Fond du Lac Band of Lake Superior Chippewa
Reservation Business Committee

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August 3, 2021

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Re: Notification of Objection to NorthMet Mine Project, U.S. Army Corps Proposed Permit MVP-1999-05528-TJH

Dear Administrator Regan, Acting Regional Administrator Newton, District Engineer Col. Jansen, and Mr. Konickson:

The Fond du Lac Band of Lake Superior Chippewa ("Band") received notice from the U.S. Environmental Protection Agency ("EPA") on June 4, 2021 that discharges associated with a proposed U.S. Army Corps of Engineers' Clean Water Act ("CWA") Section 404 permit No. MVP-1999-05528-TJH ("404 Permit") for PolyMet Mining, Inc.'s NorthMet Mine Project may affect the quality of the Band's

waters. Pursuant to CWA Section 401(a)(2), 33 U.S.C. § 1341(a)(2), the Band has determined the discharges related to the proposed NorthMet Mine Project ("Project") will affect the quality of the Band's waters so as to violate the Band's water quality requirements.

This matter is on remand from the U.S. District Court for the District of Minnesota in *Fond du Lac Band of Lake Superior Chippewa v. Kurt Thiede, et al.*, Case No. 0:19-cv-02489-PJS-LIB (D. Minn.). The remand concerns the Band's claims that EPA and the Corps failed to comply with CWA Section 401(a)(2) regarding the Project.

In accordance with CWA Section 401(a)(2), the Band has reviewed water quality effects related to discharges from the Project. I am enclosing the Band's analysis, which sets forth the Band's determination that the Project will affect the quality of the Band's waters. The Band's analysis identifies the specific receiving waters and water quality requirements that will be affected. In addition, the Project will impact the Band's treaty resources and create environmental justice issues that your agencies must give appropriate consideration. Accordingly, the Band hereby notifies you of its objection to the proposed 404 Permit and requests a public hearing on the objection pursuant to CWA Section 401(a)(2).

The Corps' regulations require the public hearing be held within the Fond du Lac Reservation, 33 C.F.R. § 325.2(b)(1)(i). The Black Bear Casino in Carlton, MN would be a suitable location for the public hearing. We look forward to coordinating with you to finalize the necessary details for the hearing.

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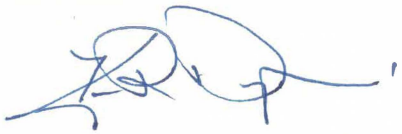
Sincerely,



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Enclosures

August 3, 2021

THE FOND DU LAC BAND OF LAKE SUPERIOR CHIPPEWA'S CLEAN WATER ACT SECTION 401(A)(2) "WILL AFFECT" ANALYSIS FOR POLYMET MINING, INC.'S NORTHMET MINE PROJECT

Developed by:

Fond du Lac Environmental Program

Dr. Brian Branfireun

Matthew Schweisberg, SPWS

Dr. Elsie Sunderland

Great Lakes Indian Fish and Wildlife Commission

I. INTRODUCTION

On June 4, 2021, the U.S. Environmental Protection Agency ("EPA") notified the Fond du Lac Band of Lake Superior Chippewa ("Band") pursuant to Clean Water Act ("CWA") Section 401(a)(2), 33 U.S.C. § 1341(a)(2), that discharges associated with PolyMet Mining, Inc.'s NorthMet Mine Project ("Project") may affect the Band's water quality.[1] Accordingly, the Band reviewed water quality effects related to discharges that may result from the Project in order to evaluate whether the discharges "will affect the quality of [the Band's] waters so as to violate any water quality requirements" in the Fond du Lac Reservation.[2] This review included reviewing information related to the Project, including but not limited to, the Final Environmental Impact Statement ("FEIS"), related PolyMet Permits and 401 Certification, and several maps and images of the watersheds for the Embarrass, Partridge, and St. Louis Rivers that show the numerous small streams and creeks that provide surface hydrologic connections from the Mine site, the Plant site, and Hydrometallurgical Tailings Facility to the aforementioned Rivers.

The Band was assisted in its review by subject matter experts Dr. Brian Branfireun, Senior Professional Wetland Scientist ("SPWS") Matthew Schweisberg, Dr. Elsie Sunderland, and the Great Lakes Indian Fish and Wildlife Commission ("GLIFWC") through John Coleman and Esteban Chiriboga. The credentials for these experts are located in Attachment 2, Exs. 30 at 7-21; Attachment 2, Ex. 31 at 7-12; and Attachment 3. Together, the Band and the subject matter experts developed this analysis.

This analysis incorporates by reference in its entirety the Band's April 30, 2021 submission, including expert work from Dr. Brian Branfireun and SPWS Matthew Schweisberg, to the U.S. EPA regarding the Band's determination that the Project may affect the Fond du Lac Reservation's wetland and other water resources due to non-compliance with the Band's water quality standards.[3] This analysis also relies on substantive content from prior expert opinions that Dr. Branfireun provided on the Project[4] in addition to other scientific literature that relates to:

- fate and transport of mercury and sulfate, and generation of mercury, methylmercury and sulfide in peat wetlands and associated streams and rivers;

- the fish and wildlife resources of the St. Louis River and the Fond du Lac Reservation; and

[1] Attachment 1 (EPA "May Affect" Notification and Analysis).
[2] 33 U.S.C. § 1341(a)(2).
[3] A full copy of the Band's April 30, 2021 Submission to the U.S. EPA ("April 30 Submission") is also being provided to the U.S. Army Corps of Engineers as part of this analysis. *See* Attachment 2. Attachment 2 has thirty-two separate exhibits. Dr. Branfireun's expert memorandum developed for the Band is Ex. 30 and Mr. Schweisberg's expert memorandum is Ex. 31.
[4] Those prior expert memoranda can be found in Attachment 2, at Exs. 24, 25 and 27.

- the fate and transport of (methyl)mercury, sulfate and dissolved organic matter.

