WaterLegacy
Protecting Minnesota's waters and the communities who rely on them

Comments Opposing MPCA Draft NPDES/SDS Permit (MN0071013)

Comments Opposing MPCA Draft Section 401 Certification

Petition for Contested Case Hearing

In the Matter of the PolyMet NorthMet Copper-Nickel Mine Project

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INTRODUCTION

WaterLegacy Statement of Interest

WaterLegacy is a Minnesota 501(c)(3) non-profit organization founded to protect Minnesota's water resources, wetlands, wildlife, habitats and the communities that rely on them, particularly from the threat of copper-nickel mining in sulfide-bearing ore in Northeastern Minnesota. Many of plaintiff's board members, advisory committee members and supporters live in Northeastern Minnesota and use the Superior National Forest and the waters and habitats of the Embarrass River, Partridge River and St. Louis River watersheds for a variety of recreational and aesthetic purposes including hiking, canoeing, kayaking, cross-country skiing, horseshoeing, dog-sledding, wildlife viewing, solitude and photography.

Several of WaterLegacy's members have canoed up the South Branch Partridge River and the Partridge River from forest roads and have otherwise walked and canoed onto the site of the proposed PolyMet NorthMet Copper-Nickel Mine Project ("PolyMet Project"). They have enjoyed the proposed PolyMet mine site and the sinuous reaches of the Upper Partridge River in proximity to the site for their beauty, for recreation, for hunting, and to gather wild plants.

Many members of WaterLegacy have gathered wild rice or have fished downstream of the proposed PolyMet Project in the Embarrass River and Embarrass River chain of lakes, the Partridge River, Colby Lake and the St. Louis River. Some of these members belong to environmental justice communities and rely on the wild rice they gather and on wild-caught fresh fish from these watersheds for sustenance. Some of our members have conducted scientific investigations of waters and habitats in the Partridge River and St. Louis River downstream of the proposed PolyMet Project. At least one of our members works as a wilderness guide, specializing in immersive wilderness experiences that include teaching plant and animal ecology, tracking, hunting, and traditional gear and transportation. He has taken at least two groups canoeing and portaging up the Partridge River toward the proposed PolyMet mine site.

Some of our members live in Hoyt Lakes, and drink municipal water drawn from Colby Lake. Other members of WaterLegacy own lakeshore property within the Embarrass River chain of lakes or riparian property on the Embarrass River or St. Louis River downstream of the proposed PolyMet Project, where they recreate, swim, canoe, kayak, cross-country ski, fish, support sustainable ecological practices, and obtain moral and spiritual as well as economic value from preserving the property they own. Other members of WaterLegacy are doctors and other health professionals concerned about the impacts of PolyMet pollution on the health of their patients and the Northeastern Minnesota communities in which they live and serve.

WaterLegacy's mission, goals and objectives would be adversely impacted by the MPCA's approval and issuance of the Draft NPDES/SDS Permit MN0071013 ("Draft NPDES/SDS Permit"). Our mission, goals and objectives would also be adversely impacted by the MPCA's approval and issuance of the Draft Clean Water Act Section 401 Certification ("Draft 401 Certification"). As explained in our Comments below, issuance to PolyMet of a permit for its water pollution and MPCA certification to the federal government that the State of Minnesota supports a federal Clean Water Act permit for PolyMet wetlands destruction would severely

impact Minnesota water resources in the Partridge River, Embarrass River and St. Louis River watersheds, the quality of water in Minnesota's Lake Superior basin and the health and well-being of plant, animal and human communities who rely on these fresh water resources.

The interests of WaterLegacy's individual members in a wide range of recreational, aesthetic, cultural, life-sustaining, economic and spiritual activities would be adversely affected by MPCA action to approve and issue the Draft NPDES/SDS Permit and/or to approve and issue the Draft 401 Certification for the PolyMet Project. Not only our members who own or rent property immediately downstream of the property, but many other members of WaterLegacy have continuing and important connections with the waters and natural resources on the site of and downstream of the proposed PolyMet copper-nickel mine project. WaterLegacy's members intend to continue their recreational, aesthetic, cultural, life-sustaining, economic and spiritual activities connected to the waters and other natural resources that would be adversely affected by issuance of a water pollution permit and Clean Water Act certification to PolyMet for its proposed open-pit copper-nickel sulfide ore mining and processing project.

Specific Actions Requested from MPCA by WaterLegacy

1. WaterLegacy requests that the Minnesota Pollution Control Agency ("MPCA") reject and deny the Draft NPDES/SDS Permit MN0071013 ("Draft NPDES/SDS Permit") for the PolyMet[1] NorthMet Copper-Nickel Mine Project ("PolyMet Project")

2. WaterLegacy requests that the MPCA reject and deny the Draft Clean Water Act Section 401 Certification ("Draft 401 Certification") for the PolyMet Project.

3 WaterLegacy requests that the MPCA grant our Petition for Contested Case Hearing submitted in furtherance of WaterLegacy's mission and the representation of our members whose individual interests would be impaired by the approval and issuance of the Draft NPDES/SDS Permit and/or the Draft 401 Certification for the PolyMet Project.

Summary of WaterLegacy Comments Opposing Draft Permit and 401 Certification

The PolyMet project is Minnesota's first copper-nickel sulfide ore mine project to reach the permitting stage. Many other copper-nickel mine projects are in various stages of exploration and feasibility analysis in Minnesota. It is understood both that the PolyMet project would serve as the "snowplow" behind which other copper-nickel mine projects would advance and that the standards set for the PolyMet NPDES/SDS permit and Section 401 Certification would become precedent for future copper-nickel projects. For this reason, it is particularly important that the MPCA "get it right" and establish standards that will protect natural resources across a broad swath of northeastern Minnesota, from southwest of Duluth to the Boundary Waters watersheds.

[1] Poly Met Mining, Inc. is a shell company, wholly owned by its publicly-traded parent PolyMet Mining Corp., the only entity for which any regulator has any financial information. PolyMet should be the subject of any permits issued by the MPCA, as it will be a signatory for any permit to mine issued by the Minnesota Department of Natural Resources. See PolyMet Permit to Mine NorthMet Project, Dec. 2017 ("PolyMet PTM App."), p. 23, available at http://www.dnr.state.mn.us/polymet/permitting/ptm/index.html

Getting it right will be no easy task. Sulfide mining for copper, nickel, gold and other metals, also known as "hardrock mining," has a very poor track record. There is no sulfide mine in a water-rich environment, like that in northeastern Minnesota, which has operated and closed without polluting surface water and/or groundwater with acid mine drainage and/or toxic metals. In 2009, the U.S. Environmental Protection Agency ("EPA") in identifying the hardrock mining industry as the first priority for financial responsibility rules under Superfund statutes, estimated that this sulfide mining industry is responsible for polluting 3,400 miles of streams and 440,000 acres of land.[2] EPA also estimated that the metal mining industry (copper, nickel, gold, lead and zinc) was responsible for nearly 1.15 billion pounds or approximately 28% of the total 2007 Toxic Release Inventory that U.S. industry was required to report.[3]

It cannot be assumed that the sulfide mining Superfund sites highlighted by EPA to have a potential remediation cost as high as $54 billion[4] were attributable to "direct discharge" of pollutants to surface waters. Many of the most extreme cases where sulfide mine projects have had toxic results requiring hundreds of millions of dollars to remediate remained as a legacy of seepage from mine pits, waste rock stockpiles and tailings facilities long after the company had filed for bankruptcy, leaving its liabilities for the taxpayers.[5]

In the course of analyzing the potential for a copper mine in Bristol Bay, Alaska, the EPA cautioned that 13 out of the 14 copper mines operating in the United States had experienced "failures to collect and treat seepage that resulted in water quality degradation." Such degradation had resulted from various factors, including "including inadequate pre-mining data, poor prediction of mitigation needs, inadequate design, improper operation, and equipment failure."[6] The EPA emphasized that "prediction failures" resulted in water collection and treatment failure, despite permits including "mitigation measures intended to prevent such occurrences."[7]

Many of the factors singled out by EPA as leading to prediction failures and thus to water quality degradation would sound eerily familiar to anyone who has followed the PolyMet environmental review process: waste rock leachate concentrations derived from humidity tests, use of simplifications to model surface-water and groundwater hydrology, water quality models that assume that mining would not affect background water quality, use of average receiving water flow without considering low dilution during low-flow periods, water quality criteria that fail to address chemical interactions or are out of date, non-representative tested rock and tailings samples, and the absence of tests for sensitive aquatic insect species.[8]

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[2] EPA, *Identification of Priority Classes of Facilities for Development of CERCLA Section 108(b) Financial Responsibility Requirements*, 74 FR 37213, 37215, July 28, 2009, attached as Exhibit 1. EPA defined "hardrock mining" to mean facilities that extract, beneficiate or process metals (e.g. copper, gold, iron, lead, magnesium, molybdenum, silver, uranium, and zinc) and non-metallic, non-fuel minerals (e.g. asbestos, gypsum, phosphate rock, and sulfur), *Id*., at 37213.
[3] *Id*.
[4] *Id*., at 37217.
[5] *Id.* at 37218.
[6] EPA, *An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska*, Volume 1 – Main Report, EPA 910-R-14-001A, January 2014, excerpts provided in Exhibit 2, see p, 8-49, autop. 3.
[7] *Id*., p. 8-54, autop. 5.
[8] *Id.*, pp. 8-56 to 8-57, autop. 8.

Overall, the EPA concluded that the probability of potential *failure* of water collection and treatment during operations for a copper mine is 93%. Post-closure collection and treatment failures are yet higher and, if the mine site were to be abandoned, EPA concluded that sulfide mining's track record suggested that failure of water collection and treatment becomes "certain."[9]

In addition to the precedent-setting nature of the PolyMet Project and the history of water degradation experienced at similar mines, a special challenge is facing the MPCA and the State of Minnesota due to the State's poor history in regulating mining pollution. For decades, despite a formal agreement with the EPA to prioritize mining permits, the MPCA has failed to update expired mining permits and variances and to enforce violations of water quality standards resulting from mining seepage from tailings and waste rock storage and from mine pits. In response to these failures of regulation, in July 2015, WaterLegacy filed a formal Petition for Withdrawal of Program Delegation from the State of Minnesota for NPDES Permits Related to Mining Facilities.[10] The EPA prepared a comprehensive protocol to investigate this petition in March 2016,[11] and its investigation is still pending.

Since July 2015, the MPCA has neither reissued any of the State's expired mining permits nor enforced violations of surface water quality standards at existing mines resulting from seepage from mine pits or waste facilities. The Minnesota Legislature has enacted special interest legislation preventing the MPCA from listing impaired waters or requiring permittees to spend money in order to comply with Minnesota's sulfate water quality standard that protects wild rice.[12] The MPCA has also issued 401 certifications even in the most egregious case where mining company seepage from mine pits and tailings waste had resulted in violation of Minnesota water quality standards, the company had violated its permit for a quarter of a century, and the permit had been expired and out of date for over a decade.[13]

In the context of mining industry failure to protect water quality, the MPCA's deficits in controlling water pollution, and the unrelenting pressure upon Minnesota regulators to approve permits and certifications irrespective of their likely and foreseeable impacts on water quality, the PolyMet Project Draft NPDES/SDS Permit and DRAFT 401 Certification stand out in stark relief. Neither the draft Permit nor the draft 401Certification comply with applicable state or federal law. Neither the draft Permit nor the draft 401 Certification would protect Minnesota water quality, environmental resources or human health. And neither the draft Permit nor the draft 401 Certification should be approved or issued by the MPCA.

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[9] *Id*. Table 14-1, autop. 9.
[10] WaterLegacy, Petition to the United States Environmental Protection Agency for Withdrawal of Program Delegation from the State of Minnesota for NPDES Permits Related to Mining Facilities, July 2, 2015, Exhibit 3. This Petition, its complete Exhibits and subsequent correspondence are available at https://www.epa.gov/mn/npdes-petition-program-withdrawal-minnesota
[11] EPA, Final Protocol for Responding to Issues Related to Permitting and Enforcement Presented in the WaterLegacy Petition for Withdrawal of Program Delegation from the State of Minnesota for NPDES Permits Related to Mining Facilities, Mar. 2016, Exhibit 4.
[12] Laws of Minnesota 2015, First Special Session ch. 4, article 4; Laws of Minnesota 2016, Chapter 165, Section 1, Exhibit 5.
[13] WaterLegacy, Comments on 2012-00415-JCB US Steel, Minntac Mine Draft Clean Water Act Section 401 Certification for Section 404 Permit 483-acre Mine Pit Extension, Access Road Relocation, Jan. 2, 2014, Exhibit 6.

The NPDES permit process reflects the State's delegated authority under the Clean Water Act, Section 402.[14] While states are given leeway to enact more stringent standards or procedures than required by the Act to protect and clean up their waters, state statutes and rules must, at a minimum, satisfy and conform to the Act and EPA regulations.[15]

Requirements for issuance of a National Pollutant Discharge Elimination System (NPDES) permit are spelled out in the Clean Water Act and its implementing regulations. These federal laws define the waters of the United States to which the Clean Water Act permitting requirements apply and the nature of point sources and their discharge.[16] Federal regulations also require that a state NPDES permit prevent discharge that causes or contributes to an exceedance of state numeric or narrative standards, including antidegradation, and define the process by which a state determines whether a discharge has the reasonable potential to cause or contribute to such exceedances.[17] These legal standards, along with corresponding state laws, will be discussed in more detail in the various discussion sections of these comments pertaining to the Draft NPDES/SDS Permit for the PolyMet Project.

Although states are entitled to waive 401certification, once a state determines not to waive 401certification, findings to issue or deny 401certification must comply with state law and with federal Clean Water Act. Federal regulations as well as Minnesota rules require that a Section 401 certification only be issued if "there is a reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards."[18]

Minnesota rules also require that the MPCA deny section 401certification upon making the factual findings that also justify revocation of a permit or refusal to issue or reissue a permit.[19] These include findings, with respect to the facility or activity to be permitted or certified that "the proposed permittee or permittees will not comply with all applicable state and federal pollution control statutes and rules administered by the agency, or conditions of the permit,"[20] or that "the permitted facility or activity endangers human health or the environment and that the danger cannot be removed by a modification of the conditions of the permit."[21] These grounds for refusal to issue a permit and for the denial of a 401certification apply to the PolyMet copper-nickel mine project and the decisions currently pending before the MPCA.

The bases for WaterLegacy's position that the MPCA is obligated under law to reject both the Draft NPDES/SDS Permit and the Draft 401 Certification are summarized below.

1. The Clean Water Act requires the MPCA to set enforceable NPDES permit limits to prevent discharge through groundwater to hydrologically connected surface waters from causing or contributing to a violation of State surface water quality standards, including degradation, applicable to waters of the United States.

[14] 33 U.S.C. §1342(b).
[15] 33 U.S.C. §1311(b)(1)(C).
[16] *See* 33 U.S.C. §§1311; 1342; 1362.
[17] *See e.g.* 40 C.F.R., Part 132, Appendix F, Procedure 5.
[18] 40 C.F.R. §121.2; Minn. R. 7001.1470.
[19] Minn. R. 7001.1450, subp. 1, item B referencing Minn. R. 7001.0140, subp. 2
[20] Minn. R. 7001.0140, subp. 2, item A.
[21] Minn. R. 7001.0140, subp. 2, item D.

2. **The Draft NPDES/SDS permit for the PolyMet Project violates the Clean Water Act and its implementing regulations by failing to perform appropriate analysis or establish permit conditions to prevent discharge to surface water through hydrologically connected groundwater from causing or contributing to an exceedance of Minnesota water quality standards.**

3. **The Draft NPDES/SDS permit for the PolyMet Project violates the Clean Water Act and Minnesota law by providing inadequate monitoring to detect if PolyMet discharge through groundwater causes or contributes to violations of Minnesota water quality standards or results in unpermitted discharge.**

4. **The Draft NPDES/SDS permit for the PolyMet Project violates the Clean Water Act, its implementing regulations and Minnesota law by failing to set limits for direct discharge to surface water with the reasonable potential to cause or contribute to violation of Minnesota water quality standards.**

5. **The PolyMet Project is likely to cause or contribute to violations of Minnesota water quality standards for mercury, increase mercury impairments, and degrade water quality by increasing mercury levels, precluding NPDES permit issuance or assurances for 401 certification under federal and state law.**

6. **The antidegradation analysis performed for the PolyMet Project with respect to pollutants other than mercury and methylmercury is inadequate for NPDES/SDS permitting or for Section 401 certification.**

7. **The Draft 401 Certification for the PolyMet Project is premature given the substantive deficiencies of the Draft NPDES/SDS Permit; the absence of an up-to-date Section 404 application; and the lack of a current evaluation of the effects of Project water appropriations on the Upper Partridge River headwaters.**

After discussing these issues, WaterLegacy also submit our **Petition for Contested Case Hearing**.

DISCUSSION

1. **The Clean Water Act requires the MPCA to set enforceable NPDES permit limits to prevent discharge through groundwater to hydrologically connected surface waters from causing or contributing to a violation of State surface water quality standards, including degradation, applicable to waters of the United States.**

Under the Clean Water Act, once pollutants have been collected and channelized, their conveyance to surface waters of the United States, whether through a pipe or through hydrologically connected groundwater, is a point source discharge. This is only common sense. Whether a processing facility collects wastewater above impervious liners and then pipes it to a

stream or collects wastewater behind dams on a pile of dirt so that it seeps into streams, the culpable conduct, discharge and impact on waters of the United States is the same.

The Clean Water Act prohibits "the discharge of any pollutant" except in compliance with certain sections of the Act, including section 402, which is applicable to NPDES permits.[22] The Act defines "discharge of a pollutant" as "any addition of any pollutant to navigable waters from any point source."[23]. A "point source" is

> any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.[24]

Under the Clean Water Act, discharge from numerous sources at the PolyMet mine site and plant site through groundwater must be regulated and controlled under the Act. "As a legal and factual matter, EPA has made a determination that, in general, collected or channeled pollutants conveyed to surface waters via ground water can constitute a discharge subject to the Clean Water Act."[25] In addition, "The majority of courts have held that groundwaters that are hydrologically connected to surface waters are regulated waters of the United States, and that unpermitted discharges into such groundwaters are prohibited under section 1311."[26]

Courts have emphasized that Clean Water Act control of pollutants discharged through groundwater is just common sense. A Hawaii court recently explained "it would make no sense to exempt a polluter from regulation simply because its pollution passes through a conduit . . . when it is established that groundwater is a conduit for pollutants, liability may attach to a discharge into that groundwater even if the groundwater is not itself protected under the Act."[27]

Pollutants dumped into a man-made settling basin must also be covered by the Act:

> [I]t would hardly make sense for the CWA to encompass a polluter who discharges pollutants via a pipe running from the factory directly to the riverbank, but not a polluter who dumps the same pollutants into a man-made settling basin some distance short of the river and then allows the pollutants to seep into the river via the groundwater.[28]

Cases involving tailings ponds and similar mining impoundments have held that an NPDES permit is required for discharge to groundwater with a demonstrated hydrological connection to surface waters. In *Washington Wilderness Coalition v. Hecla Mining Co*.,[29] the court allowed plaintiffs to pursue a claim for discharge without a NPDES permit against the mining company for seeps and leaks from a tailings pond into groundwater where pollution could be traced to a

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[22] 33 U.S.C. §1311(a), 33 U.S.C. §1342.
[23] 33 U.S.C. §1362(12)
[24] 33 U.S.C. §1362(14).
[25] U.S. EPA, *Proposed National Pollutant Discharge Elimination System Regulations for Concentrated Animal Feeding Operations*, 66 Fed. Reg. 2960, 3016 (Jan. 12, 2001), *cited e.g*. in *Hawai'i Wildlife Fund v. County of Maui*, 24 F. Supp. 3d 980, 995 (D. Haw. 2014).
[26] *Williams Pipe Line Co. v. Bayer Corp.*, 964 F. Supp. 1300, 1319 (S.D. Iowa 1997).
[27] *Hawai'i Wildlife Fund v. County of Maui*, *supra*, 24 F. Supp. 3d at 998.
[28] *N. Cal. Riverwatch v. Mercer Fraser Co.,* No. C-04-4620 SC, 2005 U.S. Dist. LEXIS 42997, 2005 WL 2122052 (N.D. Cal. Sept. 1, 2005) at *7-8; *see also Tenn. Clean Water Network v. TVA*, No.3:15-cv-00424, 2017 U.S. Dist. LEXIS 135312; 85 ERC (BNA) 1525 M.D. Tenn., Aug. 4, 2017) at *126-128.
[29] *Washington Wilderness Coalition v. Hecla Mining Co.*, 870 F. Supp. 983, 990-991 (E.D. Wash., 1994).

hydrologically connected creek and lake. Recently, a North Carolina court allowed a claim under the Clean Water Act for a utility's failure to obtain an NPDES permit for seepage from a coal ash lagoon impoundment point source into groundwater that was hydrologically connected to a lake and a river, thus serving as a conduit to navigable waters.[30]

In West Virginia case, the court ordered a coal mining company to apply for an NPDES permit for discharge from a sedimentation pond which leached pollutants into a hydrologically connected receiving stream, resulting in elevated levels of conductivity, sulfates, calcium, magnesium, and TDS.[31] This year, a Tennessee court also found that a complex of coal ash ponds is a "discernable, discrete and confined impoundment" that is "unlined and leaking pollutants" through groundwater to navigable waters; the court held that such a pollutant is a "point source" governed by the Clean Water Act.[32]

The surface waters potentially impacted by sources of contamination from the PolyMet mine site and tailings site are waters of the United States, under traditional Clean Water Act definitions, Supreme Court decisions and federal regulations.[33] The Partridge River, Embarrass River and Second Creek and connected lakes are traditional navigable waters that are currently used, or were used in the past or may be susceptible to use in interstate and foreign commerce, and tributaries to such waters in the headwaters of the St. Louis River, the largest United States tributary to Lake Superior, which is an international as well as interstate water body. The creeks at the PolyMet mine site and plant site, to the extent they are not traditional navigable waters, are tributaries to such waters; the wetlands at the PolyMet mine site and plant site are wetlands adjacent to traditional navigable waters and to tributaries to such waters; and the creeks and wetlands at both locations are waters the use, degradation or destruction of which could affect waters. The Whitewater Reservoir is an impoundment of waters of the United States.[34]

As with the tailings pond in the *Hecla Mining Co*. case, the coal ash ponds and lagoons in the *Duke Energy Carolinas and Tennessee Clean Water Network* cases and the sedimentation pond requiring an NPDES permit in the *Pocahontas Land Corp*. case, there are many potential pollution sources at the PolyMet mine site and plant site where process waters and wastes will be confined and conveyed by pipes, ditches, channels, conduits, or other discernable, confined and discrete conveyances. These proposed point sources include the tailings storage facility and the hydrometallurgical residue facility at the plant site; and sumps, ponds, equalization basins, waste rock stockpile drainage liners and collection systems and, eventually, the mine pits themselves at the mine site.

The tailings storage facility for the PolyMet Project is described by PolyMet as a "flotation tailings basin" or the "FTB" even though it would be a mound of wet tailings slurry behind

[30] *Yadkin Riverkeeper, Inc. v. Duke Energy Carolinas, LLC*, 141 F. Supp. 3d 428, 444-446 (M.D. N. Car. 2015).
[31] *Ohio Valley Envtl. Coalition v. Pocahontas Land Corp*. 2015 U.S. Dist. LEXIS 59910, at *22-23; 80 ERC (BNA) 2193; 2015 WL 2144905 (S. D. W. Va., May 15, 2015).
[32] *Tenn. Clean Water Network v. TVA, supra,* at *131-132, 134-138.
[33] *See* 33 U.S.C. §1362(7); *Rapanos v. United States*, 547 U.S. 715, 126 S. Ct. 2208 (2006); and the pre-2015 version of federal regulations defining waters of the United States under the Clean Water Act cited in *Rapanos*, 33 C.F.R. §328.3 (a)(1), (a)(2), (a)(3), (a)(5), (a)(7) and (c) (2004). The significant nexus standard enacted by the Department of the Army and the EPA in 2015, 80 FR 37054 (June 29, 2015), although scientifically valid, is not needed to determine that any of the surface waters potentially impacted by the PolyMet project are waters of the United States. Text of the pre-2015 Army Corps rule defining waters of the United States is attached as Exhibit 7.
[34] See 33 C.F.R. §328.3 (a)(1), (a)(3)(i)-(iii), (a)(4), (a)(5), (a)(7), (b) and (c) in Exhibit 7.

earthen dams stored to a level approximately 200 feet above the surrounding gradient.[35] The pond at the top of the PolyMet tailings storage facility would receive pumped and piped tailings slurry, untreated process water, untreated seepage collected from the toe of the tailings facility, filtered mine process water, sewage, waste cleaned out of backwash and filters of the wastewater treatment plant and channeled runoff from within the tailings facility.[36] The proposed hydrometallurgical residue facility (HRF) would function as a "large-scale sedimentation basin." Untreated wet residue would be pumped as slurry from the hydrometallurgical autoclave processing facility to the HRF through a pipe with multiple discharge points.[37]

Drainage from each waste rock stockpile and from the ore surge pile will be collected in a liner system, or in the case of the Category 1 waste rock stockpile a seepage containment system, and in a sump and pond system and then conveyed to the mine site equalization basins for further conveyance to the plant site by pipeline.[38] Mine site process water will be intercepted throughout the site by ditches, dikes, stockpile liners, and the stockpile groundwater containment system and routed to the equalization basins.[39] The overburden storage and laydown area (OSLA) will also be graded and compacted to direct runoff to an unlined collection pond from where it will be pumped, along with mine site construction water, to the construction mine water basin, for further conveyance to the plant site by pipeline.[40]

The PolyMet mine pits will also become unlined point sources for discharge to surface water through groundwater. During the operations phase of the project (or if early closure is required), the East Pit and Central Pit would be backfilled with Category 4, Category 2/3 and Category 1 waste rock and saturated overburden and flooded through pipes conveying water from the plant site in order to permit subaqueous storage of reactive mine waste.[41] During closure, whenever that begins, the West Pit would also be flooded with water conveyed through pipes from the PolyMet plant site.[42]

The EPA has repeatedly instructed MPCA that NPDES permits must identify, describe and regulate contaminated water from both mine site and plant site point sources discharged to surface waters of the United States through hydrologically connected ground water.

The EPA's comments on the PolyMet preliminary supplementary draft environmental impact statement (PSDEIS) explained, "Section 301 of the CWA prohibits point source discharge to surface waters, either directly or via directly connected ground water, unless the discharge

[35] See MDNR et al, PolyMet NorthMet Final Environmental Impact Statement, Nov. 2015 ("PolyMet FEIS"), 3-104, Figure 4.2.2-17, available at http://www.dnr.state.mn.us/input/environmentalreview/polymet/feis-toc.html
[36] PolyMet PTM App., *supra*, Figure 11-5, Project Water Balance in Mine Year 10, attached as Exhibit 8. *See also* MPCA National Pollutant Discharge Elimination System /State Disposal System (NPDES/SDS) Permit Program Fact Sheet ("MPCA NPDES/SDS Fact Sheet"), p. 17. The MPCA NPDES/SDS Fact Sheet, Attachments to this Fact Sheet cited *infra* and the Draft NPDES/SDS Permit are available at https://www.pca.state.mn.us/quick-links/water-quality-permit-northmet
[37] MPCA NPDES/SDS Fact Sheet, *supra*, p. 19.
[38] *Id.,* p. 15.
[39] *Id*.
[40] *Id.*; *see also* PolyMet PTM App., *supra*, pp. 179, 280.
[41] PolyMet PTM App., *supra*, *see* pp. 27, 36, Figure 3-9, Figure 3-10, Figure 3-13, 160-161, 172, 180, 281 and Figure 11-6, Project Water Balance in Mine Year 25, attached as Exhibit 9.
[42] *Id*., pp. 31, 39, Figure 3-9, Figure 3-10, Figure 3-13, and Figure 11-6, *supra*, attached as Exhibit 9.

complies with a NPDES permit."[43] EPA further advised that the Clean Water Act defines "discharge of a pollutant" as any addition of any pollutant to navigable waters from any point source;" as a result, "an NPDES permit is required at both the Mine and Plant Sites, with limits and monitoring requirements applied at the points of discharge."[44]

EPA identified mine site sources of contaminated wastewater seeping from the mine property through groundwater that required regulation under an NPDES permit including mine pits, waste rock stockpiles, the ore surge pile, the Overburden Storage and Laydown Area, and wastewater equalization basins.[45] The EPA explained that for "*pollutants that leave the mine property via groundwater*" a "level of detail" will be required for NPDES permitting "in order to determine water quality-based effluent limits and establish control and mitigation measures that ensure attainment of Minnesota's water quality standards in the Partridge River and other downstream surface."[46]

The EPA emphasized that surface water criteria as well as groundwater criteria must be applied to mine site pollutants "when the contaminated groundwater enters the Partridge River."[47] As the PolyMet environmental review process continued, the EPA underscored that surface water criteria become applicable at the first location where discharges reach surface waters, including jurisdictional wetlands:

> However, as EPA has stated previously, the pollutants originating from mine site features may discharge to jurisdictional wetlands and tributaries prior to reaching the Partridge River. CWA Section 301 prohibits any point source discharge of pollutants to waters of the United States, either directly or via directly connected ground water, unless the discharge complies with a NPDES permit. Waters of the United States include jurisdictional wetlands and tributaries. See 40 CFR 122.2.
>
> **Recommendation**: The FEIS should reflect the fact that a NPDES permit is required before the pollutants from the mine site reach waters of the U.S. (including jurisdictional wetlands and tributaries).[48]

In a spring 2015 memorandum to MPCA, the EPA was yet more pointed in its insistence that the MPCA's NPDES permit for the PolyMet Project specifically cover discharges to surface waters that will occur through subsurface flow or hydrologically connected groundwater. EPA began by stating, "EPA has consistently interpreted the Clean Water Act (CWA) to apply to discharges of pollutants from a point source to surface water, including those that occur via hydrologically connected ground water."[49] EPA stated that the memo's "clarification on discharges that occur via subsurface flow or hydrologically connected groundwater that EPA provided in the

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[43] EPA, Letter and Detailed Comments on PolyMet PSDEIS, Aug. 7, 2013 ("EPA PSDEIS Comments") Exhibit 10, p. 9 of Detailed Comments.
[44] *Id*., *citing* 33 U.S.C. §1362(12)(A), Section 502(12)(A) of the Clean Water Act.
[45] *Id*., p. 6.
[46] *Id.*, (emphasis added).
[47] *Id*.
[48] EPA, Letter and Detailed Comments on PolyMet SDEIS, Mar. 13, 2014 ("EPA SDEIS Comments"), Exhibit 11, pp. 8-9.
[49] EPA, Cover Email for NPDES MPCA NorthMet Attachment and Attachment, Proposed NorthMet Project – U.S. EPA's CWA Permitting Concerns, Apr. 7, 2015 ("EPA CWA Permitting Concerns"), Exhibit 12, p. 1 of Attachment.

aforementioned federal register notice" was occasioned by MPCA's statement that the need for NPDES permit coverage at the mine site would depend on when "a point source discharge" adds pollutants to waters of the U.S.[50]

The EPA reiterated that "the Partridge River is not the first receiving water of mine discharges"[51] and noted that, in conversations with the Agency, "MPCA confirmed their understanding that the wetlands associated with the Partridge River and the tributaries to the Partridge River are waters of the U.S. and may be the first waters receiving pollutants from mine site features."[52] EPA repeated again the flaws in PolyMet's modeling and what must be included in an NPDES permit for the PolyMet project in order to comply with the Clean Water Act:

> Since the model predictions are based on the pollutants traveling the entire distance between the mine site and the Partridge River via a subsurface flow path, we note that pollutants may reach surface waters sooner than predicted in either or both of two ways. First, pollutants may be discharged to wetlands in close proximity to the mine site, a potential that is not considered by the modeling work that supported EIS development. Second, pollutants from discharges may reach the Partridge River evaluation locations sooner than predicted because the path pollutants travel to those locations may not be entirely in the subsurface.
>
> *A complete NPDES permit application must include information detailing when and where pollutants originating from mine site activities and features will enter surface waters (40 CFR §§ 122.21 and 124.3).*[53]

Although the MPCA has yet to comply with the EPA's instructions, for at least five years the EPA has also advised the MPCA in connection with the U.S. Steel Minntac tailings storage facility that "Section 301 of the CWA prohibits point source discharges to surface waters, either directly or via directly connected ground water, unless the discharge is in compliance with an NPDES permit"[54] When the MPCA posted a pre-public notice draft NPDES permit for the Minntac tailings basin in 2014, the EPA cautioned that the Clean Water Act required an NPDES permit for "the full extent of the discharges to surface water from this facility."[55]

In 2016, when the MPCA proposed a draft NPDES permit for the Minntac tailings basin that only applied surface water quality standards to surface seeps, the EPA was yet more pointed:

> We are concerned that this draft permit as written does not address, under MPCA's approved National Pollutant Discharge Elimination System (NPDES) program and in accordance with the Clean Water Act (CWA), all discharges to surface waters from this tailings basin. . . In this case the tailings basin is a point source which, according to MPCA's own documentation is discharging pollutants to nearby surface waters in the

[50] *Id*., *citing* EPA, *Proposed National Pollutant Discharge Elimination System Regulations for Concentrated Animal Feeding Operations*, 66 Fed. Reg. 2960, 3015 (Jan. 12, 2001); EPA, NPDES *General Permits for Storm Water Discharges from Construction Activities*, 63 Fed. Reg. 7,858, 7,881 (Feb. 17. 1998).
[51] *Id*.
[52] *Id*., p. 2
[53] *Id*. (emphasis added)
[54] EPA Region 5, letter of P. Swanson, Chief Watersheds and Wetlands Branch to U.S. Army Corps St. Paul District re Minntac Extension, May 15, 2013, p. 5, Exhibit 13.
[55] EPA Region 5, letter of K. Pierard, Chief, NPDES Programs Branch, to Ann Foss, MPCA re Minntac Pre-Publication NPDES/SDS Permit, Dec. 19, 2014, p. 1, Exhibit 14.

Sand and Dark River watersheds *via direct, unmonitored surface seeps and subsurface pathways*.[56]

As explained in more detail in the next section, the proposed unlined PolyMet tailings basin, unlined Category 1 waste rock stockpile, unlined mine pits, and unlined overburden storage and laydown area and pond would all provide discharge pollutants to groundwater that is hydrologically connected to surface water. Even lined sedimentation ponds, sumps and basins for wastes and wastewater at the mine site and plant site would have some degree of discharge to groundwater from liner leakage that must be evaluated to determine propagation to the nearest surface waters in proximity to pollution sources.

The Clean Water Act requires the MPCA to set enforceable NPDES permit limits to prevent PolyMet mine site and plant site discharge through hydrologically connected groundwater to surface waters, including proximate wetlands, creeks and tributaries in the Partridge River and Embarrass River watersheds from violating surface water quality standards.

2. The Draft NPDES/SDS permit for the PolyMet Project violates the Clean Water Act and its implementing regulations by failing to perform appropriate analysis or establish permit conditions to prevent discharge to surface water through hydrologically connected groundwater from causing or contributing to an exceedance of Minnesota water quality standards.

The Clean Water Act prohibits "the discharge of any pollutant by any person" to waters of the United States, except in compliance with CWA, including the section requiring an NPDES permit.[57]

Under federal regulations, each NPDES permit must include both technology-based effluent limits and more stringent effluent limits required to achieve water quality standards established under the Clean Water Act, including both numeric criteria and State narrative criteria for water quality.[58] NPDES water quality-based effluent limits (WQBELs) must control all pollutants which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.[59]

Regulations explain how a "reasonable potential" analysis should be done, taking into account existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, and where appropriate, the dilution of the effluent in the receiving water.[60] When developing water quality-based effluent limitations, "the permitting authority shall ensure that: (a) the level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards."[61]

[56] EPA Region 5, letter of K. Pierard, Chief, NPDES Programs Branch, to Ann Foss, MPCA, re Minntac Draft NPDES/SDS Permit, Dec. 21, 2016, p. 1 (emphasis added), Exhibit 15.
[57] 33 U.S.C. §1311(a), 33 U.S.C. §1342.
[58] 40 C.F.R. §122.44(a) and (d)(1).
[59] 40 C.F.R. §122.44(d)(1)(i)-(vi).
[60] 40 C.F.R. §122.44(d)(ii).
[61] 40 C.F.R. §122.44(d)(vii).

