws and inconsistencies in the technical reports pertaining to the tailings basin. Models are poorly documented, poorly validated and may exclude captured seeps to exclude solute pollution. (Joel Roberts, DEIS Comments, pp. 9-13). The modeling assumptions for the tailings basin seem to be designed to conceal rather than evaluate potential impacts on water quality. This section of the DEIS must be revised prior

to the final EIS as follows:

- The nature and extent of contamination from the LTVSMC must be characterized through sampling as well as monitoring and considered as potential additive releases;
- The volume and concentrations of inputs to the tailings basin from WWTF effluent must be quantified;
- The volume and concentrations of inputs to the tailings basin from the plant must be quantified, including the volume and chemical composition of flotation tailings and volume and chemical composition of leaks from the hydrometallurgical residue facility;
- Assumptions for tailings basin seepage should include conservative and “worst case” scenarios such as failure of WWTF effluent to meet target concentrations and liner leakage or liner failure from hydrometallurgical residue cells;
- Modeling of the level of acid generation and metals leachate must not assume saturated tailings have “zero” reactivity, but must use predictions grounded in experience and literature, anticipating segregation of tailings and oxidation within the tailings, as well as modeling oxidation through unsaturated areas.
- Modeling must not assume that tailings will remain uniformly below 0.14 percent sulfur or uniformly non-acid generating. Predictions must be based on a transparent and realistic range of potential pH from all inputs to the tailings basin, including the virtual certainty that pH will not be uniform throughout the entire tailings facility.
- Chemical interactions between existing LTVSMC tailings and NorthMet inputs must be characterized for the full range of chemicals of concern. If the way in which most sulfide minerals react with existing tailings provides no “treatment” other than dilution, this result must be disclosed and appropriate regulatory limits on discharge applied.
- Seepage from the tailings basin must be compared with both groundwater and surface water quality standards, applying the most stringent applicable standard.
- The potential ecological and/or human health consequences of exceedances of water quality must be explicitly described. Ecological consequences must include aquatic toxicity and human health consequences must evaluate both mercury methylation in fish and effects of exceedances, including aluminum, iron and manganese, in residential wells not subject to public water quality treatment.

B (3) The EIS Must Address Fatal Flaws in the Analysis of Basic Hydrology that Affect all Predictions of Adverse Impacts on Water Levels, Flows, Wetlands and Water Quality.

SUMMARY

Tribal cooperating agencies have identified in substantial detail what they characterize as “fatal flaws” in water resources analysis due to inadequate baseline data at the mine site and tailings basin site and a lack of data for waters outside the mine footprint. Inaccurate hydrological models minimize the groundwater-surface water connection, and affect the analysis of impacts of the PolyMet NorthMet project on surface water quality, surficial aquifers, changes in river flows, water levels, water level fluctuations and wetlands impacts. To the extent that modeling, in this

case with the MODFLOW and XP-SWMM methodology, is not based on sufficient and specific quantitative data in the particular watersheds impacted by the PolyMet project, its predictions are scientifically unreliable and legally inadequate.

DISCUSSION

Flaws in the basic hydrology models affect all predictions of adverse impacts from the PolyMet NorthMet project on water levels, flows, fluctuations, wetlands and water quality. The MODFLOW model was used in the DEIS for modeling of groundwater quality impacts (DEIS, p. 4.1-56) and the effects of the proposed action on surface water quality were based on the hydrology predictions of the XP-SWMM model. (DEIS, p. 4.1-108).

A key assumption made throughout the DEIS is the lack of strong hydraulic connectivity between bedrock and surface water at the mine site. (See e.g. DEIS, p. 4.1-57). This assumption affects predictions of the impact of groundwater contamination at the mine site on the surficial aquifer, wetlands and other surface waters. This assumption also affects predictions regarding the nature and extent of impacts of groundwater appropriations at the mine on wetlands, the Partridge River, Colby Lake and the Whitewater Reservoir.

Applying basic common sense, the PolyMet project would seem to have a potential for very substantial impacts on water flows, levels and fluctuations. The mine site will remove surface runoff on 2.4 square miles draining to the Partridge River as a result of waste rock stockpiles and mine pits. (DEIS, p. 4.1-98). Mine dewatering will further reduce groundwater inflow to the Partridge River as would installing a seepage barrier at the tailings basin headwaters of Second Creek, a Partridge River tributary. (DEIS, pp. 4.1-98, 4.1-106) The NorthMet plant will require withdrawal of water from Colby Lake for plant make-up water requiring pumping from the Whitewater Reservoir. The project would also alter flows to the Embarrass River due to tailings basin seepage.

Even with the DEIS' incomplete modeling, reduction in flow in the Upper Partridge River would range from 8 percent to 27 percent by month and minimum flows could be reduced by over 20 percent in some areas. (DEIS, p. 4.1-100, SW-004; DEIS, p. 4.1-102). The surficial aquifer around the east and west pits would be lowered by 10 to 20 feet, reducing the base flow and velocity of the Upper Partridge River. (DEIS, p. 4.1-102). Withdrawal of water from Colby Lake for plant make-up water would reduce water levels in the Whitewater Reservoir by 9.87 feet in low flow conditions and result in shoreline retreat of as much as 250 feet in coves under a demand scenario predicted to be exceeded at least 10 percent of the time. (DEIS, pp. 4.1-104, 4.1-105). Combined project impacts would reduce flows in the Lower Partridge River by an

average of 9 percent. (DEIS, p. 4.1-106).

The DEIS admits that the MODFLOW model was not developed to accurately predict drawdown in the surficial aquifer or the impact, if any, such drawdown would have on adjacent wetlands and surface waters and would not necessarily be accurate for that purpose (DEIS, p. 4.1-60, 4.1-63). However, the DEIS, overall, asserts that impacts on Upper Partridge River morphology and sedimentation would not be significant (DEIS, pp. 4.1-102, 4.1-103) and that increased water level fluctuations at the Whitewater Reservoir would be “minor,” (DEIS, p. 4.1-106). The project could reduce flows in the lower Partridge River downstream of Colby Lake. (DEIS, p. 4.1-106). Although no detailed modeling was done, effects on the Embarrass River are dismissed as “negligible.” (DEIS, pp. 4.1-106, 4.1-107).

Tribal cooperating agencies provide support for their position that the water resources modeling used in the DEIS to draw conclusions regarding water quality and water resources impacts is fatally flawed and inadequate. Excerpts of tribal positions are provided below:

It is the tribal cooperating agencies position that there are several fatal flaws in the water resources section. (DEIS, Tribal Findings, p. 4.1-1)

It is the tribal cooperating agencies’ position that the baseline data for both the Mine Site and the Tailings Basin are inadequate. The baseline data for both the mine site and the tailings basin are sparse. A comparison of hydrologic data that was collected for two other projects in the region (GLIFWC letter to Jon Ahlness and Stuart Arkley, February 6, 2009) demonstrates that the PolyMet project is data-poor in the area of basic hydrology. The use of flow data on the Partridge River from a site twenty years and seventeen miles distant from the proposed project does not provide sufficient information to allow a full assessment of the hydrologic and environmental impacts of the project on the Partridge River. (DEIS, p. 4.1-21)

It is important to note that the MODFLOW model was developed to assess the rates of mine pit inflow and as such, the results it gives for areas outside the mine pit footprint are unsupported by data. (DEIS, p. 4.1-50)

It is the position of the tribal cooperating agencies that hydrologic characterization using MODFLOW models was done for the immediate area of the mine pit and the tailings pile only. There are no groundwater models that were designed to characterize the watertables, the potentiometric surface in the aquifers, fluxes to rivers and streams or to predict impacts to the water tables or surface waters. The MODFLOW groundwater model at the tailings area is restricted to the tailings pile and cannot be used to characterize groundwater flow direction, the watertables, the potentiometric surface in the aquifers, fluxes to rivers and streams or to predict mounding impacts to the water tables or surface waters. Data driven models need to be developed and these impacts need to be predicted and evaluated. (DEIS, p. 4.1-57)

The view that mine pit dewatering impacts will be very limited or non-existent is based on the assumption that there is little or no connection between the bedrock and surficial aquifers. However, the scant data that does exist characterizing mine site hydrology suggests that there may be substantial connection between the bedrock and surficial aquifers. Such a connection would mean that dewatering of the mine pits could cause significant drawdown of the watertable in the surficial aquifer. (DEIS, Tribal Positions, p. 4.1-59, references omitted)

It is the tribal cooperating agencies' position that in order to adequately predict potentially significant environmental impacts, hydrogeologic data must be collected that can be used as input to a MODFLOW model. Tribal cooperating agencies contracted with the United States Geological Survey (USGS) to review the uncertainty of the MODFLOW model and provide recommendations on how the model could be improved. . . The conclusions of the report and the meetings should be implemented so as to produce a useful model of project site hydrology. (DEIS, p. 4.1-61)

It is the position of the tribal cooperating agencies that, as previously indicated, the empirical observations in the Adams 2009 email are insufficient to support the conclusions in the paper. Vegetation data suggest that a significant groundwater-surface water connection exists. It is the tribal cooperating agencies' position that a more robust groundwater model must be developed for this project in order to adequately characterize the potential impacts of the various project alternatives to natural resources. (DEIS, p. 4.1-61)

Analysis of underlying technical documents by individual WaterLegacy members reflects identical concerns about the extreme sparseness of the data and the lack of proof for extremely low hydrologic conductivity rates, which are orders of magnitude below those accepted for Duluth Complex. (Joel Robert DEIS Comments, pp. 2-5). It is troubling that the DEIS would rely on a consultant's email for conclusions about groundwater-surface water connections. It is even more troubling that the DEIS failed to provide information regarding reports and recommendations made by the United States Geological Survey in connection with this project. These omissions not only undermine the modeling on which the entire DEIS is based, but the fundamental requirements of public information and disclosure.

The final EIS must be based on a rigorous and data-based hydrological model at the mine site, the plant site and impacted surface and groundwaters. Prior to the final EIS, the additional assessment, monitoring and characterization needed to accurately determine impacts on groundwater, surface water and hydrology must be performed, as recommended by the U.S. G.S. (See U.S.G.S. Minnesota Water Science Center, Quarterly Progress Report, February 25, 2009, Project 8607CEW) and tribal cooperating agencies, including but not limited to the following:

- Identify, map and characterize major bedrock fractures at the mine site, identifying potential critical areas of ground-water flow between mine workings and local streams. Focus on areas where the effects of mining would have the greatest impact;
- Design a monitoring-well network to assess ground-water-flow in fractures and bedrock fractures and in more permeable glacial sediments. Use borehole tools to characterize ground-water conditions in fractures and perform a series of tracer tests to establish flow conditions along important flow paths of concern;
- Conduct aquifer testing and other hydrogeologic tests using a monitoring well network to determine whether a porous-media simulation could represent groundwater flow at the scale

of the mine site. (Recalibrate and validate models and incorporate high hydraulic conductivity features before model results are used for any ground-water-flow prediction or any geochemical modeling);

- Assess vertical flow conditions between upper bedrock and glacial material based in the most critical areas of concern (shortest paths of flow between the project site and crucial water resources and habitats, and the orientation of major fracture patterns at the site);
- Use geophysical surveys to map and borings and hydrologic tests to assess the extent and hydrogeology of glacial deposits and permeable glacial sands. Modeling based on lesser estimates of specific yield would affect predictions of water entering the mine and recovery after cessation of mine dewatering.
- Perform current assessment of Partridge River and Embarrass River flows based on field collection of data, current and proximate stream gage information and variability of weather and precipitation, including low flow conditions;
- Analyze groundwater flow direction, water tables, the extent to which water in aquifers can rise due to hydrostatic pressure (potentiometric surface), fluxes to wetlands, streams and rivers impacted by the mine site and the tailings basin.
- Update and verify assessment of impacts on wetlands as well as groundwater and surface water impacts from the mine site;
- Update and verify assessment of groundwater impacts on residential wells as well as impacts on wetlands surface waters from tailings basin seepage;

B(4) The EIS Must Analyze West Pit Potential to Violate Water Quality Standards Consistent with Law and Assess Pit Water Impacts on Wildlife, Including Migratory Birds.

SUMMARY

The pit lake proposed to be located in the west pit after closure would violate water quality standards. The DEIS inappropriately cites dilution of mercury concentrations from pit lake overflow in a “mixing zone” to downplay violation of mercury standards. The DEIS contains no analysis of the nexus between the pit lake and navigable waters from seepage, fails to analyze impacts on wildlife, including migratory birds and fails to propose mitigation of water quality violations within the pit lake itself. These deficiencies are contrary to law and must be rectified before the final EIS is released.

DISCUSSION

The DEIS acknowledges the probability that west pit lake at the PolyMet NorthMet mine site will exceed water quality for arsenic, cobalt, copper and nickel and contain significant sulfate levels. (Polymet DEIS, p. 4.1-111, p. 4.1-114, Table 4.1-64). West pit lake overflow is also likely to exceed mercury water quality standards. (DEIS, 4.1-115). The DEIS addresses this concern by suggesting that the unnamed tributary to which the west pit would discharge would essentially function as a “mixing zone” so that, even if water quality standards may be exceeded,

the water quality from the west pit overflow would be sufficiently diluted so that it would not result in exceedances at a sampling site on the Partridge River. (DEIS, p. 4.1-103).

This analysis is completely inappropriate for mercury pollution. No mixing zones are allowed under either federal or state regulations for new discharges of bioaccumulative chemicals of concern into Great Lakes waters, including all waters impacted by the proposed PolyMet project. (40 C.F.R. § 132, Appendix F, Procedure 3; Minn. R. 7052.0210, Subp. 3).

For other water pollutants, the Clean Water Act applies not only to a down-stream sampling site in the Partridge River, but would require compliance in streams (including intermittent streams) and wetlands that are connected with the Partridge River, which are also legally waters of the United States. (40 CFR § 122.2).

Violation of water quality and nondegradation standards, thus, can consider no dilution for mercury and must apply to the nearest unnamed receiving water for all pollutants. The final EIS must analyze violation of water quality and nondegradation standards resulting from west pit lake overflow allowing no mixing zone for mercury and assessing impacts of all pollutants at the nearest receiving waters.

It is also likely that the west pit lake itself would be protected by water quality standards under the Clean Water Act and under Minnesota law, as suggested by the tribal cooperating agencies. (DEIS, Tribal Positions, p. 4.1-103). This is particularly salient since the pit lake could exceed surface water quality standards for thousands of years, if not in perpetuity. (DEIS, Tribal Positions, pp. 4.1-101, 4.1-130)

The weight of precedent holds that pit lakes can be regulated under the Clean Water Act if there is a "significant nexus" to waters that are navigable. A Circuit Court found a significant nexus between an on-site quarry pit sufficient to apply the CWA where pit waters seeped into a navigable river and significantly affected the physical, biological, and chemical integrity of the river. *Northern California River Watch v. Healdsburg*, 496 F. 3d 993, 995 (9th Cir. 2007), *cert. denied* 128 S. Ct. 1225 (2008). Although Army Corps of Engineers jurisdiction may not extend to an isolated pit solely due to the impact on migratory birds, state regulation under the Clean Water Act, may still apply. *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, 531 U.S. 159, 167, 171, 121 S. Ct. 675 (2001). Under Minnesota Rules, numerous mine pit lakes are classified as waters of the state (Minn. R. 7050.0470, Subp. 1), to which water quality standards, including Great Lakes Initiative mercury standards would apply. (*See*

Minn. R. 7050.0222, Subp. 3; 7052.0100, Subp. 4. GLI mercury standards are applicable, for example, to State 2Bd waters).

As part of its assessment of water quality standards, the final EIS must: 1) describe the nexus between proposed west pit lake overflow and seepage to streams and wetlands draining into Partridge River; 2) evaluate water quality parameters and violation of water quality standards in the west pit lake, its seeps and overflow; and 3) analyze the adverse impact of water quality violations on aquatic life and water fowl exposed to the pit lake, including but not limited to piscivorous and migratory birds. (See DEIS, Tribal Positions, p. 4.4-17).

The United States Environment Protection Agency has repeatedly found draft EISs to be deficient or objectionable due, in part, to their failure to address concerns pertaining to acid rock drainage in pit lakes and the impacts of pit lake pollution on wildlife:

EIS No. 20050087, ERP No. DS-BLM-K67038-NV, Ruby Hill Mine Expansion--East Archimedes Project, Extension of Existing Open Pit and Expansion of Two Existing Waste Rock Disposal Areas, Plan-of-Operations Permit, Eureka County, NV. Summary: EPA expressed environmental concerns about the potential impacts of pit lake water quality on aquatic life and water fowl, heap leach closure, and surface water diversion structure design and maintenance, and recommended the Final SEIS provide additional information and identify additional mitigation. Rating EC2. (Fed. Reg. Vol. 70, No. 092, May 13, 2005, 70 FR 25565).

EIS No. 20070368, ERP No. DS-BLM-K67052-NV, Newmont Gold Mining, South Operations Area Project Amendment, Updated Information on the Cumulative Effects Analyses, Operation and Expansion, Plan of Operations, Elko and Eureka Counties, NV. Summary: EPA continues to have environmental objections to the project because of its potential significant adverse impacts to water quality and the lack of sufficient measures to ensure against acid rock drainage. We recommend the final SEIS provide additional information regarding mine geochemistry, measures to prevent acid drainage, mitigation for potential impacts to pit lake water quality, water quality monitoring, mercury emissions and controls, and financial assurance. Rating EO2. (Fed. Reg. Vol. 72, No. 245, December 21, 2007, 72 FR 72706).

EIS No. 20080518, ERP No. D-BLM-K67058-NV, Bald Mountain Mine Northern Operations Area Project, Proposes to Expand Current Mining Operations at several Existing Pits, Rock Disposal Areas, Heap Leach Pads, Processing Facilities, and Interpit Area, Combining the Bald Mountain Mine Plan of Operations Summary: EPA expressed environmental objections because waste rock from several pits could generate leachate with high concentrations of metals and metalloids, and degrade water quality if the leachate should reach groundwater or surface waters, or if pit lakes would form. Also, EPA expressed concerns about potential impacts to air quality and the lack of suitable soil for reclamation. EPA recommends the additional information on waste rock geochemical characterization, potential impacts to water and air resources, mitigation and monitoring, and closure and reclamation. Rating EO2. (74 FR 50964 Federal Register / Vol. 74, No. 190 / Friday, October 2, 2009 / Notices)

B(5) The EIS Must Accurately Analyze the Potential for Mercury Discharge given the Inefficacy of Proposed Treatments to Reduce Mercury.

SUMMARY

Despite the critical importance of mercury water quality in the waters impacted by the PolyMet NorthMet project, all of which are Lake Superior Basin waters currently impaired for mercury, the DEIS provides incomplete and misleading information on predicted mercury discharge and predicted water quality impacts of the Project with respect to mercury. The final EIS must accurately and candidly analyze the potential for mercury releases exceeding water quality standards, given historical tailings basin discharge levels and inefficacy of proposed treatments in removing mercury.