As part of this analysis, GLIFWC provided maps to the Band showing four zones of estimated drawdown of groundwater around the Mine site resulting from dewatering activities during construction and operation. Those maps are discussed and included below. GLIFWC also provided maps showing the areas of extend and wetland types adjacent to the Mine tailings pond, in the riparian zones, and in the 100-year floodplain of the Embarrass, Partridge and St. Louis Rivers. Those maps were reviewed as part of this analysis.

Based on this analysis, the Band has determined the Project's discharges will affect the Band's water quality so as to violate water quality requirements within the Fond du Lac Reservation. The Section 404 Permit issued by the U.S. Corps of Engineers should be revoked and not be issued because those violations of the Band's water quality requirements violate Section 401(a)(2) of the CWA and Section 230.10(b) of the CWA regulations (aka the "404(b)(1) Guidelines") governing issuance of Section 404 permits (40 C.F.R. Part 230).[5] Moreover, there are not adequate protective permit conditions nor corrective actions that can be imposed based on the Project as designed to prevent these violations. A summary of the main conclusions reached as part of this determination is set forth in the next section.

II. SUMMARY CONCLUSIONS

- Based on a conservative estimate the Project will fill and alter nearly 7,000 acres of diverse wetlands. This acreage figure does not include indirect impacts downstream of the Mine, e.g., riparian wetlands along the St. Louis River, especially along the Fond du Lac Reservation.

- The Project will result in the discharge of millions of gallons of water containing inorganic mercury, sulfate, and dissolved organic matter to tributaries of the Embarrass and Partridge Rivers that already contain elevated levels of methylmercury and will lead to additional formation and accumulation of this potent neurotoxicant in the ecosystem. The Embarrass and Partridge Rivers are direct tributaries of the St. Louis River, which forms the northern and eastern boundaries of the Fond du Lac Reservation.

- The discharges from the Project will result in:

    - direct and seepage discharges of sulfate and inorganic mercury to extensive headwater wetlands of the Embarrass River Watershed; and,

    - seven direct wastewater outfalls to the headwater wetlands of Trimble Creek, increasing water loading by several million gallons per day that will supply hundreds of pounds of sulfate per year (based on PolyMet's own data).

[5] Moreover, the adverse impacts to aquatic resources described herein will cause or contribute to significant degradation of Waters of the U.S., a violation of Section 230.10(c) of the 404(b)(1) Guidelines that underscores why the Section 404 Permit should be revoked and not issued.

- There are extensive riparian (floodplain) wetlands along the Embarrass, Partridge and St. Louis River that contain organic-rich soils, i.e., mucks and peats. Fluctuating water levels in these riparian muck and peat wetlands will create ideal conditions (i.e., oxidation and reduction) for enhancing the methylation of mercury, thereby facilitating the accumulation of this bioavailable species of mercury in the food-web.

- As there is a direct surface water connection between the Project and the riparian wetlands along and within the Fond du Lac Reservation, it is expected that the contaminated discharges from the Project will be transported to these riparian wetlands.

- In addition, it is expected that late fall, winter, and spring flooding on the St. Louis River will back up waters into at least the three major streams on the Fond du Lac Reservation—Fond du Lac Creek, Stoney Brook, and Simian Creek—and the wetlands adjacent to those streams. As such, the contaminated discharges from the Project will reach and contaminate at least these three streams and their adjacent wetlands within the Fond du Lac Reservation.

- Fish and wildlife resources that use the St. Louis River, its riparian wetlands, the three streams, and their adjacent wetlands will be exposed to elevated levels of methylmercury, the mercury form that biomagnifies by a million-fold or more in predatory species. Biomagnification occurs when plant and animal foods containing methylmercury are consumed by higher trophic level species, resulting in the highest levels of exposure in predatory organisms including wildlife such as piscivorous birds and humans that catch and consume fish. Thus, methylmercury exposure is a concern for wetland dependent wildlife from the St. Louis River, the three principal streams, and their adjacent wetlands. Among other species, the Band's restoration efforts for lake sturgeon will likely be compromised.

- Project discharges will affect biogeochemical functions of these wetlands, which in turn will substantially affect their ecological functions. The discharges (in addition to any seepage that is not contained by the proposed and wholly unproven seepage capture system) will result in an increase in methylmercury production at a location in the watershed that will result in significant environmental harm—headwater wetlands that provide water and solutes to downstream reaches, especially the St. Louis River and its riparian wetlands.

- The weight of the scientific evidence indicates that the Project will affect water column and fish methylmercury concentrations in surface waters downstream of the Project, including the St. Louis River.

- The Project will affect methylmercury concentrations in downstream waters in two ways that are directly linked to Mine operations:

    - The direct effect of loading water, sulfate and (inorganic) mercury to headwater wetlands and surface waters will increase net methylmercury production resulting in a measurable contribution to the cumulative loading of methylmercury to the St. Louis

River. Increasing methylmercury concentrations are expected to result in increases in exposure of fish and wildlife, as well as Band member consumers, and is neither accounted for in existing mass balances, nor is there an adequate monitoring plans to detect harm.

- Changes in regional wetland hydrology in the area of groundwater impact in the vicinity of the Project will have indirect effects that will enhance mercury, sulfate and methylmercury release in an area that data clearly indicate is already naturally susceptible to enhanced methylmercury production.

- Project-related changes in hydrology and the release of excess sulfate which stimulates the process of mercury methylation will enhance production of methylmercury both adjacent to the Project as well as more distal locations in the St. Louis River watershed and contribute to the load of methylmercury in surface waters. This methylmercury will bioaccumulate in biota, increasing exposures of fish-consuming wildlife and humans.

- The consumption of methylmercury contaminated foods by fish and wildlife and by Band members will impair the Band's Designated Uses for the St. Louis River and the three principal streams on the Fond du Lac Reservation as well as wetlands adjacent to those areas.