In the Great Lakes, States and Tribes must adopt provisions as protective as the procedures in Part 132 of Chapter 40 of the Federal Code of Regulations.[62] If a permitting authority determines that a pollutant is or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any criterion applicable to the Great Lakes Initiative, "the permitting authority shall incorporate a water quality-based effluent limitation (WQBEL) in an NPDES permit for the discharge of that pollutant."[63]

Determination of a reasonable potential under the Great Lakes Initiative (GLI) is based on comparing preliminary effluent limitations (PEL) to projected effluent quality (PEQ). "In all cases, the permitting authority shall use any valid, relevant, representative information" that indicates a reasonable potential to cause or contribute to exceed water quality standards for Great Lakes pollutants.[64] Many of the pollutants that would be elevated in PolyMet mine site and plant site discharge are GLI pollutants: these include: mercury, aluminum, antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, iron, selenium, thallium and zinc.[65]

Where facility-specific effluent monitoring data is not available – as in the PolyMet Project where new discharges are proposed - the permitting authority shall project effluent quality using the 95th percentile of the projected daily, weekly and monthly values using a scientifically defensible statistical method that accounts for variability. The authority must then set WQBELs if the projected PEQ exceeds the PEL to protect aquatic life, human health and wildlife from chronic effects and/or aquatic life from acute effects.[66]

In the MPCA's NPDES/SDS Fact Sheet the Agency concluded that, "MPCA has determined that the Project as designed does not have reasonable potential to cause or contribute to any violations of any applicable water quality standards in waters of the state."[67] However, the only reasonable potential analysis described by the MPCA pertained to intentional discharge of treated water and relied solely on the efficacy of reverse osmosis in removing sulfate and copper *from seepage collected at the existing LTVSMC taconite tailings basin*.[68] WaterLegacy will detail deficiencies in the MPCA's reasonable potential analysis and proposal for effluent limitations on intentional direct discharge in Section 4 of these comments.

Although the MPCA NPDES/SDS Fact Sheet acknowledges that there are mine site and plant site features with the potential to affect groundwater,[69] there is no information in any of the volumes of PolyMet's NPDES/SDS Permit Application characterizing the chemical composition of various wastes or sources of potential pollution to groundwater or surface water. Neither the MPCA's Fact Sheet nor the Draft Permit identify the chemical composition of any potential

[62] 40 C.F.R. Part 132, Appendix F, Procedure 5.
[63] *Id*.
[64] 40 C.F.R. Part 132, Appendix F, Procedure 5: Reasonable Potential to Exceed Water Quality Standards.
[65] 40 C.F.R. Part 132, Table 6. Table 5 pollutants identified as Subject to Federal, State and Tribal Requirements include alkalinity, ammonia, bacteria, BOD, chlorine, dissolved oxygen, dissolved solids, pH, phosphorus, salinity, temperature, total and suspended solids and turbidity.
[66] *Id*., paragraph B.2. a. through c.
[67] MPCA NPDES/SDS Fact Sheet, *supra*, p. 23.
[68] *Id.*, pp. 31-38.The source for the seepage used by PolyMet in its 2012 "pilot" test is provided on pages 33 and 36.
[69] *Id*., pp. 63, 66.

pollution source or even the chemical composition predicted for various waste streams constituting the influent for the PolyMet wastewater treatment system (WWTS).

Without such information, any exercise in determining reasonable potential is, at best, wishful thinking. Even for discharge subject to water quality treatment, the resulting effluent is a function of the initial level of contamination as well as the efficacy of removal. Where pollutants will be released to groundwater untreated from thousands of acres of permanent unlined tailings and waste rock stockpile facilities, as well as stored in highly contaminated basins, detailed information on the concentration of contaminants, the volume of their likely release, and the paths by which they would soonest reach surface waters is essential to determine which pollutants in which sources have the reasonable potential to cause or contribute to a violation of water quality standards.

Data contained in other PolyMet permit applications and in environmental review documents is relevant and representative data that should have been used by the MPCA to analyze the reasonable potential of PolyMet's discharge to hydrologically connected groundwater to violate surface water quality standards. In addition, it cannot be emphasized enough that the MPCA and other regulatory agencies should have required monitoring of proximate stream and wetlands hydrology for the past thirteen years to identify the most likely pathways for discharge to groundwater to reach surface water and the geologic conditions influencing that flow. Arguably, the failure to require such monitoring, before permit issuance as well as during operations provides an insurance policy to PolyMet that Clean Water Act violations and harm to ecosystems or human beings won't be detected and proven for decades. By then, PolyMet could well be long gone.

The data below, although not intended to be complete, suggest that failure to conduct a reasonable potential analysis and set appropriate limitations on effluent that can be discharged through groundwater places wetlands, streams, rivers and downstream lakes in the Partridge River and Embarrass River watersheds at grave risk.

The FEIS predicted that PolyMet's tailings facility would produce 3,880 gallons per minute (gpm) of seepage,[70] equivalent to 2,041,000,000 gallons per year.

In its Permit to Mine Application, PolyMet predicted solute concentrations in tailings toe seepage far exceeding Minnesota water quality standards adopted to protect fish and aquatic life. For example, at the North Toe, levels of nickel in year 20 are predicted as 893 parts per billion (µg/L) -- more than 17 times the surface water quality standard of 52 µg/L and levels of copper are predicted at 650 parts per billion – nearly 70 times the water quality standard of 9.3 µg/L. Lead, a particularly dangerous neurotoxin with no safe level, would reach levels of 58 parts per billion -- more than 18 times the aquatic life water quality standard of 3.2 µg/L. North Toe seepage is also predicted to have sulfate concentrations of 424 parts per million (mg/L) – more than 42 times the water quality standard of 10 mg/L in downstream wild rice waters.[71]

[70] PolyMet FEIS, *supra*, 5-179, 5-181.
[71] PolyMet NorthMet Water Management Plan – Plant, Dec. 2017 ("PolyMet Water Mgt. – Plant"), in Appx. 11.3 of the PolyMet PTM Application, Large Table 3, Estimated Tailings Basin Seepage Water Quality, North Toe, at P90 probability. Water quality standards are based on Minn. R. 7052.0100, subp. 6 and Minn. R. 7050.0222, subp. 4,

PolyMet's modeling of seepage concentrations at the tailings toe is likely to understate actual tailings chemistry. Leachate from copper-nickel *tailings* from MinnAMAX bulk sampling was not considered in modeling of PolyMet NorthMet tailings seepage.[72] MinnAMAX tailings leachate contained levels of cobalt more than 30 times the tailings seepage concentration predicted for the PolyMet project, levels of nickel more than 21 times the predicted PolyMet concentrations, and sulfate concentrations more than 11 times higher than predicted PolyMet concentrations.[73]

The PolyMet FEIS claimed that, during mine operations, 3,860 gallons per minute (gpm) of the total 3,880 gpm of seepage modeled would be collected from the unlined, permanent tailings storage facility. This would be a nearly perfect collection rate of 99.5%.[74] To arrive at this result, the FEIS first assumed that all but 200 gpm of total NorthMet tailings seepage would be "surface seepage."[75] Next, based on PolyMet's modeling, the FEIS assumed that 100% of both tailings surface seepage and groundwater seepage would be captured on the east and south sides of the tailings waste facility,[76] and that 100% of the surface seepage and 90% groundwater seepage would be captured at the north, northwest and west toes of the tailings storage facility.[77]

Although the MPCA seems to have accepted PolyMet's claims,[78] experts challenged these assumptions during the course of environmental review. Geologist J.D. Lehr criticized the "cursory and simplistic treatment" of the role that bedrock fractures play in the transmission of groundwater at the tailings site, the assumption of a "no-flow boundary" beneath the tailings waste facility, and the resulting implication that groundwater flow through bedrock at the tailings site "is so insignificant that it can be conceptually ignored."[79] Mr. Lehr also explained that geology at the tailings site would not be favorable for a trench to be "keyed into" bedrock and cobbles (often huge boulders) would impede construction of an effective slurry trench.[80]

Anthony Runkel, the Chief Geologist for the Minnesota Geological Survey, echoed the concern that fracture zones of relatively high hydraulic conductivity and multiple flow systems within bedrock had not been modeled.[81] He noted that faults are known to be common across much of mapped extent of the Giants Range Batholith, including in the plant site/tailings basin area, and nearby fractures in the same bedrock have transported pollutants for miles with significant environmental effects.[82]

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with hardness levels of 100 parts per million (mg/L); and on Minn. R. 7050.0224, subp. 2 for wild rice. Large Table 3 is included in Exhibit 16.

[72] B. Johnson, Summary Analysis of PolyMet NorthMet Modeled Tailings Chemistry and MinnAMAX Site Tailings Leachate, Dec. 2015, Exhibit 17 ("Johnson 2015"), p, 1.

[73] *Id*., p. 3 and Tables 1 and 2 at autop. 4.

[74] PolyMet FEIS, *supra*, 5-181, Table 5.2.2-37.

[75] *Id*., 5-179.

[76] *Id*., 5-8, 5-102.

[77] *Id*., 5-186.

[78] MPCA NPDES/SDS Fact Sheet, *supra*, p. 67.

[79] J.D. Lehr, Technical Memorandum - Summary of Comments Resulting from Review of NorthMet Mining Project and Land Exchange Supplemental Draft Environmental Impact Statement, Mar. 12, 2014 ("Lehr 2014"), attached with figures and maps as Exhibit 18, autop. 3.

[80] *Id*., autop. 17-18.

[81] Anthony Runkel, MN Geological Survey, Comment on the NorthMet Supplemental Draft Environmental Impact Statement, Mar. 13, 2014, Exhibit 19, p. 1.

[82] *Id.*, p. 3.

Engineer and hydrologist Donald Lee cautioned that lack of data on bedrock groundwater at the tailings basin precludes calculation of how much groundwater is currently flowing in bedrock at the site; in addition, increased seepage and hydraulic head created in the tailings piles during PolyMet operations could result in more water flowing deeper into groundwater.[83] Dr. Lee explained that PolyMet's claims that a slurry wall would be nearly impermeable for the indefinite future were unjustified.[84] After reading predictions for tailings basin performance, Dr. Lee determined, "The analytical support for these conclusions is based on assumptions of performance that are not justified or supported by data."[85]

For more than five years, WaterLegacy requested disclosure of any evidence received from PolyMet showing that the inexpensive slurry system it proposed could achieve the claimed capture efficiency. PolyMet's 2017 Permit to Mine Application cites a single three-page Barr memo from 2012 to support its claims that a cutoff wall and containment system is commonly used and will capture seepage from its tailings basin.[86] However, this 2012 memo doesn't support PolyMet's claims for seepage capture efficiency. Instead it provides a cautionary tale.

The only mine tailings seepage example offered as an example of successful use of slurry walls to keep mine tailings seepage out of downgradient water is the Fort McMurray tailings pond seepage containment system in Alberta Canada. To quote Barr,

> Another example is the installation of a soil-bentonite cutoff wall around the perimeter of a mine tailings pond located in the province of Alberta, Canada. The cutoff wall is approximately 100-feet deep and 3 feet wide, and has a hydraulic conductivity of less than $1x10^{-7}$ cm/sec. *The cutoff wall was used to isolate the tailings pond from downgradient surface water features* including wetlands and the Athabasca River.[87]

However, information available since 2012 demonstrates that Fort McMurray tar sands tailings seepage containment has had disastrous results.

Canadian news media reported four years ago that federal research found that "toxic chemicals from Alberta's vast oil sands tailings ponds are leaching into groundwater and seeping into the Athabasca River" despite a seepage collection system that includes ditches and cut-off walls to capture seepage and runoff water, groundwater interception wells and pumps to return captured water to the tailings ponds.[88] Canadian federal research used chemical profiling to confirm that

[83] D. Lee, Ph.D., P.E., PolyMet Tailings Basin Performance, Dec. 10, 2015 ("Lee 2015 Tailings"), Exhibit 20, p. 4.
[84] *Id.,* p. 3.
[85] *Id*., p. 1.
[86] PolyMet's NorthMet Water Management Plan, p. 15, Appx. 11.3 to the PolyMet PTM App., *supra*, cites Attachment D to Reference 6 as the source of its claims. Reference 6 is the NorthMet Project Rock and Overburden Management Plan (v10). December 2017 in Appx. 11.1 of the PolyMet PTM Application and Attachment D to that Plan is the Barr Memo Groundwater Containment System: Degree of Use in Industry Dec. 26, 2012 ("Barr 2012 Containment Memo") attached as Exhibit 21.
[87] Barr 2012 Containment Memo, *supra*, Exhibit 21, pp. 1-2 (emphasis added).
[88] B. Weber, Federal study says oil sands toxins are leaching into groundwater, Athabasca River, Edmonton Globe and Mail, Feb. 20, 2014, Exhibit 22.

the source of contaminants in the Athabasca River was oil sands process-affected water from tailings ponds welling up through groundwater to the Athabasca River.[89]

In 2014, it was reported, "Industry is working to address the tailings seepage issue, budgeting more than $1 billion in tailings-reduction technology."[90] By January 2018, provincial regulators estimated that cleanup of oil sands facilities represented a $27 billion liability.[91] Unsurprisingly, "Critics say the industry could end up sticking taxpayers with the bill, estimated at $27 billion."[92]

Minnesota has some experience with seepage containment at taconite tailings basins. Pollutants from the U.S. Steel Minntac tailings basin have seeped from groundwater to downstream wetlands, rivers and lakes, affecting water quality and beneficial uses for a quarter of a century.[93] At the LTVSMC tailings facility, surface seepage collection has been unsuccessful in preventing groundwater seepage of pollutants to Second Creek. Given the unknown bedrock conditions beneath PolyMet's proposed tailings basin, its location on historic wetlands,[94] and the immediate proximity of downgradient wetlands, it cannot be assumed that seepage escaping through or beneath PolyMet's proposed dirt trench collection system would not daylight to surface water and cause or contribute to exceedance of water quality standards.

On the south side of the tailings facility, the need for a reasonable potential analysis is even more obvious. South Toe seepage daylights to surface water almost immediately. As stated in the PolyMet FEIS,

> Along the southern side, bedrock and surface topography create a narrow valley at the headwaters of Second Creek. Due to this topography and experience on the site, it is expected that all existing seepage from the Tailings Basin to the south emerges as surface seepage within a short distance of the embankment toe.[95]

The MPCA's NPDES/SDS Fact Sheet confirms that "seepage from the tailings basin is continuing,"[96] and that "pumpback systems are effective at capturing and removing surface seepage, but they are not designed to capture the seepage from the existing tailings basin to the surficial groundwater aquifer."[97] Yet more problematic, the MPCA reveals, "Unlike the seepage capture systems along the northern and western sides of the tailings basin, the South Seepage Management System will capture almost exclusively surface seepage."[98]

Based on the underlying hydrogeology, groundwater seepage from the south side of the PolyMet copper-nickel mine tailings facility could be voluminous. Geologist J.D. Lehr examined U.S. Geological Survey topographic maps from 1949 that predate taconite tailings basin construction.

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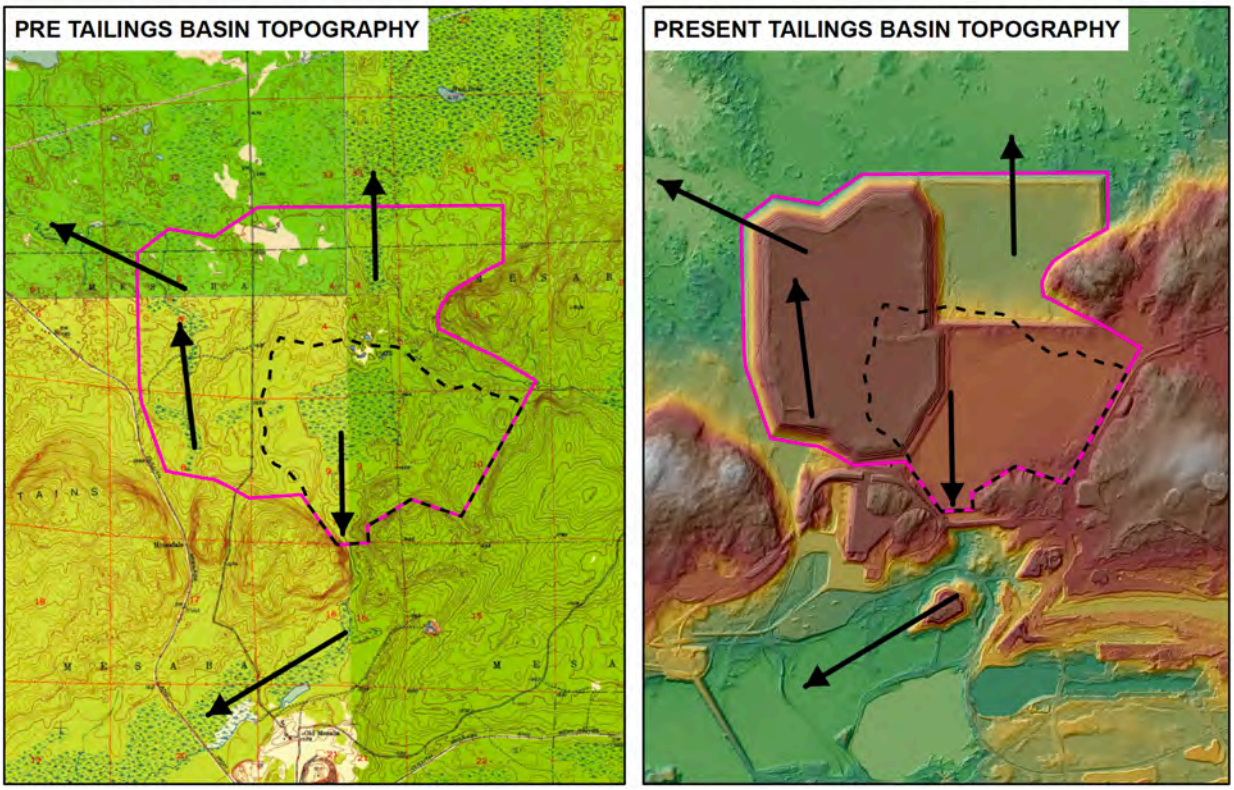
[89] Frank et al., Profiling Oil Sands Mixtures from Industrial Developments and Natural Groundwaters for Source Identification, *Env. Sci & Tech*. accepted Jan. 21, 2014, Exhibit 23.
[90] Weber 2014, *supra*, Exhibit 22.
[91] K. Orland, The battle over when and how to clean up oilsands tailings ponds is escalating, *Calgary Herald*, Jan. 16, 2018, Exhibit 24.
[92] *Id*.
[93] *See* WaterLegacy Comments on Minntac Certification, *supra*, Exhibit 6, pp. 4-7.
[94] Lehr 2014, *supra*, Exhibit 18, autop. 19.
[95] PolyMet FEIS, *supra*, 3-119.
[96] MPCA NPDES/SDS Fact Sheet, *supra*, p. 17.
[97] *Id*., p. 73.
[98] *Id*., p. 75.

These maps show that about one-third of the area currently beneath the southern portion of the Tailings Basin or about 1,000 acres, historically drained to the south and formed the headwaters of Second Creek.[99] These maps illustrate the historic and potential drainage flow[100]:



Recent Data Monitoring Reports, long after surface seepage pumpback at the SD026 south outfall of the existing LTVSMC was instituted, confirm that flow from the tailings facility may remain at high levels. During 2017, flow at the LTVSMC measuring station SD026, where the tailings basin constitutes the headwaters of Second Creek averaged 33.6 million gallons per month. Applying the gallons per minute (gpm) metric to the 2017 DMR data, south side tailings flow to Second Creek averaged 766.8 gpm. Even in 2016, a year where seepage collection may have been more effective, flow from the existing LTVSMC tailings basin to the headwaters of Second Creek averaged 140 gpm.[101]

As noted above, to date PolyMet and the agencies have predicted 0 gpm of groundwater flow from the tailings basin to Second Creek.[102]

Although MinnAMAX data previously cited suggests that PolyMet underestimates the level of tailings seepage contamination,[103] even PolyMet's predictions predict solute concentrations in

[99] Lehr 2014, *supra*, Exhibit 18, p. 19, Figure 4, and Figure 5.
[100] *Id*., Figure 5.
[101] MPCA, Discharge Monitoring Report Spreadsheet NPDES/SDS Permit MN0042536 (Existing LTVSMC Tailings Basin) SD026, Jan. 2018, ("SD026 Existing Tailings DMR") Exhibit 25.
[102] *See* p. 15 of these comments, *supra*.
[103] *See* Johnson 2015, *supra*, Exhibit 17.

South Toe Tailings Basin seepage far exceeding Minnesota water quality standards. The PolyMet Permit to Mine Application predicted mine year 20 South Toe concentrations of nickel at 1,249 parts per billion (µg/L) -- more than 24 times the aquatic life surface water quality standard of 52 µg/L, and levels of copper at 695 parts per billion – nearly 75 times the water quality standard of 9.3 µg/L. Lead, a particularly dangerous neurotoxin with no safe level, would reach levels of 100 parts per billion -- more than 31 times the aquatic life water quality standard of 3.2 µg/L. South Toe Tailings Basin seepage is also predicted by PolyMet to have sulfate concentrations of 553 parts per million (mg/L) – more than 55 times the water quality standard of 10 mg/L applicable in downstream wild rice to protect wild rice for wildlife as well as human beneficial use.[104]

The MPCA has provided no justification for its failure to perform a reasonable potential analysis to determine, under the Clean Water Act and the Great Lakes Initiative, whether PolyMet's discharge to groundwater of nickel, copper and lead, among other pollutants would cause or contribute to exceedances of Minnesota water quality standards in Second Creek.

The most egregious failure to conduct a reasonable potential analysis and set water quality-based effluent limitations to protect surface water pertains to PolyMet's proposed tailings facility, including but not limited to its discharge to Second Creek through groundwater. However, there are other sources of contaminated seepage to groundwater that similarly require analysis and potential control.

Even under PolyMet's assumptions that lower-sulfur rock can be readily characterized and sorted, Category 1 waste rock stockpile seepage contain solute concentrations far exceeding water quality standards. In Mine Year 20, PolyMet predicts that nickel concentrations in Category 1 seepage would be 2,228 µg/L, nearly 77 times the surface water quality standard of 29 µg/L, and copper concentrations would be 237 µg/L, more than 45 times the water quality standard of 5.2 µg/L. Sulfate concentrations would be 1,393 parts per million (mg/L), 139 times Minnesota's water quality standard that protects wild rice downstream in the Partridge River. Concentrations of lead would be 11 µg/L, more than eight times the aquatic life water quality standard of 1.3 µg/L and concentrations of arsenic, a class 1 carcinogen, would be 100 µg/L, nearly twice the water quality standard of 53 µg/L to protect aquatic life and 50 times the downstream water quality standard of 2 µg/L applicable to Colby Lake.[105]

By Mine Year 75, chemical concentrations in Category 1 seepage would not have attenuated. Nickel concentrations would increase slightly to 2,230 µg/L, approaching 77 times the water

[104] PolyMet NorthMet Water Management Plan – Plant, Dec. 2017 ("PolyMet Water Mgt. – Plant"), in Appx. 11.3 of the PolyMet PTM Application, Large Table 6, Estimated Tailings Basin Seepage Water Quality from the South Toe, at P90 probability. Water quality standards are based on Minn. R. 7052.0100, subp. 5 and subp. 6 and Minn. R. 7050.0222, subp. 4, with hardness levels of 100 parts per million (mg/L). This Large Table 6 is included in Exhibit 16, *supra*.

[105] Concentration levels are presented in PolyMet NorthMet Water Management Plan – Mine Dec. 2017 ("PolyMet Water Mgt. - Mine"), Large Table 6, in Appx. 11.2 of the PolyMet PTM Application. Water quality standards for nickel and copper and lead are based on Minn. R. 7052.0100, subp. 6, Minn. R. 7050.0222, Subp. 4 and Minn. R. 7050.0220, subp. 2, with mine site background hardness levels of 50 mg/L; for sulfate are based on Minn. R. 7050.0224, subp. 2; and for arsenic are based on Minn. R. 7052.0100, subp. 4. Note that PolyMet's calculations are based on the P90 average, whereas reasonable potential calculations must use the P95 probability. 40 C.F.R.§122.44(d) and Part 132, Appendix F, Procedure 5; Minn. R. 7052.0200. This Large Table 6, Estimated Water Quality from Stockpile Drainage is provided as Exhibit 26.

quality standard of 29 µg/L, and copper concentrations would remain at 237 µg/L, more than 45 times the water quality standard of 5.2 µg/L. Arsenic would remain at 100 µg/L, nearly twice the aquatic life standard of 53 µg/L and 50 times the downstream health-based standard of 2 µg/L. In addition, by Mine Year 75, sulfate concentrations would double to 2,793 mg/L, 279 times the wild rice sulfate standard of 10 mg/L. Lead concentrations would increase nine times to a level of 100 µg/L, a level which is 77 times the water quality standard of 1.3 µg/L.[106]

The Category 1 waste rock pile is proposed as a 526-acre permanent, unlined facility.[107] The PolyMet FEIS predicted that, during operations, more than 98% of groundwater seepage from the Category 1 waste rock pile would be captured by the containment system or flow through groundwater into the mine pits.[108] PolyMet and the FEIS also assumed that the geomembrane cover that would eventually be placed on the rock pile would reduce infiltration by more than 99% (from 360 gpm to 2.8 gpm).[109]

Although the FEIS characterized the Category 1 seepage capture system as a "low-permeability cut-off wall keyed into bedrock,"[110] PolyMet has proposed that "compacted soil" could serve as the barrier for seepage capture.[111] The Category 1 drainage system would rely only on gravity for seepage collection, and PolyMet admitted that along the west, north, and east sides of the stockpile, there may be areas where drain pipe could not be installed at an elevation low enough to ensure that groundwater will not flow beneath the cutoff wall.[112]

Dr. Lee evaluated the efficacy of the proposed seepage collection system for the Category 1 waste rock pile:

> The gravity driven drainage system for moving collected water to the NE and SW corners of the stockpile with subsequent pumping to the WWTF will not work as currently proposed. The bedrock surface is uneven and not uniformly sloped. . .The conductivity of the cutoff wall for the Category 1 facility is quite high. . .The effect of freeze thaw and other degradation mechanisms on the long-term performance of the cutoff wall have not been fully considered in the modeling. The degradation of the cutoff wall over hundreds of years is a certainty, but the consequences are not established.[113]

Dr. Lee concluded,"[T]he proposed drainage system is unlikely to work as anticipated." [114] Neither the PolyMet NPDES/SDS Permit Application nor the Permit to Mine Application specifies limits on the amount of untreated seepage that will be released from the Category 1 waste rockpile. PolyMet defers setting "the required performance of the groundwater containment system" to final designs not included in its permit application.[115] Although PolyMet

[106] *Id*.
[107] PolyMet PTM App., *supra*, pp. 27, 343.
[108] PolyMet FEIS, *supra*, 5-7.
[109] *Id*., 5-145
[110] *Id*., 5-113.
[111] PolyMet Rock Mgt. Plan, *supra*, pp. 11, 15, in Appx. 11.1 of the PolyMet PTM Application; PolyMet PTM App. 288.
[112] *Id*., p. 14.
[113] D. Lee, Ph.D., P.E., PolyMet Category 1 Waste Rock Stockpile, Dec. 10, 2015, ("Lee 2015 Category 1"), attached as Exhibit 27, pp. 1-2
[114] *Id.*, p. 2.
[115] PolyMet PTM App. *supra*, p. 288.

claims that geomembrane cover systems are widely used, the Company admits, "there has not been significant demand for geomembranes in waste rock stockpile covers."[116] The longest studies on geomembrane degradation cited by PolyMet were 10 years in duration,[117] but the geomembrane PolyMet proposes would have to resist degradation for hundreds of years, if not forever.

PolyMet's claims for the efficacy of the Category 1 seepage collection system are based on the same Barr 2012 Containment Memo on which PolyMet used to claim tailings seepage success.[118] PolyMet cites no examples demonstrating that an inward gradient has been maintained for decades, let alone hundreds of years, to prevent leakage of groundwater through a soil or slurry trench.

There are other features at the PolyMet plant site and the mine site which raise serious concerns about discharge through groundwater to hydrologically connected surface water. The hydrometallurgical waste facility (HRF) would receive 313,000 tons of residue annually[119] and would contain highly toxic and concentrated wastes.

Neither PolyMet's NPDES/SDS Application nor the Company's Permit to Mine Application discloses the chemical composition of HRF residues. However, PolyMet produced a technical report several years ago characterizing hydrometallurgical waste residue.[120] This report disclosed that copper concentrations in the residue would be 945 parts per million[121] - more than 100,000 times Minnesota's water quality standard for copper (9.3 parts per billion) set to protect fish in surface water near the proposed plant.[122] Total sulfate would be 13.78% of the residue or 14.91% when residue is combined with gypsum:[123] in other words, residue would have a staggering 138,000 to 149,100 mg/L of sulfate. The level of sulfate in HRF residue would, thus, be more than 10,000 times Minnesota's wild rice sulfate standard of 10 mg/L,[124] applicable downstream in the Partridge River. PolyMet has also identified a number of toxic and reactive chemicals that would be used as hydrometallurgical plant consumables.[125]

PolyMet's Facility Mercury Mass Balance Analysis states that 164 pounds of mercury would be deposited in the HRF each year.[126] If the PolyMet autoclave processing were to operate for 18 years, as currently proposed in the PTM Application,[127] by the time it closes the hydrometallurgical residue facility would contain an astonishing *2,952 pounds* of mercury. To

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[116] PolyMet NorthMet Project Adaptive Water Management Plan Dec. 8, 2017 ("PolyMet Adaptive Mgt. Plan"), p. 28, Appx. 11.4 of the PolyMet PTM App.
[117] *Id*., p. 37.
[118] PolyMet Rock Mgt. Plan, *supra*, Appx. 11.1 of the PolyMet PTM App., p. 11, citing the Barr 2012 Containment Memo, *supra*, provided as Exhibit 21.
[119] PolyMet PTM App. *supra*, p. 273.
[120] RS33/RS65 – Hydrometallurgical Residue Characterization and Water Quality Model – NorthMet Project, Feb. 2007, referenced by PolyMet for HRF waste characterization at PolyMet PTM Application, p. 465, Reference 43. PolyMet is still proposing the copper sulfate activation process cited in the RS33/RS65 report. *Id.*, p. 212, 222.
[121] Table 5-2 of RS33/RS65 above is attached in Exhibit 28, autop. 3.
[122] Minn. R. 7052.0100, subp. 6. For the plant site hardness of 10 parts per million (mg/L) is applied.
[123] RS33/RS65 HRF Residue Excerpt, *supra*, Exhibit 28, Table 5-3, autop. 4.
[124] Minn. R. 7050.0224, subp. 2.
[125] PolyMet PTM App., *supra* Table 8-5, pp. 225-227.
[126] PolyMet Facility Mercury Mass Balance Analysis (RS66), Mar. 2007, Excerpt attached as Exhibit 29, autop. 2. No more recent mercury mass balance analysis has been detected in any PolyMet permit applications.
[127] PolyMet PTM App. *supra*, p. 359.

get a sense of the significance of this amount of mercury, the water quality standard for mercury in Minnesota's Lake Superior basin is 1.3 nanograms per liter (ng/L); and one would need more than 450 billion nanograms to equal just one pound.

Although the HRF has a liner system, its location on an unsuitable site and an unstable foundation make this liner system vulnerable to stress deformation and failure, as well as dam instability. The proposed site for the hydrometallurgical residue facility would be located on 36.1 acres of wetlands,[128] a site that is unsuitable for a facility storing highly concentrated and toxic wastes. Although location of industrial solid waste facilities on wetlands is generally prohibited under Minnesota law,[129] in 2015 mining industry lobbyists successfully secured a loophole that creates an exemption for disposal of mining wastes.[130]

Engineers retained by the Minnesota Department of Natural Resources (DNR) to review HRF safety have cautioned, "The soft ground beneath the proposed residue facility consists of up to 30 feet of slimes, peat and tailings concentrate. This will not be an adequate foundation for the 80 foot high basin."[131] The review explained, "The basin will have a geomembrane or geosynthetic liner. The liner could deform and fail if the existing underlying material cannot support the material added to the basin."[132] The HRF is a permanent waste facility, and its liners would have to perform for hundreds of years, if not forever. DNR's Area Fisheries Supervisor has expressed concerns about downstream hazards that would result from release of waste from the HRF, particularly over the long term:

> How long does such a liner last and what happens when it inevitably degrades as nothing lasts forever? Even if it takes 200 years, the waste will still be there and in its location would be very susceptible to leaching into nearby wetlands and groundwater. There is no mention of the expected longevity of the liner and leakage system in the long term closure description. There is mention of a monitoring plan but no mention of how the liner could be maintained or repaired or replaced . . . I don't understand how a liner could be replaced, or even repaired, under a 97 acre site with 50 feet of fill on top . . . The Hydrometallurgical Residue Facility is a concern to Fisheries because of its potential impact on water quality as the system ages.[133]

The mine site sumps, ponds, and equalization basins are all potential sources of seepage to surface water through hydrologically connected groundwater as a result of liner leakage, while the mine pits and the overburden laydown and storage area are unlined sources of potential contamination. The equalization basins will have a single liner and a rate of leakage approximately 10 times that of the ore surge pile and Category 2/3 waste rock stockpile.[134]

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[128] PolyMet FEIS, *supra*, 5-321, Figure 5.2.3-19.
[129] Minn. R. 7035.1600, item D.
[130] Minnesota Session Laws, Special Session 2015, ch. 4, sec. 119, amending Minn. Stat. §116.07, subd. 4j; Minn. R. 7001.3050, subp. 3, item G; Minn. R. 7035.2525, subp. 2, item G. In this legislation, a mining company is "deemed to have obtained a solid waste management facility permit without making application for it" and waste from "extraction, beneficiation, and processing" of ores is exempt from the requirements applicable to all other facilities that treat, transfer, store, process or dispose of solid waste
[131] EOR (Emmons & Olivier Resources) Review Team, PolyMet Dam Safety Permit Application Review, May 15, 2017 ("EOR Dam Safety Review"), Exhibit 30, p. 5.
[132] *Id.*, p. 6.
[133] E. Evarts, Area Fisheries Supervisor, DNR Request for Comments - Dam Safety - Construction - St. Louis County - Applications 2016-1383 and 2016-1380, June 19, 2017, Exhibit 31.
[134] MPCA NPDES/SDS Fact Sheet, pp. 63, 65, and compare with p. 66.

Solute concentrations in the mine site East ("Low" Concentration) and West (High Concentration) Equalization Basins are useful to understand the level of contaminants that would result from copper-nickel mining in the Partridge River headwaters. The East Equalization Basin would aggregate seepage from the mine pits, haul roads, rail transfer hopper and Category 1 waste rock stockpile. During operations, this "Low" Concentration Basin would contain wastewater *more than three orders of magnitude* above water quality standards. Copper concentrations of 7,410 µg/L would be 1,425 times Minnesota's water quality standard and nickel concentrations of 24,600 µg/L would be 848 times the water quality standard. Manganese concentrations of 2,223 µg/L would be 22 times Minnesota's health-based limit in drinking water.[135]

The West Equalization Basin would aggregate seepage from the Ore Surge Pile and the Category 2/3 waste rock stockpile. During operations, this Basin would contain reactive wastes *more than four orders of magnitude* above water quality standards. The wastewater in this Basin would have copper concentrations of 110,000 µg/L, more than 21,150 times Minnesota's water quality standard that protects aquatic life; nickel concentrations of 405,000 µg/L, more than 13,965 times the water quality standard; and lead concentrations of 361 µg/L, nearly 278 times the water quality standard. Manganese concentrations of 39,500 µg/L would be 39.5 times the Minnesota's health-based limit.[136]

Sulfate concentrations in the East Equalization Basin would be 2,450 mg/L, 245 times the wild rice sulfate standard, and sulfate concentrations in the West Equalization Basin would be 9,010 milligrams per liter (mg/L), more than 900 times the wild rice sulfate standard applicable downstream in the Partridge River.[137]

The MPCA failed to perform a reasonable potential analysis for any mine site or plant site discharge to surface water through hydrologically connected groundwater. The Draft NPDES/SDS Permit also provides no enforceable conditions that would control such discharge.