DISCUSSION

All of the waters impacted by the PolyMet NorthMet mine and plant are within the Lake Superior Basin (DEIS, p. 4.1-33) and subject to the Great Lake Initiative amendment to the Clean Water Act and the federal and state regulations implementing the Great Lakes Initiative. (Minnesota Rules, Chapter 7052; Code of Federal Regulations, title 40, part 132).

No new mercury discharge to these waters may exceed 1.3 ng/L. (Minn. R. 7052.0005). Although the Scoping Decision for the project suggests the potential for a variance if PolyMet discharge could not achieve this standard (DEIS, Final Scoping Decision, *supra*, p. 17), federal and state law prohibit variances for new discharges of mercury within the Lake Superior Basin. (40 C.F.R. §132, Appendix F, Procedure 2; Minn. R. 7052.0280). All discharges to surface waters from the project must comply with the Great Lakes Initiative mercury concentration limit.

The DEIS does not clearly identify all of the ways in which the PolyMet NorthMet project could discharge mercury to surface waters. It is acknowledged that west pit overflow would be a discharge required to meet the Great Lakes Initiative mercury standard. (DEIS, p. S-9). However, there are other aspects of the Project that are likely to be considered discharge under the Clean Water Act. Under applicable law, collected and channelized runoff, process water, pumped water from mine dewatering and waters discharged after treatment in the wastewater treatment facility would all be viewed as point source discharge if they were either directly released to the Partridge River, as in the tailings basin alternative, or if they seeped or leaked from channels, basins or pits into wetlands, streams, rivers or other surface waters.

The DEIS fails to appropriately and transparently characterize the level of mercury in each of these potential discharge sources. This deficiency should be rectified in the final EIS.

Even based on the incomplete data in the DEIS, it is likely that discharges from some or all of these sources would violate Great Lakes Initiative discharge standards. The DEIS does not

provide a numeric prediction for the concentration of mercury within the west pit lake and the summary of west pit water quality post-closure contains no data for mercury. (DEIS, Table 4.1-64, p. 4.1-114). However, the DEIS repeatedly admits “some uncertainty” as to whether west pit lake overflow would meet the Great Lakes Initiative standard for mercury. (DEIS, pp. S-9, 4.1-124, 4.1-146). Rather than provide clear and transparent data on this issue of human health and heightened public concern, the DEIS suggests that if it were later discovered that the discharge violated water quality standards, this impact could be mitigated if it occurred. (DEIS, pp. 4.1-130, Table 4.1-68, 4.1-147, Table 4.1-77, 5-8). Deferring analysis of mercury discharge violations until after a project is constructed with a vague promise of mitigation would violate the Clean Water Act as well as environmental review requirements under the National Environmental Policy Act (NEPA) and the Minnesota Environmental Policy Act (MEPA).

In numerous tables in the DEIS predicting water quality as well as the table predicting wetland removal efficiencies, data on mercury is conspicuously absent: (See Table 4.1-62 Predicted Water Quality along the Upper Partridge River for the Proposed Action, DEIS, p. 4.1-1; Table 4.1-63 Estimated Wetland Removal Efficiencies, DEIS, p. 4.1-112; Table 4.1-64 Summary of West Pit Water Quality at Post-Closure under Proposed Action, DEIS, p. 4.1-114; Table 4.1-65 Predicted Water Quality at Colby Lake for the Proposed Action, DEIS, p. 4.1-116; Table 4.1-66 Predicted Water Quality along the Embarrass River for the Proposed Action, p. 4.1-119). The final EIS must include specific data with transparent methodology estimating mercury water quality.

The EIS must evaluate the level of mercury in seeps and discharges from pit lakes and constructed wetlands, recognizing that neither the wastewater treatment facility (WWTF) nor the constructed wetlands will be consistently effective in removing mercury. (DEIS, pp. 4.1-123, 4.1-128). The average mercury concentration in drainage before treatment at the WWTF is predicted to be 8.5 ng/L, while the average after treatment is predicted to be 7.1 ng/L (DEIS, p. 4.1-123) both of which levels are far above the 1.3ng/L limit. As far as constructed wetlands:

There is very limited data regarding the effectiveness of constructed wetlands in removing mercury. Experimental data indicate low removal rates of mercury in natural wetlands receiving municipal effluent. The available water quality monitoring at the Dunka Mine constructed wetlands, showed total mercury removal rates varying from 0 to 75. Based on the scientific literature, the constructed wetlands would be expected to be variably effective in removing total mercury, and could function as a source for methylmercury production.” (DEIS, 4.1-123, citations omitted).

The DEIS' reliance on dumping mercury-containing runoff water through the tailings basin to reduce mercury concentrations in seeps to below the 1.3 ng/L GLI standard, based on laboratory bench studies (DEIS, p. 4.1-124), is not consistent with real world data on mercury seeps and discharge. Testing of the groundwater beneath the existing LTVSMC tailings basin shows substantial exceedances of the GLI standard ranging from 4.2 ng/L to 7.7 ng/L (DEIS, p. 4.1-12, Table 4.1-6). Surface discharge from the tailings basin also shows repeated and significant exceedances of the GLI standard, ranging from 2.6 ng/L to 5.5 ng/L (DEIS, p. 4.1-43, Table 4.1-30). As noted by the tribal agencies, bench studies fail to take the impacts of leaching from existing tailings; their conclusions have not been adequately vetted and are illogical. (DEIS, Tribal Positions, pp. 4.1-16, 4.1-50 to 4.1-51).

After treatment at the WWTF, PolyMet process water and runoff are predicted to have mercury concentrations of 7.1 ng/L (DEIS, p.4.1-123). Inputs of mercury are predicted to include 107.5 pounds per year from concentrations in the ore and 5.5 pounds per year from process materials (DEIS, p. 4.1-124). There is no basis in this data from which it could be reasonably concluded that adding WWTF effluent would reduce mercury in tailings basin seeps.

The final EIS must also include a comprehensive analysis of mercury discharge to surface water and seeps to groundwater from the tailings basin based on realistic data. Groundwater modeling of the area surrounding the tailings basin must also include the mercury and sulfate load from the hydrometallurgical residue, which appears to have been excluded in the current analysis. (DEIS, p. 4.1-64).

B(6) The EIS Must Include a Comprehensive, Cumulative Analysis of Impacts of Point and Nonpoint Discharges, Emissions, Hydrological Changes and Sulfates on Mercury and Methylmercury under Applicable Law.

SUMMARY

The wetlands, streams, lakes and rivers into which the PolyMet NorthMet project would discharge mercury are waters that are impaired for mercury within the Lake Superior watershed and are subject to both Clean Water Act and Great Lakes Initiative laws and regulations that prevent new discharge of bioaccumulative chemicals, such as mercury, into impaired waters where the discharge, including operation of the facility would cause or contribute to violation of water quality standards, including Minnesota's health-based fish tissue standard. Before any detectable mercury discharge can be allowed in such waters, a quantitative, comprehensive and cumulative assessment must be made of both point sources and nonpoint source impacts on mercury in fish tissue within the watershed, including mercury discharge to water, mercury air emissions, sulfate discharge to water, sulfate air deposition and acidification, wetlands stockpiling and hydrologic changes resulting from the PolyMet project and foreseeable impacts to the watershed to determine not only waste load allocations, but that compliance schedules are in place that will allow the waters to attain water quality standards. This analysis, which is not

provided in the DEIS, must be provided in the final EIS, whether through a TMDL study or through a similar waste load allocation in the absence of a TMDL.

DISCUSSION

All of the waters that would be impacted by discharge and seepage from the PolyMet NorthMet mine site and tailings basin are waters within the Lake Superior watershed (DEIS, p. 4.1-33). All of them are impaired for mercury, either due to fish tissue testing, mercury concentrations in water or both. Throughout the Lake Superior watershed, many bodies of water remain listed as category 5C impaired waters requiring a TMDL under section 303(d) of the Clean Water Act, since the reductions in mercury air emissions proposed in Minnesota's approved Statewide TMDL would not bring these waters into compliance with mercury water quality standards. All segments of the St. Louis River downstream of the project, including segments fed by the Partridge and Embarrass Rivers, the Colby Lake reservoir downstream from the PolyMet project on the Partridge River and the Embarrass chain of lakes downstream on the Embarrass River are specifically listed in Minnesota's inventory of section 303(d) impaired waters. (MPCA, *Inventory of all Impaired Waters* (2009). Under the Clean Water Act, water quality standards in downstream waters must be protected. In addition, testing during environmental review has confirmed, on the basis of mercury concentrations in water exceeding the Great Lakes standard of 1.3 ng/L that all of the receiving waters including the Partridge and Embarrass River are impaired for mercury. (DEIS, p. 4.1-36, Table 4.1-24; p. 4.1-42, Table 4.1-29; p. 4.1-48).

Without quantification, the DEIS acknowledges that the PolyMet project "may contribute to cumulative effects on methylmercury concentrations in downstream lakes that are already on the 303(d) list." (DEIS, p. 4.1-194) The DEIS identifies several sources of methylmercury formation from the project. Due to the shallow aquifer at the site, groundwater seepage would exceed the capacity of the aquifer resulting in significant seepage upwelling and wetland inundation, particularly downgradient from the tailings basin. (DEIS, pp. 4.1-7, 4.1-65) These wetlands drain into the Embarrass River. Overflow from the west pit would be directed to an existing wetland and eventually into the Partridge River. (DEIS, p. 3-39). The PolyMet project would also contribute to mercury discharge as a result of peat excavation and stockpiling at the mine site. (DEIS, p. 4.1-123).

In addition to mercury loadings, discharges and seeps to groundwater from the mine site and tailings basin would increase sulfate loadings to wetlands and to the Embarrass and Partridge Rivers, the level of which would vary depending on the project alternative selected. (DEIS, pp.

4.1-125; 4.1-159, Table 4.1-85; 4.1-160, Table 4.1-86; 4.1-188). The project would also resulting water level fluctuations, including reduced flows in the Partridge River and increase fluctuations and drawdown in the Whitewater Reservoir. (DEIS, p. 4.1-127. The DEIS provides no citation or data to support its statement that these hydrologic fluctuations are not expected to result in “significant increases” in methylation. (DEIS, p. 4.1-127, fn 42).

The DEIS draft released to the agencies in July 2009 identified the following potential impacts of the project on methylmercury:

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. (DEIS, Appendix D, pp. 4.5-17 to 4.5-18, emphasis added)

The DEIS released to the public removed both this summary and any quantitative assessment of the impacts of increased sulfate on mercury methylation. (*Compare* DEIS, pp. 4.5-21 to 4.5-22). The DEIS also relies on a highly disputed characterization of wetlands to suggest that the tailings basin alternative, in particular, would avoid mercury methylation risks. (See e.g. DEIS, Tribal Findings, p. 4.1-113. Without analyzing downstream impoundments in the St. Louis River or the Lake Superior estuary, the DEIS asserts that the PolyMet project is not expected to “contribute significantly” to cumulative effects on mercury and methylmercury in the St. Louis River. (DEIS, p. 4.1-196).

The impacts of mercury and sulfate loadings from the project to the Partridge and Embarrass Rivers must be considered with substantial cumulative sulfate loadings from other mining and minerals processing activities. (DEIS, p. 4.1-188, Table 4.1-96; p. 4.1-192, Table 4.1-99). The effects of PolyMet’s increased mercury air emissions and the increased localized mercury air emissions from other mining, minerals processing and other emissions sources must also be considered. Recent MPCA data show that mercury emissions from the materials processing sector were at 735 pounds in 2005 and are anticipated to reach 841 pounds in 2010. These increases in mercury emissions are attributable to the Minnesota Steel Industries electric arc furnace steel mill and the Mesabi Nugget iron nugget production plant located in the Mesabi

Range and Hoyt Lakes areas, near the proposed PolyMet project. (MPCA, *Estimated Mercury Emissions in Minnesota for 2005 to 2018*, April 22, 2008, pp. 2, 18)

Regulations under the Clean Water Act and the Great Lakes Initiative require that the point and nonpoint sources that could increase mercury methylation in impaired waters be analyzed cumulatively and quantitatively. (See *Friends of Pinto Creek v. EPA*, 504 F.3d 1007 (9th Cir., 2007). EPA guidance recommends, in connection with metals mining and processing that this analysis be performed in a TMDL for the affected watershed, investigating cumulative loads from point sources and localized nonpoint sources such as abandoned mines, contaminated sediments, atmospheric deposition and sulfate loadings. (U.S. EPA, *2009 Guidance for Implementing the Methylmercury Water Quality Criterion*, p. 113 and Appendix D

The DEIS analysis of the cumulative impacts of mercury discharge, mercury air emissions, sulfate loadings, wetlands inundation, hydrologic changes and other existing and foreseeable localized impacts on the St. Louis River watershed is clearly inadequate. The EIS should provide a realistic, comprehensive, quantitative and cumulative analysis of likely impacts on the ability of waters downstream to attain Minnesota's health-based fish tissue standards of 0.2 mg/kg (Minn. R. 7050.0220), including but not limited to the following:

- 1) Mercury discharges from the PolyMet project, including all nonpoint as well as point source discharges during mine operation, closure and post-closure;
- 2) Sulfate discharges from the PolyMet project, including all nonpoint as well as point source discharges during mine operation, closure and post-closure;
- 3) Quantitative analysis of mercury methylation inputs from the PolyMet project under a "worst case" scenario including high precipitation and flooding and drying weather events, based on at least the following factors during mine operations, closure and non-closure:
 - Increased sulfate discharge from the project, impacting methylation in streams, wetlands and impoundments from the mine site and plant site downstream until the juncture of the St. Louis River with Lake Superior. This analysis must be based on an accurate wetlands delineation and analysis of the places within the watershed where low availability of sulfates places a limitation on mercury methylation;
 - Hydrologic changes, particularly to the Partridge River, Colby Lake and Whitewater Reservoir resulting in drying and rewetting potentiation of methylmercury. This analysis must be based on an accurate hydrological model, including variations in precipitation;
 - Peatlands disruption, including stockpiling, decomposition and release of mercury stored in organic material;
 - Land cover changes, including forest clearing and construction of wetlands on areas of high sulfate mine drainage within the Partridge River watershed;
 - Air emissions from the PolyMet project, including fugitive emissions and modeling a

probable range of efficacy in mercury removal as well as local deposition.

4) Cumulative impacts of other mining, minerals processing, energy facility projects or expansions resulting in impacts that could increase mercury or methylmercury, including each of the elements described above.

This analysis should also detail any compliance schedules to which other sources are subject and the year by which, according to these compliance schedules along with the PolyMet project impacts, the impaired waters from the PolyMet NorthMet site downstream through the St. Louis River can reasonably be expected to attain water quality standards.

Tribal agencies have repeatedly emphasized the inadequacy of the DEIS in providing either an accurate, a quantitative or a cumulative analysis of the impacts of the PolyMet project on the bioaccumulation of mercury in fish, in violation of Minnesota's health based standards. (See DEIS, Tribal Positions, pp. 4.1-113, 4.5-16, 4.5-17, 4.5-18, 4.6-8, 4.8-9, 4.14-5, 4.14-6).

Concern about the inadequate and incomplete analysis of methylmercury increases in the DEIS is based not only on federal and state laws, but on the serious toxic impacts of methylmercury in fish on piscivorous wildlife and on human children, infants and the developing fetus. Methylmercury is a highly toxic substance that, even in low dosages, is inimical to human health; for example, it attacks the nervous system, the kidneys, the immune system, and the reproductive system and is especially damaging to a developing fetus. The U.S. EPA has concluded that exposure to methylmercury can result in a variety of health effects in humans. Children exposed to low concentrations of methylmercury in the womb are at risk for neurodevelopment effects, including lowered performance in fine motor function, language skills, visual-spatial abilities and verbal memory. (See e.g. U.S. EPA, 2009 *Guidance for Implementing the Methylmercury Water Quality Criterion*, pp. 9-10). In addition to quantifying potential and cumulative impacts in numeric terms, the final EIS should discuss the consequences to wildlife and to human health of additional mercury contamination of fish.

B(7) The EIS Must Include a More Thorough Analysis of Sulfate Impacts on Wild Rice in the Embarrass, Partridge and St. Louis Rivers.

SUMMARY

Wild rice is uniquely protected under Minnesota statutes, in recognition of its ecological importance, particularly to Indian tribes. Wild rice requires relatively low-sulfate waters to thrive and would be impacted by the PolyMet NorthMet project, through release of sulfates, especially but not uniquely under the Tailings Basin Alternative where contaminated seeps from the tailings basin would be collected and discharged to the Partridge River. The EIS must do a much more comprehensive analysis of the locations where wild rice is growing on the Partridge and Embarrass Rivers. The EIS must also examine the potential of the project to violate sulfate

standards on the St. Louis River, which has been specifically designated as a state wild rice water.

DISCUSSION

Protection of wild rice is uniquely recognized under Minnesota water quality laws. It is explicitly provided that the quality of wild rice waters and the habitat necessary to support wild rice must not be degraded:

Wild rice is an aquatic plant resource found in certain waters within the state. The harvest and use of grains from this plant serve as a food source for wildlife and humans. In recognition of the ecological importance of this resource, and in conjunction with Minnesota Indian tribes, selected wild rice waters have been specifically identified [WR] and listed in part 7050.0470, subpart 1. The quality of these waters and the aquatic habitat necessary to support the propagation and maintenance of wild rice plant species must not be materially impaired or degraded. The quality of these waters and the aquatic habitat necessary to support the propagation and maintenance of wild rice plant species must not be materially impaired or degraded. If the standards in this part are exceeded in waters of the state that have the Class 4 designation, it is considered indicative of a polluted condition which is actually or potentially deleterious, harmful, detrimental, or injurious with respect to the designated uses. (Minn. R. 7050.0224, Subp. 1)

The St. Louis River is explicitly identified in Minnesota law as a wild rice water (Minn. R. 7050.0470). Concentrations of sulfates above 10 mg/L are defined as degradation and prohibited in this wild rice water. Yet the DEIS both tries to minimize the presence of wild rice on the St. Louis River (an argument precluded by the regulatory classification of these waters) and provides no analysis of the impacts of cumulative sulfate loadings from the PolyMet NorthMet project on the St. Louis River. (See DEIS, p. 4.1-195). The EIS must provide detailed information on sulfate loadings to the St. Louis River from the PolyMet project. If these loadings, taken together, increase sulfate above 10 mg/L in this designated wild rice river, changes in project design, mitigation or treatment will be required to avoid violations of law.