- The degradation of Fond du Lac Reservation waters and wetlands will result in non-compliance with the Band's Designated Uses and Antidegradation Water Quality Standards.

- Though somewhat speculative at this time, based on the economics of the Project,[6] there is a clear potential for PolyMet to have a need to expand the Project to recover a greater proportion of ore to ensure that the Project is economically feasible. If an expansion occurs, the adverse impacts described herein will increase substantially.

III. ANALYSIS

A. Background.

1. The Band's Water Quality Program.

Since May 1996, the Band has had treatment as State ("TAS") authority pursuant to the CWA.[7] EPA has approved the Band's water quality standards ("WQS"), which apply to all waters of the Fond du Lac Reservation.[8] The Band's WQS consist of designated uses, narrative and numeric criteria to protect those uses, and anti-degradation provisions. Among other things, the

[6] *See* Jim Kuipers P.E., Kuipers & Associates. PolyMet NorthMet Mine Economic Analysis, Form NI 43-101F1 Technical Report. Performed by M3, March 26, 2018.
[7] *See* 33 U.S.C. § 1377.
[8] *See* Attachment 2, Ex. 28 (Water Quality Standards of the Fond du Lac Reservation), https://www.epa.gov/sites/default/files/2014-12/documents/chippewa-tribe.pdf.

Band's WQS protect Band members in the exercise of their Treaty rights and the uses of water for subsistence purposes and to maintain their cultural and religious traditions.

The Band administers its water quality program and enforces its water quality requirements in order to protect, restore, and maintain the Reservation's water quality now and for future generations. For over 20 years, the Band has conducted a comprehensive monitoring program to evaluate the water quality of the Reservation's waters. The Band has also participated in various studies and collected data to analyze the effects of water quality on the condition and integrity of the Reservation's waters. The Band also issues certifications pursuant to CWA Section 401(a)(1) for discharges originating within the Reservation.

The Band has determined that mercury, (specifically the organic form, methylmercury), is a pollutant of particular concern because it contaminates aquatic life and bioaccumulates up the food chain. Exposure to methylmercury during pregnancy or in childhood has been associated with neurodevelopmental delays that persist over a lifetime (Debes et al., 2016). Other health effects include endocrine disruption and adverse impacts on cardiovascular health in adults and a broad suite of effects on behavior, fecundity, and reproduction in wildlife (Depew et al., 2012). Thus, increases in methylmercury in the aquatic systems surrounding the Project are expected to produce toxic effects on Band members and wildlife that consume the fish. The Band presently has fish consumption guidelines in place to protect public health, including a recommendation to limit consumption for women who are or may become pregnant and for all children under 15 years old. *See* Attachment 4 (Geyaabi Go Onishi Brochure). This recommendation advises that those tribal members consume significantly less traditional fish species on a week-to-week basis than the amount necessary for their subsistence, cultural, and religious practices.

2. Environmental Setting Summary.

a. The Project Area.

The Mine site is located on the eastern flank of the Mesabi Iron Range near the town of Hoyt Lakes in St. Louis County, Minnesota. The Mesabi Iron Range region has been mined for iron ore and lower-grade iron ore (called taconite) for over a century. Mining and ore processing for the Project will go on for at least 20 years and post-closure maintenance will continue for 200 or more years—essentially indefinitely. And processes included in the Project require large quantities of water that can divert and disrupt surface water and groundwater flows.

The Project includes several major components: a Mine site, a Plant site, a Hydrometallurgical facility, and a Transportation and Utility Corridor. According to the FEIS, the former LTV Steel Mining Company ("LTVSMC") processing plant and existing tailings basin (collectively "the Plant site") are located about 8 miles from the Mine site. The Plant site is approximately 4,500 acres, consisting mostly of the existing facilities and infrastructure. The existing tailings basin, which is unlined and was constructed beginning in the 1950s, has been inactive since 2001 and currently releases seepage with elevated concentrations of sulfate and total dissolved solids, among other constituents. The tailings basin consists of three cells totaling over

3,000 acres. The transportation and utility corridor connects the Mine site and Plant site and contains about 120 acres of land. The Project also includes plans for a seepage capture system as part of the tailing basin for the purpose of capturing and treating polluted wastewater.

The Project's Mine site will be located in the upper portion of the St. Louis River watershed. Two major rivers bracket the Mine site—the Partridge River to the south, and the Embarrass River to the north. In between the Mine site and the two major rivers are several named creeks (e.g., Spring Mine, Ridge, Yelp, Trimble, Rice Farm, Wetlegs, Longnose, Wyman) as well as numerous smaller unnamed creeks. These headwater creeks are fed by flows from wetlands and provide direct surface connections to the Embarrass and Partridge Rivers, and in turn to the St. Louis River.

The more than 3,000-acre Mine Site contains at least 1,100 acres of wetlands that mostly have been characterized as high quality. Vegetation communities present in the Project area include forests composed of aspen, paper birch, jack pine, balsam fir, white spruce, red pine, and white pine in the uplands. Wetland communities include conifer bogs, shrub swamps, cedar swamps, shallow marsh, sedge wet meadow, open bog, and hardwood swamp. Most of the wetlands are underlain by extensive peat soils.

The Partridge and Embarrass Rivers and many of the creeks contain valuable habitat for a diversity of fish and wildlife species. Among others, fish include northern pike, bluegill, northern rock bass, yellow perch, walleye, largemouth bass, black crappie, and channel catfish. According to the FEIS, fish surveys of the rivers and creeks that will be affected are limited.