The Draft NPDES/SDS Permit appears to allow PolyMet to discharge water from its tailings facility to surface waters through hydrologically connected groundwater. The Draft Permit only states that there will be "no *direct* discharge from the FTB (Flotation Tailings Basin) Pond to any receiving waters"[138] and that "*Direct* discharge to surface waters from the FTB Seepage Containment System is prohibited."[139]

The Draft NPDES/SDS Permit imposes no limits or enforceable requirements for PolyMet to improve the South Seepage Management System, which is known to be ineffective in capturing

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[135] PolyMet Adaptive Mgt. Plan, *supra*, Appx. 11.4 to PolyMet PTM App., aggregation described in Large Table 1 concentrations provided in Large Table 4, P90 at Mine Year 14. Water quality standards in 50 mg/L of hardness are 5.2 µg/L for copper; 29 µg/L for nickel, and 1.3 µg/L for lead. Minn. R. 7052.0100, subp. 6; Minn. R. 7050.0222, subp. 4; manganese health-based limit of 100 µg/L, based on Minnesota Health Department Human Health-Based Water Guidance, *supra.* Large Tables 1 and 4 provided in Exhibit 32.

[136] *Id*.

[137] *Id*., Large Table 4, P90 at Mine Year 14, *supra*, provided in Exhibit 32. Wild rice sulfate standard of 10 mg/L in wild rice waters. Minn. R. 7050.0224, subp. 2; Minn. R. 7050.0220, subp. 5a, item A (19).

[138] Draft NPDES/SDS Permit, *supra*, p. 6 (emphasis added).

[139] *Id.*, p. 41. (emphasis added).

groundwater seepage at the headwaters of Second Creek, let alone to achieve the promised 100% collection rate. The Draft Permit merely says, "During Project operations, PolyMet will upgrade the existing system to enhance the degree of seepage collection as necessary."[140]

Although the Draft Permit states, "The Permittee shall maintain an inward hydraulic gradient across the FTB Seepage Containment System as determined from water level measurements from the paired monitoring wells and piezometers," this condition is qualified to take into account "temporary conditions that may result from short-term precipitation or snowmelt events."[141] Should either a decrease in pumping rates or monitoring detect that an inward gradient is not being maintained at the tailings seepage containment system, this engineering failure would not constitute an enforceable violation of the Draft NPDES/SDS permit. Such a finding would merely trigger a long and non-exclusive list of potential mitigation measures and submittal of a Seepage Containment System Corrective Action Evaluation Report.[142] A permit violation could, theoretically, be found if PolyMet reported in an Annual Comprehensive Performance Report that an inward gradient was not being maintained to prevent impact to ground or surface waters from the tailings seepage system, submitted a mitigation plan, the MPCA disapproved the plan and PolyMet did not address the MPCA's disapproval within a deadline specified at that time.[143]

The MPCA Fact Sheet states for the hydrometallurgical residue facility that "no leakage is expected through the lower composite liner."[144] But the Draft NPDES/SDS Permit imposes no limit on discharge of HRF pollutants through groundwater. The Draft Permit only says, "*Direct* discharge from the HRF Pond and/or the HRF Leakage Collection system to surface waters or to the FTB is prohibited."[145] The Draft Permit provides a lengthy investigation work plan for a preload design, but no specifications that would result in revocation of the authority already granted in the permit that the "HRF is permitted to receive hydrometallurgical residue and process water."[146] Both the DNR and the MPCA propose to issue permits for the HRF, although neither agency nor permit has resolved concerns regarding the site, its unstable foundation, and the risks of dam instability and liner deformation releasing highly toxic wastes from the HRF.

The Draft NPDES/SDS Permit states for the mine site Category 1 seepage containment system, as with the tailings system, that "The Permittee shall maintain an inward hydraulic gradient across the Category 1 Waste Rock Stockpile Groundwater Containment System as determined by comparing water level measurements from the paired monitoring wells and piezometers" and that this condition should take into account "temporary conditions that may result from short-term precipitation or snowmelt events."[147] If monitoring detects that an inward hydraulic gradient is not being maintained at the Category 1 seepage containment system, this engineering failure, as at the tailings basin, would not be an enforceable violation of the Draft NPDES/SDS permit. The finding could lead to potential mitigation measures.[148] But, irrespective of the

[140] *Id.,* p. 7.
[141] *Id*.
[142] *Id*., pp. 41-42.
[143] *Id.,* pp. 47-48,
[144] MPCA NPDES/SDS Fact Sheet, *supra*, p. 68.
[145] Draft NPDES/SDS Permit, *supra*, p. 48.
[146] Quote is Id., p. 48; descriptions of work plans are on pp. 49-51.
[147] *Id.* p. 41.
[148] *Id*, p. 40.

ineffectiveness of containment, the only way a permit violation could be triggered would be if PolyMet disclosed in an Annual Comprehensive Performance Report that failure to maintain the inward gradient resulted in a "measurable" impact to groundwater, proposed a corrective plan and schedule, the MPCA disapproved the plan and PolyMet failed to address the Agency's disapproval.[149]

It is unclear whether the Draft NPDES/SDS Permit for the mine site is intended to prohibit indirect as well as direct discharge to surface waters. The Draft Permit states, "There will be *no discharge* of mine water or other process wastewater to surface waters from the Mine Site,"[150] and "The Permittee *shall not discharge any process wastewater* from the Mine Site to surface waters under this permit."[151] However, the Draft Permit also states, "This permit does not authorize a *direct* discharge from the Mine Site Equalization Basins or any other industrial mine water pond system to surface waters,"[152] the Draft Permit also states with respect to the Category 2/3 Waste Rock Stockpile, Category 4 Waste Rock Stockpile, OSLA, Ore Surge Pile, and Equalization Basins, "The Permittee shall operate and maintain its engineering controls associated with these infrastructure facilities to ensure there is *no discharge to surface waters* from the Mine Site."[153] These inconsistencies in language could interfere with enforcement.

The EPA has emphasized to the MPCA that, if the PolyMet NPDES permit does not cover discharge through groundwater to hydrologically connected surface water "then the company will be discharging without a permit in violation of the CWA."[154] The EPA explained, repeating discussions that the Agency had had many times before with both the MPCA and PolyMet:

> [T]here is no minimum threshold of predicted pollutant load needed to trigger the requirement to submit a permit application.
>
> The CWA [Clean Water Act] does not include exemptions that would limit NPDES permit coverage to only "excess" wastewater discharges that are deemed to have a "statistically significant" impact on receiving waters at property boundaries. There is no exclusion or exemption for discharges from facilities based on technology or engineering controls. Failure to obtain NPDES coverage for discharges of pollutants to waters of the United States would place the discharger at risk of violating the CWA.[155]

Of course, a violation of the Clean Water Act could only be prosecuted if it were detected. That is why monitoring of surface water quality in relationship to groundwater seepage of pollutants is so important.

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[149] *Id*., p 47.
[150] *Id*., p. 5 (emphasis added).
[151] *Id*., p. 40 (emphasis added).
[152] *Id*., p. 53 (emphasis added).
[153] *Id*., p. 41 (emphasis added).
[154] EPA CWA Permitting Concerns, *supra*, Exhibit 12, p. 3 of Attachment. *See also* 33 U.S.C. §33 U.S.C. §1311(a); 40 C.F.R. §122.21(a)(1) and (c).
[155] *Id*.

3. The Draft NPDES/SDS permit for the PolyMet Project violates the Clean Water Act and Minnesota law by providing inadequate monitoring to detect if PolyMet discharge through groundwater causes or contributes to violations of Minnesota water quality standards or results in unpermitted discharge.

In the environmental review process, modeling was set up to exclude data on where and when pollutants in bedrock or surficial aquifer groundwater would first daylight to surface water. The PolyMet FEIS states, "Several decisions were made while setting up the GoldSim models. An approach was taken not to represent in those models the interactions between bedrock groundwater and surficial deposits groundwater, or between groundwater and wetlands."[156]

Although the EPA has stated in writing for five years that such an analysis was necessary in order to prepare an NPDES permit in compliance with the Clean Water Act,[157] the MPCA did not require PolyMet to rectify this deficiency. There is no information in PolyMet's NPDES/SDS Application evaluating the most likely locations – whether based on hydrogeology, fractures, flows or monitoring data – where PolyMet mine site and plant site discharge of pollutants to groundwater would first reach surface water.

The Draft NPDES/SDS does not grant PolyMet an exemption from the Clean Water Act requirements that regulate discharge of surface water through hydrologically connected groundwater. However, the Draft Permit makes it highly unlikely that PolyMet would face any consequences for discharging unpermitted pollutants through groundwater to waters of the United States. In effect, by requiring deficient monitoring of surface water and groundwater, the Draft Permit would PolyMet to evade the law's prohibitions.

Failure to provide sufficient monitoring to evaluate compliance with surface water quality standards conflicts with regulations implementing the Clean Water Act. Federal regulations, applicable to state NPDES permits, require monitoring "sufficient to yield data which are representative of the monitored activity."[158] State compliance evaluation programs should be capable of identifying noncompliance with permit requirements, verifying the adequacy of sampling and monitoring, and protecting surface waters and public health.[159] States must also have remedies for enforcement of violations of State permits and program requirements.[160] These regulatory requirements would be meaningless if a state's monitoring was so deficient that no violations would be detected.

Minnesota rules similarly requires that every permit issued by the MPCA contain monitoring requirements "that are sufficient to yield representative data to determine whether there is compliance with the terms and conditions of the permit or compliance with Minnesota and federal pollution control statutes and rules."[161] Minnesota statutes contain civil and criminal

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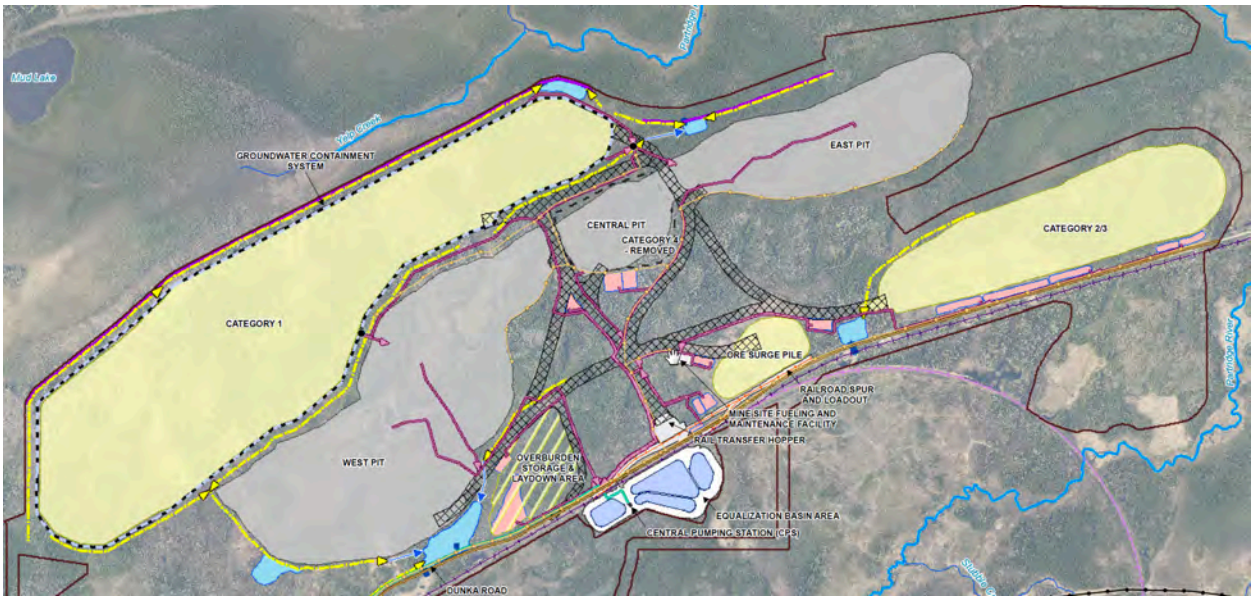
[156] PolyMet FEIS, *supra*, 5-53.
[157] *See* EPA PSDEIS Comments, *supra*, Exhibit 10, pp. 10-11; EPA SDEIS Comments, *supra*, Exhibit 11, pp. 8-9.
[158] 40 C.F.R. §122.48; applicable to states at 40 C.F.R. §123.25(a)(19).
[159] 40 C.F.R. §123.26(b)(1), (b)(2)(i), (b)(2)(iii), (b)(2)(iv).
[160] 40 C.F.R. §123.27(a)(1)-(3).
[161] Minn. R. 7001.0150, subp. 2, item B.

penalties to enforce violation of MPCA permits,[162] remedies that would become moot if permit violations could not be detected.

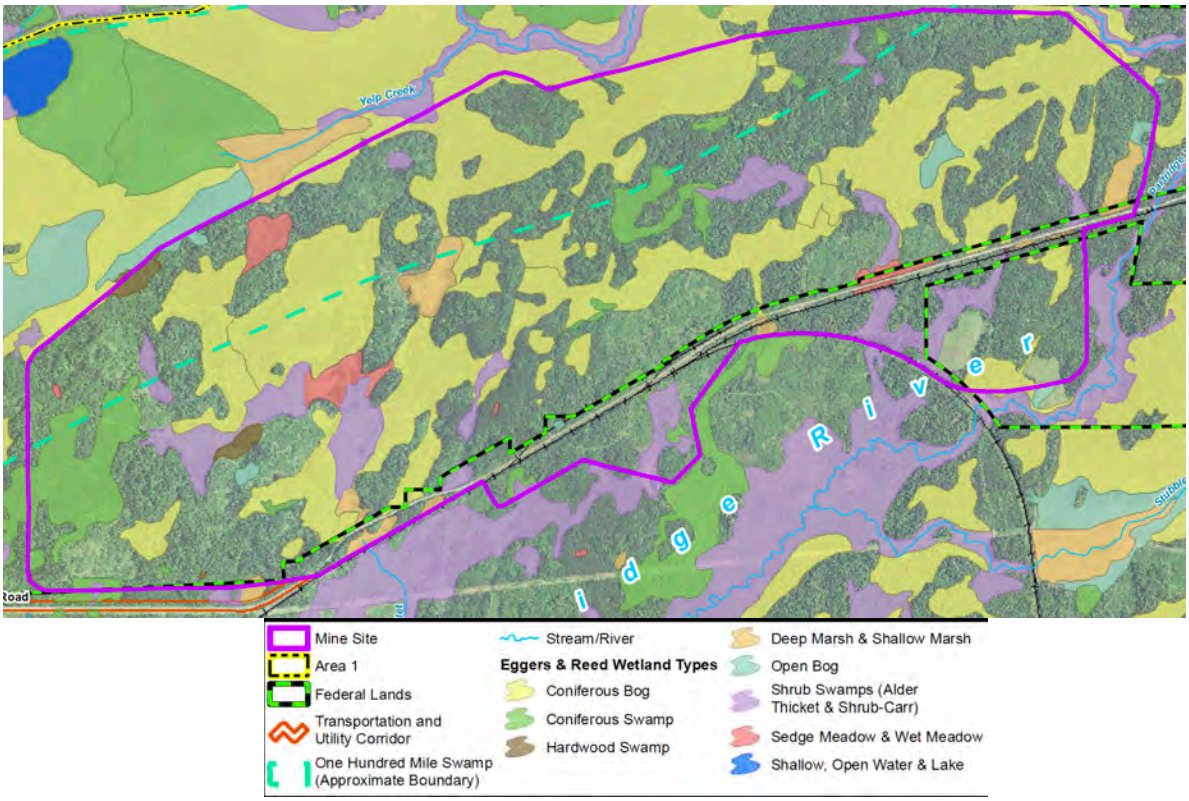
Although any mine site discharge to surface water through hydrologically connected groundwater may be permit violation under the Clean Water Act, mine site surface water quality monitoring seems to be designed to preclude detection of such a violation.

The map below[163] shows the mine site layout, along with the potential sources of contamination. Lined features, which could leak to groundwater, include the Ore Surge Pile and the Category 2/3 Waste Rock Stockpile (yellow), sumps and ponds (small pink squares) and the Equalization Basins (blue). These sumps, ponds and basins could also overflow during heavy rain events. Unlined features with higher seepage rates to groundwater include the Category 1 Waste Rock Stockpile (yellow), the West, Central and East Mine Pits (grey) and the Overburden Storage and Laydown Area (yellow lines). Mine pits would not seep during dewatering but could seep to groundwater during temporary as well as final closure or due to seasonal and rain events.

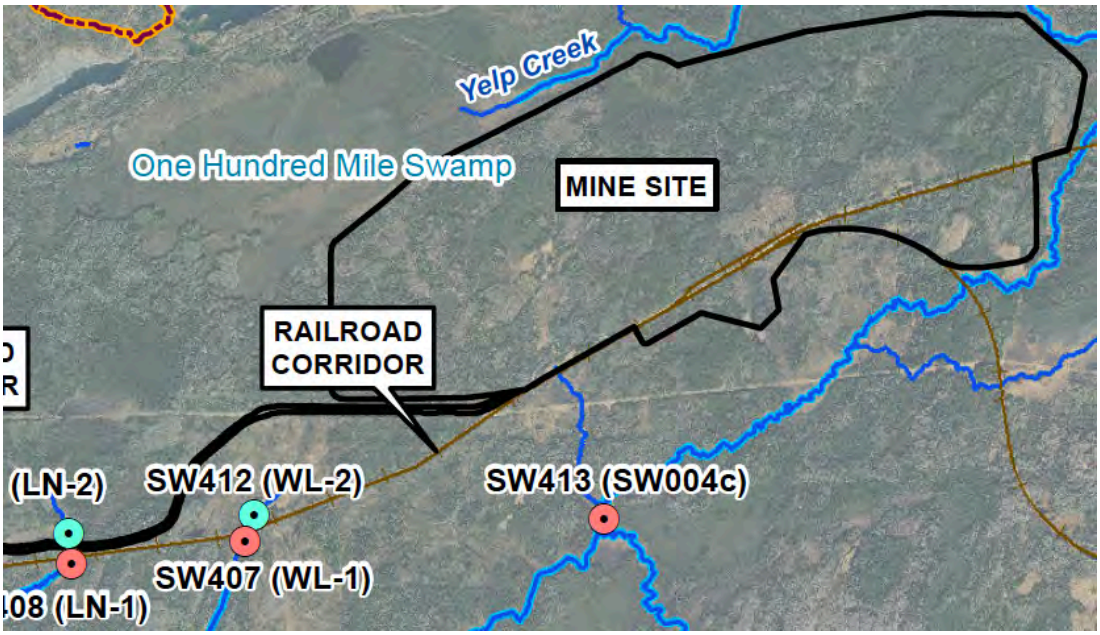


The proposed PolyMet mine site contains many wetlands and several small creeks that could be hydrologically connected to the sources of mine site contamination of groundwater. This map illustrates some of these proximate surface water features:[164]

[162] See e.g. Minn. Stat. §115.071.
[163] PolyMet PTM Application, Figure 3-2, Mine Site Layout – Mine Year 11, attached as Exhibit 33.
[164] PolyMet FEIS, Figure 4.2.3-2 Wetland Community Types Mine Site, Exhibit 34.



The map below shows the location of the only surface water monitoring sites near the mine site proposed in the Draft NPDES/SDS Permit:[165]



Proposed monitoring sites for baseline conditions are shown in green and proposed sites to identify surface water impacts are red. The sites on Longnose Creek and Wyman Creek are

[165] PolyMet NPDES/SDS Permit Application, Vol. I, updated Oct. 2017 ("PolyMet NPDES/SDS Permit App. Vol. I."), Large Figure 8, attached as Exhibit 35. (Maps in the PolyMet Application have higher resolution than the same or excerpted maps in the Draft NPDES/SDS Permit)

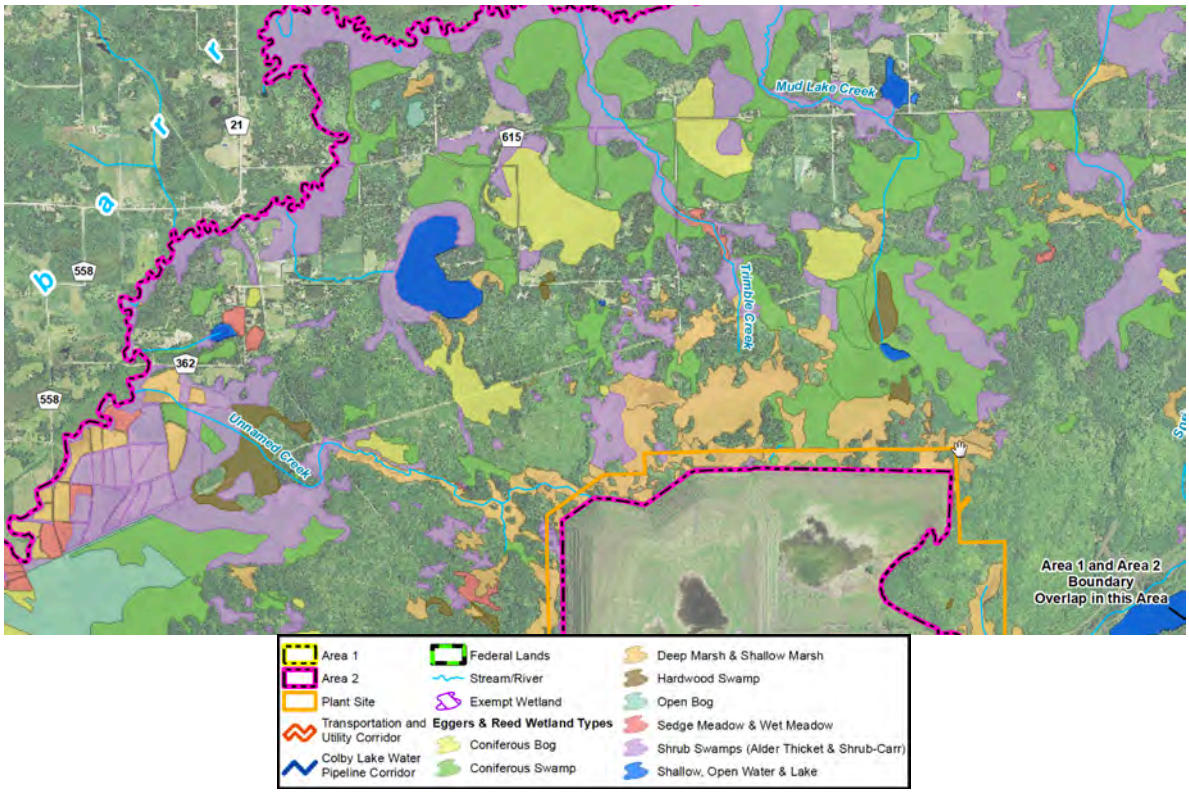
intended to monitor impacts of spills or leakage from the railway and pipeline corridor between the mine site and the plant site.[166] The single surface water site proposed to monitor impacts from discharge through groundwater to surface water from the entire mine site is identified on this map as SW004c. This monitoring site is located on the Partridge River approximately a mile south of the mine site.[167]

Surface water quality monitoring to detect impacts to surface water as a result of both direct discharge and discharge through groundwater to waters of the United States at the tailings waste facility is similarly deficient. The Draft NPDES/SDS Permit would authorize 11 discharge outfalls at the four-and-a-half mile square tailings facility, each of which is indicated in orange and is at or near the edge of the facility.

As the map shows, the Draft NPDES/SDS Permit would provide five surface water quality monitoring stations, the nearest one of which is about a mile from the northern edge of the tailings facility.[168]

As evident in the map above, there are streams originating much closer to the tailings facility than the surface monitoring stations selected. In addition, similar to the mine site, there are wetlands up to the very edge of the sources from which tailings site contamination would originate – both the discharge outfalls and the seepage containment system.[169]

[166] MPCA NPDES/SDS Fact Sheet, *supra*, pp. 53-54.
[167] PolyMet NPDES/SDS Permit App. Vol. I, Large Fig. 8, *supra*, Exhibit 35. See MPCA Draft NPDES/SDS Permit, pp. 19, 92.
[168] See Barr, Mass Balance Calculations for Mercury, Sept. 25, 2017, ("Barr 2017 Mercury Calc."), p. 4, autop. 348, Attachment F to PolyMet NPDES/SDS Permit App. Vol. III –WWTS, updated Oct. 2017.
[169] PolyMet FEIS, Figure 4.2.3-5, attached as Exhibit 36.



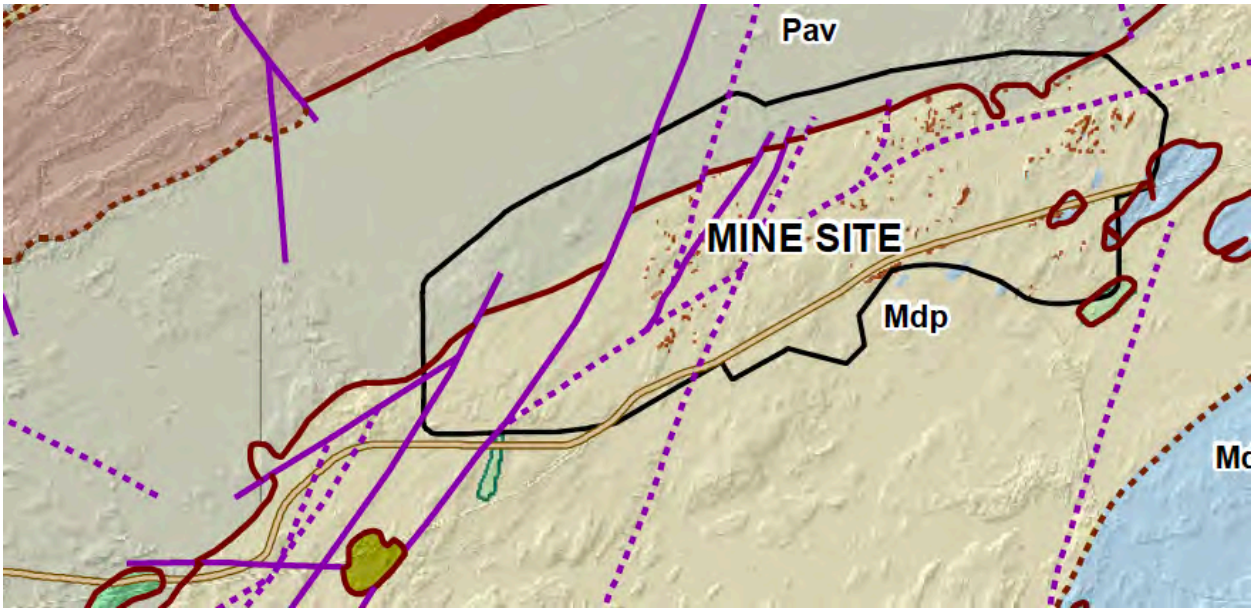
After several commenters explained that seepage could also escape from the east side of the tailings facility due to changes in elevation and hydraulic head, PolyMet represented and the PolyMet final EIS asserted that the collection system on the east side of the tailings facility would capture 100% of both surface seepage and groundwater seepage.[170] The Draft NPDES/SDS Permit proposes no surface water monitoring sites to the east of the tailings facility.

The Draft Permit suggests that monthly inspection of HRF pond and HRF leakage collection system will "evaluate the effectiveness of the liner and Leakage Collection System."[171] Although there are monitors for internal waste streams at the hydrometallurgical residue facility (HRF), there are no monitoring sites at all that could detect liner leakage at the HRF: no bedrock groundwater monitoring sites, no surficial aquifer monitoring sites and no surface water quality monitoring sites.[172]

Similarly, there are no monitoring sites of any kind – groundwater or surface water -- to detect leakage of the Equalization Basins, the highly contaminated single-lined ponds on the southern edge of the PolyMet mine site. The MPCA relies on typical liner characteristics to assume, without verification, that leakage will be minimal, and will affect neither groundwater nor nearby surface water.[173]

[170] PolyMet FEIS, 5-8, 5-102.
[171] Draft NPDES/SDS Permit, p. 48.
[172] Id.
[173] *Id*., p. 66. Other mine site sources, such as the temporary Category 2/3 Stockpile and Rail Transfer Hopper seepage will have a double liner.

The PolyMet Draft NPDES/SDS permit must be revised to include many additional surface water monitoring sites on the mine site and in wetlands and streams in proximity to mine site sources of contamination in order to determine if PolyMet is violating the draft permit prohibition of discharge of pollutants to surface water. Surface water monitoring sites should consider the groundwater contours of the mine site, which reflect a reduced groundwater gradient on all sides of the mine,[174] the 100-year flood plain for the mine site that overlaps the Category 1 seepage containment system and its sump,[175] and the many faults and fractures identified at and in the vicinity of the mine site, shown on this map as well as on the attached exhibit.[176]



These, and all other monitoring results from the PolyMet project, should be immediately posted online so that members of the public will have timely and transparent information as to the compliance of Minnesota's first copper-nickel sulfide mine with Minnesota water quality standards and the requirements of the federal Clean Water Act. Surface water monitoring sites located in wetlands should specifically measure sulfate, mercury, methylmercury and water fluctuations, among other parameters to address concerns about increased mercury contamination resulting from the PolyMet project.

The PolyMet Draft NPDES/SDS permit must also be revised to include multiple surface water monitoring sites in wetlands adjacent to the tailings waste facility and the closest points of creeks to determine whether tailings seepage containment failure is resulting in discharge to surface waters. Such monitoring should reflect groundwater contours at the tailings site[177] as compared

[174] PolyMet FEIS, Figure 4.2.2-7, Estimated Existing Groundwater Contours- Mine Site, Exhibit 37.
[175] PolyMet Water Management Plan – Mine, Appx. 11.2 to PolyMet PTM Application, *supra*, Large Figure 3, attached as Exhibit 38.
[176] Barr, Hydrogeology of Fractured Bedrock in the Vicinity of the NorthMet Project, Dec. 2014 ("Barr 2014 Hydrogeology") Large Figure 1, attached as Exhibit 39
[177] PolyMet FEIS, Figure 4.2.2-17 Estimated Existing Groundwater Contours in Surficial Deposits and Bedrock Outcrops - Plant Site, Exhibit 40.

to the eventual height of the tailings deposits, as well as the faults and fractures identified at and near the tailings site.[178]

MPCA's current plan to have only three surficial aquifer monitoring wells downgradient of the tailings site[179] is also insufficient. Additional monitoring sites in the plant site surficial aquifer are required to identify likely flowpaths from groundwater seepage to surface water.

Such monitoring of surface and groundwater is also important to assess the impacts on both human health and natural resources in the event of spillage, overflow or partial or complete dam failure at the tailings site. Surface water monitoring sites located in wetlands should specifically measure sulfate, mercury, methylmercury and water fluctuations, among other parameters to address concerns about increased mercury contamination resulting from the PolyMet project.

Locations of groundwater monitoring sites should be re-evaluated to ensure that they follow potential pathways from sources of contamination along faults and fractures. In particular, the Draft NPDES/SDS Permit should locate surficial groundwater monitoring stations radiating out from the seepage collection systems for the Category 1 waste rock seepage at the mine site and the tailings seepage at the plant site.

The PolyMet Draft NPDES/SDS permit should also include strategically located groundwater and surface monitoring sites to ascertain whether the liners for the HRF are leaking. Particularly since this waste facility is proposed to contain highly toxic wastes, including a large mass of mercury, on an unsuitable site with an unstable foundation, effective leakage capture must be verified, not assumed. Similarly, the Draft NPDES/SDS Permit should require surficial groundwater and surface monitoring sites to ascertain whether liners for the Equalization Basins and other mine site sources of contamination are performing as hoped.

In addition to the deficiencies in the location of monitors, there are gaps in the nature of parameters proposed to be monitored.

The Draft NPDES/SDS Permit sets a priority on groundwater monitoring at and around the seepage containment systems at the tailings facility and the Category 1 waste rock stockpile and in monitoring to detect northward flow. The parameters tested in these monitors should be expanded.

The Draft Permit proposes that monitoring at the tailings seepage trench and the Category 1 seepage trench would include only water levels within the containment trench, would include no metals or parameters indicative of copper-nickel mining or processing outside the trench.[180] Such limitations would hamper the use of seepage data to determine whether pollutants found in bedrock groundwater, surficial aquifer or in surface water monitoring originated from seepage failure and whether action would need to be taken in order to avoid violation of water quality standards. In order to determine the role of seepage in contamination of groundwater or surface

[178] Barr 2014 Hydrogeology *supra*, Large Figure 1, Exhibit 39.
[179] See MPCA NPDES/SDS Fact Sheet, p. 55, 67 and Draft NPDES/SDS Permit, p. 98 for tailings seepage system performance monitoring and MPCA NPDES/SDS Fact Sheet, Table 11, p. 53 and Draft NPDES/SDS Permit, p. 84 for Category 1 seepage system performance monitoring.
[180] MPCA NPDES/SDS Fact Sheet, Table 11, p. 53; MPCA Draft NPDES/SDS Permit, p. 84.

water, metals including at least the following should be monitored at both the tailings seepage system and the Category 1 seepage system: arsenic, cadmium, copper, lead, mercury, nickel and zinc. In addition, an effort should be made to identify and monitor for parameters that are chemical signatures for the PolyMet mining project.

Another, even more significant deficiency in the quality of monitoring is the monitoring to evaluate northward flow, which will only detect water levels and no other parameters.[181] Given potential changes affecting hydrology from operations at the Northshore Mine Peter Mitchell Pit, even if changes in water levels were detected in groundwater north of the PolyMet mine site, attribution would be difficult absent additional information as to the constituents of that groundwater. Again, monitoring the suite of metals associated with copper-nickel mining and the particular rock formations at the proposed PolyMet mine site would provide evidence of the source of the flow and yield the data necessary to represent the monitored activity.

4. The Draft NPDES/SDS permit for the PolyMet Project violates the Clean Water Act, its implementing regulations and Minnesota law by failing to set limits for direct discharge to surface water with the reasonable potential to cause or contribute to violation of Minnesota water quality standards.

Federal regulations require that any new copper mine project must comply with new source performance standards which provide technology-based effluent limitations (TBELs).[182] The only effluent limits contained in the Draft NPDES/SDS Permit for the PolyMet copper-nickel mine project are based on TBELs and apply to SD001, the monitoring station for surface discharge from the tailings site wastewater treatment system (WWTS).[183]

Wastewater discharged at the contaminant levels allowed under new source technology based effluent limits (TBELs) for copper mining would far exceed Minnesota water quality standards. At the PolyMet copper mine tailings site, the new source TBEL for zinc is more than 4 times Minnesota's water quality standard (120 µg/L); the TBEL for arsenic is 9.4 times Minnesota's standard (53 µg/L); the TBEL for cadmium is 20 times Minnesota's standard (2.5 µg/L); the TBEL for copper is 16 times Minnesota's standard (9.3 µg/L); the TBEL for lead is almost 94 times Minnesota's applicable standard (3.2 µg/L); and the level of mercury in discharge allowed by the TBEL for mercury is more than 769 times the level to which mercury is limited under Minnesota water quality standards for the Lake Superior Basin (1.3 ng/L).[184] Minnesota's water quality standards were enacted and approved by the EPA to implement Clean Water Act section 303 requirements to protect beneficial uses of water[185] and federal and international agreements pertaining to the Great Lakes.[186]

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[181] Draft NPDES/SDS Permit, p. 90.
[182] 40 C.F.R. §440.104.
[183] See Draft NPDES/SDS Permit, pp. 70-71 setting monthly average limits of 500 µg/L for arsenic, of 50 µg/L for cadmium, of 150 µg/L for copper, of 300 µg/L for lead, of 1000 nanograms per liter (ng/L) for mercury and of 500 µg/L for zinc.
[184] Minnesota water quality standards for cadmium, copper, zinc and lead are in Minn. R. 7052.0100, subp. 6 and Minn. R. 7050.0222, subp. 4, applying a hardness level of 100 mg/L for receiving waters. Standards for arsenic and mercury are in Minn. R. 7052.0100, subp. 5.
[185] 33 U.S.C. §§1311(b)(1)(C); 1313.
[186] *See* 40 C.F.R. Part 132.