The cumulative impacts analysis of the PolyMet project, along with other mining and minerals processing expansions acknowledges, “The activities included in this cumulative effects assessment have the potential to increase sulfate concentrations in the middle segment of the St. Louis River between the confluence with the Embarrass River and Knife Falls Dam. (DEIS, p. 4.14-9) The DEIS then provides no numeric analysis of the sulfate concentrations that would result from the cumulative impacts of these projects to the St. Louis River. This failure must be rectified in the final EIS and sulfate loadings from other sources may also need to be reduced.

In addition to categorically protecting the St. Louis River, Minnesota Rules also provide, for the unlisted waters (*see* Minn. R. 7050.0430) of the state, “The quality of Class 4A waters of

the state shall be such as to permit their use for irrigation without significant damage or adverse effects upon any crops or vegetation usually grown in the waters or area.” The numerical standard of 10 mg/L of sulfates is used as an indicator in unlisted waters used for the production of wild rice. As reflected in position taken by tribal agencies, the law provides that the 10 mg/L sulfate standard, in addition to protecting the St. Louis River and all wild rice designated waters, applies to any other waters of Minnesota where wild rice is growing. (*See e.g.* DEIS, Tribal Positions, pp. 4.1-108, 4.1-109).

Tribal agencies have reflected a high level of concern that the environmental review process has failed to appropriately assess and recognize the prevalence of wild rice growing in the Partridge, Embarrass and St. Louis Rivers downstream of the project. The DEIS notes that field surveys of wild rice were recently done (four years after the application for the project was made to the U.S. Army Corps of Engineers):

Recent (August and September 2009) field surveys found wild rice at various locations along the Upper and Lower Partridge River, to Embarrass River, and further downstream in the lower St. Louis River. Fairly dense stands were found in the Lower Partridge River and Cedar Island Lake along the Embarrass River. (4.8-13 to 4.8-14)

Water quality analysis and claims that project parameters “meet surface water quality standards” must be revised throughout the EIS to reflect exceedance of sulfate standards in the Lower Partridge and the Embarrass Rivers. (*See e.g.*, DEIS, Tribal Positions, pp. 4.1-116, 4.1-147). The sulfate levels in the new DEIS, Table 4.1-67 at page 4.1-121, *Effects of the Proposed Action on Wild Rice Areas* and Table 4.1-86 at page 4.1-160, *Estimated Effects of the Tailings Basin Alternative on Wild Rice Areas*, reflect potential exceedances of Minnesota’s wild rice sulfate standard in various areas of the watersheds downstream of the project.

A more rigorous and comprehensive analysis of the implications of sulfate effects of the proposed action should be provided in the final EIS:

- The wild rice 10 mg/L sulfate standard should be applied to the St. Louis River and any areas of the Partridge and Embarrass Rivers historically producing wild rice. (*See* DEIS, Tribal Positions, pp. 4.1-105, 4.1-108, 4.1-109, 4.1-128, 4.1-159, 4.1-161).
- Dilution estimates in particular, should receive additional scrutiny along with the potential that hydrologic changes from pit dewatering and tailings basin seepage. (*See* DEIS, Tribal Positions, p. 4.1-14 to 4.1-15).
- Potential capture and treatment of all discharge to the Partridge or Embarrass Rivers to reduce sulfate concentrations must be considered in the final EIS. (*See* DEIS, Tribal Positions, pp. 3-51 to 3-52, 4.1-133).

- The EIS must analyze cumulative impacts on wild rice in the Partridge, Embarrass and St. Louis Rivers from other mining and processing activities.
- The historic pre-mining prevalence of wild rice in the St. Louis River watershed under low sulfate conditions must also be considered, testing sediment cores for pollen as well as reviewing historical records. (*See* DEIS Comments of Len Anderson).
- Consultation with tribes regarding the cultural significance of wild rice must be completed, including an objective and thorough wild rice survey. (DEIS, Tribal Positions, p. 4.1-33).
- The EIS must evaluate impacts of wild rice impairment on cultural resources and environmental justice, as well as defining the extent of violations of the 10 mg/L water quality standards pertaining to sulfates in waters designated for or producing wild rice.

B(8) The EIS Must Thoroughly Assess Impacts of the PolyMet Project’s Contamination of Groundwater and Drinking Water on Human Health.

SUMMARY

The PolyMet NorthMet DEIS inadequately discloses the impacts of the project on drinking water at private residential wells downstream of the tailings basin and at Colby Lake, where drinking water is drawn for the City of Hoyt Lakes. More troubling, where exceedances of water quality standards are identified, the DEIS minimizes their significance and provides misleading information as to the impacts of exceedances on public health. The final EIS should not only rectify these errors of omission and commission, but should provide a specific section on drinking water, addressing potential exceedances and the nature of toxicity to human beings.

DISCUSSION

Rather than reporting potential exceedances of iron, manganese, arsenic and aluminum in drinking water and discussing the potential health risks of ingestion, the DEIS seems to take every possible opportunity to dismiss risks. Specifically, the DEIS adjusts predictive models to reduce apparent risk of arsenic exceedance, discounts aluminum concentrations and, without scientific references, dismisses iron, manganese and aluminum levels as having no human health risk. These defects of omission and commission are inconsistent with the comments made by the U.S. EPA Region 5 and contradict federal public health authorities on human health toxicity.

Drinking Water Wells

There are at least 27 existing domestic wells located between the proposed NorthMet tailings area and the Embarrass River. (DEIS, p. 4.1-20). Several of the residential wells located downgradient from the existing LTVSMC tailings basin have manganese and fluoride concentrations exceeding the groundwater evaluation criteria, and at least one exceeds aluminum criteria. Samples also show levels of arsenic close to exceedance. Although groundwater downgradient from the tailings basin is heavily contaminated with iron (at 4,743 µg/L, more than

15 times the standard of 300 µg/L), the DEIS reports no sampling of residential wells for iron. (DEIS, p. 4.1-15, Table 4.1-8).

DEIS predictions of groundwater impacts of the PolyMet tailings basin on residential wells do not evaluate the additional loading of chemicals combined with any existing contaminant plume from the LTVSMC tailings (DEIS, p. 4.1-94, Fn 27). The cumulative impacts discussion of water quality doesn't even mention residential well drinking water. (See DEIS, pp. 4.14-3, 4.14-6, 4.14-8, 4.14-9). The DEIS is clearly inadequate to evaluate water quality at residential wells near the tailings basin.

Colby Lake

Colby Lake is the source of drinking water for the City of Hoyt Lakes. Monitoring data shows consistent elevations of aluminum, iron and mercury and exceedances of manganese and thallium have been observed. (DEIS, pp. 4.1-37, 4.1-38).

Initial modeling performed in the DEIS for Colby Lake predicted the PolyMet project would result in exceedances of water quality standards for arsenic (at 5.1 µg/L, more than twice the standard of 2.0 µg/L), iron (at 1,713 µg/L, more than five times the 300 µg/L standard), manganese (at 149 µg/L, nearly three times the 50 µg/L standard) and thallium (0.4 µg/L, as compared to the 0.28 µg/L standard). (DEIS, p. 4.1-116, Table 4.1-65). The DEIS predicted aluminum concentrations would be above screening values (76 µg/L as compared to screening levels from 50-200 µg/L), but far below actual average concentrations in Colby Lake which have ranged from 171-301 µg/L. (DEIS, p. 4.1-38, Table 4.1-25).

As the U.S. EPA Region 5 noted in their comments, although the DEIS altered its predictive model by “readjusting variables to less conservative inputs” the predicted arsenic concentration of 1.9 µg/L is still very close to Minnesota’s chronic water quality standard of 2.0 µg/L and is still a concern. (USEPA, PDEIS Comments, *supra*, p. 4, altering of predictive model see DEIS, p. 4.1-115).

For aluminum, the DEIS first created an assumption to avoid the application of water quality standards suggesting that total aluminum should be presumed not to result in dissolved aluminum violations (DEIS, pp. 4.1-35, 4.1-42, 4.1-43, 4.1-51, 4.1-117) and then denied the significance of any potential exceedances, stating, “Aluminum has not been an issue for the City of Hoyt Lakes, despite historic “elevated” concentrations. . The City is not required to monitor for aluminum.” (DEIS, p. 4.1-117).

Although the DEIS did not discuss the health effects of arsenic, the DEIS dismissed the

potential health risks of iron, manganese and aluminum. The DEIS asserted that iron and manganese are regulated only for aesthetic considerations in drinking water and “are not considered to present a risk to human health.” (DEIS, p. 4.1-51). Dismissal of human health concerns related to arsenic, iron, manganese and aluminum is inadequate if not misleading, as even the brief summary below demonstrates.

The DEIS did not discuss the contamination of Colby Lake with amphibole or asbestos-like mineral fibers. However, tribal cooperating agencies suggest that amphibole fibers have been identified as existing pollutants in the Hoyt Lake community water supply and that they are known to cause digestive tract cancers. (DEIS, Tribal Positions, p. 4.14-4). Both the background level of amphibole fibers in Colby Lake and the potential for their increase should be identified in the EIS.

Minnesota rules proscribe degradation of groundwater irrespective of whether it is used for drinking water. (Minn. R. 7060.0500). Cumulative increases in groundwater contamination must be evaluated according to nondegradation policies as well as to assess human health risk.

Arsenic

Minnesota’s applicable chronic human health standard for arsenic in water is 2 µg/L. This standard is more protective than current U.S. EPA requirements and is based on data suggesting that chronic exposure to similar levels of arsenic increases the risk of cancer, particularly in the bladder, and lungs. Arsenic ingestion at low levels can also reduce IQ in children. (MDH, Arsenic in Drinking Water and your Patients’ Health, <http://www.health.state.mn.us/divs/eh/hazardous/topics/arsenicfct.pdf>, pp. 3-4). The federal Department of Health and Human Services (DHHS) has determined that inorganic arsenic is known to be a human carcinogen (a chemical that causes cancer). The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans. The U.S. EPA also has classified inorganic arsenic as a known human carcinogen.

Iron

The DEIS states that the City of Hoyt Lakes water treatment plant is able to remove nearly all iron at its water treatment plant. (DEIS, p. 4.1-116). However, U.S.EPA Region 5 Comments suggest that the methods used by Hoyt Lakes – open basin sedimentation, gravity sand filtration and corrosion control – are not the most effective in making significant reductions. (USEPA, PDEIS Comments, *supra*, p. 4). The final EIS should clarify what levels of iron reduction are achieved by the Hoyt Lakes treatment plant.

Even if the Hoyt Lakes water treatment plant is effective in reducing iron contamination, cumulative exceedances of iron in residential wells may have serious health consequences. A portion of the public is vulnerable to hemochromatosis, or “iron overload” disease. This vulnerability is genetic, and the specific gene mutation was discovered in 1996. According to the Centers for Disease Control and Prevention (CDC), hemochromatosis is the most common genetic disease in the U.S.A. One in 8 are "silent carriers" of the single gene mutation and 1 in 100-200 have the double mutation putting them at high risk for developing the disease. The symptoms of hemochromatosis vary and can include: chronic fatigue, arthritis, heart disease, and liver problems including cirrhosis and cancer. Hemochromatosis can lead to organ damage and even death.

Manganese

Although the DEIS suggests that iron is effectively removed from the Hoyt Lakes water plant, no similar control of manganese is even suggested. Hoyt Lakes has had problems with manganese in the water supply in the past, due to release of manganese from lake sediments in late summer. There is no basis to believe that the method used to reduce this risk – increasing the height of the intake valve – would protect drinking water contamination from upstream sources. (See DEIS, p. 4.1-116)

Manganese is a toxic chemical (CAS#: 7439-96-5) classified by the Agency for Toxic Substances and Disease Registry (ASTDR). In laboratory studies, ingestion of manganese has been found to cause kidney and urinary tract illnesses, impairments of fertility and sperm damage and nervous system dysfunction. Manganese has been shown to cross the blood-brain barrier and can cross the placenta during pregnancy, enabling it to reach a developing fetus. Very high levels of manganese ingested in water have reportedly resulted in death and there are several studies linking manganese ingestion to neurological damage. (<http://www.atsdr.cdc.gov/toxprofiles/tp151-c3.pdf>)

Aluminum

U.S. EPA Region 5 Comments express particular concern about increasing aluminum concentrations over time, especially at sampling points upstream of Colby Lake. The U.S. EPA notes that, although there is no Safe Drinking Water Act Maximum Contaminant Level (MCL) yet set for aluminum, “several studies over the past several years have shown various health effects related to aluminum” so that a conclusion that predicted levels would not pose human

health risks would need verification and supporting documentation. (USEPA Comments, PDEIS, *supra*, p. 3).

The CDC's ATSDR toxicological profile reports that in some studies, oral exposure to aluminum has been associated with increased risk of Alzheimer's disease. It is well-established that persons with kidney disease who have difficulty removing aluminum from the body can develop bone disease or neurotoxicity attributable to excess aluminum.

(<http://www.atsdr.cdc.gov/toxprofiles/tp22-c3.pdf>). Potential health consequences of aluminum exceedances should not be dismissed.

The final EIS must more completely assess contamination of groundwater and drinking water, including human toxicity, as follows:

- Conduct (or report) more complete testing of residential water quality, including testing for iron exceedances;
- Use additional wells to monitor and model the plume of groundwater contamination from the LTVSMC site;
- Provide a cumulative analysis of the impacts of the LTVSMC, NorthMet project and other sources of groundwater contamination on residential wells, including but not limited to potential exceedances of iron, manganese, aluminum and arsenic;
- Assess the background level of amphibole fibers in Colby Lake and any potential for their increase as a result of the NorthMet project;
- Model cumulative exceedances of iron, manganese, aluminum and arsenic in Colby Lake, identifying whether and the degree to which current water treatment methods do or do not reduce concentrations;
- Evaluate increases in predicted groundwater contamination under Minnesota's nondegradation rules;
- Explain the potential human health consequences of all exceedances in drinking water, using available public health references, such as CDC, ATSDR, U.S. EPA and MDH publications and guidance.

C(1) The EIS Must Provide a Transparent and Scientific Delineation of Wetlands and Analysis of Direct and Indirect Impacts on Wetlands.

SUMMARY

The PolyMet project is singular among sulfide mining projects due to its impacts on high quality wetlands. The mine site which would be directly and irretrievably impacted by the project includes 1,302 acres of wetlands, most of which are high quality. The huge tailings basin site, into which mine runoff and processing waters from the plant would be dumped, is also surrounded by wetlands. In order to determine the scope of impacts to wetlands on and near the project sites and downstream on the Partridge, Embarrass and St. Louis River channels, a more scientifically rigorous and transparent analysis of wetlands delineation, hydrology and chemical impacts must be provided in the final EIS. Analysis must also consider impacts during mining

and post-closure. The current analysis is not only inadequate, but appears to be designed to minimize impacts to critical natural resources.

DISCUSSION

The DEIS has estimated a total of 667.9 acres of indirectly impacted wetlands, 318.6 at the mine site and 349.3 (DEIS, p. S-9) at the plant site. Due to flaws in wetland delineation, limitation of the scope of wetlands analyzed, inadequacies in analysis of hydrology and lack of explicit consideration of impacts of the project during 20 years of operation and post-closure, it is virtually certain that the indirect impacts of the project on wetlands at these sites have been significantly underestimated. The final EIS must rectify these deficiencies and provide a transparent, science-based analysis of wetland impacts over time and throughout the potentially affected watershed.

The DEIS both states and implies that the indirect impacts of the PolyMet NorthMet project on wetlands would be minimal due to its characterization of the nature of the wetlands on and near the mine site as coniferous and perched bogs that are dependent on precipitation, rather than ground water for their moisture and nutrients. (PolyMet DEIS, pp. 4.2-3, pp. 4.2-11 to 4.2-14, Table 4.2-3). The DEIS states that few acres of mine site wetlands not excavated by the project are dependent on groundwater and then concludes that no indirect impacts on wetlands from groundwater are expected at the mine site. (DEIS, p. 4.2-19).

This conclusion, with its obvious strategic importance, is vigorously disputed by the tribal cooperating agencies, who object to the scientific validity of determining wetlands delineation from aerial views referenced in an email (DEIS, Tribal Positions, pp. 4.2-1, 4.2-21; DEIS, pp. 4.2-1 to 4.2-2, 4.2-19). Tribal agencies state that many of the wetlands that have been identified during delineation as "perched bogs" are cedar swamps, northern wet ash swamps, forested rich peatlands, northern alder swamps, and poor fens, all of which require groundwater inputs. (DEIS, Tribal Positions, pp. 4.2-3, 4.2-4, 4.2-5, 4.2-22, 4.2-23, 4.2-27, 4.2-49; DEIS, p. 4.2-10). Characterizing various wetland types as unconnected to groundwater may also be inconsistent with classifications published by the MDNR. (See Matt Tyler DEIS Comments). Even the underlying project wetland delineation study suggests that many wetlands potentially impacted by the project are dependent on groundwater resources:

The wetland delineation study (RS14, Appendix A) identified over 390 acres of wetland community with a significant white cedar component. For example, wetland ID-48 (Table 4.2-3) was identified in delineation reports as dominated by white cedar. White cedar is an indicator of mineral rich waters. Renaming wetland ID-48 as a coniferous bog, as was done in Table 4.2-3, does not make that community a bog. Cedar dominated

wetlands are cedar swamps, not bogs. The significance of this is that, bogs tend to be precipitation fed while swamps tend to be groundwater fed. Data from the wetland delineations (RS14) suggest that bogs are *not* the most prevalent wetland type. In fact, it appears that wetlands that require groundwater inputs: forested rich peatlands and poor fens are the most prevalent. (DEIS, Tribal Positions, p. 4.2-10)

Insufficient wetland delineation has been provided around the tailings basin, although wetland impacts from inundation are likely to occur. (DEIS, Tribal Positions, pp. 4.2-1 to 4.2-2). This is particularly significant since the area described as the “tailings basin” is a vast area as much as two miles in diameter, much of which is surrounded by wetlands. (See DEIS, Appendix A, Figures 3.1-27, 4.1-11). Accuracy of the DEIS wetland delineation along the Partridge River is also disputed by the tribes. (DEIS, p. 4.2-43, 4.2-48).

The accurate delineation of wetlands is critical not only on and immediately adjacent to the project site, but along the Partridge and Embarrass Rivers and downstream on the St. Louis River. Although not mentioned in the DEIS, studies show that both the Partridge and the Embarrass Rivers contain extensive wetlands environments. The Partridge River tributary has 20.3 square miles of wetlands (approximately 12.5 percent of its area is wetlands) and the Embarrass River has 19.3 square miles of wetlands (approximately 10.7 percent wetlands). (Berndt & Bavin, *Sulfate and Mercury Chemistry of the St. Louis River in Northeastern Minnesota: A Report to the Minerals Coordinating Committee*, MDNR, Draft Report, June 2009, p. 30). Depending on the nature of these wetlands, they may be more or less vulnerable to impacts of the project due to hydrologic changes and chemical inputs.