Wildlife habitat in these watersheds supports species such as the monarch butterfly, northern leopard frog, common loon, hooded merganser, osprey, red-tailed hawk, ruffed grouse, spruce grouse, American woodcock, killdeer, common tern, belted kingfisher, pileated woodpecker, black-backed woodpecker, brown creeper, golden-crowned kinglet, Swainson's thrush, magnolia warbler, pine warbler, savannah sparrow, beaver, porcupine, black bear, and white-tailed deer. Federally- and state-listed species and species of special concern include Canada lynx, northern long-eared bat, gray wolf, moose, little brown bat, Eastern pipistrelle, northern goshawk, boreal owl, wood turtle, yellow rail, and the Quebec emerald dragonfly.

b. The Fond du Lac Reservation

Drainage from the Mine site via the Embarrass and Partridge Rivers enters the St. Louis River approximately at river mile 160, and drains downstream to the Fond du Lac Reservation, which begins approximately at river mile 65. The St. Louis River flows for approximately 30 miles along the northern and eastern boundary of the Fond du Lac Reservation. There are three major streams on the Fond du Lac Reservation that drain to the St. Louis River and provide direct surface water connections between the River and the Reservation—Stoney Brook (and Martin Branch, which drains to Stoney Brook), Simian Creek, and Fond du Lac Creek. In addition, there are numerous smaller unnamed creeks that drain to the three major streams as well as directly to the

St. Louis River. The Fond du Lac Reservation is approximately 43% wetlands.[9] Principal wetland types are forested, scrub shrub, emergent (i.e., shallow marsh), and aquatic bed (e.g., lilies).

At least four game fish species can be found in appreciable numbers: northern pike, walleye, smallmouth bass, and channel catfish. The channel catfish fishery remains the highest priority of Band members who regularly use the St. Louis River's fishery resources.[10]

Many, if not most, of the bird species listed above for the entire St. Louis River watershed are found on the Fond du Lac Reservation. In particular, several waterfowl and wading bird species use Reservation waters and wetlands, e.g., mallard, teal, wood duck, ringneck, coot, Canada geese, heron, sandhill cranes and egret. Trumpeter swan populations have been increasing on the lakes and ponds as well. Several birds of prey use Reservation lands, especially bald eagle and osprey.

Terrestrial and aquatic wildlife on the Reservation include moose, black bear, coyote, white-tailed deer, ruffed and sharp-tailed grouse, beaver, muskrat, mink, river otter, marten, fisher, snowshoe hare, and bobcat. Occasionally gray wolf and Canada lynx are observed on the Reservation.

c. Existing Conditions

As the Band indicated in its March 6, 2012, letter to the St. Paul District of the Army Corps of Engineers, Attachment 2, Ex. 3, mercury and specifically methylmercury in Reservation waters and wetlands are the principal health concerns of the Band. Mercury concentrations in the St. Louis River have exceeded the Band's chronic human health standard (0.77 ng/L) for more than a decade. Consumption of fish contaminated by methylmercury is the primary exposure pathway for Band members and wildlife, and existing monitoring data indicate levels are already elevated in many species that are consumed as food.[11] The Band continues to be especially concerned about any new or expanded discharges to the St. Louis River system upstream of the Reservation that will contribute to cumulative increases in mercury and sulfate loadings, enhance mercury methylation, and increase methylmercury bioaccumulation in fish and wetland dependent wildlife.

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[9] Fond du Lac Resource Management, 2018 Integrated Resource Management Plan, http://www.fdlrez.com/rm/downloads/FDL_IRMP-101817.pdf.

[10] *Id*.

[11] The Fond du Lac Environmental Program has collected and analyzed preferred game fish species from Reservation waters, including the St. Louis River, and worked closely with the Minnesota Department of Health to develop and communicate reservation-specific fish consumption guidance based upon the high mercury concentrations found. This data collection, funded through EPA tribal water quality monitoring grants, was in direct response to Band members' expressed concerns for health risks (to themselves and family members) associated with practicing traditional subsistence lifeways, specifically consuming locally harvested fish. Final reports for each of these sampling efforts were provided to EPA Region 5 in accordance with grant reporting requirements, and sampling was conducted under an EPA-approved Quality Assurance Project Plan.

The discharges from the Project will increase the loading of mercury, manganese,[12] and sulfate in the St. Louis River.[13] Both the Embarrass and Partridge Rivers are listed by the Minnesota Department of Natural Resources as impaired waters, from their headwaters to their confluence with the St. Louis River. The St. Louis River is listed as impaired for methylmercury in fish tissue where it forms the northern and eastern boundaries of the Reservation. There have been and continue to be fish consumption advisories for the St. Louis River that greatly affect the Band's members by inhibiting the traditional and safe consumption of fish.

d. Background on the Mercury Cycle

In the northern hemisphere, anthropogenic activities have resulted in large quantities of inorganic mercury being released to the atmosphere and a resulting 200% to 500% increase in deposition to ecosystems since ca. 1850. In terrestrial and freshwater environments, such as that found in Minnesota, inorganic mercury is converted to methylmercury (typically only a few percent of all mercury forms in the environment) in low-oxygen environments such as the sediments of lakes and slow-moving waters, and in wetlands (in particular peatlands) that support the activity of sulfate-reducing bacteria, principle methylators of mercury in freshwater environments. The methylation process is an enzymatic by-product of the sulfate-reduction reaction. Thus, nutrient-limited anaerobic environments that have a supply of inorganic mercury, sulfate, and organic matter (required for microbial metabolism) are likely net sources of methylmercury, with sulfate and organic matter being limiting (in that order). A primary mechanism of methylmercury loss in aquatic systems is through photodegradation by UV light. Methylmercury is the only form of mercury that bioaccumulates in aquatic systems and presents serious risks to consumers of higher trophic level fish because it can cross the blood-brain and placental barriers, unlike inorganic mercury (Debes et al., 2016).

B. Discharges from the Project.

The U.S. Army Corps of Engineers ("Corps") is required to ensure the Project's compliance with the Band's water quality requirements.[14] Several CWA permits have been issued to PolyMet for the Project, including: a CWA Section 404 permit from the Corps to discharge dredge and fill material;[15] a CWA Section 402 individual permit from the Minnesota Pollution Control Agency ("MPCA") to discharge pollutants; and multiple CWA Section 402 general

[12] Principal effects of manganese exposure in children include deficits in bone growth and immune function and somatic cell mutation. *See* Ykateryna D. Duka, Svetlana I. Ilchenko, Mykola M. Kharytonov, and Tetyana L. Vasylyeva. Impact of Open Manganese Mines on the Health of Children Dwelling in the Surrounding Area. Emerg. Health Threats J. 2011; 4: 10.3402.