Each NPDES permit must include technology-based effluent limitations (TBELs), where applicable.[187] But these TBELs serve as a floor, not a ceiling:

> Generally, the Clean Water Act uses two different types of standards "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters": technology-based standards and water-quality standards. 33 U.S.C. § 1251(a). Technology-based standards set a minimum level of treatment that must be performed by those who discharge pollutants into waters. That level is predetermined by EPA to be both technologically available and economically achievable. . . . In contrast, water quality standards depend on the purpose for which a particular body of water is used. 40 C.F.R. § 131.3(i). . . . States are primarily responsible for creating and revising water quality standards, but they must also submit those standards to EPA for approval.[188]

Each NPDES permit must also include water quality-based effluent limits (WQBELs) and requirements in addition to or more stringent than technology based standards to the extent necessary to achieve water quality standards established under section 303 of the Clean Water Act, including state narrative criteria for water quality."[189] Federal courts have consistently held "If the TBELs are insufficient to attain or maintain water quality standards, the CWA requires NPDES permits to include additional water quality-based effluent limits ('WQBELs')."[190]

Under federal regulations implementing the Clean Water Act, limitations must control all pollutants or pollutant parameters which "are or may" be discharged that a level which will have the reasonable potential to "cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."[191] By definition, a water designated as impaired for a pollutant or failure to attain a narrative criterion already represents an excursion above water quality standards.

Minnesota rules require that an NPDES permit issued by the MPCA "must contain conditions necessary for the permittee to achieve compliance with all Minnesota or federal statutes or rules."[192] As explained in Section 2 of these comments, even using PolyMet's modeling and projections, if seepage from the PolyMet flotation tailings basin (FTB) were not treated, that discharge would cause or contribute to the violation of both State numeric and narrative water quality criteria.

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[187] 40 C.F.R. §122.44(a)(1); See 33 U.S.C. §§ 1311,1316.
[188] *City of Dover v. United States EPA*, 36 F. Supp. 103, 107-108 (U.S.D.C. D.C. 2014).
[189] 33 U.S.C §§1311(b)(1)(C); 1312(a); 1342(b) and 40 C.F.R § 122.44(d)(1).
[190] *NRDC v. United States EPA*, 808 F. 3d 556, 564-565, 577 (2nd Cir. 2015) *citing NRDC v. United States EPA*, 822 F.2d 104, 110, 261 U.S. App. D.C. 372 (D.C. Cir. 1987). *See also Waterkeeper v. United States EPA*, 399 F.3d 486, 492 (2nd Cir. 2005); *Miccosukee Tribe of Indians of Fla. v. United States*, 2008 U.S. Dist. LEXIS 57809 *; 38 ELR 20205; 2008 WL 2967654, slip op. at 114 (U.S.D.C. So. Dist. Fla., July 29, 2008); *United States v. S. Fla. Water Mgmt. Dist*., 2011 U.S. Dist. LEXIS 114510, slip op. at 44-45 (U.S. D.C. S. D. Fla. Jan. 4, 2011); *City of Dover, EPA, supra*, 36 F. Supp. at 108-109 ("Technology-based limits essentially act as a floor: they describe a minimum level of treatment a permit holder must perform. . . . If technology-based limits are not strict enough to ensure that a state's water quality standards will be met, then a permit must contain additional limits regardless of technological or financial concerns.").
[191] 40 C.F.R. §122.44(d)(1)(i).
[192] Minn. R. 7001,1080, subp. 1.

The MPCA has not disregarded the potential of PolyMet FTB pollutants to violate Minnesota water quality standards. What the Agency maintains is that the water quality treatment proposed and pilot-tested by PolyMet would reduce the levels of pollutants in FTB seepage sufficiently so that there would be no reasonable potential for direct discharge from the tailings facility to cause or contribute to violation of Minnesota water quality standards.[193]

There are several problems with this rationale: A) PolyMet has not actually "pilot tested" treatment of influent similar to that proposed in its copper-nickel mine project, and the NPDES/SDS public record contains evidence of similar treatment at a similar scale; B) Even if the treatment proposed by PolyMet were likely to be effective in reducing *other* metals, there is a reasonable potential that effluent from its wastewater treatment plant would cause or contribute to violation of mercury standards for mercury in receiving waters that are already impaired by elevated mercury in fish and in the water column; C) The MPCA has performed no analysis to determine if the specific conductance predicted for WWTS effluent would cause or contribute to toxicity, reflected in fish assessment impairments in the Embarrass River; and 4) The NPDES/SDS Permit places no limitations on surface water discharge from the existing LTVSMC tailings facility, which will transfer to PolyMet prior to the construction of a seepage collection system or treatment facility. Each of these deficiencies must be corrected before an NPDES/SDS permit can be issued to PolyMet in compliance with federal and state law

A) Undemonstrated treatment efficacy for copper-nickel mining influent.

The MPCA Fact Sheet states that a reasonable potential analysis was conducted for a wide range of metals, "based on available data submitted with the permit application," including estimated effluent quality data reported in EPA Form 2D, results from the pilot testing of the proposed wastewater treatment technology, modeling projections from the FEIS, and design engineering modeling conducted after the FEIS. The MPCA apparently concluded based on this information that there is no reasonable potential that any parameter would cause or contribute to an excursion from water quality standards.[194]

The data cited by MPCA is deficient and is not the full extent of data available in this record to evaluate the reasonable potential for exceedances. The estimated effluent characteristics reported by PolyMet to the EPA on Form 2D are either "based on treatment target" or on the "GoldSim model WWTS influent."[195] Stating that effluent characteristics will be based on a target a discharger hopes to attain is a tautology, not performance-based information. Even if PolyMet's influent modeling were verifiable, rather than based on exclusion of pertinent data,[196] a demonstration of removal efficacy would be required to find that there is no reasonable potential

[193] MPCA NPDES/SDS Fact Sheet, p. 31?
[194] Id., p. 44.
[195] PolyMet NPDES/SDS Application Vol. III – Waste Water Treatment System, updated Oct. 2017 ("PolyMet NPDES/SDS App. Vol. III"), Attachment to EPA Form 2D, autop. 46-48. All volumes of the PolyMet NPDES/SDS Application are available at https://www.pca.state.mn.us/quick-links/water-quality-permit-northmet.
[196] Failure to include MinnAMAX copper-nickel data in modeling of tailings leachate is discussed in these comments, p. 15, *supra*, and in Johnson 2015, Exhibit 17, *supra*. The next subsection of these comments discusses concerns related to mercury.

for exceedance. Absent effective removal, the concentrations of many parameters in predicted wastewater treatment system (WWTS) influent far exceed applicable water quality standards.[197]

Although the MPCA NPDES/SDS Fact Sheet refers to "pilot" testing of PolyMet's proposed wastewater treatment technology for tailings seepage, this is a misnomer. The only pilot treatment cited by PolyMet in its October 2017 NPDES/SDS Application is a 2013 test conducted for seven months on water from a seep and a shallow well at the existing LTVSMC taconite tailings facility, not on PolyMet copper-nickel mine flotation tailings.[198] Concentrations of parameters are quite dissimilar. Where the LTVSMC seepage had copper and nickel concentrations averaging less than 3 µg/L PolyMet WWTS influent is predicted to have copper concentrations up to 200 times higher and nickel concentrations up to 300 times higher.[199]

The influent flow rate for this test ranged from 19 to 22 gallons per minute (gpm), more than two orders of magnitude smaller than the predicted flow rate (3,030 gpm) for the PolyMet wastewater treatment system.[200] Some of the significant problems with reverse osmosis efficacy, such as fouling of membranes, would be more significant with higher concentrations of metals and higher flows than in a small-scale test using taconite tailings.

PolyMet seems to consider the results of this "pilot" testing sufficiently unreliable that it has proposed that wastewater treatment at its facility be considered "Adaptive Management:"[201]

> Flexibility in operation of the mine water treatment trains will allow operators to adjust to changing or unforeseen conditions, as described in Section 2.2.4 of Reference (1). Because the actual water that will be generated by the Project will not be available until after the mine operations are initiated, pilot-testing with former LTV Steel Mining Company (LTVSMC) Area 5 pit water has been used to provide a basis for design (as described in Section 3.1 of Reference (10)). The composition of the actual mine water that will be realized at the Mine Site will likely vary from the pilot-test water source. For these reasons, treatment equipment has been selected such that component operation may be modified to account for unforeseen changes in influent water quality, reaction kinetics, sludge characteristics, or other factors that may modify the underlying chemistry in the process units.[202]

A treatment technology that a discharger describes as requiring flexibility due to unforeseen changes in influent quality and other factors does not obviate the need for effluent limitations to

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[197] Tailings toe concentrations predicted by PolyMet in the Permit to Mine Application are attached, *supra*, in Exhibit 16. The source for GoldSim influent data cited by PolyMet in EPA Form 2D, Large Table 28 of NorthMet Project Water Modeling Data Package Volume 2 - Plant Site (v.11), Poly Met Mining Inc., Mar. 2015 ("PolyMet Water Modeling – Plant 2015") is attached as Exhibit 41.
[198] See PolyMet NPDES/SDS App. Vol. III, *supra*, references on p. 118. The text and influent tables from Barr, Final Pilot-Testing Report – Plant Site Wastewater Treatment Plant Pilot-testing, June 2013 ("Barr 2013 Testing") are attached as Exhibit 42. Description of the taconite tailing influent tested is at pp. 8, 11, and duration is at p. 7.
[199] Compare Table 1 of Barr 2013 Testing, *supra*, Exhibit 42 with Large Table 28 in PolyMet Water Modeling – Plant 2015, *supra,* Exhibit 41.
[200] *Id*., p. 12 describes test influent flow. The flow rate of the PolyMet wastewater treatment system is take from the Project Water Balance Figure 11-5 of the Permit to Mine Application, *supra*, Exhibit 8.
[201] PolyMet NPDES/SDS App. Vol. III, *supra,* p. 98.
19. *Id.*
[202] *Id.*, p. 98.

prevent excursions above water quality standards. Adaptive engineering risks decades of uncertainty, contaminant release, violations and unforeseen costs.

Pilot tests should have been required during the past 13 years since environmental review began, to test actual leachate from copper-nickel mine tailings. And now, in the permitting process, due diligence must be applied to review whether there are any similar treatment processes at a similar scale succeeding to such a degree as to support a massive new discharge source. As disclosed in the Form 2D information provided by PolyMet, existing secondary membrane treatment systems – those at the Eagle Mine and Calpine - are more than an order of magnitude smaller than what PolyMet has proposed.[203] More information is needed to evaluate whether the Consol Buchanon Coal Mine primary membrane system (1900 gpm), required by EPA after $200 million in violations, has been constructed and, if so, what its operating removal rate has been. Similarly, the Queensland coal-seam gas desalination application (1,500 gpm) should be evaluated to determine its efficacy. The University of Queensland has reported, "Desalination of produced water is severely impacted by mineral scaling on reverse osmosis (RO) membranes." The University has begun a new project in May 2017 to address this problem.[204]

Tailings seepage proposed to be treated by the PolyMet wastewater treatment system contains pollutants far exceeding Minnesota water quality standards. Absent clear evidence from a similar pilot or successful experience at a treatment facility of similar scale, there is a reasonable potential that high levels of pollutants in tailings seepage predicted by PolyMet for parameters including copper, nickel, lead and sulfate – would not be controlled sufficiently to comply with water quality standards.

B) Reasonable potential that direct discharge of mercury will exceed water quality standards and contribute to impairment of a Great Lake bioaccumulative substance of immediate concern.

The MPCA's NPDES/SDS Fact Sheet states that a reasonable potential analysis for mercury was conducted as part of the permit application review and the Agency determined there is no reasonable potential for concentrations of mercury to cause or contribute to an exceedance of water quality standards.[205] The MPCA also states generally that the degree of treatment necessary to accomplish an effluent concentration of 10 mg/L sulfate in the discharge from the WWTS will also result in the effective removal of other parameters of concern from the wastewater.[206] But the Fact Sheet contains no discussion of any treatment methods, influent data, or any other information indicating that PolyMet surface water discharge will not cause or contribute to exceedances of water quality standards for mercury.

The available evidence does not show that treatment proposed by PolyMet is capable of treating tailings seepage so that effluent that meets Minnesota's Lake Superior Basin 1.3 nanograms per

[203] *Id*., EPA Form 2D attachment, autop. 49.
[204] Univ. of Queensland, Centre for Coal Seam Gas, Mitigation of silica nanoparticle scaling in water treatment, 2017, available at http://research.ccsg.uq.edu.au/projects/mitigation-silica-nanoparticle-scaling-water-treatment, research summary attached as Exhibit 43.
[205] MPCA NPDES/SDS Fact Sheet, *supra*, p. 42.
[206] MPCA NPDES/SDS Fact Sheet, *supra*, p. 38.

liter (ng/L) water quality standard for mercury. This is particularly important since the receiving waters for PolyMet discharge, including the Partridge River and Embarrass Rivers; Embarrass, Sabin, Wynne, Esquagama and Colby Lakes; the Whitewater Reservoir and many downstream segments of the St. Louis River -- are all listed under the Clean Water Act 303(d) as impaired due to mercury.[207] Under law, mercury is a bioaccumulative substance of immediate concern.[208]

The PolyMet Form 2D generally cited by the MPCA to suggest that wastewater treatment effluent will meet water quality standards bases projected compliance with mercury standards on the "target" for mercury of 1.3 ng/L, the Minnesota water quality standard.[209] As stated before, a claim that treatment will meet a target, without more, is an unsupported allegation.

In its NPDES/SDS Application, PolyMet states that the use of an "organic metal scavenger" with greensand filtration technology has been demonstrated to be capable of achieving Minnesota's water column mercury standard in other industries in the Iron Range.[210] Although treatment proposed in the Draft Permit includes membrane separation and a greensand filter, it does not include an organic metal scavenger or other treatment specific to mercury removal.[211]

The only "pilot" test done by PolyMet, the seven-month test of LTVSMC tailings influent reported in 2013 by Barr, did no testing to evaluate mercury removal. Mercury was below detectible levels in the influent chosen for the test.[212] Conclusions regarding mercury in Barr's report were based on literature and inquiries to the membrane supplier. Barr reported, "Mercury removal by RO membranes is highly dependent on the type of membrane used. Mercury rejections [the percentage removed by treatment] ranging from 22 to 99.9% have been reported."[213] The Barr 2013 report continued, "Mercury removal by RO is highly variable and dependent upon its speciation and the membrane selection. For these reasons, its removal is difficult to quantify."[214]

PolyMet's NPDES/SDS Application does not commit to any level of mercury removal efficacy for its proposed treatment. PolyMet states, "Some mercury removal is expected across the greensand filter. However, the influent concentration of mercury to the tailings basin seepage treatment train is expected to be below the WWTS discharge treatment target."[215] To make this statement, PolyMet cites a "bench-scale study" of the effectiveness of flotation tailings in removing mercury[216] and states that the concentration of future FTB seepage "is expected to be

[207] MPCA, Draft Impaired Waters List 2018, excerpt with St. Louis River, Lake Superior Basin 2018 Mercury Impaired Waters attached as Exhibit 44, full listing at https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list
[208] Minn. R. 7052.0010, subp. 5; 7052.0350, item K including mercury as a BSIC.
[209] PolyMet NPDES/SDS App. Vol. III, *supra*, Attachment to EPA Form 2D, autop. 46-48.
[210] *Id*., p. 99
[211] Draft NPDES/SDS Permit, *supra*, p. 8. "The tailings basin seepage treatment train will consist of a pre-treatment basin, greensand filtration, primary membrane separation (such as RO), secondary membrane separation, and permeate stabilization prior to discharge. The tailings basin seepage treatment train is further described in Volume 3 of the October 2017 permit application."
[212] Barr 2013 Testing, *supra*, Exhibit 42, Table 1 and Table 2, autop. 65-69.
[213] *Id*., p. 39
[214] *Id*., p. 41
[215] PolyMet NPDES/SDS App. Vol. III, *supra*, p. 85.
[216] *Id*., p. 97, citing "Reference (45)," which is not listed among the references on p. 118.

similar to the concentrations in the seepage from the existing LTVSMC tailings basin, which is approximately 1.0 ng/L."[217]

Although neither PolyMet's Permit to Mine nor its NPDES/SDS application provides underlying data to evaluate these claims, documents obtained during the course of environmental review provide the missing information. Neither the bench-scale study of effectiveness of flotation tailings adsorption of mercury nor monitoring data from the existing LTVSMC tailings basin support PolyMet's claims that PolyMet's tailing seepage would have mercury concentrations below the levels required to comply with Minnesota's 1.3 ng/L standard.

The only bench-scale study of mercury adsorption to NorthMet tailings was performed by NTS in 2006. This test was only eight hours long. PolyMet stated and the FEIS reported that this 480 minute test showed that NorthMet tailings would reduce mercury concentrations by 73 percent (from 3.3 ng/L to 0.9 ng/L).[218] But the actual 2006 bench study both showed that plain water in a control flask (Jug D) reduced mercury concentrations by 22 percent in this short test and that the trend in the study, when it was discontinued after only eight hours, was that also mercury was *desorbing* from the tailings. From the fourth hour of the experiment, when mercury was beneath the detection limit, to the eighth hour when the experiment was discontinued, mercury concentrations may have doubled.[219] Since PolyMet's tailings seepage will be a permanent feature on the site subject to fluctuations in chemical and water inputs, it is unreasonable to rely on a 480 minute test to predict that mercury will not desorb from tailings and increase concentrations in wastewater influent.

PolyMet's claim that existing LTVSMC tailings seepage is below the 1.3 ng/L mercury water quality standard is also based on selective and misleading reporting of available information. Although PolyMet claims that passage through LTVSMC reduces mercury, FEIS data on existing conditions at the tailings site belies this claim. Mercury in the existing Cell 2E pond has a mean concentration of 1.4 ng/L. Mercury in the toe of the existing tailings facility ranges as high as 153 ng/L and has a mean concentration of 4.9 ng/L. Using simple arithmetic, the FEIS shows that in passing through existing LTVSMC tailings mean mercury *more than triples*.[220]

Table 4.2.2-23 Existing Pond Water and Groundwater Quality at the Toe of the Tailings Basin

Parameters	Units	Pond Water Quality (Cell 2E)	Groundwater Evaluation Criteria	Toe of Tailings Basin (GW-001, GW-006, GW-007, GW-008, GW-012, Surficial Aquifer)		
General		Mean		Detection	Mean[1]	Range
Mercury	ng/L	1.4	2,000	55 of 72	4.9	<0.25–153

[217] *Id.,* p. 99, citing Section 6.9 of PolyMet NorthMet Project Water Mgt. Plan - Plant (v6). August 2017. This version of the Water Mgt. Plan was not provided in any public record; version 7 of the Plan, contained in the PolyMet Permit to Mine Application as Appx. 11.3, includes no information regarding mercury.
[218] PolyMet FEIS, *supra*, 5-229.
[219] NTS Laboratory Study of Mercury Adsorption to LTV Taconite and NorthMet Tailings, 2006, provided as Appx. B in Addendum Technical Design Evaluation Report RS29T - Wastewater Treatment Technology NorthMet Project, Oct. 2007, NTS Study attached as Exhibit 45.
[220] PolyMet FEIS, Table 4.2.2-23, 4-126, metals excerpt above, complete Table attached as Exhibit 46.

This failure of tailings to remove mercury is particularly salient given PolyMet's annual authorized appropriation of 1,800 million gallons per year from Colby Lake for use in the NorthMet beneficiation plant.[221] Colby Lake water has an estimated mercury concentration of 5 to 6 ng/L.[222] After the beneficiation process, its water would be released to the tailings pond.

The available information shows that PolyMet surface discharge from its WWTS, lacking treatment specific to mercury, has the reasonable potential to cause or contribute to the exceedance of Minnesota's Lake Superior Basin water quality standard for mercury and to impairments for mercury in the water column and in fish tissue in the Embarrass River, its chain of lakes and other downstream waters.

C) Reasonable potential that direct discharge to surface water will exceed narrative standard preventing aquatic toxicity and contribute to fishes assessment impairment.

Federal regulations require water quality-based effluent limitations to ensure compliance with state narrative water quality criteria as well as numeric criteria.[223] Where biologic indicators demonstrate impairments of aquatic uses, and new mining discharge would contribute to an existing violation of narrative water quality standards, that discharge is prohibited. An NPDES permit must set conditions to prevent further impairment, not merely monitor for pollutants.[224]

The Embarrass River is listed under the Clean Water Act 303(d) program as impaired for fishes assessment from its headwaters to the St. Louis River, and a stressor identification has been done, including Spring Mine Creek and the Embarrass River, finding that, "Both of these streams are discharge points for mine pit dewatering, and water quality sampling results from these streams show elevated specific conductance and sulfate concentrations."[225]

Minnesota rules contain a numeric criterion for specific conductance to protect water quality for agricultural use.[226] They do not yet contain numeric criteria to aquatic life from specific conductance; the combination of ionic pollutants known to adversely affect fish and aquatic insects.[227] However, Minnesota rules do contain narrative criteria requiring protection of aquatic life from the toxic effects of pollutants through site-specific numeric criteria in the absence of broadly applicable numeric standards in order to "protect class 2 waters for the propagation and maintenance of aquatic biota."[228]

Minnesota's rules define "protection of the aquatic community from the toxic effects of pollutants" to mean "the protection of no less than 95 percent of all of the species in any aquatic

[221] PolyMet NPDES/SDS App. Vol. III, *supra*, autop. 65.
[222] Barr, Mass Balance Calculations for Mercury, Sept. 25, 2017 ("Barr 2017 Mercury Mass Balance"), p. 2, autop. 346, Attachment F to PolyMet NPDES/SDS App. Vol. III, *supra*. PolyMet NPDES/SDS App. Vol. III.
[223] 40 C.F.R. §122.44(d)(1)(i) and (vi); 40 C.F.R. §123.25(a)(15).
[224] *Ala. Dep't of Envtl. Mgmt. v. Ala. Rivers Alliance, Inc.,* 14 So. 3d 853, 855, 858, 860, 866-867 (Ct. of Civ. App. Ala. 2007)
[225] MPCA, St, Louis River Watershed Stressor Identification Report, Dec. 2016, pp. 22, available at https://www.pca.state.mn.us/sites/default/files/wq-ws5-04010201a.pdf
[226] Minn. R. 7050.0224, subp. 2.
[227] *See* EPA, A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams, Final Report, EPA/600/R-10/023F, March 2011 ("EPA 2011 Conductivity Benchmark Report"), available at https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=233809
[228] Minn. R. 7050.0217, Subp. 1.

community."[229] This is the same extirpation standard used by the EPA to develop the hazardous concentrations of specific conductivity detailed in its 2011 Conductivity Benchmark Report, its 2016 Field-Based Methods report,[230] and in peer-reviewed publications.

During the PolyMet environmental review process, EPA advised that Minnesota's "narrative water quality standard - no toxics in toxic amounts - is relevant to NPDES permitting for the NorthMet project and its receiving waters" and that this narrative standard must be addressed in the NPDES permitting process "in the context of permitting regarding approaches to protecting aquatic life and habitat in receiving waters."[231]

The Draft NPDES/SDS Permit contains no water quality-based effluent limitation for specific conductance and no chronic whole effluent toxicity limit.[232] Even if a test on surface discharge at PolyMet's monitoring location were to demonstrate whole effluent toxicity, such toxicity would not result in a permit violation, but only in repeat testing.[233] The MPCA Fact Sheet generically states that the Agency found no reasonable potential that PolyMet discharge would cause or contribute to a violation of water quality standards,[234] but the Agency provided no analysis of PolyMet's predicted discharge of specific conductance nor its potential effect on fishes assessment impairments in Embarrass River receiving waters.

Throughout the environmental review process, PolyMet refused to disclose predictions of specific conductance in any waste stream or the basis for such predictions.[235] Concentration tables in PolyMet's Permit to Mine Application[236] and in PolyMet's Form 2D disclosures to the EPA[237] contained also contain no information on specific conductance. However, PolyMet's NPDES/SDS Application contained specific conductance data near the tailings site.[238] Surface water quality data on the north side of the tailings basin at Mud Lake Creek site (MLC-1) had an average specific conductance measured in µmhos/cm at 25 ºC[239] of 492, with a maximum of 1,362 µmhos/cm; at Trimble Creek (TC-1a) had average specific conductance of 723 µmhos/cm, with a maximum of 1,150 µmhos/cm; and at Unnamed Creek had average specific conductance of 793 µmhos/cm, with a maximum of 1,386 µmhos/cm.[240] Specific conductivity at PM-12.2,

[229] Minn. R. 7050.0217, Subp. 2.
[230] EPA, Field-Based Methods for Developing Aquatic Life Criteria for Specific Conductivity, Public Review Draft, EPA-822-R-07-010 December 2016. This "EPA 2016 Field-Based Methods" document, along with its Appendices Peer Review Reports and EPA Responses pertinent to the Field-Based Methods are available at https://www.epa.gov/wqc/draft-field-based-methods-developing-aquatic-life-criteria-specific-conductivity.
[231] EPA PSDEIS Comments, *supra*, Exhibit 10, p. 11.
[232] Draft NPDES/SDS Permit, *supra*, p. 33.
[233] *Id*., p. 34.
[234] MPCA NPDES/SDS Fact Sheet, *supra*, p. 59.
[235] This deficit was repeatedly raised in environmental review comments; see e.g. PolyMet FEIS, A-328, A-329. The FEIS provided no predictions of specific conductivity under the Proposed Action.
[236] See PolyMet PTM App., *supra*, PolyMet NorthMet Water Mgt. Plan - Mine, Large Tables 1-6, Appx. 11.2; PolyMet NorthMet Water Mgt. Plan – Plant, Large Tables 3-15, Appx. 11.3; PolyMet NorthMet Adaptive Water Mgt. Plan, Large Tables 1-4 and p. 10, Table 2-1, Appx. 11.4.
[237] PolyMet NPDES/SDS App. Vol. III, EPA Form 2D, autop. 46-48.
[238] PolyMet NPDES/SDS Application, Vol. V - Tailings Basin and Beneficiation Plant ("PolyMet NPDES/SDS App. Vol. V"), Oct. 2017.
[239] Minnesota rules and PolyMet's reports measure conductivity as µmhos/cm at 25 ºC, while EPA measure in µS/cm at 25 ºC. These units of measurement are interchangeable. In these comments, 25 ºC is implied, if not stated.
[240] PolyMet NPDES/SDS App. Vol. V, *supra*, Large Table 2, MLC-1 is at autop. 48, data from 2011 through 2015; TC-1a at autop. 58, data from 2012-2015; PM-11/SW003 at autop. 60, data from 2004-2015.

impaired by Spring Mine Creek but not by LTVSMC tailings seepage, averaged 539 µmhos/cm of specific conductance, with a maximum of 1600 µmhos/cm.[241]

Based on the sensitivity data described below, existing specific conductance levels in the Embarrass River watershed are high enough to impair aquatic life. The level of specific conductance that PolyMet predicts from its modeling will be released in its wastewater treatment system (WWTS) effluent is 753-960 µmhos/cm.[242] Even if this prediction could be verified, it is high enough to contribute to an impairment of aquatic insects in the wetlands and creeks where effluent would discharge from the PolyMet tailings facility and to contribute to the fishes assessment impairment in the Embarrass River.

The weight of evidence from EPA reports, peer-reviewed literature and data from the Minnesota ecoregion where the PolyMet Project would be located demonstrates that the level of specific conductance proposed to be released by the WWTS would exceed the level toxic to sensitive genera of aquatic insects (benthic macroinvertebrates) and the fishes that rely on them for food.

A field-based method of determining aquatic life numeric criteria for specific conductivity was finalized by the EPA in 2011.[243] Since 2011, environmental stakeholders have requested that the MPCA set WQBELs limiting specific conductivity in wastewater discharge permits and conduct rulemaking to set numeric criteria for specific conductivity to protect aquatic life.[244]

In 2015, retired Minnesota regulators Bruce Johnson and Maureen Johnson undertook a review of background levels of specific conductivity in a portion of northeastern Minnesota's Ecoregion 50, along with data pertaining to benthic macroinvertebrates (aquatic insects) in impacted and unimpacted waters in the ecoregion.[245] They concluded that the EPA protocols for field-based specific conductivity criteria were applicable to Northeast Minnesota surface waters. In addition, they recommended adoption of a numeric criterion of 300 µS/cm as a chronic value of year-round application in order to protect benthic macroinvertebrates according to the criteria (prevent 5% extirpation of invertebrate genera/protect 95% of genera) set by the EPA.[246]

The EPA's Office of Research and Development reviewed the Johnson & Johnson Specific Conductance Evaluation and concluded in a memorandum dated February 4, 2016, that the weight of evidence supported the inference that effluents that increase specific conductivity to more than 300 µS/cm are likely to extirpate more than 5% of genera common to both Minnesota and Appalachia, the ecoregion EPA initially studied, and have adverse effects in northeast Minnesota waters.[247]

The EPA secured a broader set of data on benthic invertebrates and water quality from the

[241] *Id*., autop. 68, data from 2010 through 2015. Locations of referenced tailings site surface monitoring sites are provided in Large Figure 5, PolyMet NPDES/SDS App. Vol. V, *supra*, attached as Exhibit 47.
[242] PolyMet NPDES/SDS App. Vol. III, *supra*, p. 59.
[243] EPA 2011 Conductivity Benchmark Report, *supra*.
[244] See Environmental Groups Comments on MPCA 2017 Triennial Standards Review, Feb. 9, 2018, Exhibit 48.
[245] B.L. Johnson & M.K. Johnson, An Evaluation of a Field-Based Aquatic Life Benchmark for Specific Conductance in Northeastern Minnesota, November 2015. Attached with Table 1 in Conductivity References, Exhibit 49, autop. 33- 92.
[246] *Id*., p. 42, autop. 74.
[247] S. M. Cormier, Ph.D., Review Memorandum for "An Evaluation of a Field-Based Aquatic Benchmark for Specific Conductance in Northeast Minnesota" (November 2015) Prepared by B. L. Johnson and M. K. Johnson for WaterLegacy, Feb. 4, 2016, ("EPA Review Memo"), p. 2, autop. 94, Attached in Conductivity References, Exhibit 49, autop. 93-102.

MPCA to independently validate the conclusions reached in the Johnson & Johnson Evaluation. The EPA concluded as follows:

> [T]he inference that 5% extirpation of benthic invertebrates would occur at similar conductivity levels in central Appalachia and Ecoregion 50 in Minnesota was supported by analysis of an independent data set of paired benthic invertebrate and SC data from Ecoregion 50 in Minnesota. We estimated that more than 5% of genera would be extirpated in streams greater than 320 µS/cm.[248]

In December 2016, after extensive peer-review, the EPA released to the public its field-based methods for States (and Tribes with Treatment as a State authority) to use in developing aquatic life criteria for specific conductivity in regions outside central Appalachia.[249] Appendix D to the EPA's 2016 report detailed the method that should be used by states to develop a numeric criterion for specific conductance where there is sufficient water chemistry and biological data to calculate extirpation concentrations and hazardous concentrations.

The EPA reviewed biological and specific conductivity for 62 Ecoregions across the United States, including Minnesota Ecoregion 50 (Northern Lakes and Forests), where the PolyMet Project would be located. The EPA map below shows Minnesota's Ecoregions, along with paired biological and water quality sampling sites.[250]

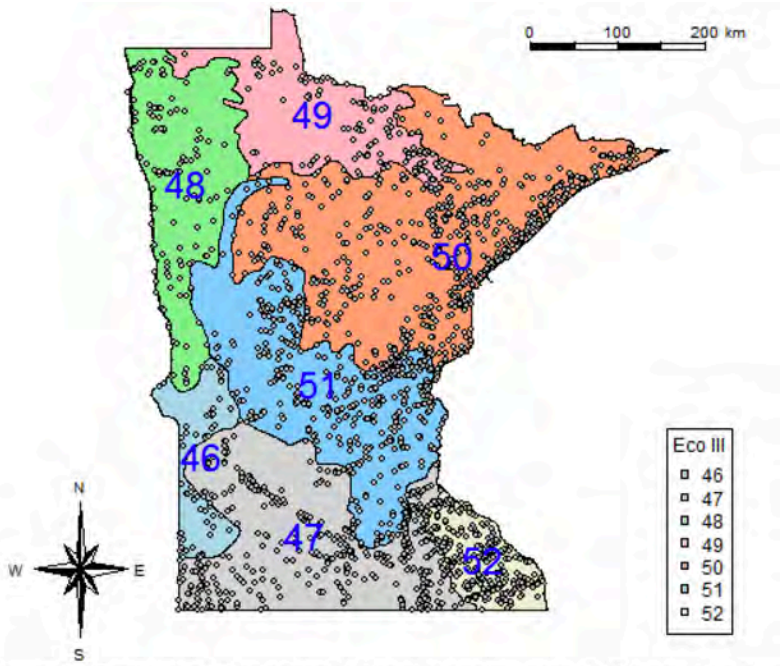

Figure 2. Ecoregion 50 is contained in the orange area in the northeast portion of Minnesota. Circles represent paired biological and water quality sampling sites. There are fewer samples in the area bordering Canada, often referred to as the boundary waters, which are less accessible for sampling.

[248] *Id*., p. 10, autop. 102.
[249] EPA, Field-Based Methods for Developing Aquatic Life Criteria for Specific Conductivity, Public Review Draft, EPA-822-R-07-010 December 2016. This "EPA 2016 Field-Based Methods" document, along with its Appendices A through G and Peer Review Reports and Responses are available at https://www.epa.gov/wqc/draft-field-based-methods-developing-aquatic-life-criteria-specific-conductivity.
[250] EPA Review Memo, *supra*, Exhibit 9, p. 7, autop. 99.

Although data in other Ecoregions was less robust, EPA found sufficient data to recommend a provisional specific conductivity value for aquatic life in Ecoregion 50, the Northern Lakes and Forests region in northeast Minnesota. In the Ecoregion where PolyMet proposes to locate its copper-nickel mine and flotation tailings facility, based on 734 samples, the EPA recommended a provisional hazardous concentration of 320 µS/cm to protect aquatic life from toxicity.[251]

Since December 2016, the EPA has published in peer-reviewed journals the scientific basis for establishing the proposed specific conductivity hazardous concentrations based on the weight-of-evidence process, the use of extirpation to evaluate tolerance of specific conductivity, and the step-by-step calculation to predict specific conductivity levels that extirpate freshwater aquatic benthic invertebrates. The EPA has also developed spreadsheet tools to conduct this analysis and predict stressor levels that extirpate genera and species.[252]

Based on federal law, Minnesota narrative standards, existing specific conductivity concentrations in impaired receiving waters, and the application of the EPA's specific conductivity benchmark methods to Minnesota data consistent with peer-reviewed literature, there is a reasonable potential that PolyMet's surface discharge of specific conductivity from the WWTS would cause or contribute to violation of Minnesota water quality standards.

D) Failure to set effluent limits for surface discharge from existing LTVSMC tailings.

Although it seems at first glance that the Draft NPDES/SDS Permit precludes direct discharge to surface water from the PolyMet tailings basin, the actual limits are less inclusive. The Draft Permit states, "Water from the Tailings Basin will be *recycled back to the Beneficiation Plant* and *will not be directly discharged during operations*."[253] The Draft Permit explains that the FTB (Flotation Tailings Basin) will contain flotation tailings generated during operation and will be constructed atop the existing LTVSMC tailings basin. The Draft Permit states "there will be *no direct discharge from the FTB Pond* to any receiving waters."[254] Similarly, "Direct discharge to surface waters *from the FTB Seepage Containment System* is prohibited."[255]

The Draft NPDES/SDS Permit prohibits deposit of nonferrous mining tailings in the FTB until its seepage containment system is operating, and requires PolyMet to maintain the existing pumpback systems for the former LTVSMC tailings basin until operation of the wastewater treatment system has begun.[256]

These provisions of the Draft NPDES/SDS Permit are not problematic on their own. However, the failure of the Draft Permit to set water quality-based effluent limitations for direct discharge

[251] EPA 2016 Field-Based Methods, *supra*, Appendix D. Development of a Background-to-Criterion Regression Model, at D-1, D-4, D-23, D-27, autop. 1, 4, 23, 27, in Conductivity References, Exhibit 49.
[252] G. Suter, et al., A Weight of Evidence Framework for Environmental Assessments: Inferring Qualities, *Int. Env. Assess. & Mgt.,* Vol. 13: 6, pp. 1038–1044; G. Suter, et al., A Weight of Evidence Framework for Environmental Assessments: Inferring Quantities, *Int. Env. Assess. & Mgt.* Vol. 13:6, pp. 1045–1051; M.B. Griffith, et al., Using Extirpation to Evaluate Ionic Tolerance of Freshwater Fish, *Env. Tox. & Chem.,* (accepted for pub. Oct., 2017); S.M. Cormier, et al., Step-by-step calculation and spreadsheet tools for predicting stressor levels that extirpate genera and species, *Int. Env. Assess. & Mgt*., (accepted for pub. Oct., 2017). The Griffith and Cormier articles are included in Exhibit 49, *supra*, Conductivity References.
[253] Draft NPDES/SDS Permit, p. 5 (emphasis added).
[254] *Id.*, p. 6 (emphasis added).
[255] *Id.*, p. 41(emphasis added).
[256] *Id*., pp. 40, 43.

from the existing LTVSMC tailings basin prior to the construction of the FTB and its seepage containment system fails to comply with the Clean Water Act, its implementing rules or Minnesota water quality standards. During the pendency of construction or under a scenario where the PolyMet Project does not proceed for any reason, existing LTVSMC tailings seepage discharge to surface waters would have the potential to cause or contribute to exceedances of Minnesota's water quality standards. The MPCA must conduct a reasonable potential analysis for existing LTVSMC discharge, and the Draft NPDES/SDS Permit must water quality-based effluent limitations (WQBELs) for any parameters that have the potential to cause or contribute to exceedances of Minnesota's numeric and narrative water quality criteria.