In addition to relying on an email reporting aerial views for wetlands delineation, it appears that the DEIS has relied upon an email containing anecdotal information and aerial photographs from other mines to estimate groundwater drawdown impacts on wetlands from the project. (DEIS, p. 4.2-20; DEIS, Tribal Positions p. 4.2-21). The DEIS contains no quantitative assessment of mine related drawdown of the regional water table, creating a serious data gap in the ability to adequately assess indirect impacts upon wetlands. (See Section B(3), *supra*, DEIS, Tribal Positions, p. 4.2-20, 4.2-22).

The DEIS’ suggestion that, instead of performing a hydrological analysis in environmental review to verify the prediction of impacts on wetlands, PolyMet could monitor for hydrological impacts and mitigate if they are found (DEIS, p. 4.2-20) is inconsistent with the legal requirements for environmental review. The core purpose of both NEPA and MEPA is to disclose environmental impacts, not to defer their recognition until a project has been built and it

is too late to prevent harm.

Tribal agencies maintain that a more scientifically rigorous delineation of wetland types and hydrological impacts to wetlands would demonstrate more significant indirect impacts to wetlands than described in the DEIS. (DEIS, Tribal Positions, pp. 4.2-21, 4.2-22, 4.2-23).

Tribal agencies have also proposed a more customary method for estimating indirect wetland impacts developed by the Army Corps of Engineers for the Crandon sulfide mine project and presented by tribal staff at professional conferences. (DEIS, Tribal Positions, p. 4.2-25). The final EIS must include the following:

- An objective, transparent and comprehensive delineation of wetlands at the project site and along downstream water bodies, consistent with MDNR classifications;
- Absent specific scientific justification for deviating from this methodology, the EIS should use methodology developed for the Crandon mine to estimate indirect wetlands impacts.

C(2) The EIS Must Describe the Replacement of all Wetlands Directly or Indirectly Impacted by the Project.

SUMMARY

Loss of wetlands from direct and indirect impacts of the PolyMet NorthMet project constitutes a significant irreversible loss of natural resources resulting from the project. Even without considering downstream impairment of wetlands in the Embarrass River, the Partridge Rivers or the St. Louis Rivers, the DEIS estimates that 1,522.1 acres of wetlands will be directly or indirectly impacted on or immediately adjacent to the project site, most of which wetlands are high quality. These wetlands would most likely need to be replaced at a 1.5 to 1 ratio, yet the DEIS only proposes wetland replacement resulting in 1287 acres of wetlands credits, leaving a deficit of nearly 1,000 acres. The final EIS must detail replacement of all impacted wetlands, including a discussion of replacement quality or must acknowledge the irreversible loss of at least 1,000 acres of highly valuable wetlands.

DISCUSSION

Loss of wetlands from the direct and indirect impacts of the PolyMet NorthMet project constitutes one of the most significant irreversible losses of natural resources resulting from the project. Even without considering downstream impairment of wetlands in the Embarrass, the Partridge or St. Louis River channels, the PolyMet project would have approximately 854.2 acres of direct wetland impacts and 667.9 acres of indirect wetland impacts, for a total predicted impact of 1,522.1 acres. (DEIS, p. 4.2-24). Of these wetlands, all but one coniferous bog community wetland, all shrub community wetlands and all forested swamp community wetlands are rated high quality. (DEIS, pp. 4.2-5 to 4.2-6)

Minnesota law requires that, if impacts on wetlands cannot be avoided or restored, wetlands must be replaced. (Minn. Stat. §103G.222). Replacement ratios are set in rules, and the

baseline requirement in the PolyMet project area is that wetlands must be replaced on a 1.5 to 1 ratio if the wetlands used for replacement are either outside the watershed or different in kind from the wetlands being lost. (Minn. R. 8420.0117, *see* DEIS, p. 4.2-29)

It is evident from the DEIS that no plan has been developed to fully replace the wetlands impacted by the PolyMet project. The plan proposed in the DEIS suggests that there would be 175 acres of on-site mitigation of wetlands, mitigation outside the project's watershed in Aitkin with 810 acres of wetlands and 123 acres of buffer, and mitigation outside the watershed in Hinckley with 313 acres of wetland and 79 acres of buffer, for a total of 1170.3 acres of wetland credits. It is suggested that the closure plan is designed to add another 175 acres of wetlands and that the current plan provides 1,287 acres of mitigation credits. (DEIS, p. 4.2-38)

First, the on-site mitigation documented in the DEIS does not add up to the 350 acre total claimed in the above summary. Just a few pages earlier, the DEIS states that the current plan includes the creation of 30 acres of wetlands on the contaminated LTVSMC emergency basin, 75 acres on the tailings basin at closure, 30 acres on the mine stockpile areas and 40 acres at the east pit, which would not be eligible for wetland credits. (DEIS, p. 4.2-30). The DEIS then goes on to state that, although other location were identified, "At the current stage of planning it is not possible to estimate the potential extent of wetland mitigation in these areas." (DEIS, pp. 4.2-30 to 4.2-31). Identified on-site mitigation, thus, adds up to a total of 135 acres of wetland credits, including post-closure mitigation. The final EIS must reconcile this discrepancy.

Even accepting the DEIS assertion that, by the time of closure 1,287 acres of mitigation will be provided, there is a deficit in wetlands replacement. Although not explicitly stated in the DEIS (the PDEIS released in July 2009 openly acknowledged a deficit, DEIS, Appendix D, p. 4.2-42), the current proposal in the DEIS has a deficit when compared to the total predicted wetland impact. Using the baseline 1.5 ratio for wetlands replacement, 2283 credits would be needed to replace 1,522.1 acres of wetlands, resulting in a deficit of 996 acres when compared to the current wetlands mitigation plan.

Rather than acknowledging and addressing the deficit in wetlands mitigation, the DEIS proposes that mitigation for predicted indirect wetland impacts, including those on the mine site and adjacent to the tailings basin, can be deferred until the permitting process. (DEIS, pp. 4.2-20, 4.2-24, 4.2-38, 4.2-39). The DEIS proposes that wetlands monitoring can be conducted during operations and post-closure and that mitigation can be addressed at that future time, perhaps decades later. (DEIS, p. 4.2-24).

The suggestion that evaluation and mitigation of critical environmental impacts, such as loss of wetlands can be deferred until permitting or to project operations and closure is inconsistent with the National Environmental Policy Act and the Minnesota Environmental Policy Act. NEPA requires agencies to evaluate and mitigate environmental impacts of projects before the permitting stage, the core purpose for which NEPA was enacted. (*See e.g. Mexico v. Bureau of Land Management*, 565 F.3d 683, 703 (10th Cir. 2009).

Any wetlands for which the replacement is not identified in the final EIS should be considered unmitigated. (DEIS, Tribal Positions, p. 4.2-42). The final EIS must detail replacement of all impacted wetlands, including a discussion of replacement quality or must acknowledge the irreversible loss of the equivalent of nearly 1,000 acres of highly valuable wetlands.

C(3) The EIS Must Address the Loss of Cultural Resources as a Result of Direct and Indirect Loss and Functional Impairment of Wetlands in the 1854 Ceded Territory.

SUMMARY

The PolyMet NorthMet Project would directly and indirectly impact, at a minimum, 1,122 acres of wetlands on the mine site, a site located in the Superior National Forest that is within the 1854 Ceded Territory to which members of the Fond du Lac, Grand Portage and Bois Forte Bands of Chippewa (also referred to as Ojibwe) tribe retain treaty rights. Since even the proposed on-site wetlands restoration would no longer be part of the Ceded Territory if the project moves forward, none of the wetlands replacements proposed in the DEIS are within the 1854 Ceded Territory.

DISCUSSION

The PolyMet NorthMet Project would impact an estimated 1,122.9 acres on its mine site: directly impacting 804.3 acres through excavation and impacting 318.6 acres through changes in hydrology, chemical inputs and other disruption (DEIS, pp. 4.2-9, 4.2-18). The mine site, which contains a total of 1,302 acres of wetlands (DEIS, p. 4.2-9) is located in the Superior National Forest, within the 1854 Ceded Territory to which members of the Fond du Lac, Grand Portage and Bois Forte Bands of the Chippewa (also referred to as Ojibwe) tribe retain usufructuary rights.

Since the mine site would be removed from the Ceded Territory in order for the PolyMet project to proceed, none of the wetland replacements proposed in the DEIS, including those on the mine site, would be within the 1854 Ceded Territory. At most, the 175 acres proposed to be restored on the mine site or the 175 acres to be restored post-closure (DEIS, p. 4.2-38) might have some relation to waters within the remaining Ceded Territory. The planned wetland replacement, thus, would lead to a substantial loss of wetlands within the Ceded Territory. (DEIS, p. 4.14-5).

Minnesota Rules state that a replacement plan for activities that involve modification of

known archaeological, historical, or cultural resource sites must be denied if the proposed activities will have a significant adverse effect on the archaeological or historical value of the site. (Minn. R. 8420.0515, Subp. 5). Although the strict letter of this rule is restricted to sites eligible for inclusion in the National Register of Historic Places, its rationale may apply to the Ceded Territory. Tribal representatives have recently suggested that the 1854 Ceded Territory may meet the criteria for listing in the National Register, while the U. S. Army Corps of Engineers has asserted that it would not. As acknowledged in the DEIS, even if the Ceded Territory is not listed, “This does not diminish the significance of the Project impacts to the cultural geography of the Ceded Territory.” (DEIS, p. 4.8-15).

The Ceded Territory represents an important cultural resource that may be impacted by loss and impairment of wetlands. The DEIS does not include this issue in its description of impacts on wetlands (DEIS, Section 4.2). The final EIS must analyze the cumulative impacts of the PolyMet project on the 1854 Ceded Territory, including but not limited to the loss of wetlands and changes in wetland functional values during operation, closure and post-closure, the additive effects of air and water emissions on wetlands, and the loss of tribal access to wetlands due to the above changes and the mitigation of wetland impacts by replacements occurring outside the ceded territory. (DEIS, Tribal Positions, p. 4.2-44)

Any loss of wetlands or loss of wetland functionality within the Ceded Territory that is not replaced within the Ceded Territory must be considered an irreversible and irretrievable loss of cultural resources resulting from the PolyMet project.

C(4) The EIS Must Analyze the Cumulative Impacts of the PolyMet Project on the Functionality of Wetlands throughout the St. Louis River watershed.

SUMMARY

The DEIS suggests that over 1,522 acres of wetlands may be directly or indirectly lost as a result of the PolyMet NorthMet mine and processing facility, but does not provide a comprehensive analysis of the project and other watershed impacts, on the functionality of wetlands downstream of the project, including wetlands on the Embarrass, Partridge and St. Louis Rivers. The final EIS must analyze the cumulative impacts on water quality and the aquatic ecosystem downstream through the St. Louis River watershed to Lake Superior.

DISCUSSION

The DEIS analysis of the impacts of the PolyMet NorthMet mine and processing plant on wetlands is confined almost entirely to the mine and plant sites and the wetlands immediately adjacent to these sites. Considering only these locations, the DEIS suggests that approximately 1,522 acres of wetlands will be impacted by the project. (PolyMet DEIS, p. 4.2-24).

The DEIS identifies direct impacts from other mining projects of approximately 328 acres, but describes no indirect effects on wetlands from other projects. (DEIS, p. 4.2-46) Then, in analyzing impacts on wetlands in the Partridge River watershed, the DEIS suggests that existing wetland conditions will only be reduced by 1,155 acres (DEIS, p. 4.2-47, Table 4.2-9) even though its own analysis (which tribal agencies believe is understated) identifies 1,132 acres of impacted wetlands within the Partridge River watershed from the PolyMet mine project alone. (DEIS, p. 4.2-9) Simple addition suggests that impacts are understated.

Although the DEIS acknowledges that acid mine drainage from the tailings basin has impaired the quality of surrounding wetlands (DEIS, p.4.2-52) the DEIS impacts analysis does not address the impacts of sulfate discharge, air emissions or hydrological changes beyond the mine site on wetland functionality in the Partridge River. Even with this constraint, the DEIS acknowledges that, due to the high quality of the Partridge River wetlands (3.4 percent according to the DEIS) impacted, “the function and values served by the wetlands in the watershed would be expected to be significantly affected” by the direct and indirect losses of wetlands from the PolyMet project. (DEIS, p. 4.2-48).

The failure to consider functional impairment of wetlands and the impacts of increased tailings basin drainage on surrounding wetlands renders the analysis of impacts to the Embarrass River watershed meaningless. The DEIS minimizes the loss of wetlands around the existing tailings basin due to their low quality without an assessment of how increased discharge at the PolyMet plant might impair the function of additional wetlands. (DEIS 4.2-52). This analysis is inadequate.

Minnesota Rules recognize that the public value of wetlands is based upon their function, including filtration of pollutants to surface water and groundwater, using nutrients that would otherwise pollute public waters, trapping sediments, recharging groundwater, flood and storm water retention and fish, wildlife and native plant habitats. (Minn. R. 8420.0522). Minnesota Rules on replacement of wetlands require analysis of both the value and function of wetlands that may be impacted. (*See* Minn. R. 8420.0515).

Although the DEIS acknowledges that there would be significant impacts on the Partridge River watershed as a result of the PolyMet project, no characterization is provided as to the nature of the functions that would be impacted or the relationship of that loss of function to water quality and fish, wildlife and plant habitat.

In order to assess wetlands impairment and mitigation, the final EIS must:

- Recalculate the acreage of wetlands functionally impacted, including wetlands impacted by acid mine drainage, air emissions or hydrological changes under both the Proposed Action and the Tailings Basin Project alternative
- Evaluate the impacts of loss of wetlands and wetland functionality throughout the Partridge, Embarrass and St. Louis River watersheds (*See* DEIS, Tribal Positions, pp. 4.2-43, 4.2-44).
- Consider cumulative indirect as well as direct impacts from other foreseeable projects in evaluating wetlands impacts to watersheds;
- Provide and evaluate a mitigation plan for the NorthMet project that replaces wetlands and wetland functionality within affected watersheds.

Although it might be more convenient to mitigate wetlands with large remote tracts, the Minnesota Wetlands Conservation Act may require identifying and securing smaller parcels of wetlands within the watershed to protect water resources and wetlands functionality.

D(1) The EIS Must Conform to the Endangered Species Act, Include USFWS Consultation and Evaluate Cumulative Impacts on Canada Lynx and Gray Wolf Habitat and Wildlife Corridor Destruction.

SUMMARY

The PolyMet NorthMet project will result in total loss of 1,454 acres of federally designated critical habitat for two endangered species known to be in the vicinity of the mine site – the Canada lynx and the gray wolf. The project will impact at least two of the thirteen wildlife travel corridors in the Mesabi Range needed for species survival. Cumulative impacts of reasonably foreseeable mining and processing projects will impact 31,000 acres of habitat and 10 out of 13 wildlife corridors. Despite these substantial project and cumulative impacts on species protected under the Endangered Species Act, the draft EIS contains no biological assessment or consultation with the United States Fish and Wildlife Service and does not evaluate the cumulative impacts of projects on the survival and recovery of endangered species, as required under applicable laws. The final EIS must provide this assessment, consultation and determination of the destruction and adverse modification of designated critical habitat.

DISCUSSION

Canada lynx populations in the United States are protected under the Endangered Species Act (ESA) as a federally-listed threatened species. (PolyMet DEIS, p. 4.4-2). The ESA provides that federal agencies may take no action that will result in the ‘destruction or adverse modification’ of designated critical habitat. (16 U.S.C. 1536(a)(2); *See e.g. National Wildlife Federation v. National Marine Fisheries Service*, 524 F.3d 917, 933 (9th Cir. 2007).

Over three-quarters of lynx records in Minnesota are from the northeastern portion of the state and more than a fourth of the sightings reported to the Minnesota Department of Natural Resources (MDNR) between 2000 and 2006 were in St. Louis County. (DEIS, 4.4-2). At least 20 different lynx sightings have occurred within 18 miles of the project area, including reproductive

individuals. (DEIS, pp. 4.4-3, 4.4-10) Portions of the PolyMet mine site are within the revised boundaries of federally designated lynx critical habitat recently established in federal rules on February 25, 2009. (DEIS, pp. 4.4-2, 4.4-3).

Although the MDNR may consider the gray wolf population fully recovered in the Great Lakes region, the gray wolf is a federally-listed threatened species under the ESA. The PolyMet project is located within Zone 2 of the designated critical habitat for the gray wolf. (DEIS, p. 4.4-3). Wolves have been documented to the north and northeast of the mine site and wolf tracks have repeatedly been observed on the mine site. (DEIS, p. 4.4-4).

With respect to both the Canada lynx and the gray wolf, neither their status as endangered species nor the fact that the project is proposed to be located on critical habitat can be disputed. It is also beyond dispute that, unlike impacts of forestry uses,

Mining impacts. . . represent a total habitat loss (i.e., wildlife use is essentially eliminated in the affected area for the duration of mine operations) that has a longer duration and slower recovery (e.g., the lack of nutrients and organic material in the soils would slow forest succession). (DEIS, p. 4.4-29)

The DEIS acknowledges that the project would result in the destruction of approximately 1,454 acres of suitable lynx and wolf habitat, resulting in a “loss and fragmentation” at the mine site for at least 40 years. Increased vehicle and rail traffic would also result in both lynx and wolf mortality, resulting in incidental “taking” of these endangered animals. (DEIS, pp. 4.4-10, 4.4-11, 4.4-12). The DEIS notes that consultation with the United States Fish & Wildlife Service (USFWS) has not been completed, (DEIS, p. 4.4-9) and that impacts of the PolyMet and proposed timber harvesting on the Lynx Analysis Unit (LAU) in the southwest portion of the Superior National Forest would render 12 percent of the LAU unsuitable as lynx habitat. (DEIS, p. 4.4-12)

The DEIS fails to document consultation with the USFWS pertaining to the potential that additional and cumulative mining activity will further impact critical lynx and wolf habitat. This oversight is particularly striking given the environmental impact statement process underway to address dozens of prospecting permits in the Superior National Forest (<http://www.fs.fed.us/r9/forests/superior/projects/prospecting.php>) and the fact that cumulative impacts from historical, present and future mining-related activities in the Mesabi Iron Range are estimated to be 153,184 acres, including impacts on 31,000 acres from future mining activities. (DEIS, p. 4.4-29).

Statements in the DEIS that impacts from the PolyMet and other mining projects on loss

and fragmentation of wildlife habitat that extend for many decades should be considered “temporary” and not “significant” (DEIS, p. 4.14-5) have no legal or scientific basis. The DEIS cites no biological assessment that might support this conclusion.

Destruction of endangered species habitat may impact species survival not only due to the destruction of acreage, but due to the impairment of wildlife travel corridors that permit endangered and other species to move between remaining areas of habitat. The DEIS acknowledges that destruction of wildlife corridors may lead to population and genetic isolation, reducing population stability and persistence. (DEIS, p. 4.4-30).