[13] *See* prior Branfireun memoranda, *supra* n.4.

[14] 33 U.S.C. § 1341(a)(2).

[15] Of note, the Corps suspended PolyMet's CWA Section 404 Permit on March 17, 2021, and EPA's June 4 notification to the Band refers to that permit as a "proposed" permit. As explained above, that permit should be revoked, not just suspended.

construction stormwater permits from MPCA to discharge pollutants. The State of Minnesota has also issued a certification for the Project pursuant to CWA Section 401(a)(1). Significantly, neither the FEIS or any of these permits either addresses or ensures compliance with the Band's WQS. Similarly, the Project's FEIS fails to evaluate the Project's effects on the Band's waters.[16]

For example, the Section 404 permit would authorize PolyMet to dredge and fill wetlands. PolyMet's dredge and fill activities would result in the largest permitted destruction of wetlands in Minnesota's history. PolyMet will discharge dredged or fill material into wetlands, which would then either be removed and replaced by mine pits or excavated and replaced with fill material discharged to construct overburden and waste rock storage facilities, roads, storm and mine water management systems, tailings basin buttresses, the tailings basin seepage capture system, and utility corridors. PolyMet's discharges into wetlands will generate turbidity and suspended particulates that will then be conveyed via overland flow to downstream waters. PolyMet's dredge and fill activities will remove and dewater wetlands that are dominated by peat bogs, which will release and discharge significant amounts of dissolved organic matter as well as mercury into waters of the United States (some of which are already listed on the MPCA Section 303(d) list for mercury impairments), affecting the Band's downstream waters. The Section 404 permit does not discuss the Band's downstream water quality standards.

The Project's individual NPDES permit does not include water quality-based effluent limits for mercury sulfate, or specific conductance. The individual NDPES permit contains state-law based "operating limits" on an internal waste stream (not discharges to the environment) which are only arguably enforceable under the CWA. These "operating limits" are set to Minnesota's WQS, which are not nearly as stringent as the Band's WQS in certain respects. Both EPA and the Band recommended to MPCA that the individual NPDES permit contain water quality-based effluent limits for several pollutants, including mercury and sulfate. However, the NPDES permit does not contain any water quality-based effluent limits, nor does it consider risks posed by methylmercury exposures at all, despite mercury ultimately being the contaminant of concern with respect to human health.

The Project has four general construction stormwater NPDES permits from MPCA. PolyMet's general NPDES permit coverage would authorize PolyMet's discharges from the draining of over 900 acres of wetlands dominated by peat bogs. As EPA acknowledged, this activity is expected to release significant amounts of mercury into downstream navigable waters, including the Band's. A general NPDES construction stormwater permit, however, assumes compliance with WQS and does not include conditions to address specific issues regarding WQS.

[16] *See, e.g.*, FEIS 4-1 (FEIS's "discussion of the affected environment is limited to those resources that may be subject to potential environmental effects from . . . the NorthMet Project Proposed Action"), 4-19 (characterizing the hydrology and water quality "within the Partridge River and Embarrass River watersheds because these watersheds are expected to be affected by the NorthMet Project Proposed Action").

The Project also may result in other discharges that are not controlled at all under the CWA. PolyMet assumes at least 10% of untreated polluted water will seep through its proposed seepage capture system. As described below, this assumption is overly optimistic and entirely unproven. As such, it is expected that significantly more untreated polluted water will seep from the Project and discharge to jurisdictional waters with a direct hydrologic connection to the Band's waters.

Further, as described above the proposed tailings basin, which will be built on an existing tailings basin, currently discharges and seeps polluted water into jurisdictional waters with a direct hydrologic connection to the Band's waters. PolyMet's proposed tailings basin will be constructed using the upstream construction method and material for the dam would come from tailings and material borrowed from the LTVSMC dam and basins, as well as other waste rock. PolyMet's proposed tailings basin has a significant probability of failure, which would result in heavily polluted wastewater flowing or issuing out of the tailings basin.[17] These discharges would then flow into other jurisdictional waters with a direct hydrologic connection to the Band's waters.

Similarly, the drawdown effects from the Project discussed below will create significant ecological impacts and cause water containing mercury, including methylmercury, to flow or issue out of wetlands outside PolyMet's seepage capture system and into the small creeks that flow to the Embarrass and Partridge Rivers, all waters with a direct hydrologic connection to Fond du Lac Reservation waters.

C. Project De-Watering Operations Will Cause Changes in Regional Hydrology and the Release of Sulfate, Inorganic Mercury and Methylmercury from Impacted Wetlands.

In addition to the over 900 acres (according to the FEIS) of diverse and ecologically valuable wetlands that would be directly destroyed and altered by construction of Project, including the Mine site and operation of the Mine, the development and de-watering of the open pit will lower groundwater and surface water levels around the mine directly affecting an area that contains over 6000 acres of wetlands.[18] PolyMet has previously argued that site conditions preclude the application of the numerical model used to determine pit dewatering requirements to explicitly identify the extent of wetland impact, and as such only apply knowledge from analog sites. This argument has been dismissed in another expert Opinion (J.S. Price, 2017). Despite the