The failure of the MPCA to establish WQBELs for the existing LTVSMC tailings discharge is particularly troubling given the Agency's assertion in a memo contained in the PolyMet Permit to Mine Application that should the PolyMet copper-nickel mine project never become operational (scenario II), no treatment or mitigation would be required for potential exceedances of mercury, sulfate, alkalinity, hardness, total dissolved salts and specific conductance at the LTVSMC tailings facility.[257]

For mercury, the MPCA offered that high concentrations of mercury exceeding Minnesota water quality standards in surface water surrounding the LTVSMC Basin "are most likely due to influences from precipitation and background concentration, not from seepage from the existing Basin."[258] Thus, under scenario II, "no treatment/mitigation is necessary in final closure for mercury."[259]

For sulfate, MPCA proposed that high sulfate at the Basin "will likely not result in an exceedance of the calculated sulfate standard (or alternative sulfate standard in the proposed rule) if the MPCA's proposed rule revision goes into effect."[260] If the proposed wild rice rulemaking revision were not completed, the MPCA offered, "another regulatory option available to the State would be to consider developing a site-specific standard based on the science at that time."[261] In any case, under scenario II, "no treatment/mitigation for sulfate would be required for protection of wild rice."[262]

For a range of Class 3 and Class 4 pollutants from the LTVSMC tailings site – alkalinity, hardness, total dissolved salts and specific conductance, MPCA offered that the Agency "has made this rulemaking a high priority and expects to propose revisions in 2018." Ann Foss, the memo's author continued, "Based on current information, MPCA expects that these standards will either remain unchanged or become less stringent."[263] MPCA also suggested that, even if the rules were not weakened, "At any point, the MPCA can consider other regulatory options such as site-specific standards (SSS), a use attainability analysis (UAA), a use and value demonstration

[257] Ann Foss, MPCA Metallic Mining Sector Director, Legacy Permitting/Financial Assurance for Change in Assignment Former LTV Steel Mining Company (LTVSMC) Tailings Basin and Plant Site (Dec. 12, 2017), Attachment O to Legacy Closure Plan for Ferrous LTVSMC Legacy Areas subject to Assignment from Cliffs Erie, L.L.C., Dec. 2017, Appx. 15.1 of the PolyMet PTM Application. Attachment O is provided in Exhibit 50.
[258] MPCA, Legacy Permitting Attachment O, *supra*, Exhibit 50, p. 4.
[259] *Id*., see also p. 5.
[260] *Id*., p. 4.
[261] *Id*.
[262] *Id*., p. 7.
[263] *Id*., p. 4.

(UVD), or a variance."[264] Thus, if the PolyMet project did not become operational (scenario II), "no treatment/mitigation for alkalinity, hardness, TDS and specific conductance would be required."[265]

Both factual and legal concerns are raised by this memorandum. Data comparing existing tailings pond and tailings toe mercury concentrations previously cited suggests that tailings as well as rainfall contribute to mercury exceedances. Sulfate standards based on the MPCA's proposed rulemaking are no longer applicable. In January 2018, an Administrative Law Judge, with the concurrence of the Chief Judge, disapproved both repeal of Minnesota's 10 parts per million (mg/L) wild rice sulfate standard and replacement of the standard with an equation-based formula.[266] Among other grounds, the ALJ concluded that repeal of Minnesota's existing wild rice sulfate standard would conflict with the Clean Water Act and its implementing regulations.[267]

A water quality standard may only be removed or made less stringent in compliance with the Clean Water Act and its implementing regulations, which require a scientific basis for the change and a demonstration that the uses of water for aquatic life, recreation and wildlife have all been preserved.[268] There is extensive peer-reviewed science establishing that pollutants regulated in Minnesota under Class 3 and Class 4 rules (hardness, total dissolved salts and specific conductance) affect fish and other aquatic life so that removal or weakening of these standards would impair Clean Water Act protected uses.[269]

The EPA has advised MPCA that enforcement of Minnesota surface water quality standards is not discretionary under the Clean Water Act,[270] and internal MPCA documents confirm that "Minnesota is required to enforce the state assembled and federally approved water standards, including the wild rice sulfate standard."[271] Whether the duration prior to PolyMet operations is three years or an indefinite period, the MPCA has no discretion under applicable federal or state law to leave direct discharge from the existing LTVSMC to waters of the United States unregulated.

5. The PolyMet Project is likely to cause or contribute to violations of Minnesota water quality standards for mercury, increase mercury impairments, and degrade water quality by increasing mercury levels, precluding NPDES permit issuance or assurances for 401 certification under federal and state law.

Benjamin Franklin once said, "Half a truth is often a great lie."

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[264] *Id.*, p. 9
[265] *Id*., pp. 4, 10.
[266] *In the Matter of the Proposed Rules of the Pollution Control Agency Amending the Sulfate Water Quality Standard Applicable to Wild Rice and Identification of Wild Rice Rivers,* OAH 80-9003-34519 Revisor R-4324, Report of the Administrative Law Judge, Jan. 9, 2018, ("ALJ Wild Rice Rule Report"), Exhibit 51, p. 5.
[267] *Id*.
[268] *See* 40 C.F.R. §131.5; 131.6. A variance is considered to be a change in water quality standards and requires a determination that existing uses would be preserved by the change. 40 C.F.R. §131.10.
[269] See Environmental Groups' Comments on MPCA 2017 Triennial Standards Review, *supra*, Exhibit 48, pp. 2-4.
[270] EPA (T. Hyde), Letter to Sen. Bakk and Rep. Dill, May 13, 2011, Exhibit 52, pp. 1-2.
[271] MPCA, MPCA Wild Rice Sulfate Standard, updated 1/28/13, Exhibit 53.

The PolyMet cross-media analysis of project impacts on water quality relative to mercury[272] and the MPCA's conclusion that PolyMet had demonstrated to the Agency's satisfaction that its sulfide mine would have no effects on mercury[273] epitomize that maxim. The length of PolyMet's report may create an impression of rigor, and there are selective pieces of the mercury methylation problem that are highly detailed. But, the cross-media analysis by PolyMet and its acceptance by the MPCA reflect a systematic and strategic exclusion of most of the factors that would result in a "perfect storm" of PolyMet Project impacts on mercury release, methylation and transport to downstream receiving waters impaired due to mercury in the water column and mercury contamination of fish. The ways in which mercury impacts are measured and modeled also minimize project impacts and increase the risk that the PolyMet project will degrade water quality and endanger the environment and human health.

Under federal and Minnesota law, Section 401 certification for a Clean Water Act Section 404 wetlands dredge and fill permit can only be issued if there is a reasonable assurance that the activity as a whole will be conducted in a manner that will not violate applicable water quality standards.[274] For receiving waters downstream of the PolyMet Project or water within range of its local air deposition of sulfate and mercury[275] that are already impaired due to excessive mercury, the Draft NPDES/SDS Permit may not be issued, and certification may not be granted if the project would cause or contribute to violations of Minnesota's standards limiting mercury in the water column and mercury that bioaccumulates in fish tissue.[276]

For receiving waters not yet assessed as impaired due to mercury, the PolyMet Project cannot be permitted or certified if it would violate federal regulations and state rules by allowing activities that lower the high quality of water with respect to mercury, when there are one or more practicable alternatives, including prevention or treatment, to prevent or lessen the degradation.[277] In outstanding international resource waters (OIRWs) of the Lake Superior Basin, including all receiving waters downstream of the PolyMet project, if a designated use of the water body is impaired, "there can be *no lowering* of the water quality with respect to the GLI [Great Lakes Initiative] pollutants causing the impairment."[278] In Lake Superior Basin waters impaired due to mercury in the water column or methylmercury in fish tissue, no further impairment is allowed.

Minnesota rules also require that the MPCA deny section 401certification if the permitted facility endangers human health or the environment and the danger cannot be removed by

[272] Cross-Media Analysis to Assess Potential Effects on Water Quality from Project-Related Deposition of Sulfur and Metal Air Emissions An Analysis Conducted in Support of the NorthMet Project Section 401 Certification Request Prepared for Poly Met Mining, Inc., Oct. 31, 2017 ("PolyMet Cross-Media Mercury"). PolyMet and MPCA documents pertaining to 401 certification are available at https://www.pca.state.mn.us/quick-links/401-certification-northmet.
[273] MPCA Conclusions and Recommendations Related to Poly Met Mining, Inc.'s NorthMet Project "Cross-Media Analysis to Assess Potential Effects on Water Quality from Project-Related Deposition of Sulfur and Metal Air Emissions," Ann Foss, Jan. 5, 2018 ("MPCA Cross-Media Mercury").
[274] 40 C.F.R. §121.2; Minn. R. 7001.1470; see also Minn. R. 7052.0300 – 7052.0350 regarding BSICs.
[275] Our analysis of the relatively new issue of iron impacts on mercury methylation is still ongoing.
[276] 40 C.F.R. §§ 121.2, 122.44(d)(1). Note that paragraph (d) refers to "any requirements," not only to WQBELs. See also Minn. R. 7001.1470.
[277] 40 C.F.R. § 131.12(a)(2)(ii); Minn. R. 7050.0265, 7050.0270. Degradation pertaining to other chemicals or hydrologic changes is discussed in the next section of these comments, as are alternatives to lessen degradation.
[278] Minn. R. 7052.0300, subp. 2 (emphasis added).

modifying permit conditions.[279] Minnesota's section 401 certification and permitting requirements are particularly salient for the PolyMet Project, an activity that would contribute to water quality violations and lower water quality in mercury-impaired waters, degrade waters yet not assessed, increase the concentration of mercury in aquatic insects, fish, wildlife and the bodies of pregnant women, fetuses, infants and children, and endanger the environment and human health.

Bioaccumulation of methylmercury in the aquatic food chain harms piscivorous (fish-eating) mammals and birds, along with insectivorous bats.[280] Vulnerable wildlife may include species protected by state law and under the federal Endangered Species Act, such as the Northern Long-eared Bat, for which the proposed PolyMet site and adjacent areas are critical habitat.[281]

The harmful effects resulting from human consumption of methylmercury-contaminated fish are well-known. Dr. Margaret Saracino, a Duluth child and adolescent psychiatrist has explained the particular vulnerability of fetuses, infants and children to morbidity resulting from methylmercury exposure:

> When pregnant women eat fish high in methylmercury, the fetus is then exposed to this lipophilic heavy metal. The placenta is not protective and the blood brain barrier is not well formed until after age two years, which makes fetuses, infants and young children most vulnerable to methylmercury's neurotoxic effects. Neurons in the developing brain multiply at a rapid rate and are particularly vulnerable to toxic effects of heavy metals, hence brain damage is more likely to occur during this vulnerable time. Neurotoxicity is also transferred to the infant through breast milk.
>
> The adverse effects of methylmercury depend on timing and amount of exposure. Methylmercury is a strong toxin that influences enzymes, cell membrane function, causes oxidative stress, lipid peroxidation and mitochondria dysfunction, affects amino acid transport and cellular migration in the developing brain. Exposure in utero can cause motor disturbances, impaired vision, dysesthesia, and tremors. Even lower level exposure can result in lower intelligence, poor concentration, poor memory, speech and language disorders, and decrease in visual spatial skills in children exposed to methylmercury in utero. Fetuses, infants, and young children are four to five times more sensitive to the adverse effects of methylmercury exposure than adults.[282]

[279] Minn. R. 7001.1450, subp. 1, item B citing Minn. R. 7001.0140, subp. 2Minn. R. 7001.0140, subp. 2, item D.
[280] *See e.g.* M.F. Wolfe, et al., Effects of Mercury on Wildlife: A Comprehensive Review, *Env. Tox. & Chem.*, Vol.17: 2, pp. 146-160, 1998; D.E. Yates et al., Mercury in bats from the northeastern United States, *Ecotoxicology* 23:45-55 (2014); K. Syaripuddin et al, Mercury accumulation in bats near hydroelectric reservoirs in Peninsular Malaysia, *Ecotoxicology*, 23:1164-1171 (2014).
[281] See U.S. Fish and Wildlife Service, Biological Opinion Effects to Canada Lynx, Gray Wolf, and Northern Long-eared Bat from the Proposed PolyMet Land Exchange, Feb. 2016, pp. 2, 6, 9, in Appx. 18.2 of the PolyMet PTM App., *supra*.
[282] M. Saracino, Summary Opinion regarding Morbidity Associated with Methylmercury Exposure and other Neurotoxic Chemicals Potentially Released by the PolyMet NorthMet Copper-nickel Mine Project, Dec. 7, 2015, p. 2, Exhibit 54.

From 2007-2011, the Minnesota Department of Health (MDH) conducted a study of Mercury in Newborns in the Lake Superior Basin.[283] This was a large study testing a total of 1,465 babies in Minnesota, Wisconsin and Michigan. About 30% of the Minnesota babies born in the study area were tested. In this study, 10% of the newborns in Minnesota's Lake Superior region had mercury levels above the EPA mercury dose limit, 3% of the Wisconsin newborns were above the mercury dose limit, and none of the Michigan samples exceeded the mercury limit. Babies born during the summer months were more likely to have an elevated mercury level, which, the MDH explained, suggests that increased consumption of locally caught fish during the warm months is an important source of pregnant women's mercury exposure in this region.[284]

Minnesota medical, nursing and health organizations representing more than 30,000 health professionals requested an open and transparent public health impact assessment of risks from the PolyMet project. Among the public health concerns they identified were risks posed by increased methylmercury contamination of fish.[285] Their requests for a health impact assessment were denied by State Agencies.

The threat to water quality, aquatic life, wildlife and human health requires careful scrutiny of PolyMet's dismissal of mercury and methylmercury impacts. Our concerns are cumulative, and they reflect the following important errors and omissions in PolyMet's analysis: A) Exclusion of the impacts of sulfate and mercury groundwater seepage to wetlands and streams; B) Failure to evaluate the impacts of sulfate and mercury in surface water discharge or released to wetlands; C) Failure to analyze the effects of changes in wetland and stream hydrology on mercury release, methylation and transport; D) Exclusion of multiple sources of sulfur and sulfide air deposition at both the mine site and the plant site; E) Exclusion of mine site mercury deposition, water bodies closest to mercury sources, and mercury deposition to wetlands; (F) Misleading analysis of mercury methylation in a single wetland of interest; (G) Modeling that systematically minimizes the cumulative potential for mercury and methylmercury impacts on water quality, aquatic life, fish, wildlife and human beings.

A) Exclusion of impacts of sulfate and mercury seepage from groundwater.

The "water component" of PolyMet's cross-media analysis of mercury and methylmercury specifically excludes the effects of mercury concentrations in tailings basin seepage, which PolyMet assumes "will be collected by the FTB seepage capture systems."[286] The impacts of mercury seepage cannot be included in the mercury analysis, since PolyMet has failed to characterize mercury in wastes or wastewater either during environmental review or in either its Permit to Mine or NPDES/SDS permit applications. PolyMet Permit to Mine Application appendices contained 26 separate tables estimating water quality in various Project locations

[283] MDH, Mercury in Newborns in the Lake Superior Basin summary in attached references. The full report is available at http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/newbornhglsp.html.
[284] *Id*., all facts in this paragraph are from the MDH summary.
[285] Exhibit 55 contains letters requesting a PolyMet health impact assessment from individual doctors, nurses and scientists, the Minnesota Medical Association, the Minnesota Nurses Association, the Minnesota Public Health Association, and the Minnesota Academy of Family Physicians, along with an article, E. Onello et al. Sulfide Mining and Human Health in Minnesota, Minnesota Medicine November/December 2016, pp. 51-55, detailing PolyMet health risks and requesting a health impact assessment.
[286] PolyMet Cross-Media Mercury, *supra*, p. 19.

where water contacts waste, from the tailings toe to mine pits and waste rock seepage. None of these tables estimated levels of mercury in the seepage or wastewater.[287]

In PolyMet's mass balance calculations for mercury, which provide its theoretical offset for mercury increases resulting from air deposition, average mercury concentrations in seepage and groundwater, among other sources of loading simply "were assumed constant between existing conditions and operating conditions."[288]

As described in Section 2 of these comments, there is no question that the PolyMet Project will result in potential sources of seepage with highly elevated concentrations of sulfate.[289] As with mercury seepage, sulfate seepage from either unlined sources (tailings storage, Category 1 waste rock stockpile, mine pits, OSLA peat storage area and pond) or lined sources (hydrometallurgical residue facility, mine site Category 2/3, Category 4 and Ore Surge piles and mine site sumps, ponds and equalization basins) none of these potential sources of sulfate loads were considered in PolyMet's cross-media analysis.[290]

There is no basis for PolyMet's claims for nearly perfect capture of seepage from the unlined Category 1 waste rock stockpile and the unlined tailings storage facility.[291] Although seepage from lined facilities is likely to have far less volume, contaminants at the hydrometallurgical residue facility (HRF) and mine site stockpiles, ponds and basins are likely to be concentrated and toxic.[292] The HRF is proposed on an unsuitable site and an unstable foundation and would receive 164 pounds of mercury per year, or as much as 2,952 total pounds of mercury in total.[293]

As explained previously, the Draft NPDES/SDS permit would not require PolyMet to capture additional groundwater seepage from the south side of the tailings basin not captured by the existing Cliffs Erie pumpback system.[294] Groundwater flow from this tailings site headwaters of Second Creek averaged 766.8 gpm in 2017 and 140 gpm in 2016.[295] In 2017, this groundwater seepage from the Second Creek south side headwaters alone was 38 times the total seepage predicted by PolyMet to escape uncaptured from containment systems at the tailings basin; even in 2016, the uncaptured seepage from the Second Creek south side of the tailings site was seven times the total predicted for the entire tailings site.[296] Sulfate concentrations predicted by PolyMet for South Toe tailings seepage are 553 mg/L, more than five times the average concentration of sulfate in LTVSMC tailings seepage.[297]

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[287] *See* PolyMet PTM App., *supra*, PolyMet NorthMet Water Mgt. Plan - Mine, Large Tables 1-6, Appx. 11.2; PolyMet NorthMet Water Mgt. Plan – Plant, Large Tables 3-15, Appx. 11.3; PolyMet NorthMet Adaptive Water Mgt. Plan, Large Tables 1-4 and p. 10, Table 2-1, Appx. 11.4.
[288] Barr 2017 Mercury Mass Balance, *supra*, p. 12, autop. 356, Attachment F to PolyMet NPDES/SDS App. Vol. III, *supra*.
[289] See pp. 14-15, 18, 19-20 of these comments, *supra*.
[290] See PolyMet Cross-Media Mercury, supra, p. 123, explaining that presumed concentrations of 10 mg/L sulfate in WWTS discharge were the only source of sulfate loading through water included.
[291] See pp. 15- 21 of these comments, *supra*
[292] See pp. 21-22 of these comments, *supra.*
[293] See p. 21 of these comments, *supra*.
[294] See pp. 17, 22-23 of these comments, *supra.*
[295] SD026 Existing Tailings DMR, *supra*, Exhibit 25.
[296] *Id*., flow data compared with the PolyMet FEIS, *supra*, 5-181, Table 5.2.2-37.
[297] Compare PolyMet Water Mgt. – Plant, *supra*, Large Table 6 included in Exhibit 16 with SD026 Existing Tailings DMR, *supra*, Exhibit 25.

During environmental review, both PolyMet and regulatory agencies argued that there is no established relationship between sulfate and mercury methylation.[298] However, it is now clear that the MPCA does not dispute that sulfate loading and resulting sulfide production increase both mercury methylation and to mobilize inorganic mercury release from sediments.[299]

Research by Amy Myrbo, Ph.D., co-authored by staff scientists at the MPCA, has demonstrated that increased sulfide production resulting from sulfate loading both increases release of inorganic mercury from sediment into the water and increases the proportion of mercury that is converted to toxic methylmercury.[300] Dr. Myrbo found that in mesocosms with sulfate loading of either 100 mg/L or 300 mg/L, methylmercury increased 5.9 times as compared to the control experiment where no sulfate was added.[301] Sulfate loading also increased release of inorganic mercury from sediments to the water, with a maximum increase at sulfate loading of 300 mg/L of 2.2 times over the experimental control.[302]

It has long been suggested that that there is a "sweet spot" where sulfate and sulfide concentrations are optimal for mercury methylation. Dr. Myrbo concluded that there is substantial evidence that sulfide levels above concentrations of 300-3000 µg/L have an inhibitory effect on mercury methylation.[303] It is not known whether sulfate loading at the concentrations predicted in tailings seepage or the Category 1 waste rockpile would be within the "sweet spot" for mercury methylation when they first reach wetlands or sediments. But, since PolyMet sulfate seepage would surface in the headwaters of Second Creek, the Partridge River or the Embarrass River, it is highly likely that this sulfate would also be carried downstream and diluted, creating a potential for sulfide formation and mercury methylation in downstream wetlands and sediments from the PolyMet site to the St. Louis River estuary.

Brian Branfireun, Ph.D., in his expert opinion on the PolyMet Project FEIS, concluded that "potential for seepage of sulfates and associated impacts to wetlands in the vicinity of both the project mine site and tailings basin" should not be discounted and that "Such seepage would enhance methylmercury production in the project area and could also contribute directly to water quality impairments in sulfate-poor sediments downstream of the project site."[304]

Dr. Branfireun explained that "the small tributaries that are more proximal to the proposed NorthMet mine site location clearly demonstrate sulfate-limited conditions. The mean sulfate concentrations in Longnose Creek, West Pit Outlet Creek and Wetlegs Creek are 0.91, 2.6 and 3.9 mg/L respectively." Increases in sulfate above these low background levels would promote

[298] PolyMet FEIS, *supra*, 5-231 to 5-232.
[299] MPCA, Final Technical Support Document: Refinements to Minnesota's Sulfate Water Quality Standard to Protect Wild Rice, Aug. 11, 2017, p. 100, available at https://www.pca.state.mn.us/sites/default/files/wq-rule4-15n.pdf
[300] Myrbo, et al., Increase in nutrients, mercury, and methylmercury as a consequence of elevated sulfate reduction to sulfide in experimental wetland mesocosms*, J. Geophys. Research: Biogeosciences*, 122, pp. 2769-2785, 2017, Exhibit 56.
[301] *Id*., Table 1, p. 2775.
[302] *Id*.
[303] *Id*., p. 2771.
[304] Brian Branfireun, PhD, Final Expert Review of the NorthMet Mining Project and Land Exchange Final Environmental Impact Statement, Dec. 12, 2015 ("Branfireun 2015"), Exhibit 57, p. 24.

mercury methylation in creek sediments in even in these relatively sulfate-poor and undisturbed tributaries.[305]

The "wetland of interest" where sulfur compound air deposition was modeled by PolyMet is located south of the Dunka Road in an alder thicket.[306] The location of PolyMet's wetland of interest is shown on the map below.[307]

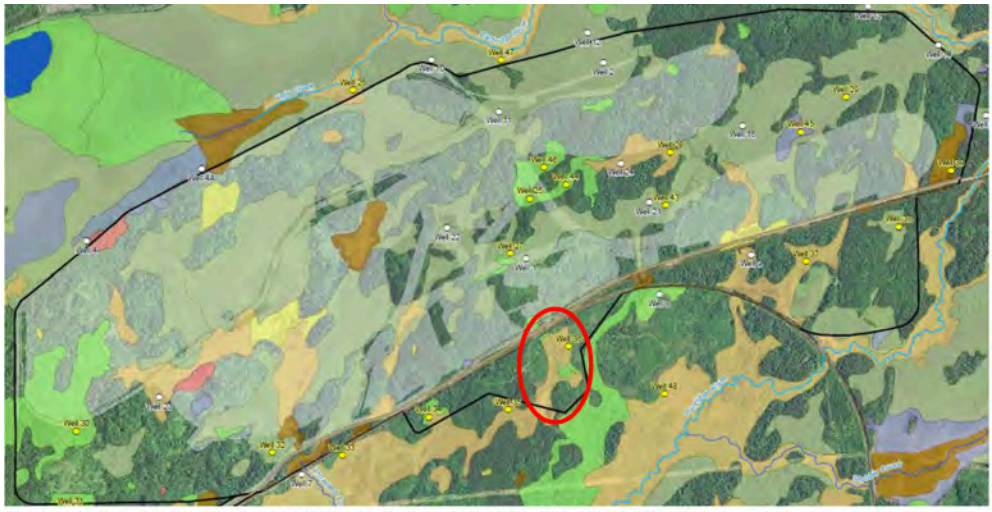
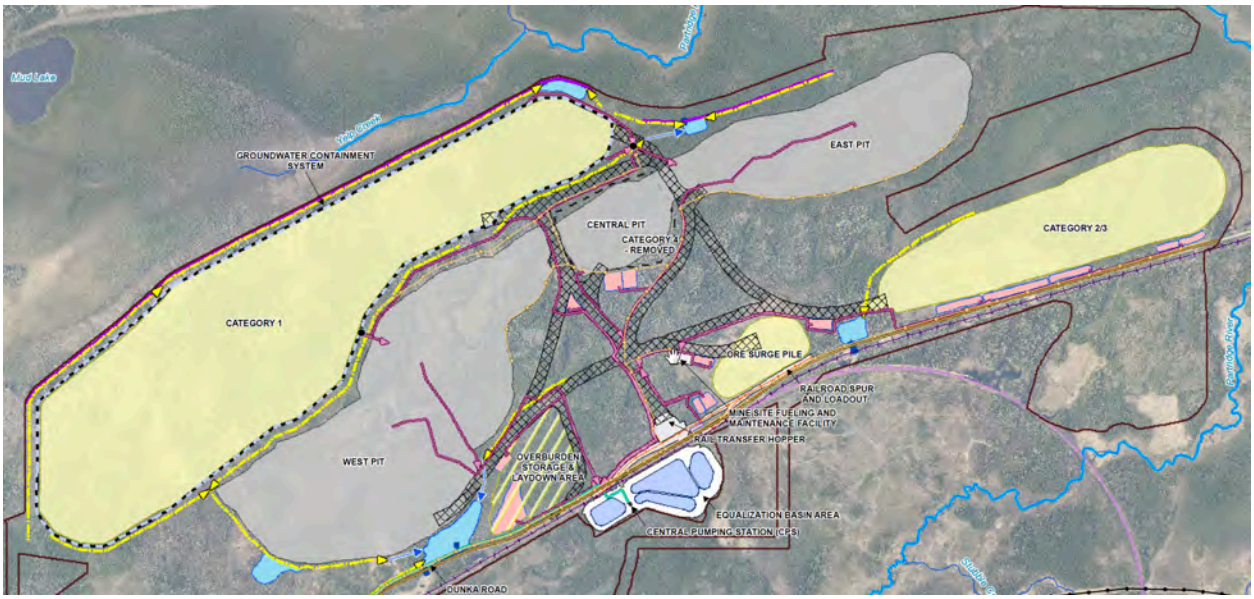


Figure C-1 Wetland of Interest Location Relative to the Mine Site

This wetland location is immediately adjacent to the east of the Equalization Basins (blue), which have a single liner and south of the Ore Surge Pile (yellow) with its sump and pond (pink).[308]



[305] *Id*., p. 11.
[306] Barr, Technical Memorandum. Cross-media Water Quality Analysis – Hydrology Summary, Oct. 19, 2017 ("Barr Cross-Media Hydrology"), p. 4, autop. 288 in Appendix C to PolyMet Cross-Media Mercury, *supra*.
[307] *Id*., p. 5, autop. 289.
[308] PolyMet PTM Application, Figure 3-2, Mine Site Layout, *supra*, Exhibit 33 also on p. 27 of comments, *supra*.

With this proximity, even if liners work as planned, they may seep to adjacent wetlands.

B) Failure to evaluate the impacts of sulfate and mercury in surface water discharged or released to wetlands.

In addition to assuming that no seepage would affect wetlands or stream sediments where methylation could take place, the PolyMet cross-media analysis failed to consider the impacts of surface water on mercury release and mercury methylation. This restriction of the scope of analysis will be significant in wetlands on and near the mine site, including the "wetland of interest" upon which PolyMet focused.

Although complete information on stormwater management is not provided in PolyMet's NPDES/SDS Application, PolyMet is proposing that water that has contacted surfaces directly disturbed by mining, such as drainage collected on the liners of the Ore Surge Pile or Category 2/3 waste rock stockpile, will be intercepted by ditches, dikes, sumps, ponds and pipe, and will be conveyed by pipe to the plant site tailings facility or, in later years to help flood the East and Central mine pits.[309] Water from construction and from the unlined Overburden Storage and Laydown Area (OSLA) that would contain peat as well as overburden, would also be channeled to the Construction Mine Water Basin, which also appears to be an unlined pool.[310]

PolyMet proposes that any mine site water not in direct contact with mining surfaces, OSLA storage or construction will be considered non-contact "stormwater." This stormwater will be given no special handling to protect surrounding waters from loading with chemical parameters. The stormwater "will be separated from mine water and controlled through a system of ditches, dikes, and ponds; and will discharge off-site either directly or after being routed through on-site sedimentation ponds to reduce total suspended solids (TSS)."[311]

Neither the PolyMet cross-media analysis nor any other document pertinent to the Draft NPDES/SDS Permit or the requested 401certification evaluates the likely concentrations of chemical parameters in mine site "stormwater." However, it is likely, due to air deposition as well as any difficulty in routing water in ditches across the mine site, that mine site "stormwater" will have elevated levels of sulfate and metals, including mercury, as a result of mineral dust deposition.

Despite excluding from its analysis both the sulfide mineral deposition from blasting and that from wind erosion at the massive mine site waste rock stockpiles,[312] PolyMet has predicted that total sulfide mineral deposition on some portions of the mine site within the watershed draining to its "wetland of interest" could exceed 1,000 milligrams per square meter per year (mg/m2/yr).[313] This level is approximately four times that predicted by PolyMet for sulfide deposition to the "wetland of interest" itself.

[309] PolyMet NPDES/SDS Application, Vol. II – Mine Site, Oct. 2017, p. 20.
[310] *Id*.
[311] *Id*., p. 13.
[312] *See* pp. 61-62 of these comments, *infra*.
[313] PolyMet Cross-Media Mercury, *supra*, Large Figure 7, Total Sulfide Mineral Dust, Mine Site, Mine Year 13, autop. 165, attached as Exhibit 58.

A technical memorandum prepared by Barr Engineering pertaining to PolyMet's "wetland of interest" explains that this wetland will not be dewatered or experience drying and wetting cycles exacerbating mercury methylation because water levels are assumed to remain constant.[314] Specifically, the memo explains that parts of the upland watershed on both sides of the Dunka Road will be removed by mine site infrastructure and will no longer contribute stormwater to the wetland, but, "Additional areas on the north of Dunka Road that do not currently drain to the wetland will have stormwater directed across Dunka Road and into the wetland during Project operations."[315]

This drainage to the "wetland of interest," presumably by a culvert under the road as well as by ditching, is illustrated by this drawing in the memo: [316]

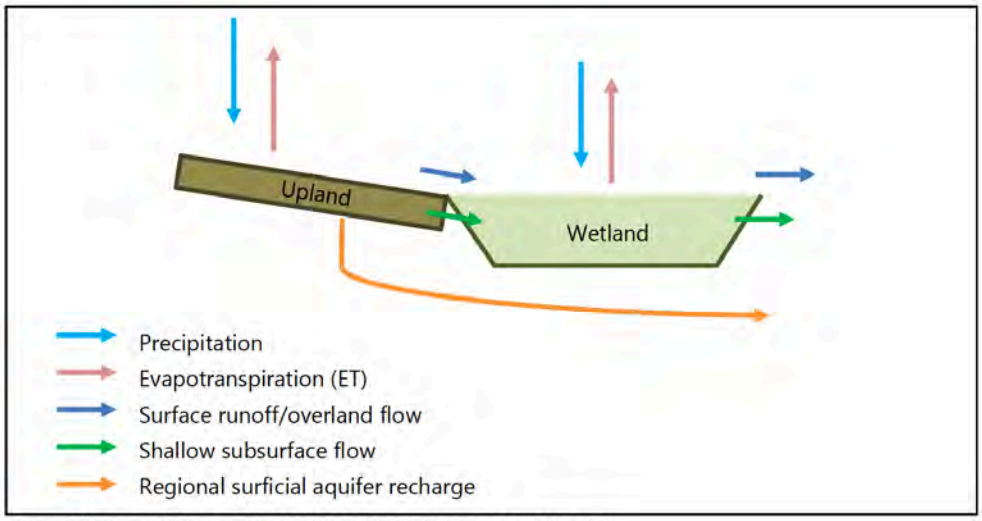


Figure C-3 Wetland Water Balance Conceptual Model

Neither the Barr hydrology memo nor the PolyMet cross-media analysis evaluate the effect of sulfate or mercury in mine site "stormwater" on mercury release or methylation within the "wetland of interest" or on any other wetlands to which mine site "stormwater" may be conveyed.

However, from the perspective of solute chemistry, it is highly likely that all water channeled off the proposed PolyMet copper-nickel mine would effectively be "contact" stormwater. The consequences of this surface water drainage to the wetlands and streams adjacent to the proposed PolyMet mine must be considered in any cumulative analysis of the impacts of the mine on mercury release, methylation and transport.

Similarly, the PolyMet cross-media analysis assumes that there will be no overflow from any mine site features affecting the concentrations of surface water flowing to and through wetlands on and near the mine site. As described previously, the mine site Equalization Basins, which are located immediately adjacent to the "wetland of interest" as well as other surface waters have

[314] Barr, Technical Memorandum. Cross-media Water Quality Analysis – Hydrology Summary, Oct. 19, 2017 ("Barr Cross-Media Hydrology"), p. 9, autop. 293 Appendix C to PolyMet Cross-Media Mercury, *supra*.
[315] *Id*., p. 5, autop. 289.
[316] *Id*., p. 7, autop.

high concentrations of a number of solutes.[317] PolyMet predicts that the "Low" Concentration (East) Equalization Basin would have markedly elevated sulfate levels of 2,450 mg/L and the High Concentration (West) Equalization Basin would have sulfate levels of 9,010 mg/L per year.[318]

To provide a basis for comparison, although wetlands sulfate sampling at the mine site has not been provided, the PolyMet FEIS did provide water quality data for the three creeks to the south and west of the mine site. Mean sulfate concentrations were 0.91 mg/L in Longnose Creek, 2.6 mg/L in the unnamed creek identified by PolyMet as West Pit Outlet Creek and 3.9 mg/L in Wetlegs Creek.[319] With more than three orders of magnitude difference in sulfate concentrations, even a small leak or spill over from the Equalization Basins could have a substantial effect on mercury release from sediments and methylation in nearby wetlands and creeks.