The DEIS appears to rely on studies done for other proposed intrusive actions to assess the impacts of the PolyMet project on wildlife corridors. Based on this analysis, the DEIS notes that the project would impact 2 of the 13 wildlife corridors identified in a comprehensive study. (DEIS, p. 4.4-31, citing Emmons and Olivier Resources, Inc. 2006). With reference to impacts on Corridor 11 the DEIS states that the LTVSMC tailings basin, despite two decades since closure, “provides poor habitat.” ((DEIS, p. 4.4-31). The DEIS characterizes the impacts on Corridor 12(17) as indirect and does not describe any impact to Corridor 10(14), southwest of the PolyMet plant site, which might be impacted, since the Mesabi Nuggett project is its other side. (DEIS, Appendix A, Figure 4.4-1). An independent USFWS consultation on corridor impacts is needed.

Other mining and processing projects in the immediate area (DEIS, p. 4.4-31 to p. 4.4-33) would result in serious cumulative impacts on wildlife corridors, including the following:

- Essar Steel Minnesota DRI, Steel Plant and Connected Actions (Corridors 2, 3, 4);
- US Steel Keewatin Taconite Mine and Plant (Corridor 4);
- Mittal Minorca East Reserve/Inspat Inland (direct loss, Corridor 8);
- NorthMet Mine, Tailings Basin, and Railroad Spur (Corridors 11, 12);
- Peter Mitchell Mine Pits Expansion (impacts Corridor 12, direct loss Corridor 13);
- Mesabi Nuggett Phases I and II (Corridor 10);
- Mesaba Energy Power Generation Station (Corridors 2, 10);
- Cliffs Erie Railroad Pellet Transfer Facility (Corridor 10);
- Minnesota Steel (Corridor 2 fragmentation, direct loss of Corridors 3, 5);
- Minnesota Steel/Keewatin (direct loss, Corridor 4); and
- U.S. Steel Minntac Expansion (direct loss, Corridor 6).

Several corridors are expected to be lost entirely, while others are likely to be impaired by fragmentation or loss of adjacent habitat. (DEIS, p. 4-4-32). The map contained in the Appendices identifies the PolyMet mine site itself as “high quality corridor” and visually depicts a series of existing and potential disruptions of wildlife corridors by extraction and processing projects. (DEIS, Appendix A, Figure 4.4-1).

The DEIS attempts to characterize the cumulative effects on wildlife travel corridors in the Mesabi Iron Range as “minor” (DEIS, p. 4.14-5). Reviewing earlier text, this seems to be based on the statement that “relative to the impacts from these other reasonably foreseeable projects, the contribution of the NorthMet project to cumulative effects on wildlife corridors would be minor.” (DEIS, p. 4.4-32). When all cumulative impacts documented in the DEIS are read together, as above, it appears that all but 3 (Corridors 1, 7 and 9) of the 13 wildlife corridors identified by Emmons and Olivier would have some adverse modification impacts.

This analysis of cumulative impacts turns environmental review upside down. Cumulative impacts analysis under the National Environmental Policy Act (42 U.S.C. §4332(2)(C); 40 C.F.R. §1508.11 and 1508.25(c)) and under the Minnesota Environmental Policy Act (Minn. Stat. §116D.04; Minn. R. 4410.1700, Subp. 7) is not intended to justify resource loss if other foreseeable projects may also be destructive, but to identify significant or even irreparable harm to the environment -- in this case, to two endangered species -- resulting from cumulative destruction. *See e.g. Citizens Advocating Responsible Development v. Kandiyohi County*, 713 N.W. 2d 817, 830 (Minn. 2006)(The point of the "cumulative potential effects" criterion is “to determine whether the project, which may not individually have the potential to cause significant environmental effects, could have a significant effect when other local projects already in existence or planned for the future are considered.”)

The final EIS must be based on Endangered Species Act law and scientific analysis of the impacts on lynx and wolf habitat and wildlife corridors rather than reassuring platitudes that impacts are not expected to be significant. Specifically, the final EIS must contain:

- A biological assessment and consultation with the USFWS regarding impacts on lynx, wolf, critical habitat and wildlife travel corridors (*See* 50 C.F.R. 402);
- Recognition that mining impacts represent a total habitat loss and that a 40 or more year loss of habitat for endangered species should be considered a permanent loss;
- A cumulative impacts analysis in consultation with the USFWS based on reasonably predicted mining as well as forestry activities, consistent with the objectives of NEPA and the ESA prohibition of destruction or adverse modification of habitat for endangered species.

D(2) The EIS Must Provide a Comprehensive Analysis of Endangered and Threatened Plant Species, Particularly the Floating Marsh Marigold.

SUMMARY

The PolyMet project would have both direct and indirect effects on state threatened and endangered plant species. In the case of the endangered marsh marigold (*Caltha natans*), the indirect effects of the project would impact at least 42 percent of the populations in Minnesota

that occur on or near the mine site and, since the balance of the species is located on the Partridge River, might eliminate this endangered species within the State depending on the level of changes in river hydrology and chemistry. The EIS must include a detailed analysis of the status and requirements for survival of this endangered species, along with quantification of impacts from the project and the “tailings basin alternative,” including changes in chemistry, hydrology and habitat.

DISCUSSION

The PolyMet project would have both direct and indirect effects on nine state threatened and endangered plant species that occur on or near the mine site. Direct impacts include the complete loss of plant populations as a result of the excavation of the mine pits, burial under stockpiles, or disturbance during infrastructure construction. (DEIS, p. 4.3-14). Indirect effects on plant populations may occur as a result of changes in hydrology or water quality, deposition of particulate matter (dust), application of road salts, or weed incursion. The magnitude of the potential effects could include potentially significant effects on reproduction and/or population persistence. (DEIS, p. 4.3-14)

With respect to the floating marsh marigold, the DEIS indicates that there are only 12 known populations in the state of Minnesota. Five of these occur on or near the PolyMet mine site and may be indirectly impacted by changes in hydrology, chemistry or other disturbance at the mine, affecting 42 percent of the *Caltha natans* population in the State. (DEIS, p. 4.3-15, Table 4.3-9). The DEIS further acknowledges that the floating marsh marigold “is found primarily in relatively undisturbed habitats and is not likely to be tolerant of disturbance” and that the remaining eight populations of this endangered plant are located “near” the mine site along the Partridge River. (DEIS, p. 4.3-16).

Minnesota’s endangered species laws (Minn. Stat. §84.0895; Minnesota Rules, Chapter 6212.1800 to 6212.2300) and Minnesota’s laws pertaining to wetland replacement (Minn. R. 8420.0515, Subp. 2) restrict the ability to take or kill a plant species designated in Chapter 6134 of the Minnesota Rules as threatened or endangered. The marsh marigold, *Caltha natans*, is identified as an endangered species in Minnesota Rules 6134.0300, Subpart A (10).

The Minnesota Department of Natural Resources has expressed concern about the survival of the marsh marigold in Minnesota and the vulnerability of this species to habitat disruption:

Caltha natans is a circumboreal species that is generally rare or local throughout its North American range. This is especially true south of the Canadian border, where it has been found at only a few sites in St. Louis County, Minnesota, and at only one location in Wisconsin. An additional cause for concern in Minnesota is the local extirpations

recently suffered by this species. The reason for the extirpations is largely habitat loss, which is a well-documented problem for aquatic species statewide. . .

Most populations discovered in the 1940s and 1950s have not been relocated. Despite the fact that there are many acres of apparently suitable habitat in northeastern Minnesota, only a handful of sites have been found since 1954. Several of these sites are at risk because of habitat alteration. *Caltha natans* was listed as an endangered species in Minnesota in 1996. . .

Caltha natans is very sensitive to habitat disturbances, especially alteration of naturally-occurring water level fluctuations, herbicides, nutrient enrichment, sedimentation, and nonnative species invasion such as *Lythrum salicaria* (purple loosestrife). Clearing of vegetation in the riparian area of streams and on shorelines of lakes without an adequate buffer also presents a potential threat. (<http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDRAN06020>)

The DEIS provides no maps of the specific locations of *Caltha natans* populations, no specific data on the changes in hydrology, chemistry, dust or disturbance that could affect these populations and no study of the status and requirements for survival of this endangered species. The DEIS statement that the project “is not expected to jeopardize” the presence of this species in Minnesota is inadequate and unsupported. (DEIS, p. 4.3-16).

Since the PolyMet project has the potential to impact not only populations *Caltha natans* on the mine site, but populations downstream on the Partridge River, a thorough investigation of potential impacts on this endangered species is required under Minnesota law. This investigation must include quantitative analysis of water level fluctuation, chemical changes, nonnative species invasion and habitat disturbance both as a result of the proposed project and as a result of the “tailings basin alternative” that would direct additional discharge from the tailings basin to the Partridge River. This investigation must be completed before the final EIS is issued to determine whether loss of a Minnesota endangered plant species will be among the irreparable and irreversible commitments of resources if the PolyMet project is permitted to proceed.

E (1) The EIS Analysis of Mercury Air Emissions, Cumulative Impacts and Potential Offsets Must be Consistent with the Clean Water Act and Minnesota’s Statewide Mercury TMDL.

SUMMARY

The DEIS identifies approximately eight pounds of new mercury emissions from the proposed PolyMet NorthMet project, describes other increased mercury emissions within the region and within the mining industry sector and then proposes that mercury emissions might be offset in a variety of ways. However, as presented in the DEIS, these offset proposals are inconsistent either with the Clean Water Act and Minnesota’s Statewide TMDL. The marked increase in cumulative regional and mining sector mercury emissions must be analyzed in the final EIS, along with a plan for contemporaneous and substantial reductions of mercury emissions within the watershed and the minerals processing sector.

DISCUSSION

Assuming a high level of efficiency from the wet scrubber system at the hydrometallurgical facility, the DEIS identifies 8.3 pounds of new mercury emissions from the proposed PolyMet NorthMet project (DEIS, p. 4.6-34, 4.6-39). Based on a stakeholder-devised recommendation for mercury reductions, the DEIS then describes an offsetting plan for project mercury emissions that might include any of the following: offsets from purchasing emissions credits from in-state taconite or energy facilities, entering into a partnership with another mercury-emitting sector such as crematoria, collecting mercury products, or doing research with publicly owned treatment works. (DEIS, p. 4.6-35, 4.6-40 to 4.6-41). This plan is inconsistent with Clean Water Act protection of mercury-impaired waters and with Minnesota's Statewide Mercury TMDL.

Minnesota's Statewide Mercury Total Maximum Daily Load (TMDL) study was completed by the Minnesota Pollution Control Agency (MPCA) and approved by the EPA in 2007. The TMDL concluded that two-thirds of the waters on Minnesota's 2004 Impaired Waters List were impaired because of mercury. Since the source of nearly all of the mercury in Minnesota waters is atmospheric deposition shared by all mercury-impaired waters of the state, the core objective of the statewide TMDL would be to set targets for in-State reduction of anthropogenic mercury from the various sectors responsible for mercury emissions.

The TMDL determined that Minnesota's contribution to anthropogenic mercury emissions must be reduced by 93 percent as compared with 1990 emissions to reach fish tissue based water quality standards. (Minnesota Statewide Mercury TMDL, p. 30). As of 2000, annual mercury air emissions were about 3,638 pounds, reflecting a 68 percent reduction below estimated 1990 levels, primarily due to restricting mercury in products, such as paint and batteries. As of 2000, 21 percent of Minnesota's mercury emissions were from minerals processing. (Minnesota Statewide Mercury TMDL, p. 30, 37, 40).

Minnesota's Statewide TMDL requires that the MPCA employ a phased approach with "sector-specific reduction milestones" to achieve its goal 93 percent mercury emissions reductions. (Minnesota Statewide Mercury TMDL, p. 44). No allowance was made in Minnesota's approved TMDL for increases in mercury emissions by any mercury source sector.

Water bodies not expected to meet mercury standards even if Minnesota's Mercury TMDL emissions reductions are achieved remain on the list of impaired waters requiring an additional TMDL under section 303(d) of the Clean Water Act. The receiving waters downstream from the PolyMet project (Colby Lake, the Embarrass chain of Lakes, the St. Louis

River segments downstream of the Embarrass and Partridge River tributaries) are on this 303(d) list of impaired waters. (MPCA, *Inventory of all Impaired Waters* (2009).

Despite the Statewide TMDL and highly impaired waters in the Lake Superior Basin, Minnesota's mercury emissions from the materials processing sector in northeastern Minnesota are increasing rather than decreasing. Recent data from the MPCA show that mercury emissions from the materials processing sector were at 735 pounds in 2005 and are anticipated to reach 841 pounds in 2010, increasing the share of mercury produced by the materials sector in Minnesota from approximately 22 percent to 32 percent. (MPCA, *Estimated Mercury Emissions in Minnesota for 2005 to 2018*, April 22, 2008, p. 2) These mercury increases are due to the Minnesota Steel Industries and the Mesabi Nugget iron nugget plant, not far from the proposed PolyMet project. The proposed Keetac mining expansion would add another 49 pounds of mercury to the sector and the region. (MPCA, *Estimated Mercury Emissions*, *supra*, p. 18).

The Statewide TMDL requires sector-specific emissions reduction -- not increases -- in order to reach a target of 210 pounds from the mining and minerals processing sector by 2025. (MPCA, 2009 Implementation Plan for Minnesota's Statewide Mercury TMDL, pp. 12,14). It is virtually impossible that additional mercury reduction not already needed to attain this sector target would be available to offset increased emissions from the PolyMet project.

Mercury emissions reduction targets are related to violations of water quality standards promulgated under the Clean Water Act. The Clean Water Act, even under its most generous interpretation, requires that offsets for pollution causing impairment of water quality standards be contemporaneous and within the watershed. (*In re City of Annandale*, 731 N.W. 2d 501 (Minn. 2007). Offsets from products collection, alliances with crematoria and various proposed research efforts are clearly insufficient under applicable law.

Before the final EIS is released, a more thorough investigation of cumulative mercury emissions and sector increases must be conducted. The implication of compliance schedules for waters impaired for mercury and compliance with sector reduction targets should require a new analysis of the potential for offsets of project mercury emissions.

E(2) The EIS Must Fill Gaps in its Analysis of Human Health Risks from Hazardous Air Pollutants, Amphibole Fibers and Particulates.

SUMMARY

The DEIS analysis of the human health risk from inhalation of pollutants at the PolyMet NorthMet plant and mine site and the analysis of risks and mitigation from hazardous air pollutants is incomplete. The final EIS must include at least the following additional analyses:

cumulative cancer and non-cancer health risks including particulate emissions and amphibole fibers, identification of all hazardous air pollutants released at the mine and plant site, including releases attributable to fugitive emissions and diesel combustion, and explicit discussion of mitigation of cancer and non-cancer health risks, particularly when human health risks exceed Minnesota Health Risk Values.

DISCUSSION

The DEIS analysis of the human health risk from inhalation of pollutants at the PolyMet NorthMet plant and mine site and the analysis of risks and mitigation from hazardous air pollutants is incomplete. The final EIS must include at least the following additional analyses: cumulative cancer and non-cancer health risks including particulate emissions and amphibole fibers, identification of all hazardous air pollutants released at the mine and plant site, including releases attributable to fugitive emissions and diesel combustion, and explicit discussion of mitigation of cancer and non-cancer health risks, particularly when human health risks exceed Minnesota Health Risk Values.

Inhalation Health Risks

The DEIS states that the non-cancer risk from air emissions at the plant site exceeds acute non-cancer Health Risk Values under Minnesota Dept of Health rules. (*See* Minnesota Rules, Chapter 4717.8000 to 4717.8600). The risk drivers are oxides of nitrogen from gas combustion, nickel and arsenic. (DEIS, p. 4.6-24). Cancer risk from the tailings basin did not exceed Minnesota's 1 in 100,000 lifetime cancer risk standard; however the overall lifetime cancer risk for an off-site worker was .39 in 100,000 for a non-farmer and .69 for a farmer receptor, approaching the Health Risk Values threshold. (DEIS, p. 4.6-25).

At the mine site, acute and sub-chronic non-cancer risks for off-site receptors were predicted to be well below the (1.0) level of concern under MDH rules. (DEIS, p. 4.6-27). However, at the mine site, multi-pathway cancer risk was 3 in 100,000, above Minnesota's threshold for acceptable cancer risk. The main drivers were consumption of foods containing dioxin and hazardous air pollutants associated with diesel fuel in mine vehicles, (DEIS, p. 4.6-27).

The cancer and non-cancer health assessment from the tailings basin and the mine site in the DEIS did not include amphibole fibers and does not appear to have included impacts from particulate matter or fine particulates. (DEIS, p. 4.6-23, Table 4.6-16, p. 4.6-26, Table 4.6-17).

- The final EIS must clarify whether inhalation risks of particulates and fine particulates were included in the health risk assessment and explain what assumptions were made as to their chemical composition.

Amphibole Fibers

The DEIS provides some basic information about the presence of amphibole fibers in the ores proposed to be mined and processed at the PolyMet facility. Amphibole fibers are regulated in Minnesota as a result of a long history of litigation regarding taconite tailings and the potential for amphibole fibers to cause cancer and other human health effects. (DEIS, p. 4.6-56). The U.S. EPA Integrated Risk Information System (IRIS) has classified asbestos as a Group A Human Carcinogen due risks of lung cancer, including bronchial carcinoma and mesothelioma. Non-cancer effects of asbestos include asbestosis, which reduces lung function and may restrict breathing. (DEIS, p. 4.6-57, *see also* Agency for Toxic Substances Disease Registry (ATSDR), Asbestos Health Effects, http://www.atsdr.cdc.gov/asbestos/asbestos/health_effects/). Toxicological data pertaining to non-asbestos amphibole fibers is less conclusive, and the Minnesota Department of Health assumes that these fibers have the potential for toxicity as well. (DEIS, pp. 4.6-58 to 4.6-59).

A 2005 flotation pilot test found that 9 percent of the fibers in samples thought to be representative of ore from the NorthMet deposit were characterized as amphibole and that 0.2 percent of the sample met the U.S. EPA definition of an asbestos fiber. Fibers identified in the sample would be found in particulate matter, predominantly in fine particulates. Although a risk assessment protocol has been developed for asbestos fibers, it is not precisely applicable to the nature of the fibers found in NorthMet ores. The DEIS notes that no quantitative assessment has been done of the potential health risk from airborne amphibole fibers from the PolyMet projects. (DEIS, p. 4.6-60).

In order to accurately characterize cancer and non-cancer risks from air emissions at the plant and mine sites, the additive risk of amphibole fibers must be included.

- Additional testing should be conducted to verify that the grinding process did not interfere with the identification of amphibole fiber length;
- The final EIS should estimate inhalation health risks including amphibole fibers. Given the level of uncertainty as to toxicity of the particular fibers found, a “worst case” analysis should be done under a “worst case” assuming that the toxicity of fibers in the NorthMet is similar to asbestos fibers and a “best case” analysis under less conservative risk assumptions.