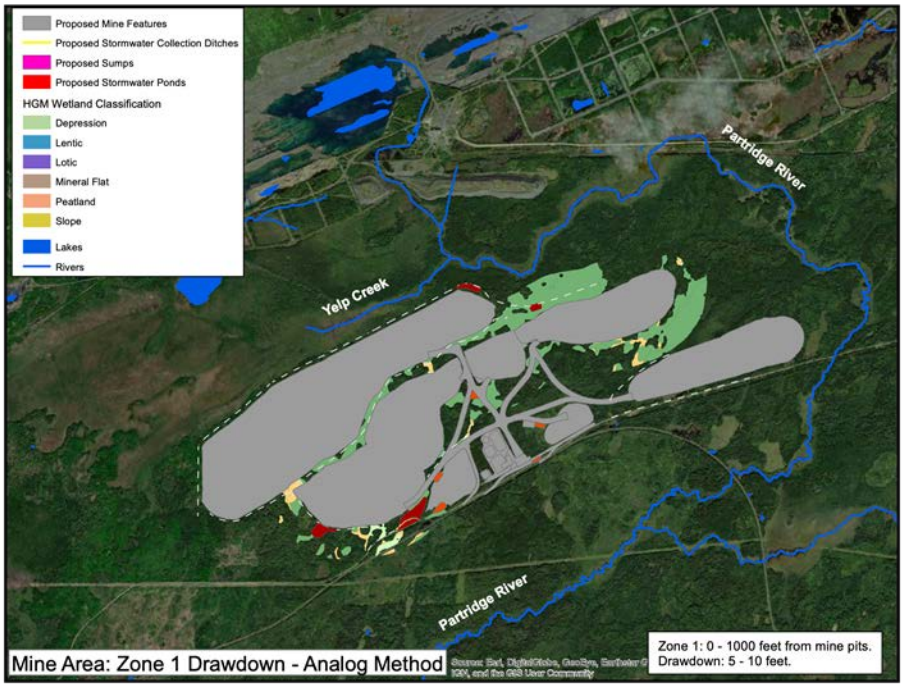
[17] *S.D. Warren Co. v. Maine Bd. of Envtl. Protection*, 547 U.S. 370, 376 (2006) (discharge under CWA Section 401 means water "flowing or issuing out"). Recent catastrophic upstream dam failures at Mount Polley in British Columbia and at Córrego do Feijão in Brumadinho, Brazil, show the costs and risk of upstream dam construction in this industry context. *See* Cherise Seucharan, *Mount Polley Mine Disaster: 3 Years Later Concerns Still Remain, CBC News,* Aug. 4, 2017 (https://www.cbc.ca/news/canada/british-columbia/mount-polley-mining-fears-1.4235913); Shasta Darlington, et al., *Brumadino Dam Collapse: A Tidal Wave of Mud*, N.Y. Times Feb. 9, 2019 (https://www.nytimes.com/interactive/2019/02/09/world/americas/brazil-dam-collapse.html).

[18] *See* Attachment 5 (PolyMet Wetlands Area Map by GLIFWC).

clear potential for impacts on surface water and wetland function, in the absence of a model, PolyMet asks that it be taken on faith that wetlands in the zones of impact would be largely unaffected by aquifer depressurization because they are hydrologically 'disconnected' from underlying groundwater systems. This unsubstantiated contention was consistently challenged in prior opinions (Branfireun, 2014; 2019), as it is neither supported by best available science, nor PolyMet's own data (or lack thereof) and expert opinions.

Maps developed by GLIFWC (included below)[19] show the approximate area of groundwater drawdown in four zones, which have ranges of potential surface dewatering effects ranging from severe (Zone 1 – closest to the mine pit) to modest-minimal (Zone 4, farthest)—