The potential for overflow as a result of a storm event or flooding of mine site wastewater collection features is particularly salient since none of these features is designed to prevent overflow in the event of a maximum precipitation event. In fact, the Equalization Basins, the nearby pond for runoff of process water at the rail transfer hopper where ore is loaded, and the sumps collecting seepage from the Category 1 waste rock pile would be designed with only the capacity to contain a 100-year, 24-hour rainfall event.[320] Various sumps and mine-water ponds containing highly contaminated mine process water would be designed for a 10-year 24-hour rain event with an overflow back-up to accommodate only a 100-year 24-hour rainfall; these include sumps and ponds for the Category 2/3 waste rock pile, the Category 4 waste rock pile and the ore surge pile.[321]

The 100-year 24-hour rainfall used for these designs appears to be 5.2 inches.[322] That level of rain is approximately half of the highest locally reported rainfall resulting in widespread flooding in northeastern Minnesota in June of 2012.[323]

The overburden storage and laydown area (OSLA) on the south side of the site, which will contain excavated peat with the potential to release mercury as well mineralized overburden materials, would provide even less protection from flooding, since it is designed to accommodate only a 25-year 24-hour rain event.[324]

Prevention of overflow from the Equalization Basins and other wastewater storage locations at the mine site depends on pumping contaminated water through the pipeline between the mine and the plant site using pumps at the central pumping station.[325] A sensor is proposed to provide a warning before Equalization Basins reach full capacity to prevent overfilling so that pumping

[317] See pp. 22-23 of these comments, *supra*.
[318] PolyMet Adaptive Mgt. Plan, *supra*, Appx. 11.4 to PolyMet PTM App., Large Table 4, P90 at Mine Year 14, *supra*, provided in Exhibit 32.
[319] PolyMet FEIS, *supra*, Table 4.2.2-15, 4-91.
[320] PolyMet PTM Application, *supra*, p. 344; PolyMet Water Mgt. Plan - mine, *supra*, pp. 10-11.
[321] *Id.*, pp. 10-11.
[322] Golder Associates Technical Memorandum, Sept. 12, 2012, in PolyMet Rock Mgt. Plan, *supra*, autop. 183, Appx. 11.1 of the PolyMet PTM Application states the magnitude of a 100-year, 24-hour storm event.
[323] U.S. Geological Survey, Floods of June 2012 in Northeastern Minnesota, Scientific Investigations Report 2012-5283, Exhibit 59, p. 1.
[324] PolyMet PTM Application, *supra*, p. 179, 280, 344.
[325] *Id*., pp. 172, 180, 344-345.

to the plant site can be done at a faster rate.[326] However, no redundant pumps or pipelines are planned to protect water quality in the event of an extended power outage or a storm event exceeding the 100-year 24-hour design volume.[327] In a heavy rainfall, PolyMet proposes an emergency operating procedure where temporary portable pumps may be used to return mine water in various sumps to the mine pits and temporarily stop pit dewatering.[328] No additional plans to prevent Equalization Basin overflow are described.

Neither PolyMet's predictions for the "wetland of interest" nor any other discussion in the cross-media analysis evaluated the impact of overflow from pollutant sources on the mine site, either directly into wetlands or into channels for non-contact "stormwater."

PolyMet's cross-media analysis states that the intentional discharge from the wastewater treatment facility (WWTS) at the PolyMet tailings site was included in the mercury mass-balance calculations for the Partridge River and Embarrass River watersheds.[329] However, this analysis was constrained by unsupported assumptions and monitoring failures. First, the WWTS discharge concentration assumed in the mass-balance calculations was 1.3 ng/L, the water quality standard applied to mercury in the Lake Superior Basin.[330] As explained in Section 4 of these comments, PolyMet's assumptions regarding low mercury levels in flotation tailings seepage are unsupportable and the Draft NPDES/SDS permit has required no treatment to effectively remove mercury before discharge of effluent to surface waters.[331] Absent a water quality-based effluent limit on mercury intentional discharge, there is no basis to assume that mercury in tailings site discharge will not exceed 1.3 ng/L.

In addition, the cross-media analysis fails to consider the impacts of loading inorganic mercury directly to wetlands, the primary sites for methylation. Despite more than 13 years of planning for the NorthMet project, PolyMet has apparently failed to monitor the wetlands into which treated tailings basin seepage would be discharged. As summarized in the Barr memo on mercury mass balance calculation to explain why degradation analysis would be performed a mile or more away from the north side of the tailings facility, rather than the Trimble Creek and Unnamed Creek headwater wetlands, "No mercury monitoring has been conducted in these wetlands."[332]

As discussed at length in Section 3 of these comments PolyMet's failure to monitor any wetlands near either the mine site or the tailings site and the failure of the Draft NPDES/SDS Permit to require such monitoring in the future will conceal any violations of permit conditions prohibiting discharge of untreated pollutants to surface water.[333] PolyMet's failure to monitor existing mercury, methylmercury and sulfate levels in mine site and plant site wetlands has additional

[326] PolyMet Water Mgt. Plan – Mine, *supra*, p. 24.
[327] *Id*., p. 43.
[328] *Id*., pp. 43-44.
[329] Barr 2017 Mercury Mass Balance, *supra*, p. 18, autop. 362 of PolyMet NPDES/SDS App. Vol. III – WWTS, *supra*.
[330] *Id.*
[331] See pp. 37-40 of these comments, *supra*.
[332] Barr 2017 Mercury Mass Balance, *supra*, p. 4, autop. 348 of PolyMet NPDES/SDS App. Vol. III – WWTS, *supra.*
[333] See Section 3, pp. of these comments, *supra*.

consequences for antidegradation analysis and evaluation of cumulative Project effects on mercury and methylmercury in receiving waters.

The effect on antidegradation analysis is immediately evident. On the north side of the tailings site, where the nearest monitoring sites were creeks a mile or more away, mercury discharge at 1.3 ng/L predicted levels would not result in degradation. On the south side of the tailings site, at Second Creek (SD026), where there was monitoring data for existing conditions, predicted mercury discharge of 1.3 ng/L would more than double the 0.6 ng/L existing concentration of mercury.[334]

Yet more significant, the MPCA's failure to require monitoring of wetlands for mercury, methylmercury and sulfate prior to permit approval and throughout the course of PolyMet operations, closure and maintenance prevents effective cumulative analysis of whether Project activities will cause or contribute to mercury impairments and endanger Minnesota's environment and human health.

C) Failure to analyze the effects of changes in wetland and stream hydrology on mercury release, methylation and transport.

There is no question that the wetlands surrounding the PolyMet mine site and plant site are highly methylating environments.

Dr. Brian Branfireun has explained that the methylmercury data collected by PolyMet during environmental review demonstrates that the ratio of methylmercury to mercury in the Partridge and Embarrass Rivers surface water sampling sites and mine site creeks are all indicative of a highly methylating environment. This data shows the fraction of methylmercury in the Partridge River as 2.2% at SW-001, increasing to 14.6% at SW-004a and remaining at about 10% at the next two stations. For the two surface water sampling sites on the Embarrass River, mean percentages of methylmercury are 10.4% and 8.8%. Although Wyman Creek, which is impacted by mining has the highest percentage of methylmercury (12.5% at PM-5), the relatively unimpacted mine site creeks also have high methylmercury ratios of 6.0% at Longnose Creek, 5.5% at proposed West Pit Outlet Creek and 9.6% at Wetlegs Creek.[335]

Dr. Branfireun also emphasized, "The high percentage of methylmercury in these surface waters speaks to sensitivity of their watersheds to both a) hydrological impact from a change in either surface or subsurface hydrology, and b) deposition of any additional sulfate either from surface water flows, or wet/dry atmospheric deposition."[336] The data also shows that "surface waters in the small tributaries at the proposed mine site, the Partridge, and the Embarrass Rivers are all strongly influenced by the presence of wetlands in their watersheds." In fact, Dr. Branfireun stated that he is not professionally aware of any other surface waters where the fractions of

[334] Antidegradation tables found in MPCA, PolyMet Mining, Inc. NPDES Antidegradation Review - Preliminary MPCA Determination, Jan. 10, 2018 ("MPCA Antideg. Review"), Attachment 3 to NPDES/SDS Fact Sheet, pp. 21-24, Distances to monitored sites found in Barr 2017 Mercury Mass Balance, *supra*, p. 4, autop. 348 of PolyMet NPDES/SDS App. Vol. III – WWTS, *supra.*
[335] Branfireun 2015, *supra*, Exhibit 57, pp. 3-4.
[336] *Id*., p. 4.

methylmercury as a percentage of total mercury are as high as the waters reported in documents prepared as part of PolyMet environmental review.[337]

Dr. Branfireun cited peer-reviewed literature explaining that in wetlands exposed to sulfate loading, "prolonged water table drawdowns lead to greater sulfate release in all treatments." As a result of a natural drought in experimental wetlands, wetlands drawdown increased methylmercury desorption and flux from peatlands, drove sulfate-reducing-bacteria activity that increased mercury methylation, and made sulfate "available for export to downstream aquatic systems (e.g. lakes and other wetlands) that could be equally susceptible to *in situ* net methylations."[338]

Based on his field experience and this important peer-reviewed study, Dr. Branfireun concluded for the NorthMet site that "a significant proportion of bog wetlands that are within the zone of drawdown from the proposed mine proposed development will also exhibit sulfate regeneration and increased export of methylmercury, under natural rewetting cycles as well as storm events."[339] Hydrologic changes at both the mine site and tailings site would increase mercury and methylmercury and release sulfate to downstream waters:

> [D]evelopment-induced change in hydrology, such as those proposed at both the NorthMet mine site and tailings basin, could amplify those drought-rewetting cycles (in terms of magnitude, frequency, or both). These implications should not be understated. Independent of any additional releases of uncaptured sulfate or mercury from the proposed NorthMet development, dewatering of wetlands surrounding the tailings basin through seepage collection and even modest impacts on water table position by underdrainage of mine site peatlands through open pit dewatering could increase total mercury, methylmercury and sulfate in the Partridge, Embarrass, and ultimately the St. Louis River.[340]

The drying and rewetting of peat overburden in the NorthMet unlined laydown area could also impact mercury release and methylation. Dr. Branfireun cautioned that this storage would "result in repeated flushes of methylmercury as well as inorganic mercury."[341] Based on the Coleman-Wasik (2015) research, Dr. Branfireun cautioned, "The continuous process of drying and rewetting of overburden peat stockpiled in laydown areas may not only continue to release inorganic mercury, but may also continuously regenerate sulfate, and in anaerobic locations, promote methylmercury formation."[342]

PolyMet has not disputed that mine site wetlands, including the "wetland of interest" selected for review are highly methylating environments. The PolyMet cross-media report notes that potential export of methylmercury from the "wetland of interest" under existing conditions was estimated at ~0.08 to 0.16 µg/m2/yr, which is 2 to 4 times higher than the estimates for similar

[337] *Id*., pp. 15-16.
[338] *Id*., p. 20, quoting Coleman-Wasik et al., Hydro-logic fluctuations and sulfate regeneration increase methylmercury in an experimental peatland, *Journal of Geophysical Research – Biogeosciences*, 120: 10.1002/2015JG00299. Dr. Branfireun's 2015 Referred Materials are attached as Exhibit 57A.
[339] *Id*.
[340] *Id*., pp. 21-22.
[341] *Id*., p. 22.
[342] *Id*., p. 21.

boreal wetlands (0.03 to 0.04 µg/m2/yr) in the Marcell Experimental Forest studied in the peer-reviewed literature.[343]

One result of the elimination of dewatering, drying, and rewetting of wetlands from PolyMet's cross-media analysis was to remove the potential that this process would enhance weathering and permit the release of sulfide minerals over a period of years. This assumption affects predictions of the release of sulfide from chalcopyrite particles, although PolyMet's modeling that all sulfide in pyrrhotite particles will react within a year is protective.[344]

In addition, rather than analyzing the effects that hydrologic changes resulting from the NorthMet Project would have on the "wetland of interest" and other highly methylating wetlands, PolyMet proposed that targeted upland drainage would obviate the need to analyze the impacts of water fluctuations on its selected "wetland of interest."[345] PolyMet then failed to analyze the impacts of drying and rewetting on any other wetlands affected by dewatering at the mine site or due to tailings site seepage collection in any part of its cross-media analysis.

This omission may be one of the most significant deficits in PolyMet's cross-media analysis. As Dr. Branfireun explained with respect to the PolyMet Project, "Even relatively small changes in water table position and wetting and drying frequency in the ombrotrophic wetlands at the NorthMet mine site have the potential to impact sulfate and methylmercury concentrations of receiving waters."[346]

D) Exclusion of multiple sources of sulfur and sulfide deposition at both the mine site and the plant site.

Increase in mercury methylation as a result of sulfur and sulfide emissions and deposition is the primary factor addressed by the PolyMet cross-media analysis. But, even PolyMet's evaluation of sulfur compound emissions suffers from exclusions that distort and minimize the effects of sulfur compounds on mercury methylation. PolyMet's air modeling for the cross-media analysis was performed according to the modeling protocol appended to the report.[347] This Protocol excluded many significant sources of sulfur and sulfide deposition.

First, the cross-media modeling protocol excluded from analysis PM_{10} fine particulates from either plant site stacks or vehicle exhaust, whether on the plant site or mine site,[348] asserting that stack particulate emissions are assumed to include only smaller $PM_{2.5}$ particles based on the control technologies for sources at the facility.[349] However, both PolyMet's air emissions permit

[343] PolyMet Cross-Media Mercury, *supra*, p. 108.
[344] PolyMet Cross-Media Mercury, *supra*, pp. 98-101.
[345] *See* Barr Cross-Media Hydrology, pp. 4-9, autop. 288-293, Appendix C to PolyMet Cross-Media Mercury, *supra*.
[346] Branfireun 2015, *supra*, Exhibit 57, p.19.
[347] PolyMet Cross-Media Mercury, *supra*, p. 77, referring to Appendix A, Cross-Media Air Emissions Modeling Protocol v1, Mar. 2017 ("Cross-Media Protocol").
[348] Cross-Media Protocol, *supra*, p. 4, autop. 178 in PolyMet Cross-Media Mercury, *supra*. Exclusion confirmed in review of PolyMet Cross-Media Mercury, *supra*, see e.g. Table 4-1, p. 79, p. 85.
[349] *Id*., p. 7, autop. 181.

application and the draft air permit itself undermine this claim. For both PM_{10} and $PM_{2.5}$ particles, emissions control technology markedly reduces potential emissions.[350]

Table B-1
NorthMet Project
PTE and Controlled PTE for Criteria Pollutants

Pollutant	Project Total PTE (tpy)	Project Total Controlled PTE (tpy)
Point Sources Only		
PM10	15585.54	168.34
PM2.5	15538.77	164.43

But, even with controls placed on stack emissions, PolyMet Project potential point source and fugitive air emissions of PM_{10} exceed those for $PM_{2.5}$. As shown in the table below from the air emissions permit application, controlled point sources of particulates are much higher at the plant site than at the mine site and potential controlled point source total PM_{10} particulates would be 168.34 tons per year, as compared to 164.43 tons per year of $PM_{2.5}$ particles.[351]

Table ES-1 Summary of Total Controlled PTE – Point Sources (tons per year [tpy])

Pollutant	Mine Site Point	Plant Site Point	Project Point Total	PSD Threshold
PM_{10}	3.98	164.36	168.34	250
$PM_{2.5}$	1.53	162.90	164.43	250
SO_2	0.81	6.36	7.17	250

Controlled fugitive emissions sources at both the mine site and plant site, which include vehicle emissions as well as dust, model more than seven times as much PM_{10} as $PM_{2.5}$ and include 262 tons per year of PM_{10} fugitive emissions at the plant site, as well as 454.90 tons per year at the mine site.[352]

Table ES-2 Summary of Total Controlled PTE – Fugitive Sources (tpy)

Fugitive or Point	Mine Site Fugitive	Plant Site Fugitive	Project Total Fugitive
PM_{10}	454.90	262.12	717.03
$PM_{2.5}$	69.14	31.37	100.51

[350] Technical Support Document Attachment 1 for Draft Air Emissions Part 70 Permit No. 13700345-101, ("TSD Draft Air Permit Attach. 1"), Table B-1, autop. 2. All MPCA and Barr documents pertaining to the Draft Air Emissions Permit for the PolyMet Project are at https://www.pca.state.mn.us/quick-links/air-quality-permit-northmet.
[351] Barr, Application for a Permit to Construct and Operate North Met Project Prepared for Poly Met Mining, Inc., Aug. 2016, ("Barr Air Permit App. PolyMet"), p. 2, Table ES-1.
[352] *Id*., p. 3, Table ES-2.

The significance of excluding PM_{10} air emissions when evaluating the effects of local sulfide mineral deposition on mercury methylation is even greater than would be evident by the tonnage of sources alone. PM_{10} particles are heavier and are more likely to be deposited locally than $PM_{2.5}$, impacting wetlands and proximate watersheds. As Barr explained in the application for PolyMet's air emissions permit, "Fine particles ($PM_{2.5}$ and smaller) and gases tend to remain suspended for long periods of time (days to weeks) and travel away from the emission source: they are generally not associated with local deposition."[353]

PolyMet's cross-media modeling protocol also excludes wet deposition of stack emissions, and models only the dry deposition of gas-phase/aerosol/fine particles ($PM_{2.5}$), stating that, even if wet deposition sulfur emissions are important, since their volume is much less than that of dust, including them wouldn't change PolyMet's conclusions.[354] This exclusion may only affect a few percent of the total sulfur mass, but once again the protocol decreases the likelihood that sulfur compounds in stack emissions will be deposited on local wetlands and watersheds.

Next, at the mine site, the cross-media modeling protocol excluded from analysis fugitive dust generated both by blast hole drilling and by handling of overburden, ore and waste rock.[355] According to the PolyMet Permit to Mine Application, ore blasting will use approximately 8 million pounds of blasting agents (ammonium nitrate and fuel oil) annually, while planned waste rock movement, to place waste rock into stockpiles will use approximately an additional 7.3 million pounds of blasting agents.[356] PolyMet's air emissions permit listed "blasthole drilling" as one of the primary sources of fugitive emissions.[357]

Although there are no data in the record to quantify the significance of this omission, it is widely recognized that blasting is a large contributor to dust at open-pit mines:

> Modern surface mining often involves huge tonnages thus increasing the potential for greater dust hazard. Blasting is one of the operations that is carried out in most mines, and may produce very large quantities of dust. The dust cloud can be raised to substantial heights depending on the blasting parameters. The blasting dust cloud is normally visible for several minutes. Most of the dust settles in and around the mining area, although some may be dispersed to long distances before settling down. Some of the settled dust is raised again by mining activities such as moving vehicles. Depending on meteorological conditions this dust can disperse to substantial distances adversely affecting local communities."[358]

Dust resulting from wind erosion at mine site Category 1, Category 2/3 and Category 4 waste rock stockpiles was also excluded from the cross-media analysis modeling protocol.[359] No

[353] Barr Air Permit App. PolyMet, *supra*, p. 38.
[354] PolyMet Cross-Media Mercury, *supra*, p. 104; see also p. 85.
[355] Cross-Media Protocol, *supra*, p.4, autop. 178 and Large Table 1, autop. 196, in PolyMet Cross-Media Mercury, *supra.*
[356] PolyMet PTM App., *supra*, p. 3.
[357] Barr Air Permit App. PolyMet, *supra*, p. 16.
[358] S. Bhandari et al., Dust Resulting from Blasting in Surface Mines and its Control, Explo 2004 Conference, Exhibit 60, p. 3.
[359] Cross-Media Protocol, supra, Large Table 1, autop. 196 in PolyMet Cross-Media Mercury, *supra*

rationale was provided in the modeling protocol or the cross-media analysis for this exclusion of sulfur deposition sources proximate to mine site wetlands. Tailings basin wind erosion from beaches was included in the modeling protocol.[360]

Receptors within large rectangular boundaries surrounding the mine pits and also encompassing a number of wetlands that will remain intact during PolyMet mine operations were excluded from cross-media modeling. The rationale provided for this exclusion was that it would eliminate the "complications" with trying to model a receptor within an emission source.[361]

These various mine site exclusions may help explain why PolyMet's map of "total" sulfide mineral dust in Large Figure 7 has unexpectedly low predictions of sulfide in several areas. In addition to the red rectangles specifically mentioned for exclusion, sulfide mineral deposition depicted on vast areas adjacent to and downwind of the Project's massive mine pits and stockpiles would reflect neither blast hole drilling, blasting of rock for handling or stockpile wind erosion.[362]

The cross-media modeling protocol also excluded particles greater than 30 microns in diameter (PM_{30}) on the grounds that these "larger" particles (at least 1/1,000 of an inch) would be less likely to disperse more than 20 to 30 meters from an emission source.[363] Although excluding PM_{30} from air emissions analysis is appropriate if the concern is inhalation risks or dispersal to a regional air shed, this exclusion minimizes the effects of dust and rail car spillage at the mine site, at the plant site, and along eight miles of tracks between them. Many sources of dust and spillage are less than 30 meters away from wetlands or are proximately upgradient from wetlands and streams that could be sites of mercury methylation.

The PolyMet FEIS concluded that surface water quality in the mine site Upper Partridge tributary streams (sulfate-limited Wetlegs Creek, Longnose Creek, and proposed West Pit Outlet Creek) "would be affected by ore spillage from the rail cars," although the FEIS did not analyze how ore spillage to wetlands or creek sediments would affect mercury methylation.[364] The FEIS did state, "Approximately 543 acres of wetlands along the railroad corridor could be affected by releases of solutes resulting from rainfall contacting spilled ore and fines."[365]

It is difficult to see these modeling exclusions as anything but a way to minimize rather than evaluate the effects of PolyMet Project sulfate deposition on mercury methylation. Based on maps of dust deposition and calculations of sulfate loading previously provided in environmental review or supplied for the draft air emissions permit, it is highly likely that modeling exclusions reduce the projections made for sulfide deposition in the "wetland of interest" selected by PolyMet and render these predictions unsound. Supplemental information from other parts of the PolyMet record is also useful to define which other wetland areas should have been investigated to obtain a more rigorous and comprehensive analysis of impacts on mercury and methylmercury

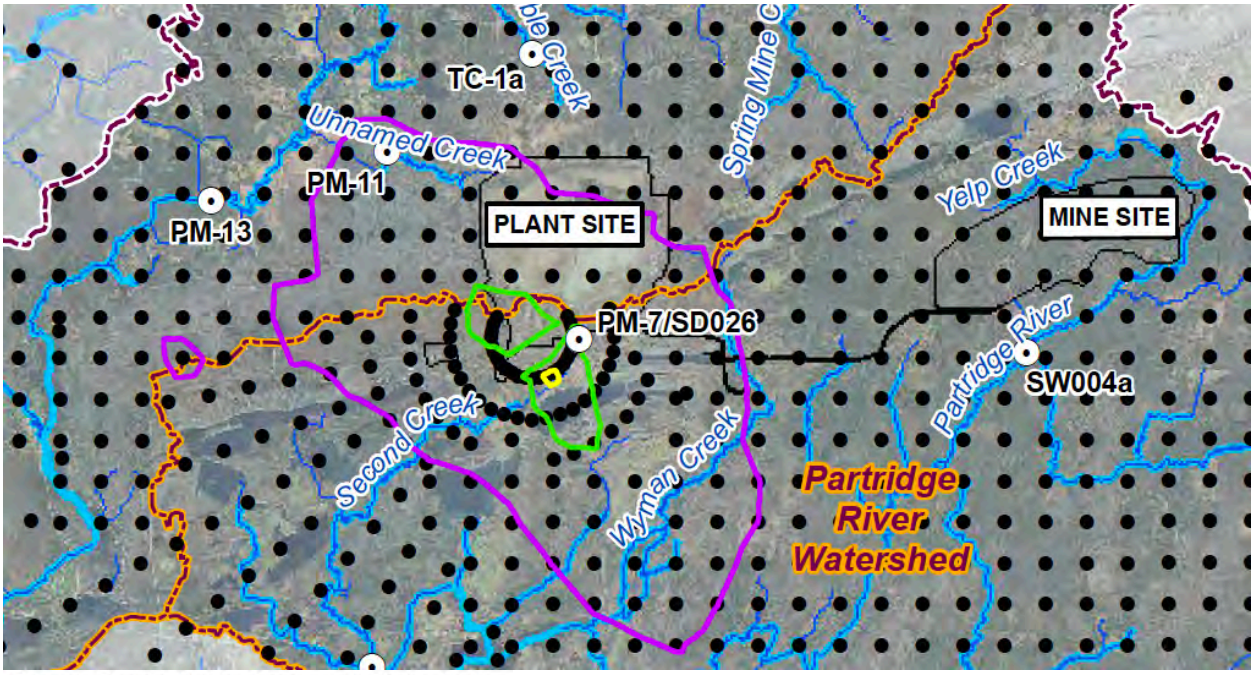
[360] Cross-Media Protocol, *supra*, p. 9, autop. 183 and Large Table 1, autop. 195 in PolyMet Cross-Media Mercury, *supra.*
[361] *Id*., p. 13, autop. 187. Our information suggests that this modeling is feasible.
[362] *See* Large Figure 7, Total Sulfide Mineral Dust, *supra*, in PolyMet Cross-Media Mercury, *supra*, Exhibit 58.
[363] Cross-Media Protocol, *supra*, Large Table 1, autop. 196 in PolyMet Cross-Media Mercury, *supra.*
[364] PolyMet FEIS, *supra*, 5-164.
[365] *Id*., 5-314.

exceedances and degradation that would result from permitting and certification of the PolyMet copper-nickel mine project.

E) Exclusion of mine site mercury deposition, water bodies closest to mercury sources, and mercury deposition to wetlands.

The PolyMet cross-media analysis of mercury deposition adds to growing concern that its objective may be to dismiss concerns about PolyMet Project effects rather than evaluate them. This is accomplished by failing to analyze water bodies and monitoring locations likely to show effects from mercury deposition and by explicitly excluding mercury air deposition to wetlands.

The PolyMet cross-media analysis states, "The primary potential source of mercury emissions for the Project is the Autoclave Stack, which will be located at the Plant Site." [366] Mercury emissions are concentrated at the plant site, particularly on the south side of the site, where the plant facilities are, contributing as much as 3 percent of mercury background concentrations south of the tailings site. The cross-media analysis notes that, in addition to increased surface discharge of mercury from the wastewater treatment system at Second Creek discharge point (SD026),[367] "Mercury deposition from Project air sources is also focused in the Second Creek watershed."[368] Mercury air deposition isopleths are shown on the map below:[369]



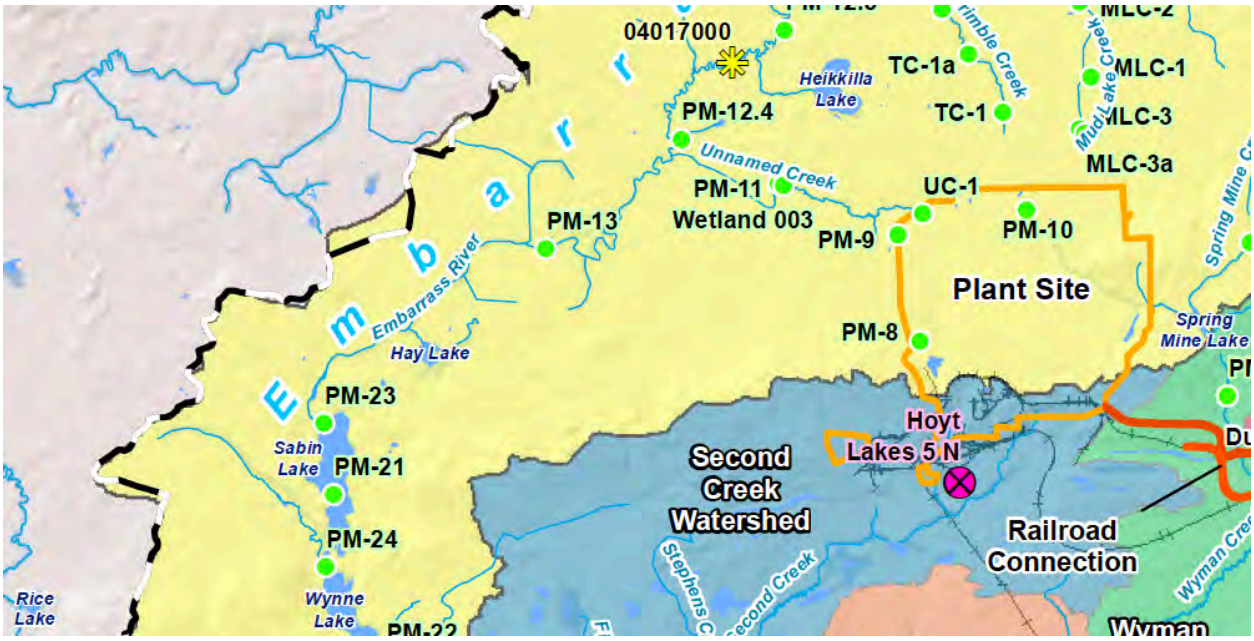
[366] PolyMet Cross-Media Mercury, *supra*, p. 15. _
[367] See p. ___ of these comments, *supra*.
[368] PolyMet Cross-Media Mercury, *supra*, p. 124.
[369] *Id*., Large Figure 13, Estimated Project Contribution to Mercury Air Concentration, attached as Exhibit 61.

The PolyMet cross-media analysis fails to evaluate mercury air deposition from plant site stack emissions at any site proximate to the emissions. The first site at which air deposition to Second Creek is evaluated is 11 miles downstream at MNSW8.[370]

The PolyMet cross-media analysis states, "mercury stack emissions (Autoclave; fuel combustion) have not changed from those estimated in 2012, building and stack parameters related to the autoclave have not changed, and the air model and meteorological input data have not changed appreciably." The 2012 modeling results were brought forward and used unchanged in the cross-media analysis.[371] In the intervening years, neither PolyMet nor the MPCA saw fit to locate a monitoring site in closer proximity to mercury, sulfate dust and particulate air deposition in the Second Creek watershed.

Large Figure 13 above shows that the monitoring site on Unnamed Creek (PM-11) is within the isopleth showing elevated mercury deposition to wetlands. This site is listed in the cross-media table showing potential cumulative effect on total mercury loads and concentrations. But no methylmercury changes are calculated either at PM-11 or even at MNSW8. The table suggests that methylmercury load increased "is not assessed at these locations but is incorporated downstream," further from the site of potential impacts.[372]

Although most of the lakes in the Embarrass River watershed are farther away, Heikkilla Lake appears to be within the area where mercury stack emissions would represent up to 1% of background, and Sabin Lake far outside it. The map below shows the locations of Heikkilla Lake and Sabin Lake.[373]



[370] The MNSW8 monitoring site is at the location USGS 04016000 on PolyMet FEIS Figure 4.2.2-1 *supra* and was selected since the PolyMet FEIS.
[371] PolyMet Cross-Media Mercury, *supra*, p. 17.
[372] *Id*., p. 126.
[373] Map is copied from PolyMet FEIS, Figure 4.2.2-1 Watersheds, Streams and Data Collection Sites, attached as Exhibit 62.

The exclusion of Heikkilla Lake from cumulative analysis is troubling. PolyMet argues that the lake may not support a fish population, so that Sabin Lake was a better candidate for cumulative analysis.[374] Since Sabin Lake is outside the isopleth showing impacts of mercury air deposition, it would seem like a less appropriate candidate for analysis.

In addition to modeling sites with less proximity to plant site air emissions, rather than closer sites, the PolyMet cross-media analysis completely excludes the impacts of mercury air deposition to uplands or wetlands, except at the "wetland of interest."[375] The analysis argues that "only mercury deposited directly to the water surface will result in an increase in water column mercury concentrations because mercury deposited to the terrestrial watershed will be retained in the watershed."[376]

However, the peer-reviewed literature is more complex and does not support the blanket exclusion from analysis of all mercury deposited to wetlands. The Harris et al. 2007 article cited in the PolyMet report cautioned that the "low level of new mercury export and methylation would not be expected to occur in all wetlands" and cited a pilot study in a wetland with a water table near the peat surface where "added spike mercury was quickly methylated and transported into the lake."[377] A report from the Mercury Experiment to Assess Atmospheric Loadings in Canada and the United States (METAALICUS) found that experimentally applied stable mercury isotopes migrated vertically and/or horizontally in peat and pore waters from an experimental plot to the lake margin. The authors concluded,

> When we couple the biogeochemical dynamics with the evidence of a surface hydrologic transport mechanism, we conclude that wetlands can be very dynamic environments for the transport and transformation of recently deposited Hg, contributing significantly to the total load to adjacent aquatic ecosystems in some watersheds.[378]

Although the PolyMet cross-media analysis summarized mercury emission estimates and speciation assumptions from various sources, mercury loading analysis was done based on the stack emissions modeled in 2012 and an estimate of release of mercury from the mineral matrix of fugitive sulfide mineral dust.[379] No mercury air emissions from mine site sources were considered, even though they are predominantly vehicle emissions, likely to be locally deposited and not particle-bound.

The table below is derived from Table 2-1 in the PolyMet cross-media analysis.[380] If local deposition of mine site mercury from vehicle emissions and fugitive dust were to be analyzed, this calculation would add up to 317.5 grams of mercury deposited to proximate mine site

[374] PolyMet Cross-Media Mercury, *supra*, pp. 26-27.
[375] *Id*., p. 121.
[376] *Id.*
[377] R. Harris et al., Whole-ecosystem study shows rapid fish-mercury response to changes in mercury deposition, PNAS, vol. 104, No. 42, 16586- 16591(Oct. 16, 20107), included in Branfireun 2015 Referred Materials, *supra*, Exhibit 57A.
[378] B. A. Branfireun, et al., Speciation and transport of newly deposited mercury in a boreal forest wetland: A stable mercury isotope approach, Water Resources Research, Vol. 41, W06016, doi:10.1029/2004WR003219, 2005, p. 10, Exhibit 63.
[379] PolyMet Cross-Media Mercury, *supra*, p. 120, 122.
[380] *Id*., Table 2-1, p. 16. The table below included the estimates and speciation assumptions for the Mine Site without change, adds the total in pounds per year and grams per year.

watersheds. When the "mercury mass balance" for the project is measured in tenths of a gram, exclusion of mine site local mercury deposition may be quite significant.

Table 2-1 Mercury Emission Estimates (Potential to Emit) and Speciation Assumptions		
Emission Source	Emissions (pounds/yr)	Speciation[1]
Mine Site		
Diesel fuel combustion	0.6	Emissions from ground-level sources; heavy mine equipment
Fugitive dust and material handling	0.1	Hg concentration in waste rock and ore is very low; 100% particle-bound; Hg within mineral matrix[2]
Mine Site Total	**0.700**	Hg from mine site in pounds/year
Mine Site Grams	**317.5**	Hg from mine site emissions, primarily vehicle emissions in grams/year

Although excluding local mine site deposition may affect the results of the cross-media analysis, removing from the analysis any mercury deposition to uplands or wetlands makes a striking difference in the assessment of mercury risks. As with stack emissions from the plant site, except at the "wetland of interest," only emissions of dust to the area of "open surface water" were included in PolyMet's mercury calculations."[381]

As illustrated in the table below derived from PolyMet's Table 5-3,[382] by restricting the calculation of mercury air deposition impacts only to open surface water, the cross-mercury analysis effectively reduced the perceived potential impact of mercury air emissions by more than 99 percent.

Table 5-3 Inputs to Mercury Loading Calculations			
Watershed	**Watershed area (square meters)**	**Open surface water area (square meters)**	**Ratio of open surface water in watershed**
Wetland of Interest	4.29E+05	8.26E+04	**0.19**[1]
Trimble Creek (TC-1a)	6.22E+06	1.56E+04	**0.003**
Unnamed Creek (PM-11)	6.72E+06	3.47E+04	**0.005**
Embarrass River (PM-13)	2.76E+08	1.17E+06	**0.004**
Partridge River (SW004a)	1.34E+08	7.09E+05	**0.005**
Partridge River, lower (USGS 04016000)	3.99E+08	2.76E+06	**0.007**
[1] Air deposition calculations for the WOI were not restricted to open water.			

[381] *Id.*, pp. 122, 98.
[382] *Id.*, Table 5-3, p. 122. The first three columns from the Table were unchanged and simple division was used to calculate the proportion of watershed area that is "open surface water area."

Reviewing the PolyMet cross-media analysis of the effects of air deposition of mercury, it appears that unreasonable exclusions substantially and inappropriately minimize the effects of mercury air deposition on the wetlands and watersheds near the proposed PolyMet mine site and plant site.

F) Misleading analysis of mercury methylation in a single "wetland of interest."