Mitigation of Human Health Risks

Although inhalation health risks from both the NorthMet plant and the mine site are predicted exceed Minnesota health risk values, the DEIS does not describe any mitigation targeted to reduce cancer or non-cancer human health risks. This is a shocking omission.

- The final EIS must include mitigation to ensure that emissions from the NorthMet project do not increase health risks above acceptable levels under Minnesota Rules.

Hazardous Air Pollutants.

The DEIS identification of hazardous air pollutants (HAPs) from the plant and the mine sites is incomplete and non-transparent, seeming to be designed to claim that the project does not meet the major source regulatory threshold rather than to provide information on toxic emissions. Despite the fact that diesel is a driver for exceedance of Health Risk Values as described above, the DEIS does not identify the actual hazardous pollutants that will be emitted by the project or provide the individual levels of release, and it explicitly omits toxic emissions from vehicle from the Table of Annual HAP Emissions, used to determine whether the project exceeds thresholds for HAP emissions. (See p. 4.6-11, 4.6-27). The U.S. EPA criticized this omission of mobile sources in determining the major facility thresholds for HAPs. The U.S. EPA recommended that toxic emissions from mobile sources, including on-road and off road mining equipment, trucks and rail locomotives be included in evaluating whether the NorthMet project exceeds thresholds for hazardous air pollutants. (USEPA PDEIS Comments, *supra*, p. 2).

- The EIS must address the gap in disclosure of hazardous air pollutants, listing each specific HAP that will be emitted from every source at the plant and mine site and in what quantities and including and describing all sources of emissions, including all mobile sources and fugitive air emissions.
- The methodology by which it was determined which toxic pollutants were and were not aggregated as “single” HAPs should also be transparent in the final EIS.

On-site Workers

The DEIS does not contain any analysis of health risks to on-site workers.

- The EIS must analyze cancer and non-cancer inhalation risks to workers at the mine and the plant.

E(3) The EIS Must Include Fugitive and Mobile Source Emissions and All Foreseeable Projects in Assessing Air Quality and Must Analyze Impacts of Particulates on Ecosystems as well as Air Quality.

SUMMARY

Analysis of air quality issues in the DEIS combines arguments to avoid compliance with federal and state legal standards with analysis of the impacts of air pollution. The attempt to avoid classification of the massive PolyMet NorthMet mine and processing plant as a “major source” of emissions results in a lack of transparency, if not an understatement of air pollution impacts. Although purporting to provide a cumulative analysis, several substantial and foreseeable sources of cumulative emissions are excluded. Particularly since both permissible pollution increment ceilings and Air Quality Standard limits are approached in this analysis, the EIS must revise the evaluation of air quality impacts to include all emissions sources and all foreseeable cumulative impacts. The EIS must also provide a more thorough analysis of the impacts of

increases in particulates and fine particulates, including an assessment of their chemical composition and impacts of deposition on aquatic and terrestrial ecosystems in close proximity to the project.

DISCUSSION

PolyMet NorthMet mine site sources for air emissions include excavation, portable crushing and screening operations, blast hole drilling, unpaved roads, and vehicle exhaust. Plant site point source emissions are predicted to occur from the crushing plant, flotation operation autoclaves and other hydrometallurgical processes, process consumables handling sources, and combustion sources. Fugitive emissions from the plant site are expected to occur from raw materials handling, haul trucks, rail cars, roads, and from the tailings basin (DEIS, p. 6-9).

The DEIS stresses that point source emissions from the PolyMet NorthMet project are below the 250 tons per year (tpy) “major source” thresholds for the prevention of significant deterioration (PSD) program so that neither technology-based requirements nor limits on incremental pollution apply. (DEIS, p. 4.6-4). This is somewhat misleading. Minnesota rules referenced in the DEIS do not set a 250 tpy threshold for a major source. Under Minnesota law, a major stationary source of pollutants for which a Part 70 permit is required is a facility that emits or has the potential to emit 100 tons per year of any air pollutant (Minn. R. 7007, Subp. 2.B.) In Minnesota, the PolyMet project would be a major source as a result of its point source criteria pollutant emissions alone, including 178 tpy of particulates (PM₁₀), 150 tpy of fine particulates (PM_{2.5}), 193 tpy of total suspended particulates (TSP) and 102 tpy of volatile organic compounds (VOCs).

In addition, when fugitive and mobile source emissions from the mine and the tailings basin are combined with “smokestack” emissions from the plant, the PolyMet project far exceeds even federal major source thresholds of 250 tpy for each pollutant. Mobile source emissions of nitrogen oxides (NO_x) from the mine site are projected at 315 tpy, fugitive emissions of particulates (PM₁₀) from the mine site (685 tpy) and plant site (122 tpy) combined are 807 tons per year and fugitive emissions of fine particulates (PM_{2.5}) from the mine and plant site together are 116 tons per year. (DEIS, p. 4.6-10, Table 4.6-5). The Tailings Basin Alternative adds another 96 tpy of PM₁₀ and 11 tpy of PM_{2.5} (DEIS, p. 4.6-13). The PolyMet will have a major source impact on air quality, especially as a result of particulate emissions. Criteria pollutant totals from the PolyMet project are summarized in the chart below:⁴

⁴ Excluding TPSs and VOCs, for which no mobile source or fugitive emissions data was provided in the DEIS.

Pollutant	PolyMet Emissions Proposed Action (Total tons/year)	PolyMet Emissions Tailings Basin Alt. (Total tons/year)	Federal Major Source Threshold (tons/year)
NO _x	363	363	250
PM 10	985	1081	250
PM 2.5	266	277	250

The emission of hazardous air pollutants (HAPs) from the PolyMet project may also exceed federal source thresholds for HAPs. As noted in the preceding section E(2), the USEPA has questioned the analysis of HAPs in the DEIS, stating that mobile source toxic emissions must be included to determine whether the project exceeds major source thresholds for HAPs. (USEPA PDEIS Comments, *supra*, p. 2).

The PolyMet NorthMet project would be located in a Class II area, rather than a Class I category applicable to wilderness areas. The first air quality analysis is whether the additional pollution from the project exceeds the increment by which pollution is allowed to increase. The DEIS estimates that the PolyMet project, combined with other regional sources will use up 97 percent of the increment in Class II areas for particulate emissions averaged over 24 hours at the mine site (29 µg/m³ of an allowable 30 µg/m³) and 83 percent of the increment at the plant site (25 µg/m³ of an allowable 30 µg/m³). (DEIS, pp. 4.6-13, 4.6-15, 4.6-16, Table 4.6-9).

The DEIS air quality model included the Peter Mitchell Mine, Mesabi Nugget Phase I, Cliffs Erie Pellet Yard, Laskin Energy Center, and LTV Steel Mining Company emissions. (DEIS, p. 4.6-11). However, as the U.S. EPA highlighted in their comments, this air quality analysis did not consider all current and foreseeable projects. The Mesaba Energy power plant, Mesabi Nugget Phase II and the Keetac Expansion should have been considered in analyzing cumulative impacts on air quality, including Class II increments. (USEPA PDEIS comments, *supra*, p. 1).

It is not clear from the DEIS whether all fugitive and mobile source emissions were included, whether cumulative impacts of the PolyMet project on mine or plant site receptors were considered or whether the increased emissions from the Tailings Basin Alternative were included. In addition to stating that additional foreseeable projects such as the Keetac expansion should not have been excluded from the cumulative analysis, tribal cooperating agencies suggest

that modeling of compliance with Class II PSD increments, compliance with NAAQS and MAAQS air pollution standards and cumulative Class I PSD increment analysis failed to include complete particulate emissions from the tailings basin. (DEIS, Tribal Positions, pp. 4.6-40, 4.4-41, 4.4-42). Since particulate emissions already approach the Class II increment limit, it is likely that if all cumulative sources and project emissions are included in the model there will be insufficient Class II increment to permit emissions of particulates at the levels proposed by PolyMet.

Data on potential exceedances of National Ambient Air Quality Standards (NAAQS) and Minnesota Ambient Air Quality Standards similarly show that standards for particulate will nearly be exceeded, even under DEIS modeling assumptions that may minimize cumulative impacts. Particulate emissions from the plant, combined with background levels of particulates are at 79 percent of allowable limits averaged over 24 hours ($118 \mu\text{g}/\text{m}^3$ as compared to a standard of $150 \mu\text{g}/\text{m}^3$), while fine particulate emissions from the mine, combined with background are at 97 percent of allowable limits ($34 \mu\text{g}/\text{m}^3$ as compared to a standard of $35 \mu\text{g}/\text{m}^3$). (DEIS, p. 4.6-17, Table 4.6-10).

Again, since particulate and fine particulate emissions already approach NAAQS and MAAQS limits, if all cumulative sources and project emissions are included in air modeling, federal and state air quality standards for particulate pollution are likely to be exceeded.

Similar to the Class II increment at the project site, PSD analysis at the nearest Class I location, the Boundary Waters Canoe Area Wilderness (BWCAW) twenty-one miles away, suggests that total cumulative modeled air concentration would consume 94 percent of the increment ($7.5 \mu\text{g}/\text{m}^3$, out of a PSD increment limit of $8 \mu\text{g}/\text{m}^3$) for short term particulate pollution (DEIS, p. 4.6-4).

The analysis of particulate (PM_{10}) pollution, like the Class II and NAAQS analysis discussed previously, doesn't include the Mesaba Energy power plant, Mesabi Nugget Phase II and Keetac Expansion and may not include all project emissions from the tailings basin, in particular. If all cumulative sources and project emissions are included in the Class I increment analysis, it is likely that there would be insufficient remaining increment to accommodate PolyMet's increased PM_{10} emissions. In addition, despite requests by tribal cooperating agencies for this information (DEIS, Tribal Positions, pp.4.6-16, 4.6-18) the DEIS provides no Class I increment analysis for fine particulates. ($\text{PM}_{2.5}$)

Even under the DEIS models, impacts on the BWCAW may be significant, with a

maximum change in light extinction of 14.7 percent and calculated visibility impacts greater than 5 or 10 percent on a small number of days each year. (DEIS, p. 4.6-19, Table 4.6-12).

Air emissions from the PolyMet NorthMet mine and plant sites have the potential to adversely impact aquatic and terrestrial ecosystems as a result of deposition of pollutants as well as resulting in deterioration of air quality and visibility impairments. Particulates and fine particulates released by the project will contain nano particles of sulfates and heavy metals that may impact sustainable production of nearby forests. (Bruce Johnson DEIS Comments).

Particulate emissions may also impact aquatic systems and increase mercury methylation:

It is the position of the Tribal cooperating agencies that an overlooked environmental impact from fugitive emissions is the reactivity of the waste rock dust. Tribal cooperators believe that while the dust might not necessarily create sulfuric acid it is reactive enough that additional sulfates might form in wetlands and lead to an increase of methylation of mercury. Further analysis should be done and the results included in the DEIS. (DEIS, p. 4.6-8)

Although the DEIS contains some assessment of impacts of air deposition, the analysis does not appear to include particulate or fine particulate deposition, but only sulfur dioxide and nitrogen oxide deposition. (*See e.g.* DEIS, pp. 4.6-20, 4.6-44). The DEIS also focuses on relatively remote receptors in Class I areas at least 21 miles away or on diffuse ecosystems, discussing the effects of NorthMet acid deposition on a four-county area including Itasca, St. Louis, Lake and Cook Counties. (DEIS, p. 4.6-44). Even without considering particulate depositions and looking at this highly diffuse four-county assessment area, the DEIS predicts that the NorthMet project will increase sulfur dioxide emissions by 6 percent and nitrogen oxides by 12 percent. (DEIS, p. 4.6-44). It should also be noted that while coal plant pollution controls may cushion the impacts of NO_x and SO₂ increases, particulate pollution is increasing throughout the region. (DEIS, p. 4.6-53).

As with water quality modeling discussed previously, predictions in the DEIS that air pollution will approach 97 percent of increments and standards without exceeding them raises concern about the objectivity of the analysis. The misplaced advocacy in the DEIS against a finding that the NorthMet project is a major source increases suspicion that air quality modeling may fail to include appropriate inputs in order to attain a desired outcome. The final EIS must both revise its air quality analysis and provide greater transparency on sources and levels of emissions in order to dispel this concern, as follows:

- Provide transparency regarding all project emissions sources, including specification of volatile organic compounds and total suspended particulates from mobile and fugitive sources and specification of the tons per year for hazardous air pollutants.

- Provide transparency and include in air quality modeling (Class II increment, Class I increment and compliance with NAAQS and MAAQS) all emissions from the mine and plant, including mobile and fugitive source emissions, additional emissions from the Tailings Basin Alternative and cumulative impacts from one project site to receptors at the other project site;
- Revise modeling of compliance with/exceedance of Class II and Class I increments and federal and state air quality standards to include cumulative impacts of all current and foreseeable projects, including but not limited to the Mesaba Energy power plant, Mesabi Nugget Phase II and the Keetac Expansion;
- In addition to the above revisions, calculate PSD Class I increment for fine particulates (PM_{2.5});
- Revise calculations of light extinction and visibility impacts at the BWCAW based on inclusion of all project emissions and cumulative impacts of current and foreseeable projects;
- Assess the chemical composition of particulate and fine particulate emissions from the mine site and plant site, including levels of sulfates and heavy metals;
- Analyze the effects of deposition of particulates and fine particulates in aquatic and terrestrial ecosystems and the cumulative impacts of particulate, sulfur dioxide and nitrogen oxide deposition.
- Base the analysis of deposition effects on areas of predicted highest deposition, in addition to a remote Class I or a diffuse multiple-county analysis.

F(1) The EIS Must Include a Thorough Environmental Justice Analysis Based on Impacts of the Project on Usufructuary Rights, Fishing, Hunting and Gathering Wild Rice among Other Adverse Impacts.

SUMMARY

The DEIS is clearly deficient in its failure to analyze the environmental impacts of a project that will uniquely deprive members of Indian tribes of usufructuary rights to the 6,700 acres of property on which it would be located, that would result in loss to the Ceded Territories of nearly 1,000 acres of wetlands and that would also create disparate impacts on tribes and other minority or low-income communities who fish, hunt and gather wild rice, or rely for cultural practice of any of the plant or animal species in any of the areas that will be impacted by the Project.

DISCUSSION

The PolyMet NorthMet DEIS contains an appropriate definition of environmental justice, but a glaringly insufficient and inappropriate analysis of this issue, in conflict with applicable law. Environmental justice requires that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial operations, such as the PolyMet mine and processing facility. Executive Order 12898 directs federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse effects of agency programs,

policies, and activities on minority and low-income populations. (DEIS, p. v.)

Federal agencies, including the U.S. EPA, treat environmental injustice as a violation of civil rights under Title VI of the Civil Rights Act. EPA's implementing regulations prohibit taking any action, including any permitting decision, which may have a discriminatory *effect* based on race, color, or national origin. (U.S. Environmental Protection Agency, *Title VI - Law and EPA's Regulations*, <http://www.epa.gov/civilrights/t6lawrg.htm>).

The DEIS discussion of environmental justice is brief and laughably inappropriate, addressing primarily the Native American population census of St. Louis County as compared to the Native American population census for the State of Minnesota, rather than the actual impacts of the PolyMet project on property rights, health, or natural resources that are of significance to the culture and social and economic well-being of Indian tribal members. (DEIS, pp. 4.10-14 to 4.10-15). Based on this narrow and contrived analysis, the DEIS then concludes:

The Project was evaluated for effects relating to the social, cultural, and economic well-being and health of minorities and low-income groups through a review of socioeconomic and demographic data compiled from the 2000 U.S. Census. Such effects are termed environmental justice issues, and none were identified for the Project. (DEIS, p. 4.10-14)

The EIS must start over and provide an environmental justice analysis sufficient to comply with Executive Order 12898 and applicable civil rights laws. The environmental justice analysis should include evaluation of the disparate impacts of at least the following adverse environmental impacts of the project on Indian tribes, minority and low-income communities.

Loss of usufructuary rights

Indian tribal members, a protected population under civil rights laws and environmental justice analysis, are the only individuals directly and adversely impacted by loss of usufructuary rights in the 1854 Ceded Territory due to the potential transfer of Superior National Forest land to the PolyMet Mining Company. Although the DEIS suggests that the land to which Chippewa Tribes have rights will be exchanged for other land in the Ceded Territory, (DEIS, p. S-18), the DEIS neither identifies the land to be exchanged nor demonstrates that its size and functional value to the Tribes will be at least equal to that of the 6,700 acres lost. Unless the final EIS contains a detailed environmental analysis (including cultural as well as economic and environmental values) demonstrating that specific land to be exchanged for the PolyMet site creates no such adverse effect upon the Tribes, the project is discriminatory in its effect and creates a disparate adverse impact upon the Tribes.

Loss of wetlands

The DEIS acknowledges that at least 1,222 acres of wetlands would be directly or indirectly impacted at the mine site (DEIS, p. 4.2-9). None of these wetlands are planned to be replaced in the Ceded Territory; even replacement on the mine site will no longer be within Ceded Territory once the land exchange is completed. Loss of wetlands and the cultural, social and environmental benefits they provide, will disproportionately impact the Ceded Territory to which only Indian Tribes, and no other populations have distinct rights. Since a substantial majority of the wetland acres lost as a result of the PolyMet project are within the Ceded Territory, under the current wetland replacement plan, loss of wetlands creates a substantial and unmitigated adverse impact on Indian Tribes.

Mercury in fish tissue

Although the DEIS analysis is incomplete, it is clear that seeps and discharge from the mine and plant, local deposition of mercury emissions, sulfate mobilization of methylmercury and hydrologic changes are likely to increase the mercury contamination of fish tissue. The EIS must analyze the degree to which increases of mercury in fish tissue impact tribal waters and fisheries and the degree to which increased mercury in fish throughout the St. Louis River and Lake Superior Basin watersheds disproportionately impact Indian tribal members, other minority communities and low income persons. This analysis should address, as did proceedings to establish the Minnesota Statewide TMDL, the particular impacts on people who fish for subsistence and to whom the ability to fish for subsistence has cultural as well as social and economic significance.

Gathering of wild rice

Although the DEIS and Tribal Positions reflect disputes as to the degree to which wild rice will be impacted in the Partridge, Embarrass and St. Louis Rivers (*See Section B(7), supra*) some level of impairment is virtually certain. Any impairment of wild rice creates an environmental justice concern, since Indian tribal members gather rice at a rate greater than their census numbers and since impairment of wild rice harvests is likely to have a greater adverse impact on Indian cultural, social and economic well-being. Statewide, the DEIS acknowledges that more than 3,000 tribal members participate in wild rice harvesting statewide along with about 1,500 non-tribal individuals (DEIS, p. 4.1-44, *citing* MnDNR 2008). It is obvious that the rate participation in wild rice harvest is far greater for tribal members, who represent only 1.2 percent of the population in Minnesota. (DEIS, p. 4.10-14). In addition to analyzing compliance with 10 mg/L sulfate standards in wild rice waters, the final EIS must analyze environmental

justice impacts of impairment of wild rice.