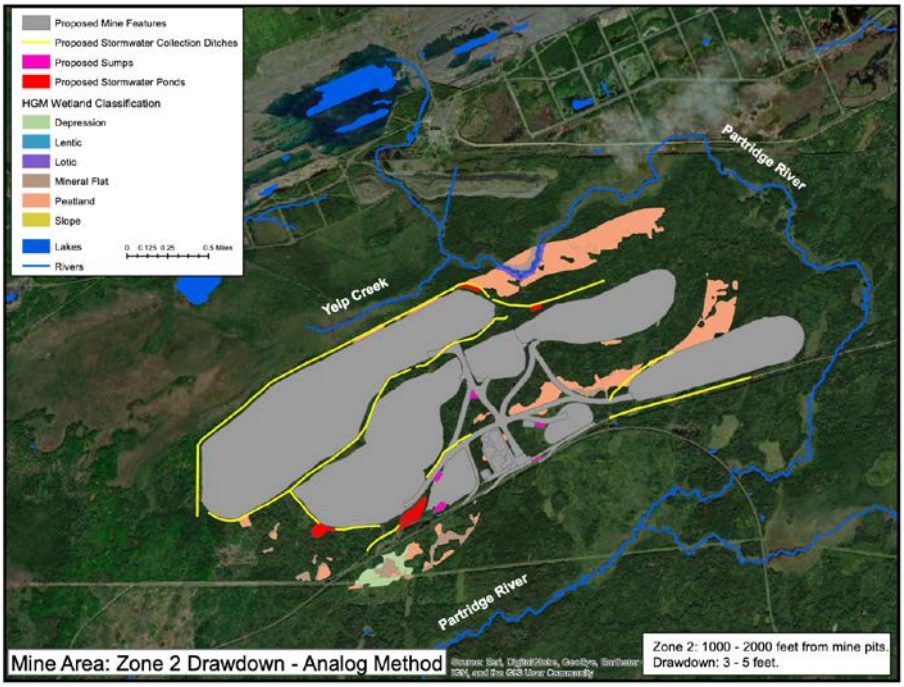
Zone 1: 5 to 10 feet of drawdown



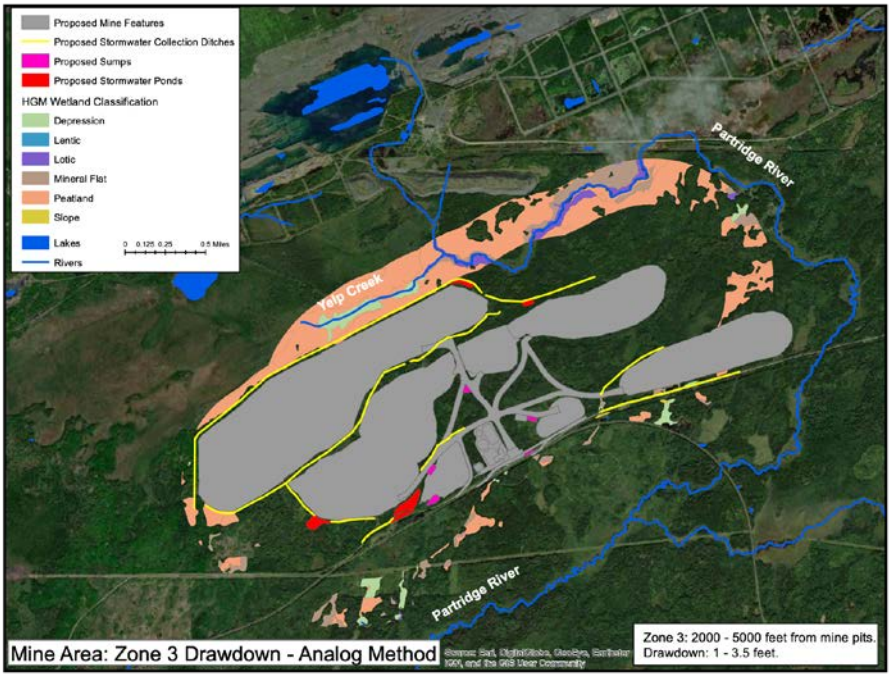
continued next page

[19] As part of its review of the Project, GLIWFC developed an analysis of indirect impacts to wetlands due to drawdown at the Project's Mine site. *See* Attachment 6 (Letter from GLIWFC to Tony Hingsberger, Project Manager U.S. Army Corps (Apr. 30, 2013)).

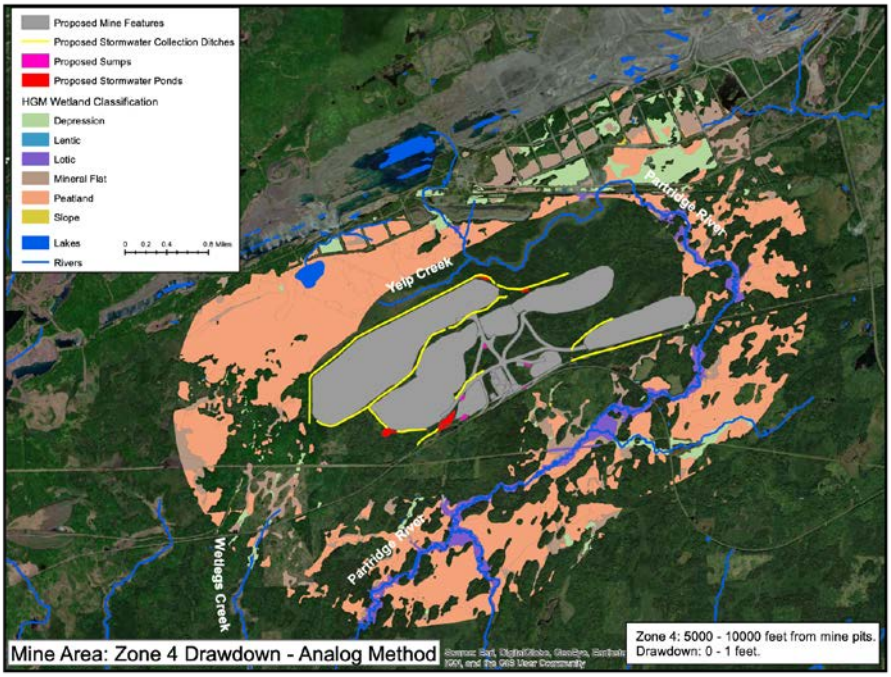
Zone 2: 3 to 5 feet of drawdown



Zone 3: 1 to 3.5 feet of drawdown



Zone 4: 0 to 1 foot drawdown



The wetlands in the analog drawdown zones contain extensive areas of saturated organic soils (i.e., peat). The affected peat soils lack free oxygen (i.e., are anaerobic) and already contain inorganic mercury and methylmercury. From a survey of wetland mercury concentrations undertaken in the St. Louis River watershed (Branfireun et al., 2009) upper soil concentrations of Total mercury and methylmercury for peatlands with 100% organic soils (peat) average 5.2 and 72 ng g^{-1} (7.1% methylmercury), respectively, and for other wetland types average 4.8 and 127 ng g^{-1} (3.7% methylmercury), respectively. From this, the masses of inorganic mercury and methylmercury in the top 30 cm of wetland soils for the entire area of water table drawdown are 131.2 and 7.2 kg, respectively with the distribution of this mass being a function of wetland type and area. Given that the solid phase is >99% of the mass of mercury and methylmercury in the terrestrial environment (Coleman-Wasik et al., 2012), this is a substantial pool in wetlands in the analog drawdown zone that is available for exchange and transport. Using partition coefficients (LogKd) for wetland soils typical of northern Minnesota (4.1 L kg^{-1} for inorganic mercury; *see* Branfireun et al., (2005) and 3.5 L kg^{-1} for methylmercury; *see* Skyllberg et al., (2008), then the pore water concentrations will be 5.33 ng L^{-1} Inorganic mercury, and 1.64 ng L^{-1} methylmercury, for peatlands, and 9.72 ng L^{-1} inorganic mercury, and 1.50 ng L^{-1} methylmercury, for other wetland classes. These estimates are consistent with reported concentrations in the literature (Table 1). Importantly, they also are in line with those reported by Coleman-Wasik et al. (2015) in an experimental peatland in north-central Minnesota where the impacts of lower water tables on sulfate, mercury and methylmercury was studied. There, typical total mercury concentrations were up to 12 ng L^{-1} and methylmercury up to 4 ng L^{-1}.