The PolyMet cross-media analysis of mercury methylation in a single "wetland of interest" suffers from several flaws. The cross-media analysis, as every other analysis done by PolyMet to date, precluded consideration of the impacts of surficial aquifer seepage surfacing in wetlands and affecting mercury methylation by completely failing to analyze this important factor. Perhaps more striking, even as the cross-media analysis proposes channeling of mine site stormwater to maintain hydrology in the "wetland of interest," the analysis fails to consider sulfate loading from mine site surface water in calculating methylation potential. Although the cross-media analysis makes an exception and considers loading of mercury from fugitive dust to one designated wetland, the analysis excludes mine site mercury vehicle emissions, which (Table 2-1 on the preceding page) have six times the mass of mercury in mine site fugitive dust.

Dr. Branfireun's report on NorthMet effects on mercury methylation included a quantitative analysis pertaining to the one factor for which numeric data was provided, where Barr identified the mine site location with highest sulfate loading from dust deposition.[383] Using Barr's numbers for sulfate deposition, validating assumptions for sulfate background with peer-reviewed literature and expressing both the background and NorthMet mine site sulfate deposition numbers in the same units, Dr. Branfireun calculated that the sulfate load from dust deposition at this proposed mine site location would be 12.6 kilograms per hectare per acre (kg/ha/yr) as compared to the background rate of 4.58 kg/ha/yr. The sulfate load would, thus be 3.76 times or 376% of the background deposition rate.[384]

Comparing this additional loading with peer-reviewed studies measuring methylmercury export after adding sulfate to experimental wetlands, and using the conservative assumption in the FEIS that all sulfur in dust is converted to sulfate, Dr. Branfireun calculated that methylmercury export from sensitive mine-site peatlands may be increased up to 1.88 times as a result of sulfate air deposition alone. Given the magnitude of this potential impact, he explained, even if less than the total sulfate deposited is liberated to the environment, "there will still be a substantial stimulatory effect on peatland methylmercury production."[385]

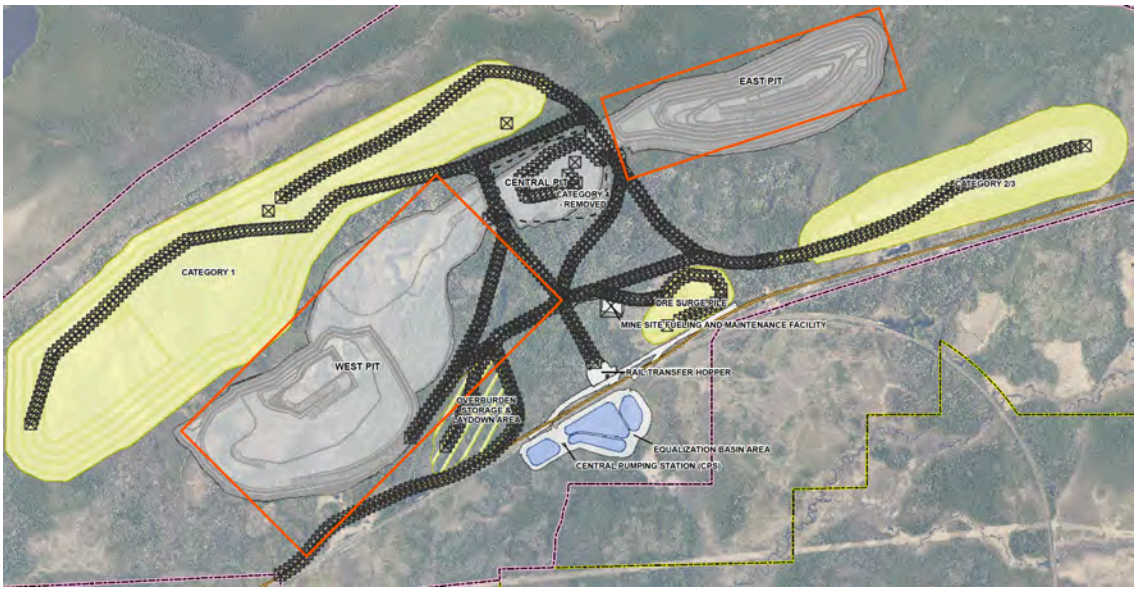
Based on the finding in the Coleman-Wasik 2015 study that portions of an experimental wetland recovering from high sulfate loading had methylmercury levels intermediate between those of unimpacted and current experimental treatments, Dr. Branfireun opined that sulfate loading impacts would continue even after deposition stops. "It can be expected that effects of elevated

[383] The reference in question, Barr, Mercury Overview A summary of potential mercury releases from the NorthMet Project and potential effects on the environment Prepared for Poly Met Mining, Inc. Mar. 2015 ("Barr 2015f") is included with other Referred Materials for Dr. Branfireun's 2015 expert opinion in Exhibit 57A, *supra*.
[384] Branfireun 2015, *supra*, Exhibit 57, p. 22, deriving background rate from data in Barr 2015f, *supra*, at p. 42.
[385] *Id*., p. 23.

sulfate deposition on peatlands will persist to some degree even after additional sulfate loading has ceased."[386]

Without quantifying the other factors, such as mercury and sulfate loading through water, changes in wetland hydrology or mercury air emissions, Dr. Branfireun explained that increased methylmercury export from methylating peatlands would be reflected "in methylmercury concentrations in the upper tributaries, and the Embarrass and Partridge Rivers, given the role these wetlands play in supplying water to these streams and rivers." Increased methylmercury "would also be expected to impact the upper St Louis River, given the direct hydrological connection and known methods of methylmercury transport."[387]

PolyMet's cross-media analysis concluded that the total potential atmospheric load of sulfate to the "wetland of interest" during operations is 6.4 kg/ha/yr, of which 1.55 kg/ha/yr is related to the Project.[388] The analysis contains no explanation of the differences between this result and Barr's 2015 sulfate load projections. The change from sulfate to sulfide mass and the more conservative assumption made in 2015 that all sulfur deposited is liberated to the environment, as contrasted with modeling that a fraction of the chalcopyrite particles will react,[389] could substantially reduce predicted sulfate loading. Since the 2015 Barr report does not exclude dust sources from its analysis, the cross-media modeling protocol may also have affected predictions of sulfate loading. Finally, because the cross-media analysis is narrowly focused on dust from haul roads and rail transfer, the selection of wetlands south of Dunka Road may have reduced the predictions of sulfate loading. The maps in subsection (A) of this Section of comments[390] show where the "wetland of interest" is located, next to the blue Equalization Basins and south of Dunka Road, and the map below shows haul roads with black cross-hatching.[391]



[386] *Id.,*
[387] *Id.*
[388] PolyMet Cross-Media Mercury, *supra*, p. 106. This estimate includes sulfate background of 4.85 kg/ha/yr.
[389] *Id*., pp.78, 8; *see also* Appendix B to PolyMet Cross-Media Mercury, Technical Memorandum, Method for calculation of sulfate and metals release from chalcopyrite dust particles, Oct. 30, 2017.
[390] See p. 52 of these comments, *supra*.
[391] TSD Draft Air Permit Attach. 1, *supra*, Large Figure Q4-13, Mine Site Model Source Layout, Exhibit 64.

Large Figure 7 in the PolyMet cross-media report models sulfide dust levels range from 102 to 212 milligrams per meter squared per year (mg/m2/yr) in the "wetland of interest" while higher sulfide mineral dust levels can be found on the mine site itself. This map also suggests that background sulfide mineral deposition at the mine site may be less than 10 mg/m2/yr.[392]

In order to evaluate, rather than minimize project impacts on mercury, the assessment of impacts at the "wetland of interest" on the south side of the mine site must be redone. First, the sulfate and mercury loading to the wetland through surficial aquifer seepage must be calculated. Then, if existing hydrologic conditions at this wetland will in fact be maintained by channeling mine site surface water from the rail spur and rail transfer hopper side slopes,[393] sulfate and mercury loading from this surface water must be added. Third, mine site sulfide mineral dust loading should not exclude blasting or wind erosion, both of which are likely to take place at the Ore Surge Pile and Category 2/3 waste rock stockpile, in proximity to the wetland.

Next, in addition to estimating the impacts of mercury in fugitive dust, as the cross-media report has already done, the impacts of mercury vehicle emissions on mercury methylation as well as on mercury loading must be calculated. Finally, in the interest of transparency, the cross-media analysis should clearly explain assumptions made and their effects, including the calculations used to estimate methylmercury production from total sulfate and mercury loading. It is likely that an analysis including these readily discernable contributors to mercury methylation would arrive at a very different conclusion as to the impact of PolyMet operations on the "wetland of interest" south of Dunka Road.

Even more important, given the number of factors in PolyMet operations that could increase mercury methylation and the variability of inputs and wetlands types across a vast area at the plant site and the mine site, no analysis restricted to a single wetland could be adequate to evaluate methylmercury impacts. Selection of additional wetlands to study in depth should take into account sources and composition of seepage, locations of intentional surface discharge and mine site stormwater release, locations most likely to be affected by mine dewatering and tailings seepage collection, proximity to both point source and fugitive dust deposition of sulfur compounds, and mercury air deposition, considering deposition to wetlands as well as to open waters.

If all of these factors are considered cumulatively, it is clear that wetlands should be studied at the plant site as well as at the mine site. In addition to the *south mine site* location already selected in PolyMet's cross-media analysis, a minimum of three other wetland of interest sites are recommended for analysis: a *South Tailings Site* wetland, a *North Tailings Site* wetland, and a *North Mine Site* wetland.

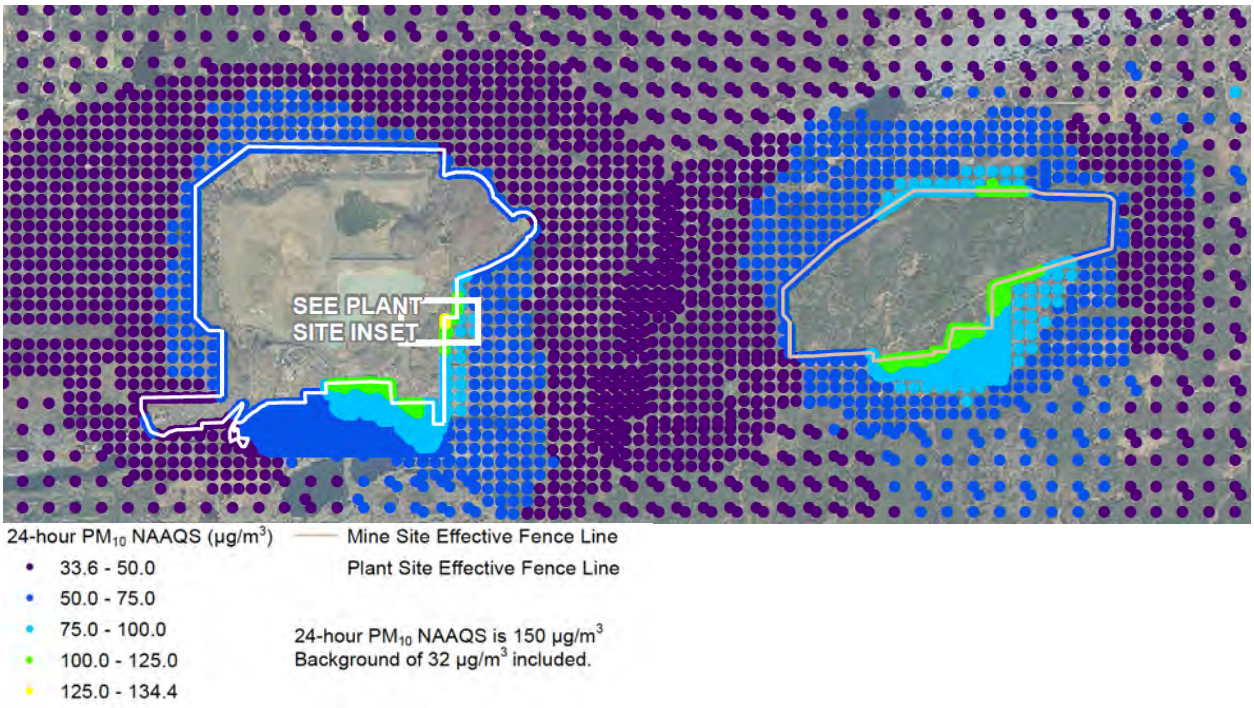
The first additional wetland study area proposed is a *South Tailings Site* wetland, near the headwaters of Second Creek. As explained previously, the headwaters of Second Creek will be the site of groundwater seepage with highly elevated sulfate levels emerging within a short distance into a headwaters creek.[394] In addition, surface water discharge at the headwaters of

[392] PolyMet Cross-Media Mercury, Large Figure 7, *supra*, attached as Exhibit 58.
[393] Barr Cross-Media Hydrology, p. 9, autop. 293 Appendix C to PolyMet Cross-Media Mercury, *supra.*
[394] See pp. 17-19, 23-24 of these comments, *supra*.

Second Creek (SD026) expected to increase mercury concentrations and mercury deposition from Project air sources is also focused in the Second Creek watershed.[395]

The PolyMet cross-media analysis suggests that, after the south mine site wetland, the highest sulfide deposition based on fugitive dust and $PM_{2.5}$ from stacks was in the watershed of Unnamed Creek, monitoring location PM-11 on the northwest side of the tailings basin.[396] It is difficult to determine where the highest levels of dust deposition will be predicted at the mine site once modeling includes drill core blasting in mine pits; blasting of overburden, waste rock; and wind erosion from waste rock stockpiles on the mine site.

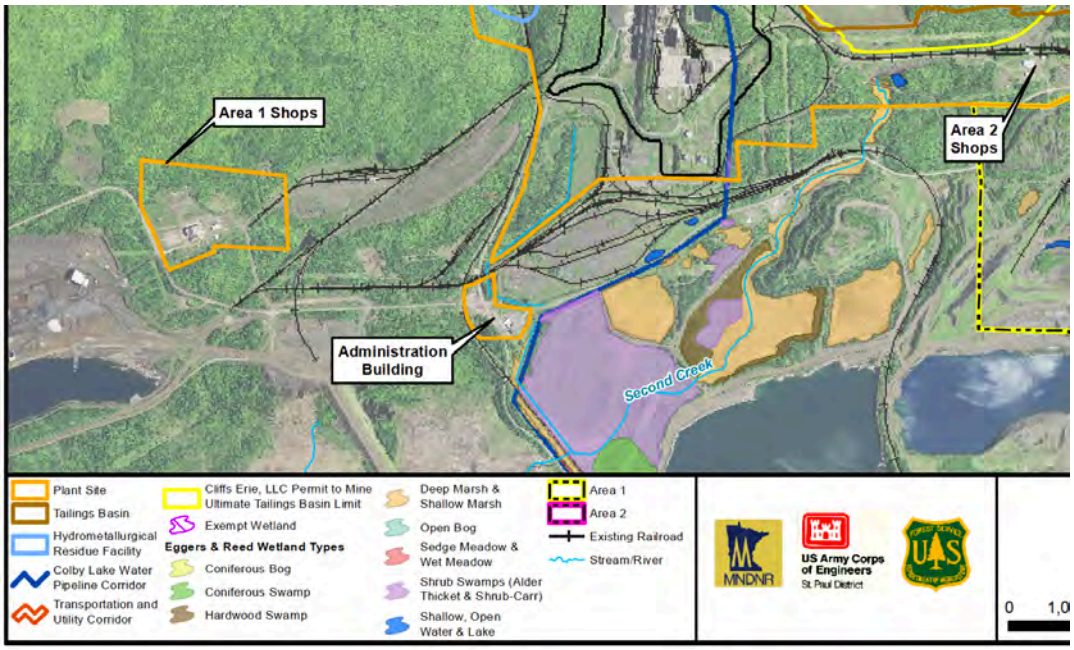
There are also locations on the south side of the tailings site and on both the north and south sides of the mine site where PM_{10} is at least three times the background level.[397]



Cumulative cross-media analysis of the *South Tailings Site* considering mercury loading, mercury release from sediments and mercury methylation would include impacts of sulfate and mercury seepage through groundwater and direct discharge, sulfate deposition from dust and stack emissions and mercury air deposition.

There are wetlands that would provide a *South Tailings Site* at which to model methylation. The wetlands include shrub swamps (alder thicket), deep and shallow marsh and small areas of coniferous and hardwood swamp:[398]

[395] PolyMet Cross-Media Mercury, *supra*, p. 124, *see also* Large Figure 13, attached as Exhibit 61.
[396] *Id*., p. 78.
[397] TSD Draft Air Permit Attach. 1 *supra*, Large Figure Q4-3, attached as Exhibit 65.
[398] PolyMet FEIS, supra, Fig. 4.2.3-6 Wetland Community Types – Plant Site, attached as Exhibit 66.



Selection of a *North Tailings Site* wetland would allow analysis of cumulative effects on mercury loading and methylation reflecting hydrologic changes from tailings seepage collection, sulfate and mercury loading from uncaptured tailings seepage, direct discharge of sulfate and mercury to wetlands, and air deposition of mercury and sulfur compounds through dust and stack emissions.[399]

A *North Mine Site* wetland would allow analysis of cumulative effects on mercury methylation resulting from sulfate and mercury loading through Category 1 seepage and East Pit seepage, hydrologic changes resulting from East Pit dewatering, sulfide deposition, including PM_{10}, from vehicle emissions and fugitive dust from blasting and stocpile wind erosion, and mercury emissions from vehicles and mineral dust. *North Mine Site* wetlands near the East Pit and the Category 1 waste rock stockpile, include coniferous bog wetlands, are likely to be particularly methylating environments.[400]

G) Modeling and analysis that systematically minimize the cumulative potential for mercury and methylmercury impacts.

Comments to this point have highlighted assumptions and exclusions that undermine the integrity of the cross-media analysis and suggest that it systematically minimizes the effects of the PolyMet mine project on mercury loading, mercury release from sediments, and mercury methylation and transport to downstream waters.

This final section addresses two overarching issues that further undermine the application of PolyMet's analysis to support either an NPDES/SDS permit or Section 401 certification. First, PolyMet's mercury mass balance is erroneous as well as simplistic. Second, PolyMet's

[399] *Id.*, *see* Fig. 4.2.3-5 Wetland Community Types – Area 2 and Plant Site, attached as Exhibit 67.
[400] *Id.*, *see* Fig. 4.2.3-2 Wetland Community Types Mine Site, *supra*, attached as Exhibit 34.

"cumulative" analysis reflects watershed-wide dilution of selected sources of loading rather than stream-watershed dynamics reflecting the full range of potential factors could affect mercury and methylmercury production, release and transport.

Although PolyMet's cross-media analysis makes a brief and contrived foray into assessment of mercury methylation, its cumulative assessment returns to the mercury mass balance model promoted during the course of environmental review. Even without the level of detail contained in the cross-media report, Dr. Branfireun criticized the mass balance model as "cheaper and easier" method that "can be presented as definitive to a non-expert," emphasizing that "a mass balance model *cannot* by definition incorporate mechanistically the input and removal processes for mercury, and *cannot* address the biogeochemical aspects of mercury methylation across the landscape which are at the root of the potential impacts associated with the PolyMet proposal."[401]

With PolyMet's method of deriving its mercury and sulfate mass balance calculations exposed more thoroughly in the cross-media analysis and NPDES/SDS application, this criticism seems prescient. As in the environmental review process, PolyMet claims that an increase in mercury resulting from project activities is more than balanced by the capture of stormwater and groundwater containing mercury in the Partridge River watershed and by water capture resulting from operation of tailings seepage collection affecting the Embarrass River watershed.[402]

In the NPDES analysis, PolyMet assumes that there are no project contributions to Partridge River watershed mercury loading at the mine site; there are only reductions in mercury as a result of capture of non-contact runoff and groundwater that contain mercury at concentrations above the Great Lakes standard (1.3 ng/L) under background conditions.[403] No seepage, overflow or channeling of surface water from mine site lined or unlined sources of potential mercury loading are even considered.[404]

At Second Creek, PolyMet assumes mercury loading from the tailings site is only from treated wastewater discharge, even though an average of 140 gallons per minute seeped untreated from the existing tailings basin to Second Creek in 2016 despite the pumpback system and an average of 767 gallons per minute of untreated wastewater similarly escaped capture in 2017.[405] PolyMet also assumes, although no mercury removal treatment has been tested, demonstrated or required for tailings seepage,[406] that the only tailings site mercury input is surface discharge with a mercury concentration of 1.3 ng/L, and credits the Project for the "loss" of mercury loading from Colby Lake pumping to the tailings site as a further reduction of mercury to the Partridge River watershed.[407] No leakage from the large quantity of mercury in the hydrometallurgical residue facility is modeled.

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[401] Branfireun 2015, *supra*, Exhibit 57, p.13.
[402] PolyMet Cross-Media Mercury, *supra*, p. 90; Barr 2017 Mercury Mass Balance, supra, pp. 19, 21, autop. 363, 365, Attachment F to PolyMet NPDES/SDS App. Vol. III, *supra*.
[403] *Id*., Large Table 1, autop. 375.
[404] See pp. 49-53 of these comments, *supra*.
[405] See p. 18 of these comments, *supra*.
[406] *See* pp. 37-40 of these comments, *supra*
[407] Barr 2017 Mercury Mass Balance, supra, Large Table 1, autop. 375 in Attachment F to PolyMet NPDES/SDS App. Vol. III, *supra*.

In the Embarrass River watershed, PolyMet's mass balance model assumes only 21 gallons per minute of tailings basin seepage and claims that mercury concentrations in the seepage will be only 1.5 ng/L to derive credit for seepage capture. The only Project additions to mercury loading are small runoff and background groundwater redirections from a drainage swale.[408]

In addition to making the unsupportable assumptions noted above, all of which minimize Project mercury impacts, PolyMet's NPDES mercury mass balance analysis considers no mercury air deposition and no mercury methylation resulting from sulfate loading.[409]

The PolyMet cross-media analysis does not improve on the basic errors in the underlying mercury mass balance in order to estimate mercury methylation. It merely compounds them. As discussed previously in this section, the cross-media analysis considers no sulfate loading from bedrock groundwater, surficial aquifers or surface water affected by sulfate in estimating mercury methylation potential in any wetlands or sediments. The cross-media analysis does not evaluate the effects of hydrologic changes from seepage collection and mine dewatering on wetlands that are already highly methylating, as compared to the controls in peer-reviewed literature.[410]

Even where the cross-media analysis adds atmospheric deposition of mercury and sulfate to its calculations, the underlying assumptions and methods preclude significance in its findings. For mercury air deposition, PolyMet's cross-media analysis fails to model local deposition to the mine site, even though its own estimates identify 317 grams of mercury that could impact the Upper Partridge River watershed. Then, PolyMet's assessment excludes 100 percent of the mercury deposited to uplands and wetlands, reducing the watershed area modeled for mercury air deposition impacts by more than 99 percent.[411]

A modest change in any of these assumptions would change conclusions reached about mercury impacts from the PolyMet Project.

Even in evaluating mercury methylation resulting from sulfate air deposition, PolyMet's cross media analysis excluded stack emissions most likely to deposit locally (PM_{10} and wet deposition of finer particles and gases) and multiple sources of mine site and transportation corridor particles, including dust from blasting in mine pits and of overburden, waste rock and ore, dust from wind erosion of ore and waste rock stockpiles and any particles larger than 1/1000 of an inch in size.[412] PolyMet further assumed that particles would only weather for a year, so that much of the sulfide deposited in mineral dust would not be released.[413]

Even with all of the exclusions and limiting assumptions applied by PolyMet, the single wetland of interest assessed by PolyMet was predicted to experience a 32% increase in sulfate loading as

[408] *Id*., Large Table 1, autop. 374.
[409] The Barr 2017 Mercury Mass Balance models a decrease of 1.3 grams per year (g/yr) in the Embarrass River, a decrease of 6.4 g/yr in the Upper Partridge River and a decrease of 8.7 g/yr in the Lower Partridge River.
[410] *See* Sections 5 (A) through (C) of these comments, *supra*
[411] *See* Section 5 (E) of these comments, *supra*.
[412] *See* Section 5 (D) of these comments, *supra*.
[413] *See* PolyMet Cross-Media Mercury, *supra*, pp. 74, 76, 85, Table 4-3.

compared to background and a 16% increase in methylmercury as a result solely of sulfide dust impacts.[414]

However, for its "cumulative" analysis, the cross-media report did not estimate the various factors, including but not limited to sulfate air deposition, that would increase mercury methylation in localized wetlands and sediments impacted by the Project. Instead PolyMet diluted its calculation of sulfur air deposition - which already excluded numerous emission sources – over entire watersheds and concluded that sulfate increases from air sources were not sufficient to increase mercury methylation.[415]

The analysis excluded seepage and surface water sources of sulfate or mercury loading to methylating wetlands and sediments, assumed project mercury loading was limited to wastewater discharge at 1.3 ng/L, and credited the PolyMet project with substantial reductions in methylmercury as a result of reducing flows in the Partridge River and Embarrass River watersheds.[416]

Having reduced the perfect storm of factors with the potential to increase mercury release, methylation, and transport to the effects of dispersing some atmospheric sources of sulfate over large watersheds, the unsurprising if deceptive conclusion reached in the PolyMet cross-media analysis was that neither methylmercury increases in the water column nor methylmercury increases in fish would be significant.[417]

PolyMet concluded that sulfate from Project air emissions could cause a small increase (0.003 to 0.005 ng/L) in water column methylmercury in the Partridge River and Embarrass River watersheds, but this small increase would not be "measurable."[418] The only "measurable" change PolyMet admitted was an increase in mercury due to surface discharge of treated water at the headwaters of Second Creek (SD026).[419] The MPCA accepted the conclusion reached in PolyMet's cross-media analysis that there would be no measurable change of mercury in water or fish as a result of sulfur deposition, without questioning the exclusions on which this conclusion was based.[420] More generally, the MPCA also denied that the Project would result in measurable changes to water quality downstream in the St. Louis River.[421]

The PolyMet cross-media analysis, however detailed in its calculations, appears to be willfully blind to the cumulative scope of project impacts on mercury in the water column and mercury in fish from mercury air emissions to wetlands as well as open waters; mercury loading from treated and untreated surface water and from seepage through groundwater; mercury release from sediments and mercury methylation resulting from sulfate seepage through groundwater,

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[414] *Id*., Table 4-4, p. 87.
[415] See PolyMet Cross-Media Mercury, *supra*, Table 4-4, p. 87.
[416] PolyMet Cross-Media Mercury, *supra,* Table 4-5, p. 88; Table 4-6, pp. 89-90; Table 5-1, p. 117; p.123; Tables 5-5 and 5-6, pp. 126-127, and Appendix G.
[417] *Id*., Table 4-7, p. 90; Table 6-2, p. 132, Appendix G.
[418] *Id*., p. 4.
[419] *Id*., pp. 4-5.
[420] MPCA Conclusions and Recommendations Related to Poly Met Mining, Inc., NorthMet Project "Cross-Media Analysis to Assess Potential Effects on Water Quality from Project-Related Deposition of Sulfur and Metal Air Emissions," Jan. 5, 2018, p. 2. The MPCA did, however, question whether assumptions regarding release of sulfate were overly conservative, pp. 6-9.
[421] MPCA NPDES/SDS Fact Sheet, *supra*, p. 87.

sulfate release from surface water, sulfur air deposition, and hydrologic changes affecting wetlands and streams at both the mine site and the tailings site.

It is in PolyMet's interest to provide regulators and the public with a lengthy analysis of the elephant's trunk and to insist that it has proved that the elephant is a small and pliable creature incapable of crushing damage, let alone a rampage. We should know better.

If the MPCA were to evaluate the full scope of mercury and sulfur compound emissions and releases that would result from the PolyMet Project, the impacts of hydrologic changes, and the mechanisms for methylmercury export and bioaccumulation to downstream waters, the Agency would be forced to conclude that there is no reasonable assurance that the PolyMet copper-nickel mine project would not contribute to mercury impairments in downstream waters, degrade downstream waters not yet designated as impaired for mercury, and endanger the environment and human health. As Brian Branfireun summarized at the close of environmental review, "It is my opinion that the NorthMet development could create a substantial risk of ecologically significant increases in water column and fish methylmercury concentrations in downstream waters, including the St. Louis River."[422]

6. The antidegradation analysis performed for the PolyMet Project with respect to pollutants other than mercury and methylmercury is inadequate for NPDES/SDS permitting or for Section 401 certification.

Both federal and state laws preclude permitting of facilities or certification of activities that degrade water quality when there are one or more possible alternatives available to prevent or lessen the degradation.[423] In the Lake Superior Basin, if the pollutants in question are not bioaccumulative chemicals of concern, Chapter 7050 antidegradation standards apply.

The MPCA may not approve a proposed activity if prudent and feasible prevention, treatment, or loading offset alternatives exist that would avoid degradation of existing high water quality. Even if the MPCA finds that prudent and feasible prevention, treatment, or loading offset alternatives are not available to avoid degradation, a proposed activity shall be approved only when the commissioner makes a finding that degradation will be prudently and feasibly minimized and that the proposed activity is necessary to accommodate important economic or social changes in the geographic area in which degradation of existing high water quality is anticipated.[424]

Minnesota rules also set policy to prevent degradation of groundwater, requiring that industrial waste be controlled "as may be necessary to ensure that to ensure that to the maximum practicable extent the underground waters of the state are maintained at their natural quality." To relax this protection, a determination must be made not only that a change is justifiable by reason of necessary economic or social development, but that the degradation "will not preclude appropriate beneficial present and future uses of the waters."[425]

[422] Branfireun 2015, *supra*, Exhibit 57, p. 27.
[423] 40 C.F.R. § 131.12(a)(2)(ii); Minn. R. 7050.0265.
[424] Minn. R. 7050.0265, subp. 5, item A and item B.
[425] Minn. R. 7060.0500.

This analysis cannot be performed tautologically. It must consider all impacts of a project on water quality, not just those that the regulator has already decided will be prudently minimized under the existing plan for a facility that has been deemed necessary for an economic objective.

The MPCA's analysis of degradation resulting from the PolyMet is deficient in at least the following respects: A) The MPCA fails to analyze the degradation of surface water and groundwater at the mine site and plant site that would result from releases of pollutants by the PolyMet project to bedrock groundwater and surficial aquifers; B) The MPCA fails to consider best practices that would serve as feasible and prudent prevention and mitigation measures to would avoid or minimize that degradation.

A) Failure to analyze degradation resulting from release of pollutants to bedrock groundwater and surficial aquifers.

In the first and second Sections of these comments, we detailed requirements under the federal Clean Water Act to protect waters of the United States from discharge through hydrologically connected groundwater and the deficiencies in PolyMet's proposed plans for mine site and plant site waste and seepage containment that may cause or contribute to a violation of Minnesota water quality standards.

The same deficiencies in siting and seepage containment at the tailings basin, deficiencies in seepage containment at the Category 1 waste rockpile, poor choices in location of hydrometallurgical residue waste storage, and failure to address movement of contaminants from mine pit walls would result in degradation of both surface water and groundwater and the mine site and the plant. Liner leakage and potential overflow of waste storage basins, particularly where they have not been designed to accommodate maximum precipitation, could contaminate the mine site surficial aquifer as well as mine site surface water. As noted previously in discussing mercury and methylmercury concerns, there is no assurance that mine site "non-contact" stormwater won't in fact be contaminated – by blasting, vehicle exhaust, dust, and air deposition – even that stormwater doesn't actually touch mine pits or stockpiles.

The PolyMet Project environmental review contained no analysis of propagation through fractures or faults in bedrock and only a minimal examination of the potential effects on water quality of pollutants propagating through surficial groundwater. The NPDES/SDS permitting record is yet more deficient. As summarized by the Agency, "The MPCA's review of the Antidegradation Evaluation presented in the NPDES/SDS permit application focused on the proposed discharge from the Plant Site WWTS. For the duration of the first permit cycle, and for at least the proposed active mining period of the project, this will be the only process water discharge to surface waters authorized under this permit."[426]

The MPCA acknowledged that the discharge of treated effluent from the plant site wastewater treatment system (WWTS) would result in degradation of water quality parameters, but chose to disregard the environmental review modeling subjected to federal and public review in favor of a

[426] MPCA NPDES/SDS Fact Sheet, Attachment 3 ("MPCA NPDES/SDS Fact Sheet Attach. 3") Jan. 10, 2018, p. 27.

new PolyMet design model that would reduce findings of degradation.[427] In any case, the MPCA assumed without analysis that neither increased levels of contaminants in PolyMet tailings seepage as compared to seepage from a closed taconite project, the level of groundwater flow that will remain despite the pumpback system at the headwaters of Second Creek, or the seepage that will escape capture from the dirt trench around the north side of the tailings basin that the PolyMet project will result in degradation. According to MPCA's overly trusting predictions, the PolyMet tailings plan will "cut off movement associated with former LTVSMC tailings basin" and thus result in an improvement in water quality for sulfate and salty parameters.[428] The MPCA did not discuss the effects of tailings seepage on groundwater contamination with lead or surface water contamination with copper, nickel and other metals toxic to aquatic life,[429] which contaminants are far less elevated in existing tailings seepage.

Although the PolyMet FEIS failed to determine where mine site surficial contaminants would first daylight to surface waters, this document provided a prediction of the level of contaminants in mine site surficial aquifer flow paths at the property line. These locations may be at or near the places where seepage first surfaces to wetlands. For the East Pit Category 2/3 flowpath, the Proposed Action aluminum is predicted at 339 µg/L, an increase to 576% of the modeled continuation of existing conditions (CEC) scenario and nearly three times the 125 µg/L water quality standard. Cobalt is predicted at 10.5 µg/L, an increase to 1,117% of the modeled CEC scenario and more than twice the 5 µg/L water quality standard. For the Overburden Storage and Laydown Area at the old property boundary, aluminum is predicted at 139 µg/L, an increase to 236% of the CEC level, also above the 125 µg/L water quality standard. For the West Pit flowpath at the property boundary, a cobalt concentration of 33.1 µg/L is predicted for the Proposed Action, which would be an increase to 3,521% of the modeled CEC scenario and more than six times the 5 µg/L water quality standard. Lead concentrations in the West Pit Flowpath are predicted at 5.2 µg/L – an increase to 800% of the modeled CEC scenario and four times the applicable 1.3 µg/L water quality standard for lead.[430]

If the concentrations of solutes modeled for the CEC in the flowpaths when they reach the Partridge River are the same as CEC levels modeled for the same flowpaths at the property line,[431] applying the ratios of relative differences provided in the FEIS, cobalt, aluminum, and lead would still violate applicable water quality standards at the point where they reach the Partridge River a mile away. In the PolyMet FEIS, cobalt reaching the Partridge River from the West Pit Flowpath could reach 24.3 times the CEC level, thus estimated at 22.8 µg/L -- four times the 5 µg/L water quality standard. Aluminum from the East Pit Category 2/3 Flowpath could be 2.9 times the CEC level, thus estimated at 171 µg/L -- considerably above the 125 µg/L water quality standard. Lead from the West Pit Flowpath could be 5.8 times the CEC level, thus estimated at 3.8 µg/L -- nearly three times the 1.3 µg/L chronic water quality standard for the

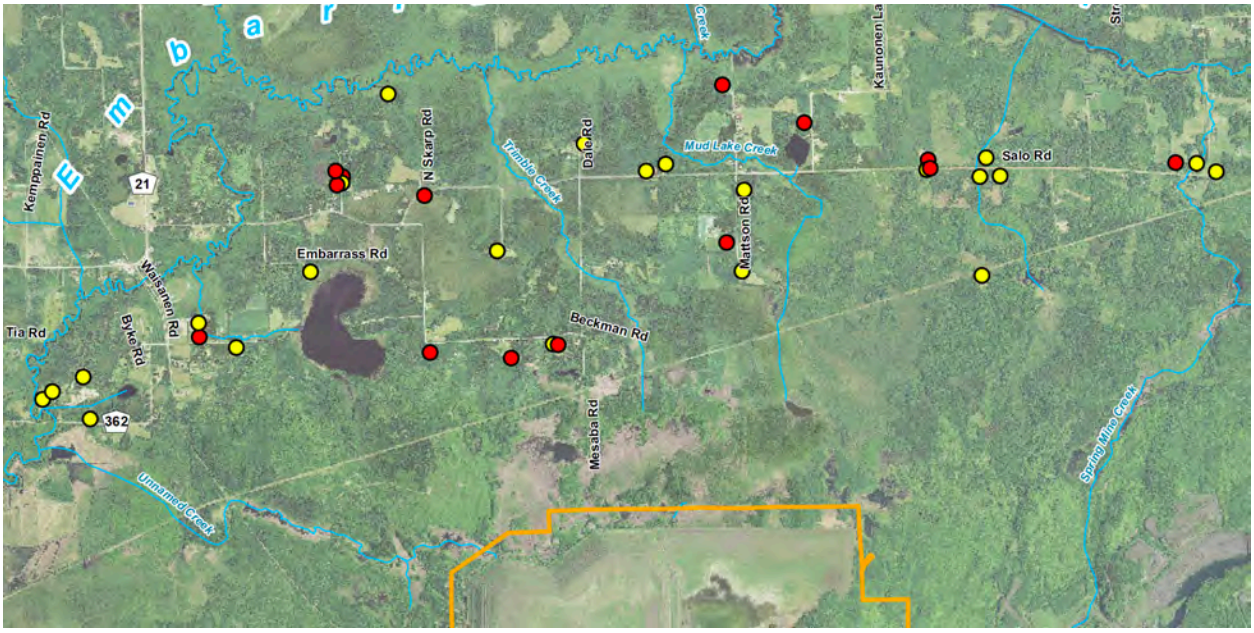
[427] *Id*., p. 17. Although the results of PolyMet's new modeling are evident, we were unable to find information on the methods and assumptions supporting the new conclusions.
[428] MPCA NPDES/SDS Fact Sheet Attach. 3, *supra*, p. 2.
[429] See discussion of North Toe seepage parameters at pp. 14-15, *supra* and discussion of South Toe seepage parameters at pp. 18-19 in these comments, *supra*.
[430] PolyMet FEIS, *supra*, Table 5.2.2-23, p. 5-129; maximum P90 concentrations are predicted. Existing baseline levels of hardness in the Partridge River near the mine site are 37 mg/L (FEIS, 4-87, Table 4.2.2-13), so the chronic water quality standard for lead is 1.3 µg/L pursuant to Minn. R. 7050.0222, subp. 4.
[431] The CEC flowpath levels are estimated based on PolyMet FEIS, *supra*, 5-129, Table 5.2.2-23.