Other Natural Resource Impacts

The DEIS has begun a more comprehensive analysis of the impacts of the project on natural resources and species of importance to Indian tribes. For each adverse impact, an environmental justice analysis is required, since “any impacts to natural resources will disproportionately affect tribes due to their subsistence consumption of wild rice, fish, and other wildlife within the 1854 Ceded Territory.” (DEIS, Tribal Positions, p. 4.10-15)

In addition, since data in the DEIS suggests that the City of Hoyt Lakes has a higher percentage of families below poverty level and a lower percentage of persons in the labor force than the State of Minnesota as a whole (DEIS, p. 4.10-4, Table 4.1-06), specific potential adverse impacts to Hoyt Lakes, such as violation of water quality standards in Colby Lake, must be analyzed from an environmental justice perspective. The fact that persons in an economically-depressed area might be willing to accept health risks if jobs are promised is precisely why an environmental justice analysis adverse impacts on low-income communities.

F(2) The EIS Must Discuss Adverse Social and Economic Impacts of the Project, Including Boom and Bust Cycles, Impacts on Business Related to Environmental Amenities and the Potential for Taxpayer Liability for a Superfund Site.

SUMMARY

The DEIS discusses the beneficial social and economic impacts of the PolyMet NorthMet project resulting from employment opportunities and increased tax revenue, but does not discuss potential adverse social and economic impacts whether from the historic and predictable boom and bust cycle of extraction industries in Northern Minnesota, the historical and predictable volatility of copper prices or the impacts that degradation of environmental quality may have on regional economies, dependent on residential choice as well as tourism. The EIS must analyze these potential adverse social and economic impacts as well as evaluating the potential social and economic risk that the project will result in creation of an unfunded Superfund site, imposing economic burdens on the community and taxpayers.

DISCUSSION

The DEIS discusses the beneficial social and economic impacts of the PolyMet NorthMet project resulting from employment opportunities and increased tax revenue, but contains virtually no analysis of potential adverse social and economic impacts from the project.

The DEIS acknowledges that multiple projects occurring within the same time period may cause some disruptive stress on existing infrastructure and that construction activities may include temporary disruption due to rapid increases in population and a likely influx of single, transient males (DEIS, p. 4.10-27). The DEIS notes that East Range communities have

historically had higher levels of employment than they do currently, but states this fact to suggest that there is reserve capacity in housing, schools and hospital infrastructure, rather than to examine underlying economic boom and bust economic trends. (DEIS, p. 4.10-27). The DEIS mentions in passing that there will be a potential decrease in population with closure, but notes this only to suggest that this decline will reduce pressure on social services. (DEIS, p. 4.10-21).

Without citing any references, the DEIS suggests only negative social and economic outcomes from the No Action Alternative, including declining employment, population decline, underutilized housing and aging population. (DEIS, p. 4.10-21) The DEIS fails to reference economic gains in St. Louis, Itasca and Lakes Counties over the past decades despite reduction in mining employment due to mechanization. *See* Thomas M. Power, *The Economic Role of Metal Mining in Minnesota: Past Present and Future*, October 2007, “Power Report,” pp. iii-v, 22-28) The DEIS also does not address adverse social or economic consequences of the risk that project could create an unfunded Superfund liability for taxpayers, as other mining projects across the nation historically have done.

Missing from the DEIS analysis is any acknowledgement of the boom and bust cycle of extraction industries in Minnesota and the adverse social and economic impacts associated with the cycle once ores that can be economically extracted and processed are used up. Research pertaining to Northern Minnesota documents repeated booms and busts in the mining industry, leading to community instability and long-term decline. From 1979 to 2005, 83 percent of the iron jobs in Minnesota were eliminated, while 80 percent of the nation’s copper mining jobs disappeared between 1972 and 2002. (Power Report, *supra*, pp. ii, 6, 7, 29).

Price volatility affects the decline cycle. When metal prices are high, lower grade deposits are brought on line, adding to supply and moderating price increases. In a global market, poorer nations also attempt to secure mining jobs, displacing American sources. In addition, technical change steadily displaces labor with more powerful equipment and new electro-chemical processes, resulting in a smaller workforce even for the same amount of ore extraction. Although mining inevitably depletes economically viable ores in a relatively short period of time, the process of extraction and processing creates relatively permanent environmental damage. (Power Report, *supra*, pp. ii, 6, 7). The EIS must assess the adverse impacts to local communities of the bust cycle, when population and payroll drop due to temporary shut-downs or inevitable closure. (DEIS, Tribal Positions, p. 4.10-14)

In correlating a “no action” alternative with adverse consequences, the DEIS also fails to

analyze the actual economy of Northern Minnesota and its reliance on sectors of the economy that depend on residential preference and, thus, indirectly on environmental amenities, as well as tourism and recreation, that depend directly on environmental quality. Mining related income is only a small percentage of earnings in Northern Minnesota and the growth of other sectors of the economy has provided sources of income many times larger than the loss of the iron industry payroll. (See Power Report, *supra*, pp. iii, 10,11, 22-23, 25) The EIS must acknowledge negative economic and social impacts to local communities if natural resources are lost or damaged due to the project. (See DEIS, Tribal Positions, pp. 3-50, 4.10-14).

Finally, the DEIS fails to analyze the price assumptions on which both the opening and continued operation of the project depend. This is not an academic inquiry. Interest in the project was, no doubt, spurred by the quintupling of copper prices from 2001 to 2006, rising from about \$0.75 per pound to about \$3.80 per pound. In the 1970's, a similar sharp increase in copper prices spurred interest in development of Minnesota's copper ore deposits, but copper prices fell in the early 1980s and copper mines shut down nationwide rather than opening in lower-grade Minnesota deposits. (Power Report, pp.1, 5). Recent economic recession and predicted economic factors that might lead to the intermittent operation, early shut down or failure to fund adequate reclamation and post-closure activities if the project were to move forward should be analyzed in the EIS.

The final EIS should include adverse economic and social impacts of the project and potential benefits of the no action alternative, considering the following:

- Information on Minnesota's mining industry, including historical and reasonably predictable cyclical "boom and bust cycles;
- Analysis of the regional economy's current reliance on perceived environmental amenities, including tourism, recreation and industries such as health and finance which may be located based on residential choices;
- Analysis of the adverse economic and social impacts of population and payroll loss when mining activities stall or cease, or resulting from mechanization, including impacts on unemployment, demand for social services, and tax revenues required to fund social services.
- Analysis of the price structure needed to support opening of the PolyMet mine and processing facility, maintaining operations and salaries and funding closure and post-closure treatment and reclamation.
- Analysis of the potential public economic risk that unfunded closure and post-closure reclamation and pollution remediation costs would become a burden on taxpayers.

G(1) The EIS Must Provide a Thorough, Independent and Analytical Consideration of the Underground Mining Alternative.

SUMMARY

The Scoping Decision for the PolyMet NorthMet EIS required evaluation by a third party contractor of the feasibility of using underground mining techniques. The DEIS eliminated the underground mining alternative prematurely and provides no independent analysis of feasibility, economic return or potential reduction in environmental harm from an underground mine alternative. This failure of analysis is particularly troubling since there are substantial ore reserves at depths that might be more accessible with shaft mining and since a study of the NorthMet deposit by U.S. Steel recommended underground mining. In order to meet minimum legal requirements under federal and state environmental review statutes, the EIS must provide sufficient, objective and detailed consideration of this mining alternative.

DISCUSSION

Consideration of alternatives is a critical aspect of environmental review under both NEPA and MEPA. (*See* 42 U.S.C. § 4332(C)(iii); 40 C.F.R. § 1500.8(a)(4); Minn. Stat. 116D.04, Subd. 2a; Minn. R. 4410.2300, Subparts G and H). The PolyMet NorthMet Scoping Decision recognized that an underground alternative could reduce the environmental impacts of the NorthMet mining project and proposed that an independent third party contractor evaluate economic feasibility. (Final Scoping Decision, *supra*, p. 5)

Analysis of an underground mining alternative is particularly salient since a study of this particular deposition performed by U. S. Steel recommended underground mining. Tribal agencies note, “By examining cross-sections showing the distribution of ore by depth, it appears that there are substantial ore reserves at depths that likely could not be accessed by the proposed open-pit mine.” (DEIS, p. 3-64).

The DEIS rejects an underground mining alternative in Table 3.2-4, Alternatives Considered but Eliminated, stating, “The rate of ore production of an underground mine would not support the processing rate necessary to economically process the low grade ore, and therefore would not meet the Purpose and Need of the Project.” The DEIS also suggests that the broad distribution of the ore throughout the mine site would create a safety hazard due to the risk of mine ceiling collapse unless a sizable amount of ore was left in place and not recovered. (DEIS, p. 3-64).

The DEIS includes information comparing the initial capital cost of underground mining as compared to open-pit mining, but does not compare any other pertinent costs, such as wastewater treatment, pollution prevention and remediation, mine closure or reclamation or costs to purchase and exchange public forest lands. There is no data from which it could be determined

whether any of the costs pertaining to greater environmental risks of open-pit mining are included in the “unit costs” per ton from which the DEIS concludes that underground mining is infeasible. (DEIS, p. 3-69).

Although the DEIS discusses the decrease in minable ore tonnage resulting from preserving pillars of ore left in place for geotechnical stability (DEIS, p. 3-69), there is no discussion of the potential that open-pit mining methods will leave substantial ore reserves at depths that could not be accessed by open-pit mining.

With only a brief citation to a consultants’ memorandum (DEIS, p. 3-69), the DEIS provides no basis to ascertain whether an *independent* review of feasibility of underground mining was performed and no data pertaining to metals commodity pricing, costs of ongoing operations and reclamation, or profitability over time from which it could be determined whether underground mining is infeasible or simply less profitable than the proposed open-pit extraction. The DEIS does not dispel the concern that greater feasibility of open-pit mining may rest on the company’s ability to discount to present value (if not underestimate or avoid) future costs of water quality treatment, mine closure and reclamation.

WaterLegacy shares the concern raised by tribal agencies that the underground alternative was prematurely eliminated, even though it would pose less harm to high quality wetlands and may be less damaging to water resources. (DEIS, p. 4.2-25). As stated by the tribes:

It is the position of the tribal cooperating agencies that this alternative was eliminated prematurely and without sufficient consideration. . . The ecological costs of open-pit mining and above-ground disposal of tailings and waste rock are immense. This ecological cost, combined with the most current understanding of deposit ore grades and reasonably possible metals prices, must be evaluated to determine the viability of this alternative. (DEIS, p. 3-64)

An EIS is deficient if alternatives to the project are not adequately set forth and discussed:

A rigorous exploration and objective evaluation of the environmental impacts of all reasonable alternative actions, particularly those that might enhance environmental quality or avoid some or all of the adverse environmental effects, is essential. Sufficient analysis of such alternatives and their environmental benefits, costs and risks should accompany the proposed action through the agency review process in order not to foreclose prematurely options which might enhance environmental quality or have less detrimental effects. *Nelson v. Butz*, 377 F. Supp. 819, 823 (D. Minn. 1974), *citing Environmental Defense Fund, Inc. v. Froehlke*, 473 F.2d 346 (8th Cir. 1971).

The final EIS must include a rigorous and objective exploration of the underground alternative, including but not limited to:

- Characterization of the ore body depth, location and quality, including disclosure of the nature of resources that would not be extracted under either an underground or an open-

pit method of extraction;

- Independent analysis of the feasibility of underground mining, considering all costs of operation, maintenance, pollution prevention and remediation during mine operations, closure and post-closure under a range of reasonable assumptions regarding commodity pricing;
- Detailed discussion of the ways in which an underground mining alternative would mitigate environmental impacts on wetlands, water quality, aquatic ecosystems, endangered species and emissions of particulates and hazardous air pollutants at the mine site as well as ways in which an underground mining alternative would affect the need for perpetual maintenance and treatment of water quality impacts post-closure.

G(2) The PolyMet EIS Must Evaluate a More Robust and Comprehensive Range of Mitigation Measures and Alternative Designs.

SUMMARY

The DEIS analyzes a very narrow range of mitigation measures, possibly because most adverse impacts of the project are minimized in its analysis. Mitigation strategies should begin from the premise that waste rock, overburden and tailings are all likely to be reactive, so that water permeability and seepage to groundwater should be prevented to the maximum degree possible. Tailings and hydrometallurgical waste disposal facilities must be constructed of inert and structurally sound materials on a stable foundation and hydrometallurgical wastes should be treated as hazardous wastes with double liners and precautions to prevent leaching. In-pit treatment must be examined, along with ways to reduce contact of pit water with groundwater as well as surface water. All process water, seeps or discharge must be treated in an appropriately sized wastewater treatment facility considering nanofiltration to reduce sulfates and specific screens or methods to reduce mercury. In addition to minimizing the likelihood of water quality violations, mitigation measures must reduce cancer and non-cancer health risks to acceptable levels, reduce particulate pollution and diminish impacts on wetlands and endangered species.

DISCUSSION

Since the DEIS models minimize the risk of water quality exceedance, the need for additional mitigation of acid drainage and leachates is not readily apparent. However, in light of real world experience with drainage from sulfide mines, a robust and comprehensive range of additional mitigation measures to reduce water quality impairments is required in the EIS. The failure of the PolyMet NorthMet DEIS to consider even mitigation alternatives identified in the Final Scoping Decision undermines both the process and substance of environmental review. The suggestion in the DEIS that basic measures to protect water quality can be eliminated from consideration due to cost is inappropriate under applicable law.

Mitigation is required in the scope of an EIS under NEPA and MEPA. (*See* 40 C.F.R. §§1508.20, 1508.25(b)(3); Minn. R. 4410.2300, Subp. I). Under federal law “Draft environmental impact statements shall be prepared in accordance with the scope decided upon in the scoping process. (40 C.F.R. §1502.9(a))

Failure to “take a 'hard look' at the environmental consequences" of a major federal action, while giving adverse effects and mitigation possibilities a “perfunctory” consideration has resulted in vacation of a project approval. *Mid States Coalition for Progress v Surface Transp. Bd.* 345 F3d 520, 533, 536 (8th Cir. 2003).

MEPA not only explicitly requires that an EIS explore methods by which adverse environmental impacts of an action could be mitigated. (Minn. Stat. 116D.04, Subd. 2a), but prohibits pollution or impairment of the environment, when there is an alternative that could protect the environment. MEPA specifically states that economic considerations alone cannot justify rejecting an alternative that would protect natural resources from pollution, impairment or destruction:

No state action significantly affecting the quality of the environment shall be allowed, nor shall any permit for natural resources management and development be granted, where such action or permit has caused or is likely to cause pollution, impairment, or destruction of the air, water, land or other natural resources located within the state, so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, and welfare and the state's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment, or destruction. Economic considerations alone shall not justify such conduct. (Minn. Stat. 116D.04, subd. 6)

In the PolyMet NorthMet DEIS, several of the most obvious mitigation measures are rejected out of hand without analysis. Feasible and prudent alternatives that could protect public health and natural resources are prematurely eliminated or never considered.

Mine Site – Waste Rock and Overburden Stockpiles

At the mine site, the alternatives of off-site disposal of waste rock and co-disposal of reactive waste rock with tailings on a fully lined tailings basin are summarily rejected, although both were required to be considered in the Scoping Decision (Final Scoping Decision, pp. 4, 6 respectively). The DEIS states that off-site waste rock disposal was “eliminated from consideration” because the Mine Site Alternative subaqueous disposal provides similar benefits without the impact of transportation. (DEIS, p. 3-63, Table 3.2-4). However, this is misleading; the Mine Site Alternative provides for subaqueous disposal of one-fourth of the waste rock produced by the project. The remaining 290 million or more tons of waste rock along with the overburden would remain on-site in permanent waste rock piles. (See DEIS, pp. S-11, 3-13).

The DEIS summarily rejects the co-disposal of reactive waste rock and tailings on a lined tailings basin, with no rationale, only the following statement, “The current Project description

does not propose lining of the Tailings Basin, therefore this alternative is not feasible as a stand alone alternative.” (DEIS, p. 3-65, Table 3.2-4). As described below, a lined tailings basin should have been included in the DEIS as a necessary mitigation; this statement then has no basis.

The DEIS fails to evaluate even the most basic mitigation of waste rock stockpile drainage – enhanced liner systems, stating that subaqueous disposal is “preferred.” (DEIS, p. 4.1-164). As discussed in Section B(1), the Mine Site Alternative subaqueously disposes of Category 2, 3 and 4 rock only after 10 to 20 years and does not provide any liner system for Category 1 rock prior to completion of east pit extraction. Although the DEIS acknowledges that “there is no ‘non-reactive waste rock’ ” (DEIS, p. 3-63), that the soil overliner proposed by PolyMet is less than half of the recommended depth (DEIS, p. 4.1-154), that “saturated overburden has sufficient sulfur content (in some cases equivalent to Category 4 waste rock) to acidify and release elevated concentrations of various metals and sulfate” (DEIS, p. 4.1-165), no comprehensive let alone enhanced liner systems are proposed for overburden during mining operations. The DEIS also proposes that peat and unsaturated overburden will be stored in an unlined area, where wetting and drying will promote mercury methylation. (DEIS, p. 4.1-166).

The final EIS must analyze in detail a robust and comprehensive range of mitigation measures to prevent waste rock, peat and overburden from contaminating groundwater and surface water and increasing mercury methylation at the mine site, including but not limited to the following:

- Construction of a level and compacted platform or pad with no unsealed fractures of underlying rock surfaces prior to placement of either overburden or waste rock;
- Treatment of all overburden and waste rock as reactive materials unless a protocol of small batch continuous testing has demonstrated that certain portions are non-reactive;
- Use of liners under all waste rock (including Category 1 rock) stockpiles and overburden stockpiles at all times, whether or not some rock may be removed at a future date for subaqueous or off-site disposal. Such liner systems must have compacted soil liners at least three feet thick;
- Use of enhanced liner systems with enhanced thicknesses and resistance to tearing and liners with leak detection systems;
- Use of non-permeable liners and cover systems, including geomembranes, to prevent water infiltration on overburden and waste rock;
- Collection of drainage from all waste rock and over burden facilities, including peat and unsaturated overburden stockpiles and treatment of such drainage at a wastewater treatment facility.