Partridge River. Mine site seepage to the Partridge River would also reflect substantial increases in flowpath concentrations of chloride, sulfate, beryllium, cadmium, selenium, and zinc.[432]

The FEIS data cited above suggest a potential that substantial degradation of water quality would result from mine site seepage of pollutants. None of these sources of degradation were analyzed in the MPCA's antidegradation review.

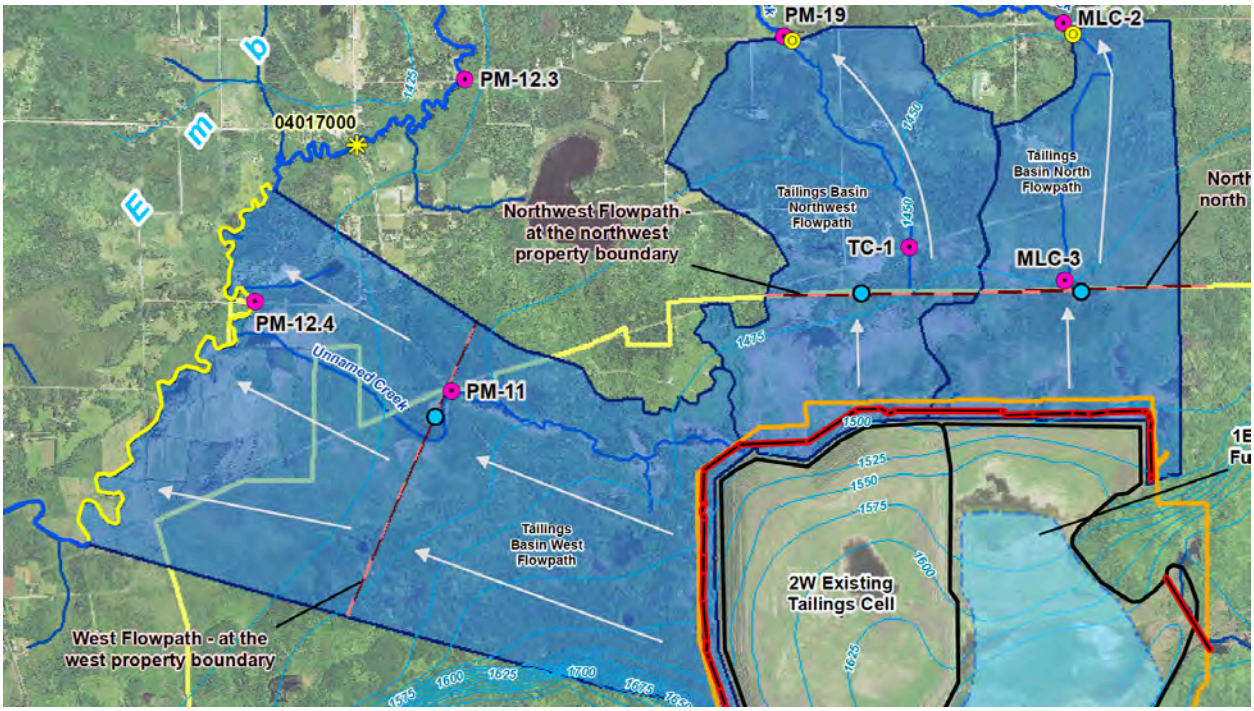
In the course of environmental review of the PolyMet project the Commissioner of the Minnesota Department of Health, Dr. Edward Ehlinger, expressed concern that fracture patterns may affect the Duluth Complex in St. Louis County, suggesting that fractures "may act as possibly conduits for higher rates of groundwater flow" through bedrock.[433] The map of tailings site fractures, first prepared by J.D. Lehr and then produced by a consultant for PolyMet, shows fault lines on both the northwest and northeast sides of the proposed PolyMet tailings basin.[434]

Since the proposed PolyMet plant and tailings site is located along the highest reaches of their Embarrass River subwatershed, groundwater in the surficial aquifer flows across the tailings site and toward the Embarrass River.[435] Between the tailing site and the Embarrass River, there are 38 wells (all dots), only 23 (red dots) of which were sampled by PolyMet during the course of environmental review.[436]



[432] PolyMet FEIS, *supra*, 5-130, Table 5.2.2-24.
[433] E. Ehlinger, M.D., MDH Commissioner, Comments on NorthMet Mining Project and Land Exchange, Mar. 13, 2014, p. 1 Exhibit 68.
[434] See Lehr 2014, *supra*, Figure 1, Exhibit 18, autop. 49; Large Figure 1 Bedrock Geology, *supra*, Exhibit 39.
[435] MPCA National Pollutant Discharge Elimination System /State Disposal System (NPDES/SDS) Permit Program Fact Sheet ("MPCA NPDES/SDS Fact Sheet Attach. 4") Jan. 10, 2018, pp. 10-11.
[436] PolyMet FEIS, Figure 4.2.2-18, Residential Well Locations Between the Tailings Basin and the Embarrass River, attached as Exhibit 69.

The PolyMet FEIS illustration of the groundwater flowpath from the tailings site flows toward many of these residential wells, as well as to the Embarrass River and its tributary creeks.[437]



Manganese contamination of groundwater and residential wells between the PolyMet tailings site and the Embarrass River raises particular concerns. EPA's secondary maximum contaminant level for manganese is 50 micrograms per liter (µg/L), and Minnesota's health-based limit on manganese in drinking water, based on neurotoxic effects on infants, children and adults, is 100 µg/L .[438]

Concentrations of manganese draining north toward residential wells would be 863.6 µg/L at the north toe; 1,311.5 µg/L at the west toe; and 1,378.2 µg/L at the northwest toe.[439] These levels range from 86 to more than 137 times the groundwater level set by the Minnesota Department of Health to prevent deficits in learning, memory, attention and motor skills.[440] Concentrations of lead in tailings toe seepage would be 13.7 at the west toe and 57.8 at the north toe.[441] The EPA's maximum contaminant level goal for lead is *zero* "based on the best available science which shows there is no safe level of exposure to lead."[442]

[437] PolyMet FEIS, Figure 5.2.2-9, Plant Site Surface and Groundwater Flowpaths, attached as Exhibit 70.
[438] The EPA secondary maximum contaminant level is applicable under Minn. R. 7050.0221, subp. 1, item B. The Minnesota Health Department Human Health-Based Water Guidance for manganese is provided at http://www.health.state.mn.us/divs/eh/risk/guidance/gw/table.html.
[439] PolyMet Water Mgt. – Plant, in Appx. 11.3 of the PolyMet PTM Application, Large Tables 3, 4 and 5; levels reflect the P90 average at mine year 20.
[440] MDH, Manganese and Drinking Water Fact Sheet, updated 2012, Exhibit 71.
[441] PolyMet Water Mgt. – Plant, in Appx. 11.3 of the PolyMet PTM Application, Large Tables 3, and 5; levels reflect the P90 average at mine year 20
[442] See EPA, What are EPA's drinking water regulations for lead? Available at https://safewater.zendesk.com/hc/en-us/articles/211401938-4-What-are-EPA-s-drinking-water-regulations-for-lead-

The MPCA may have relied on the sanguine and unsupported assumptions in the PolyMet FEIS about the rate of seepage collection from unlined facilities to assume copper-nickel mine tailings seepage would not degrade groundwater. If these assumptions are the basis for MPCA's conclusions that degradation will be avoided, they should be reflected clearly and specifically as NPDES/SDS permit conditions, the violation of which will be directly enforceable. If neither the MPCA nor PolyMet wish to be bound by the performance specifications used to justify the choice of a dirt trench around an unlined mound as seepage containment, consideration of other and better practices to minimize degradation becomes essential.

B) Failure to consider best practices to prevent and minimize degradation.

Focusing primarily on PolyMet's proposed treatment of tailings seepage with reverse osmosis, the MPCA determined "there is no prudent and feasible prevention, treatment, or loading offset alternative available to completely avoid degradation of these waters." The MPCA continued, "The only way the project could eliminate degradation would be to not discharge any water at all."[443]

WaterLegacy believes that, apart from the need to require specific treatment for mercury removal,[444] reverse osmosis may be the best available technology to treat tailings and process wastewater. Although we believe that the economic benefits of the project are overstated, we understand that the environmental review record contains evidence to support the MPCA's conclusion that the PolyMet Project would have economic benefits.

In addition to endorsing the reverse osmosis water quality treatment system, the MPCA more generally concluded, after reviewing a list of alternatives adopted by PolyMet in the environmental review process, "The proposed project will implement the best technology in practice and treatment."[445] MPCA also determined that due to a "combination of controls and mitigation" the proposed PolyMet Project would meet rule requirements for protection of groundwater.[446]

With respect to preventing the release of untreated wastewater and contamination to groundwater and surface water, we believe that many aspects of the PolyMet project reflect outmoded technology and unreasonable rejection of best available alternatives for siting, design and management. The MPCA's antidegradation review did not conduct sufficient analysis to determine that there are no prudent and feasible alternatives to prevent or minimize degradation.

The PolyMet FEIS predicted that its tailings facility would produce 3,880 gallons per minute (gpm) of seepage,[447] equivalent to 2,041,000,000 gallons per year. As detailed in Section 2 of these comments and in the preceding discussion in this Section, tailings seepage will be highly contaminated for many parameters that affect aquatic life, wildlife and human health. Despite PolyMet's representations, it is clear from experience at the LTVSMC tailing basin with the Second Creek pumpback system as well as the examples cited by PolyMet, that tailings seepage

[443] MPCA NPDES/SDS Fact Sheet Attach. 3, *supra*, p. 26
[444] See Section 4 of these comments, pp. 37-40, supra.
[445] MPCA NPDES/SDS Fact Sheet Attach 3, *supra*, pp. 1, 26-27.
[446] MPCA NPDES/SDS Fact Sheet Attach. 4, *supra*, p. 1
[447] PolyMet FEIS, *supra*, 5-179, 5-181.

will escape capture and degrade both surface and groundwater at a much higher rate than in PolyMet's rosy predictions. Nothing in the Draft NPDES/SDS permit would prevent this disadvantageous outcome.

A dry stack tailings facility on a liner system sited on a secure foundation, rather than on tailings and slimes, is the best available technology to limit the potential impacts of PolyMet tailings leachate and seepage on groundwater and surface water quality. Dry stack tailings disposal reduces seepage rates, as compared with slurry tailings. It is estimated that the seepage rate from slurry tailings is 6.4 gallons per minute (gpm) per acre, the seepage rate from paste or thickened tailings 0.06 gpm per acre and the seepage from dry filtered tailings 0.007 gpm per acre.[448]

Although WaterLegacy understands that the MPCA may appreciate the opportunity to secure treatment of seepage from the LTVSMC taconite tailings basin, the PolyMet Project must stand on its own. Action can and should be taken separately by the MPCA to update and issue permits and compel remediation at many mining facilities operating and polluting under expired and unenforced permits, including but not limited to the LTVSMC tailings basin. A copper-nickel mine facility proposed in 2018 should not use a site and technology adopted in the 1950s and since shown to be inadequate to protect water quality even from less toxic taconite wastes.

In addition to adoption of best available tailings waste storage practices, WaterLegacy believes that there are several feasible and prudent measures that should be required by MPCA to prevent and minimize degradation of water quality under routine operations and to minimize the threat of yet more severe degradation. First, the MPCA should deny any NPDES/SDS permit that allows PolyMet to site the hydrometallurgical residue facility (HRF) on the site currently proposed. Even if all wetlands were excavated and a sound foundation built, the proximity to the flotation tailings dam could result in seepage to the HRF or instability of dams on the south side of the tailings basin.[449] The threats of HRF liner deformation or dam instability are substantial and the results could be catastrophic; the feasible and prudent alternative is to find a better site.

At the mine site, there are several feasible and prudent alternatives that would avoid or minimize degradation of water quality. Each should be required by the MPCA as conditions of an NPDES/SDS permit that will degrade water entering the Partridge River and may result in violations of water quality standards as well as degradation in surface waters more proximate to contaminant sources. The Category 1 waste rock stockpile should be lined, if in-pit disposal has a legal impediment. The overburden storage and laydown area (OSLA) and its associated pond should also be lined, and the Equalization Basins should have a dual liner system. All sumps, ponds and basins at the mine site should be designed and managed to contain a maximum precipitation event - rather than a 25-year or 100-year rainfall - without overflow, and a back-up system should be in place to prevent overflow of untreated wastewater should the primary system of pumps and pipes to the mine site fail.

[448] *See* John Lupo, Ph.D., P.E., Dry Stack Tailings Overview, Slide Presentation, 2012, excerpts attached as Exhibit 72, autop. 14.
[449] PolyMet Geotechnical Data Package – Volume 2- Hydrometallurgical Residue Facility, July 11, 2016, p. 41, http://files.dnr.state.mn.us/lands_minerals/northmet/dam-safety/references/geotech_data_package_vol2_hrf_v6.pdf

7. The Draft 401 Certification for the PolyMet Project is premature given the substantive deficiencies of the Draft NPDES/SDS Permit; the absence of an up-to-date Section 404 application; and the lack of a current evaluation of the effects of Project water appropriations on the Upper Partridge River headwaters.

In addition to the substantive grounds for denial of the Section 401 certification requested by PolyMet for its NorthMet copper-mine project, the MPCA should deny the Draft 401 Certification because it is premature due to substantial unresolved controversy regarding the Draft NPDES/SDS permit, the absence of an up-to-date Clean Water Act Section 404 application, let alone a draft permit, and due to the lack of any evaluation of the effects of PolyMet Project water appropriations on Upper Partridge River stream resources that may include degradation of class 2 beneficial uses and may require mitigation.

MPCA precedent justifies denial of Section 401 certification until such time as the NPDES/SDS process is complete. In 2011, the MPCA was asked to certify under Section 401 an Aitkin Agri-Peat operation that would have opened several hundred acres of wetlands for harvesting. Public comments on the draft permit raised questions about the adequacy of its limits on mercury effluent, and the MPCA determined that certification was premature until the permitting concerns had been resolved:

> At this time, the MPCA is unable to provide the requested Section 401 Water Quality Certification, which would indicate that the proposed project can reasonably be anticipated to comply with the applicable state water quality standards. . . The process for issuing the required MPCA NPDES/SDS permit for this project, which would regulate the project's proposed wastewater discharges to ensure compliance with the applicable water quality standards, has not yet concluded (due, in part, to substantive comments received on the draft permit placed on public notice.[450]

The MPCA also found that Section 401 certification was premature due to the ongoing process not yet completed to address compensatory wetland mitigation with the U. S. Army Corps of Engineers ("Army Corps"). Certification was denied without prejudice. The MPCA did not make a final determination on the project's ability to comply with water quality standards, and allowed the applicant to reapply for certification after "the required wastewater permitting process is concluded" and "after a final proposed compensatory mitigation plan is furnished."[451]

In the PolyMet Project case, the MPCA has only recently placed the Draft NPDES/SDS Permit on public notice. As reflected in the preceding pages of substantive comments and our request for a contested case hearing, the NPDES/SDS process for the PolyMet Project is far from concluding. The discharges proposed in the current Draft Permit would not comply with Minnesota or federal law, and it remains to be seen whether the Draft Permit can be modified so that the PolyMet Project could be certified under Section 401. The time is not ripe for Section 401 certification.

[450] MPCA, Letter to Aitkin Agri-Peat re Section 401 Denial, Oct. 28, 2011, Exhibit 73, p. 1,
[451] *Id*., p. 2.

The MPCA noted in its 401 Certification Fact Sheet that PolyMet has arranged for and secured regulatory approvals for the purchase of 1282 wetland mitigation credits from the Superior Mitigation Bank, and has secured the option to purchase up to 1,800 wetland credits, which the MPCA perceived were sufficient to address wetland mitigation requirements.[452] However, the MPCA did not suggest that the additional purchase option had obtained regulatory approval.

The MPCA is undoubtedly aware that there is no current Section 404 application for the PolyMet Project, and that the last Revised Wetland Permit Application for the PolyMet NorthMet Project was submitted on August 19, 2013. The August 19, 2013 Application, for which a second public notice was issued in November 2015, contained a description of mitigation requirements and a proposal for wetland mitigation that are substantially different from PolyMet's current proposal,[453] summarized in the MPCA's 401 Certification Fact Sheet. No current Section 404 permit application has been submitted by PolyMet and no public notice has been provided for the new assessments of wetlands mitigation requirements and the new compensatory mitigation plan.

The Army Corps is continuing to work on a compensatory mitigation plan for wetlands that will be directly or indirectly impacted by the PolyMet mine project.

However, after environmental review was completed, PolyMet submitted requests for water appropriations permits reflecting uses of water from the Partridge River watershed an order of magnitude greater than the appropriation that had been described in the final environmental impact statement for the PolyMet Project. In the FEIS, the highest aggregated estimate of appropriations from the mine site Partridge River headwaters watershed was 2,845 gallons per minute (gpm).[454] The total of all draft PolyMet Water Appropriations Permits from the Partridge River headwaters watershed for the mine site is now 28,820 gpm.[455]

Our comments on the Draft PolyMet Water Appropriations Permits requested an evaluation of whether the proposed mine site appropriations would assure an adequate supply of water in the Partridge River headwaters, would preserve groundwater use for future generations, and would not harm ecosystems under applicable State law in Chapter 103G. We also requested, under applicable law, that the Minnesota Department of Natural Resources (DNR) set a protective elevation for the Upper Partridge River and define periods of low flows when during which appropriations that remove water from the headwaters watershed must be disallowed.[456]

In addition to the requirements pertinent to DNR water appropriations permits, Minnesota water quality standards set a narrative standard for all class 2 waters that includes degradation resulting from "material alteration" of the physical qualities of a water body "to the extent that attainable or previously existing beneficial uses are actually or potentially lost."[457] We know of no analysis done since PolyMet applications for water appropriation permits were filed to determine whether

[452] MPCA 401 Certification Fact Sheet, pp. 8, 18.
[453] USACE, Notice of Availability of Final Environmental Impact Statement and Supplemental Notice for Section 404 Permit Application, Proposed NorthMet Mine, Nov. 13, 2015, pp. 5-6, Exhibit 74
[454] PolyMet FEIS, *supra*, 5-146, verifying that the highest appropriation is taken from each time frame.
[455] WaterLegacy, Comments on Draft PolyMet Water Appropriation Permits, Aug. 31, 2017, p. 2, Exhibit 75.
[456] *Id.*, pp. 5-6; Chapter 103G citations within DNR jurisdiction are provided in the attached comments.
[457] Minn. R. 7050.0150, subp. 3 and subp. 4, item B.

the proposed appropriation would result in a material alteration of the Partridge River headwaters so that attainable or previously existing beneficial uses are actually or potentially lost.

Until this analysis is done, the MPCA has no assurance that PolyMet's proposed water appropriations from the Partridge River headwaters will comply with either water appropriations statutes or water quality standards. It is possible that degradation of the beneficial use of the Upper Partridge River for aquatic life will preclude permitting or Section 401 certification. It is possible that changes will need to be made in the PolyMet Project plan in order to comply with Minnesota law. At the least, it is possible that the Project will require a plan for stream mitigation to replace functions lost or impaired due to consumption of water resources in the Partridge River headwaters.

Hydrologic information provided in an appendix to the Cross-Media Analysis done for PolyMet to support Section 401 certification suggests there are some discrepancies in assessment of hydrology and water consumption in the Partridge River headwaters where the mine site is proposed. The Hydrology Summary confirms, "Water that will be captured in the mine water system will be removed from the Partridge River watershed, resulting in a reduction in runoff and baseflow to the Partridge River during operations."[458]

The Hydrology Summary states that average annual flow under existing conditions at SW004 in the Upper Partridge River south of the proposed mine site is 13.97 cubic feet per second (cfs), which will be reduced to 13.37 cfs during the time of maximum mine site impacts.[459] However, as noted above, PolyMet's applications for water appropriations permits and the draft permits prepared in response to these applications would authorize 28,820 gallons per minute in appropriations from the mine site, equivalent to 64.21cfs. Although it is anticipated that PolyMet, on average, would consume less water than allowed under the these permits, in their most recent drafts PolyMet's water appropriations permits would allow the Company to consume *more than four-and-a-half times* the average annual flow of water in the Partridge River at the mine site.

The MPCA has already recognized that, under existing conditions, the Partridge River headwaters have a 7Q10 flow (lowest 7-day average that occurs once every 10 years) of zero, so effluent limits cannot be protective if they allow any dilution of discharged pollutants.[460] In its detailed comments during environmental review, the EPA explained that "projected increased contaminant concentrations above baseline or 'no action' levels" and "the concomitant effect of projected lower stream flows" should be considered together to determine whether the PolyMet project would degrade water quality.[461]

In a prior case involving headwaters stream impacts resulting from the expansion of U.S. Steel's Minntac mine, the MPCA denied Section 401 certification without prejudice until it could be determined whether stream impacts complied with state water quality law. The MPCA

[458] Barr Cross-Media Hydrology, *supra*, p. 2, autop. 286 in Appendix C to PolyMet Cross-Media Mercury, *supra*.
[459] *Id*.,
[460] MPCA NPDES/SDS Fact Sheet Attach. 3, i, pp. 2-3.
[461] EPA PSDEIS Comments, *supra*, Exhibit 10, p. 7.

emphasized that stream mitigation for the project was required and that stream mitigation issues must be resolved before a 401 certification could be granted.[462]

WaterLegacy has provided the MPCA with compelling substantive grounds to deny issuance of the PolyMet Draft NPDES/SDS Permit and to deny Section 401 certification for the PolyMet copper-nickel mine project. In addition, based on the current state of the record, we believe that issuance of Section 401 certification is premature. Substantive issues pertaining to the NPDES/SDS permit are highly contested, the Section 404 application has not been made current, and new issues raised by PolyMet's applications for water appropriations permits have yet to be analyzed to determine whether appropriations from Partridge River headwaters would comply with either DNR permitting law or Minnesota narrative water quality standards.

PETITION FOR CONTESTED CASE HEARING

Petitioner, WaterLegacy, submits this Petition for Contested Case Hearing to the Minnesota Pollution Control Agency (MPCA) pursuant to Minnesota Statutes 14.57(a), and Minnesota Rules 7000.1800 and 7000.1900.

There is legal precedent for conducting a contested case hearing on the question of Section 401 certification,[463] as well as precedent requiring a contested case on an NPDES wastewater permit when material issues of disputed fact had not been adequately addressed.[464]

In the Introduction to our preceding comments, WaterLegacy has previously provided our **Statement of Interest**, setting forth both our organizational mission and the interests of the members we represent in preserving the water quality at risk if the Draft NPDES/SDS Permit or the Draft Section 401 Certification for the PolyMet Project were to be approved.[465]

Specific Relief Requested,[466]

1. WaterLegacy requests that the MPCA reject and deny the Draft NPDES/SDS Permit MN0071013 for the PolyMet NorthMet Copper-Nickel Mine Project ("PolyMet Project")

2. WaterLegacy requests that the MPCA reject and deny the Draft Clean Water Act Section 401 Certification for the PolyMet Project.

3 WaterLegacy requests that the MPCA grant our Petition for Contested Case Hearing submitted in furtherance of WaterLegacy's mission and the representation of our members whose individual interests would be impaired by the approval and issuance of

[462] MPCA Letter to U.S. Steel Corporation Denial of 401 Certification for Minntac Mine Expansion, June 25, 2013, Exhibit 76, pp. 1-2.
[463] *Bailey v. MPCA*, 2008 Minn. App. Unpub. LEXIS 1323, 2008 WL 4777917 (Minn. Ct. App., Nov. 4, 2008), attached as Exhibit 77.
[464] *In re City of Owatonna's NPDES/SDS Proposed Permit Reissuance*, 672 N.W. 2d 921 (Minn. Ct. App. 2004)
[465] See pp. 1-2 of these comments, *supra*.
[466] Minn. R. 7001.1800, subp. 1, subp. 2, item A(2).

the Draft NPDES/SDS Permit and/or the Draft Section 401 Certification for the PolyMet Project.

Statement of Reasons for Contested Case Hearing[467]
The reasonable basis underlying each of the disputed material issues of fact in this Petition for Contested Case Hearing is set forth in greater detail in WaterLegacy's preceding comments opposing issuance of the Draft NPDES/SDS Permit for the PolyMet Project and opposing Section 401 certification for the PolyMet Project.

WaterLegacy requests a contested case hearing on the following specific disputed material issues of fact within the authority of the commissioner:

1. As detailed in Section 2 of the preceding comments, Petitioner disputes whether the Draft NPDES/SDS Permit violates the Clean Water Act and its implementing regulations by failing to perform reasonable potential analysis or establish permit conditions to prevent discharge to surface water through hydrologically connected groundwater from causing or contributing to an exceedance of Minnesota water quality standards. In addition to questions of federal and state law under the jurisdiction of the commissioner, material facts defined more thoroughly in the comment text are disputed, including but not limited to the following:

   A) whether PolyMet Project mine site and plant site discharge to surface water through hydrologically connected groundwater has the reasonable potential to cause or contribute to an exceedance of Minnesota water quality standards, particularly although not exclusively as a result of uncontained tailing seepage and Category 1 waste rock stockpile seepage;

   B) whether the Draft NPDES/SDS Permit contains specific and enforceable conditions and limits to prevent PolyMet Project discharge from causing or contributing to exceedance of Minnesota water quality standards as a result of discharge to surface water through hydrologically connected groundwater.

2. As detailed in Section 3 of the preceding comments, Petitioner disputes whether the monitoring proposed in the Draft NPDES/SDS violates the Clean Water Act and Minnesota law due to its insufficiency to detect if and when PolyMet Project discharge through groundwater causes or contributes to violations of Minnesota water quality standards or results in unpermitted discharge. In addition to questions of federal and state law under the jurisdiction of the commissioner, material facts defined more thoroughly in the comment text are disputed, including but not limited to the following:

   A) whether monitoring locations are insufficient to detect where and when PolyMet contaminants discharged through groundwater seepage daylight to surface waters of the United States;

[467] Minn. R. 7000.1800, subp. 1, subp. 2, item A (1)-(2); Minn. R. 7000.1900, subp. 1, items A, B and C.

B) whether monitoring locations are insufficient to detect whether PolyMet direct discharge to surface waters causes or contributes to exceedance of water quality standards or violations of NPDES/SDS permit conditions;

C) whether monitoring locations are insufficient to detect leakage from lined sources of contamination and propagation of PolyMet Project contaminants through the surficial aquifer; and

D) whether monitoring parameters are insufficient or inappropriate to detect failure of seepage containment systems at the tailings waste facility and Category 1 waste rock stockpile and to detect northward flow of PolyMet pollutants.

3. As detailed in Section 4 of the preceding comments, Petitioner disputes whether the Draft NPDES/SDS permit for the PolyMet Project violates the Clean Water Act and Minnesota law by failing to set limits for direct discharge to surface water with the reasonable potential to cause or contribute to violation of Minnesota water quality standards. In addition to questions of federal and state law under the jurisdiction of the commissioner, material facts defined more thoroughly in the comment text are disputed, including but not limited to the following:

   A) whether PolyMet has demonstrated the efficacy of the proposed water quality treatment at the large scale needed and for the influent resulting from its copper-nickel mining Project;

   B) whether there is a reasonable potential that mercury in PolyMet Project direct discharge to surface water will exceed the Lake Superior Basin water quality standard and contribute to mercury impairment in receiving waters due to faulty influent assumptions and the lack of mercury removal technology in the proposed wastewater treatment system;

   C) whether there is a reasonable potential that specific conductivity in PolyMet Project direct discharge to surface water will exceed Minnesota narrative water quality criteria precluding toxicity and will contribute to fishes impairment in receiving waters; and

   D) whether the Draft NPDES/SDS would allow direct discharge to surface waters from existing LTVSMC tailings that have the reasonable potential to cause or contribute to exceedance of Minnesota water quality standards.

4. As detailed in Section 5 of the preceding comments, Petitioner disputes whether the PolyMet Project is likely to cause or contribute to violations of Minnesota water quality standards for mercury, increase mercury impairments, and degrade water quality by increasing mercury levels, thus precluding NPDES permit issuance or assurances needed for 401certification under federal and state law. In addition to questions of federal and state law under the jurisdiction of the commissioner, material facts defined more thoroughly in the comment text are disputed. Each of the disputed material facts A)

through G) described below would demonstrate that the PolyMet cross-media analysis on which the MPCA relies for its Draft 401 certification is unsound, so that the MPCA has no reasonable assurance that the PolyMet Project would not result in violations of water quality standards, and endanger the environment and human health:

A) whether the exclusion of impacts of sulfate and mercury seepage from groundwater renders the cross-media analysis of mercury unsound;

B) whether the failure to evaluate the impacts of sulfate and mercury in surface water discharged or released to wetlands renders the cross-media analysis of mercury unsound;

C) whether the failure to analyze the effects of changes in wetland and stream hydrology on mercury release, methylation and transport renders the cross-media analysis of mercury unsound;

D) whether the exclusion of impacts on mercury methylation from multiple sources of sulfur and sulfide deposition at both the mine site and the plant site renders the cross-media mercury analysis unsound;

E) whether exclusion of mine site mercury deposition, water bodies closest to mercury sources, and mercury deposition to wetlands in analyzing mercury and methylmercury increases renders the cross-media analysis of mercury unsound;

F) whether the misleading analysis of mercury methylation in a single "wetland of interest, both because of distorting exclusions and because of its singularity, renders the cross-media analysis of mercury unsound;

G) whether modeling and analysis that systematically minimize the cumulative potential for mercury and methylmercury impacts renders the cross-media analysis of mercury unsound; and

H) whether as a result of the above there is a reasonable potential that PolyMet Project effects on sulfate and mercury in groundwater seepage, sulfate and mercury in surface water discharged or released to wetlands, hydrological impacts including the drying and wetting of high methylating wetlands, and air deposition of both mercury and various forms of sulfur particulates and gases will have a cumulative effect to increase mercury in the water column and methylmercury in fish tissue in receiving waters, including Great Lakes Basin waters that are already impaired due to excessive levels of this bioaccumulative substance of immediate concern.

5. As detailed in Section 6 of the preceding comments, Petitioner disputes whether the antidegradation analysis performed for the PolyMet Project with respect to pollutants other than mercury and methylmercury is inadequate for NPDES/SDS permitting or for Section 401 certification. In addition to questions of federal and state law under the

jurisdiction of the commissioner, material facts defined more thoroughly in the comment text are disputed, including but not limited to the following:

(A) whether the failure to analyze impacts from release of pollutants to groundwater and surficial aquifers renders the antidegradation analysis inadequate to determine whether the PolyMet Project would degrade surface water and/or groundwater; and

(B) whether the failure to consider best practices to prevent and minimize degradation, including dry stack tailings, liners and relocation of a concentrated waste facility from an unstable foundation, renders the antidegradation analysis inadequate for NPDES/SDS permitting or to support Section 401 certification.

Section 1 of the preceding comments stating that the Clean Water Act requires the MPCA to set enforceable NPDES permit limits to prevent discharge to surface waters through hydrologically connected groundwater from causing or contributing to a violation of State surface water quality standards, including antidegradation, is argued purely as a matter of law.

Section 7 of the preceding comments stating that Section 401 certification of the PolyMet Project is premature given substantive controversy over the Draft NPDES/SDS permit, the lack of a current Section 404 application and the lack of a current evaluation of the effects of the Project on Partridge River headwaters stream flow is argued purely as a mater of law and policy.

Benefits of Contested Case Hearing[468]

WaterLegacy believes that holding a contested case hearing would allow the introduction of information that would aid the commissioner in resolving the disputed facts and making a final decision on the matter. In addition, a contested case proceeding where evidence can be heard by a neutral fact finder would serve the public interest and advance the mission of the MPCA under Minnesota statutes as well as under the Agency's delegated authority under the Clean Water Act. A contested case proceeding would allow review of the law and the facts in an open and public setting outside the context of MPCA failure to regulate mining pollution and outside the pressures placed on regulators to meet the requirements of mining interests rather than the public interests in the purity of air, water and land resources for which the agency was established. [469]

Proposed Witnesses and Summary of Evidence[470]

Petitioner's evidence may include oral or written testimony by any persons commenting, providing expert opinions or informally providing expert consultation in the course of environmental review of the PolyMet project; in response to the public release of draft Water Appropriations permits, draft Dam Safety permits, the draft Permit to Mine for the PolyMet project, the Draft NPDES/SDS Permit and/or the Draft 401 Certification for the PolyMet Project. Petitioner may also pose questions to regulatory staff, representatives of the permit applicant and experts to clarify unresolved questions in the record as to the nature of PolyMet plans, proposals, and risks.

[468] Minn. R. 7000.1900, Subp. 1, item C.
[469] Minn. Stat. §116.01.
[470] Minn. R. 7000.1800, subp. 1 and subp. 2, item B (1)-(3).

In addition to the exhibits submitted with these Comments and this Petition, Petitioner's documentary evidence may include any documents submitted by any parties in the course of PolyMet environmental review or in the course of responding to PolyMet draft Water Appropriations permits, draft Dam Safety permits, the draft Permit to Mine for the PolyMet project, the Draft NPDES/SDS Permit and/or the Draft 401 Certification for the PolyMet Project. Petitioner's documentary evidence may also include additional publications, references, expert reports, agency documents and records, or other documentary evidence pertinent to the issues raised in this Petition or in response to issues or matters that may potentially be raised by other parties. Petitioner is unable to determine at this point the length of time required to present these matters at a contested case hearing.

Petitioner expressly reserves the right not to be bound or limited to the witnesses, materials, or estimated time identified in this Petition if the requested contested case hearing is granted.[471]

CONCLUSION

On the basis of the Comments, Exhibits, and Petition for Contested Case Hearing submitted herein, and on the records from environmental review and permitting of the PolyMet project, including permits sought from other agencies and for other media, as well as records pertaining to the MPCA's Draft NPDES/SDS Permit and Draft 401 Certification for the PolyMet Project, and the authorities and references contained in these documents, WaterLegacy requests that the MPCA commissioner deny and reject the Draft NPDES/SDS Permit for the PolyMet Project and the Draft Section 401 Certification for the PolyMet Project and, should such denial and rejection not already be forthcoming, order a contested case hearing on the disputed material issues of fact identified in WaterLegacy's Petition for Contested Case Hearing.

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Respectfully submitted,

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[471] Minn. R. 7000.1800, subp. 1 and subp. 2, item C.