Tailings Basin and Hydrometallurgical Residue Facility

In the Final Scoping Decision, the Minnesota Department of Natural Resources (MDNR) and the U.S. Army Corps of Engineers (USACE) proposed an alternative to address the potential reactivity of the NorthMet tailings, suggesting that PolyMet develop a lined tailings storage facility at the existing LTVSMC to provide storage for five years of tailings while collecting data to determine if the tailings were reactive. If during this five-year period the tailings were determined to be non-reactive, an unlined tailings basin could be constructed and, if the tailings were ultimately determined to be reactive, Cells 1E and 2E would be lined for the entire life of the operation to prevent reactive runoff from seeping into the ground and surrounding environment, while any discharge would be monitored and, if necessary, directed to a wastewater treatment plant for appropriate treatment prior to release. The DEIS reflects that the January 2007 revised project description, arrived at with no public process or public review, removed the proposed lined tailings storage facility from consideration. (DEIS, p. 2-4). This striking change in scoping behind closed doors is inconsistent with public participation under both NEPA and MEPA.

Although the DEIS recognized that the LTVSMC tailings are neither stable nor inert, and that they increase solute loadings from the NorthMet tailings. (DEIS, p. 4.1-168), the DEIS eliminated from consideration the following mitigation alternatives for NorthMet tailings disposal: creation of a full liner for the tailings basin; thickening the tailings to reduce drainage as well as stability concerns; lining Cell 2W to dispose of NorthMet tailings, or disposing of tailings on any other location other than on top of LTVSMC tailings. (DEIS, pp. 3-56, 3-58, Table 3.2-2). The rationale for rejecting these mitigating alternatives was primarily, if not entirely, cost. The alternative of providing a partial geomembrane cap to reduce infiltration at the tailings basin was also rejected due to expense. (DEIS, p. 4.1-169).⁵

As discussed previously in Section A (6), the DEIS did not address the possibility that hydrometallurgical residues would be hazardous wastes under applicable statutes and rules. In addition, the DEIS did not consider any alternative locations, liners or embankments to reduce the

⁵ The DEIS estimated that a geomembrane cap on the “beach” areas of the tailings basin would reduce infiltration from these areas by about 25 percent (5 percent reduction in total tailings basin infiltration based on the assumption that more than 75 percent of the infiltration is from the pond). However, since the DEIS modeling assumes oxidation of submerged tailings is essentially 0 (DEIS, p. 4.1-89) the beach areas, by process of elimination, would be the source of most solutes and acid drainage in the tailings basin.

risk of leakage or failure of the hydrometallurgical waste disposal facility.

The failure to consider mitigation alternatives for the tailings basin or for disposal of hydrometallurgical waste is a fatal flaw in the DEIS. The final EIS must include mitigation of the risk of water pollution and failure of embankments at the tailings basin and the hydrometallurgical waste disposal facility, including at least the following:

- Construction of the tailings basin and the hydrometallurgical waste disposal facility on a site or sites that are not already contaminated and seeping pollution into groundwater;
- Construction of the tailings basin and the hydrometallurgical waste disposal facility on a site that has a secure geologic foundation, not peat, slimes or bog;
- Construction of embankments for the tailings basin and the hydrometallurgical disposal facility out of inert and structurally sound material that will provide no additive sources of solute loadings, rather than LTVSMC coarse tailings;
- Use of enhanced liners for the tailings basin, including geomembranes to reduce infiltration of any non-ponded area, if saturation is proposed to reduce acid and leachate formation;
- Use of dewatering and thickening of tailings to reduce volume, drainage and stability concerns;
- Construction of the hydrometallurgical residue disposal facility to prevent migration of constituents into groundwater or surface water, consistent with best practices for disposal of hazardous wastes, including double liners, a leak detection, collection and removal system, a cover system, a system for control of run-on and runoff, an inspection plan and treatment and disposal of any collected runoff and leachate.

Mine Pits

The DEIS mentions, but does not assess potential methods by which water quality in the east and west pits might be mitigated. The east pit could be filled so that a geomembrane could be installed over the entire exposed Virginia Formation area (DEIS, p. 4.1-166) and in-pit water quality treatment, such as adding limestone, iron salts or biogeochemical treatment could be provided to the west pit lake. (DEIS, p. 4.1-167). Although the east pit constructed wetland is likely to be ineffective in treating pollution and may even promote mercury methylation (DEIS, pp. 4.1-112, 4.1-169), no alternative is considered where the wetland would not be constructed. Similarly, although it is acknowledged that west pit water quality will violate water quality standards, in order that additional mining of deep west pit deposit might occur in the future, any alternative to fill or cap the west pit has been eliminated from consideration. (See DEIS, p. 3-66, Table 3.2-4).

The final EIS should discuss mitigation measures for both the east pit and west pit that

include the following:

- Sealing of major fractures that would result in seepage to groundwater or the surficial aquifer from either pit.
- Filling either or both pits with waste rock, overburden and non-reactive materials, capping the pit with a low-permeability cover to reduce infiltration and collecting and treating drainage. (Eliminating the east pit constructed wetland and/or the west pit lake).
- In any alternative where a pit lake is constructed, providing specific in-pit water quality treatment and pumping of pit lake water through the wastewater treatment facility to reduce sulfates, mercury and other contaminants.

Wastewater Treatment

The scope of wastewater treatment proposed in the DEIS is limited. The DEIS does not propose to treat seepage from the tailings basin either before discharge to the Partridge River or before releasing seepage to Second Creek after closure. The DEIS does not propose to treat east pit overflow or west pit water. (See DEIS, p. 4.1-167, 4.1-169). A wastewater treatment facility is located only on the mine site, not at the tailings basing, and the standards for which the WWTF would be targeted do not meet water quality standards. (See Section B(1), *supra*).

The final EIS must include mitigation measures based on the premise that all water that will be discharged, seep or leak from the mine site or tailings basin should be treated so that it meets both groundwater and surface water quality standards and so that its release does not increase sulfate in wild rice waters. Mitigation alternatives that should be evaluated in the EIS include the following:

- Construction of a wastewater treatment facility at the plant site as well as the mine site.
- Capture, pumping and treatment in a WWTF of the following additional flows: seeps pumped from the tailing basin before either recycling or discharge to the Partridge River, seepage flowing south from the tailings basin to Second Creek, any overflow or standing waters from the east or west pit, seepage from waste rock stockpiles, including permanent stockpiles of Category 1 rock and overburden.
- Providing sufficient WWTF capacity and treatment methodology to reduce sulfate through nanofiltration, filter mercury and achieve targets for all chemicals of concern that meet groundwater and surface water quality standards.

Air Pollution

Even without analyzing the health impacts on workers or resulting from inhalation of amphibole fibers, the DEIS discloses that the PolyMet NorthMet project will result in cancer and non-cancer risks exceeding Minnesota health risk values primarily as a result of mine site

diesel emissions and rock crushing at the plant. The level of particulate emissions from the mine site and for the project cumulatively far exceed major source thresholds, and may exceed prevention of significant deterioration limits and federal and state ambient air quality standards. (*See Sections E(2) and E(3), supra*).

The DEIS provides little assessment of alternatives to mitigate air quality impacts. Replacing LTVSMC locomotives with more modern units (a replacement already included in the analysis of air quality impacts), using a dry baghouse for rock crushing and removing mercury with wet scrubbers for the autoclave appear to be the only strategies considered. (DEIS, pp. 4.6-37, 4.6-38, 4.6-39). The DEIS states use of conveyors rather than trucks to carry ore from the mine pit to the surface was eliminated from consideration and various measures to reduce nitrogen oxides from burners were rejected. (DEIS, p. 3-65, Table 3.2-4; p. 4.6-37).

The final EIS must include alternatives to prevent exceedance of health risk values from air pollution and to reduce emissions, including emissions from fugitive and mobile sources, to accomplish at least the following objectives:

- Reduce both cancer and non-cancer inhalation risks to human health at the plant and the mine site below health risk values, including significantly reducing diesel emissions.
- Reduce emissions of particulates, fine particulates and nitrogen oxides through analysis of best available control technology in all mining activities, mitigating acid deposition and ensuring compliance with all Air Quality Standards and Class II and Class I prevention of significant deterioration limits.
- Reduce cumulative mercury emissions increase from the plant, in light of mercury emissions increases in the minerals processing sector and the local watershed area.

Wetlands and Endangered Species

Previous sections of these comments have described impacts on wetlands and endangered plant and animal species. (*See Sections C(1) through C(4), D(1) and D(2)*). The DEIS wetland mitigation proposals are inadequate and no mitigation alternatives are suggested to reduce impacts on endangered plant and animal species. The final EIS must evaluate mitigation of these impacts including the following:

- Replacement of wetlands directly and indirectly impacted by the project with a) wetlands sufficient to meet legal replacement standards without a deficit; b) wetlands that provide equivalent resources to tribes and are within Ceded Territories; c) wetlands that provide the same functionality within the St. Louis River and Lake Superior Basin watersheds.

- Specific steps to preserve endangered plant species, particularly those where project activities may impact a substantial proportion of State populations;
- Specific steps to preserve and replace, contemporaneous with any impairment, critical habitat and wildlife corridors for endangered species that will be impacted or disrupted by the NorthMet project and other cumulative foreseeable activities.

If mitigation measures cannot be taken to avoid impacts, whether on water quality, air quality, human health, wetlands or plant and animal species, the EIS must identify resulting effects as irretrievable and irreversible commitments of resources.

It must be emphasized that the purpose of an EIS under both federal and state law is to identify what mitigation would be needed to prevent a proposed federal or state action in permitting a project from resulting in pollution, impairment or destruction of human health and natural resources. If the economics of extraction of ores from the NorthMet deposit don't permit basic mitigation measures, such as building a lined tailings basin on a solid foundation, treating discharges to remove sulfates and heavy metals, mitigating water and air pollutants that impair human health and violate standards and replacing impacted wetlands, either PolyMet has created overly inflated expectations in its investors or the NorthMet site has an inadequately rich deposit to permit exploitation. Part of the function of a properly written EIS is to assist project proponents in making the calculation of whether they can "do the project right" and protect the environment. If investors cannot reduce their profits or commodity markets cannot support high enough metals prices to justify mining this deposit under environmentally protective conditions, this project should go no further.

H. The EIS Must Provide a More Comprehensive Consideration of Cumulative Impacts of the PolyMet Project along with Past, Present and Foreseeable Future Actions in the Project Vicinity.

SUMMARY

The cumulative impacts analysis in the DEIS inadequately considers the potential impacts of the PolyMet NorthMet project in combination with other past, present and reasonably foreseeable future actions in the greater project vicinity. Incomplete development of information on the impacts of the project and other contributing sources of environmental risk result in systematic understatement of cumulative impacts on at least the following resources: ground, surface and drinking water quality; mercury; wild rice; wetlands; aquatic habitats and species, including fish and invertebrates; threatened, endangered and tribally significant plants, species and wildlife; air emissions affecting inhalation toxicity and resulting in deterioration of air quality; tribal rights, cultural resources and environmental justice. Cumulative impacts analysis, fundamentally, cannot not be driven by the interests of a project proponent but must evaluate whether human health and natural resources can be sustained in the face of the proposed action and other actions that also impact the environment.

DISCUSSION

Throughout these comments, it has been suggested that the final EIS must make a more objective and complete analysis of the impacts of the PolyMet NorthMet project and the cumulative impacts of the project along with other current and foreseeable actions on human health and various natural resources. This section does not replace earlier discussions, but highlights a number of areas where cumulative impacts analysis has not been performed or has been inadequate. In each of the areas summarized below, many of which are also reflected in tribal positions (DEIS, Tribal Positions, pp. 4.14-1 through 4.14-6), additional cumulative impacts analysis must be done before the final EIS is released:

- Cumulative impacts on air quality, water quality, mercury loading, Class I and Class II increments of current and foreseeable actions including but not limited to the Mesaba Energy power plant, Mesabi Nugget Phase II, the Keetac Expansion Project and the Essar Steel Expansion Project;
- Cumulative impacts of the LTVSMC tailings and other contaminated areas of concern in considering both the instability of NorthMet tailings and hydrometallurgical residues and the impacts on water quality;
- Cumulative impacts to wetlands, tributaries, the Partridge and Embarrass Rivers, to Colby Lake and the Whitewater Reservoir considering current water quality concentrations and exceedances, groundwater drawdown or mounding due to multiple mine projects in aquifers impacted by historical and existing mine projects;
- Cumulative impacts on the Partridge, Embarrass and St. Louis Rivers including all flow paths from contaminants and all loadings from nonpoint sources and air deposition;
- Cumulative impacts on St. Louis River and Lake Superior Basin watershed of groundwater and surface water quality degradation, loss of wetlands, deposition of air pollutants, changes in cover and hydrologic changes resulting from historic, current and reasonably foreseeable mining and minerals processing activities;
- Cumulative impacts on mercury in fish tissue of mercury point and nonpoint discharge, sulfate discharge, air deposition of mercury and sulfur compounds, hydrologic changes, peat disruption and stockpiling from the NorthMet project and historical, current and reasonably foreseeable actions;
- Cumulative impacts to wild rice from sulfate throughout the watershed and from hydrologic changes;
- Cumulative impacts of loss of wetlands and wetland functionality throughout the St. Louis River watershed, the Lake Superior basin and the Ceded Territories, as well as in the Partridge River watershed;
- Climate change implications of the proposed project, considering disruption of extensive areas of peat;

- Cumulative impacts to plant and animal species that are not listed as threatened or endangered, including species such as moose that are important to tribal and non-tribal members would likely be impacted by mining projects;
- Cumulative effects on fish and macroinvertebrates, including habitat degradation and local emissions from deposition of mercury, sulfur dioxide, nitrogen oxides and particulates, and discharge to waters of sulfates and metals including mercury, nickel copper and cobalt;
- Cumulative impacts on wildlife corridors and habitat fragmentation for endangered species including historical, current and reasonably foreseeable development, including mining and minerals processing;
- Cumulative impacts on human health, deterioration of air quality and violation of air quality standards of all NorthMet air emissions sources, including mobile source and fugitive air emissions of particulates, fine particulates, criteria pollutants and hazardous air pollutants;
- Cumulative effects of noise, vibration, and visual impacts on members of the public, including tribal members;
- Cumulative environmental justice impacts of loss of usufructuary rights to Ceded Territory in the Superior National Forest, impacts on wetlands in Ceded Territory, mercury increases in fish, impairment of wild rice and wetlands in combination with other projects impacting tribal rights and resources;
- Cumulative impacts on wetlands, wildlife, water quality and social and economic concerns should be assessed for however long impacts would occur. In the case of wetlands, water quality and wildlife, impacts could occur for hundreds or thousands of years or could be permanent.

Repeated assertions in the DEIS that the cumulative impacts on the environment of the NorthMet project are not significant (DEIS, pp. 4.14-3 to 4.14-7) result from flaws in the underlying data, assumptions, legal analysis and modeling in nearly every resource-specific area as well as the lack of an appropriate cumulative effects analysis. Many of these flaws have been discussed previously in these comments.

Prior to the final EIS, in addition to addressing flaws in resource-specific areas, it is strongly recommended that the DEIS reconsider the purpose of cumulative impacts analysis. The DEIS appears to conduct cumulative impacts analysis from the perspective of the project proponent. Cumulative actions are used to justify project pollution and suggest that prior or possible reductions in pollution by other sources could prevent the project from having a significant impact. (See DEIS, p. 4.14-4, discussing SO₂ and NO₂ deposition) or to assert that potential harm to the environment may be someone else's fault, for which another source is "culpable." (See DEIS, p. 4.1-120, 4.1-161, discussing impacts on Embarrass River water quality). In some instances, the DEIS appears to justify environmental impairment on the basis

that another source or project makes an even greater contribution to the harm. (See DEIS, p. 4.4-32, discussing impacts on wildlife corridors).

Cumulative impacts analysis is required under both the National Environmental Policy Act and the Minnesota Environmental Policy Act (See 40 C.F.R. §1508.7; Minn. R. 4410.2300, Subp. H) As explained in U.S. EPA guidance,

The combined, incremental effects of human activity, referred to as cumulative impacts, pose a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts accumulate over time, from one or more sources, and can result in the degradation of important resources. Because federal projects cause or are affected by cumulative impacts, this type of impact must be assessed in documents prepared under the National Environmental Policy Act (NEPA). (U.S.EPA, *Consideration Of Cumulative Impacts In EPA Review of NEPA Documents* (May 1999), p. 1)

Fundamentally, the perspective that must be taken in cumulative impacts analysis is that of the threatened resource, not the project proponent. Cumulative impacts analysis asks, on behalf of the environment, whether human health and natural resources will be at risk as a result of pollution, impairment or destruction from cumulative projects, any of which might be less significant if considered alone. The final EIS must revise its point of view.

CONCLUSION

For all the reasons stated previously in these comments, the PolyMet NorthMet draft environmental impact statement is inadequate and insufficient. It appears to have been written to justify and promote the PolyMet NorthMet project, rather than to assess its environmental impacts and the cumulative impacts of this proposed project and other regional mining and minerals processing on the Superior National Forest, the Lake Superior watershed, human health, tribal rights and natural resources. Federal law specifically prohibits the use of an EIS to promote a project, “Environmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made.” (40 CF.R. §1502.2 (g))

The scale of destructive change required by the NorthMet project and the high quality Superior National Forest location in which wetlands destruction and mining excavation would be conducted requires a much more cautious evaluation, particularly since no plans have been provided to exchange national forest land. As the Minnesota Supreme Court stated thirty years ago in rejecting a tailing site in the Superior National Forest,

The Superior National Forest has been set aside by Congress to protect the forest for outdoor recreation, wildlife, and other conservation purposes. We have no hesitation in

holding that the destruction or removal of 8,680 acres from such a relatively wild area in order to devote it to industrial development is totally incompatible with accepted land-use principles. We are confident the Federal government would adopt a similar view if a land exchange were sought. *Reserve Mining Co. v. Herbst*, 256 N.W. 2d 808, 833 (Minn. 1977)

The conflict between open-pit mining and wilderness defined by the Court in connection with the Boundary Waters Canoe Area Wilderness supports land use principles that minimize further intrusions of mining into national forests so that the natural character of the area can be maintained. As explained in *Reserve Mining Co. v. Herbst*, *supra* at 833, quoting *Izaak Walton League of America v. St. Clair*, 353 F. Supp. 698, 714 (D. Minn. 1973).

It is clear that wilderness and mining are incompatible. Wilderness exists because man has not yet intruded upon it. As the United States was settled and frontiers vanished, wilderness disappeared except for inaccessible or otherwise then commercially useless areas. As of today but few true wilderness areas remain. Once penetrated by civilization and man made activities, it cannot be regained for perhaps hundreds of years. The recovery period is meaningless for generations to come. The destruction is irreversible.

The final EIS for the PolyMet NorthMet project must accurately and objectively apply the law, analyze the data, make appropriate modeling assumptions and assess cumulative impacts to determine the degree to which the project would result in violation of standards and regulations, pollution impairment and destruction of the environment and irreversible commitment and loss of natural resources. Any lesser analysis is legally as well as scientifically and morally insufficient.

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Respectfully submitted,



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