Prolonged (i.e., greater than approximately 30 to 45 consecutive days) drawdown of greater than approximately 10-12 inches, especially in organic soils, will cause organic matter to begin oxidizing. It is well documented that increased loading of sulfate both increases net methylmercury formation and redistributes methylmercury from the peat soil to its porewater through oxidative release. Coleman-Wasik et al. (2015) found that prolonged deep drought resulted in substantial increases in pore water sulfate, total mercury and methylmercury concentrations upon re-wetting during wet periods in the fall and/or spring snow melt. The occurrence of the spring "acid pulse" of sulfate during snowmelt post-drought is a well-documented phenomenon, and the observations of increases in mercury and methylmercury are striking. Increases in total mercury concentrations of 166-400% were observed upon rewetting after drought, attributed to oxidative release from the large pool of mercury associated with the solid phase. Methylmercury concentrations also rose significantly (129%) post drought, attributed to both oxidative release through decomposition, along with new methylmercury production caused by the drought-induced sulfate pulses (Coleman-Wasik et al., 2015). Lower and more variable water table regimes[20] and the loss of Ericaceae (i.e., bog) shrubs (from land clearing) act significantly and independently to increase both total mercury and methylmercury concentrations in peat pore water and subsequent export during times of high flows such as in spring snowmelt runoff.[21] It is reasonable to conclude that the oxidation of 25% more wetland soil volume due to persistent under-drainage would result in the oxidative release of sulfate, inorganic mercury and methylmercury in similar proportions.

Wetlands that are in the analog zone of surface water table impacts will be influenced by the open pit dewatering to varying degrees resulting in a *compounding* impact of both climate-driven drought and aquifer depressurization. In wetlands with groundwater influence, under-drainage will increase the amplitude of water table fluctuation, and enhance the magnitude and duration of drought-induced peat drying/oxidation, sulfate regeneration, and mercury methylation to varying degrees. In Analog Zones 1 and 2 in particular, a persistent lowering of the water table will increase the thickness of the aerated zone in peatlands which indeed may have a connection (albeit constrained by peat accumulation) to regional groundwater (see Siegel and Glaser, 1985), where the typical average annual water table is 5-20 inches below the peat surface. In other dominant wetland types found in these zones such as marshes which are more likely to have direct groundwater connections, the annual average water table is typically at or above the soil surface. Enhanced drying in wetlands such as these would have substantial hydrological and biogeochemical implications. Despite having smaller total areas as compared to peatlands in each of the analog zones, the higher bulk densities of these wetland soils and different mercury concentrations means that they may have total masses of mercury that are the similar to or even greater than the more extensive peatlands. This is particularly relevant for Analog Zone 3 and 4 where less pronounced

[20] Åkerblom, S., Nilsson, M B., Skyllberg, U., Bjorn, E., Jonsson, S. et al. 2020. Formation and mobilization of methylmercury across natural and experimental sulfur deposition gradients. Environmental Pollution, 263: 114398.
[21] Haynes, K. M., E. S. Kane, L. Potvin, E. A. Lilleskov, R. K. Kolka, and C. P. J. Mitchell (2017). Mobility and transport of mercury and methylmercury in peat as a function of changes in water table regime and plant functional groups, Global Biogeochem. Cycles, 31, 233–244.

potential drawdown levels would proportionally impact wetland classes more freely connected to groundwater more significantly. Analog Zone 4 presents the greatest uncertainty given the lack of empirical data, distance from the open pit, and total wetland area. Although a range of potential water table drawdown of 0-1 ft are assigned to this zone, the large area of peatlands and other wetland classes relative to other zones in the analog drawdown zone suggests that even subtle impacts on this zone could have greater impacts on exports of sulfate, inorganic mercury and methylmercury than the zones with more significant de-watering. Of the total amount of inorganic mercury and methylmercury stored in wetland soils, this zone contains 79% of the inorganic mercury and 78% of the methylmercury in the entire analog drawdown zone. Non-peatland wetlands make up only 30% of the wetland area but contribute 61 and 45% of the total mass of inorganic mercury and methylmercury, respectively. Uncertainty concerning potential hydrological impacts in this zone combined with the substantial wetland area and pool of mercury presents substantial risk of downstream impacts. A lack of monitoring of wetland chemistry under baseline conditions, and no requirement for monitoring during operations means that none of these impacts would be captured.

Wetlands are generally not closed systems, and in this context are the sources of runoff that supply the headwaters of the Partridge and Embarrass Rivers. Research shows that the upper several inches of peat soils contain larger pores that more easily transmit solutes and affect water flow,[22] and it is through these pores that water and solutes such as methylmercury are exported to receiving creeks and streams under normal hydrological conditions. The inorganic mercury and methylmercury produced in and liberated from wetland soils is transported into the numerous small streams and creeks that drain to the Embarrass and Partridge Rivers, then to the St. Louis River. This mercury in the St. Louis River is conveyed downstream to the Fond du Lac Reservation. High concentrations of high molecular weight natural dissolved organic matter ("DOM") in surface waters is associated with runoff from wetlands and peatlands, and is responsible for the tea color that is characteristic of streams and rivers in north central Minnesota. Inorganic mercury and methylmercury form very strong chemical bonds with DOM (Ravichandran, 2004), to such a degree that inorganic mercury is preserved in the dissolved form protected from particle binding and precipitation with sulfides enhancing transport, and is protected from photodegradation by UV light which is the main mechanism of methylmercury loss in freshwaters (Klapstein et al., 2018). The naturally high DOM environment in the headwaters creates the ideal conditions for the excess inorganic mercury released by the Project to be transported downstream where it may be methylated in riparian wetlands of the St. Louis River, contributing to resource impairment far from the point of release. Methylmercury formed by sulfate release by the project may be transported in the dissolved form long distances associated with, and protected by DOM, with the potential for bioaccumulation far from where it was formed, including in the St. Louis River. During spring snowmelt and/or heavy rains that cause water levels to rise in the St. Louis River, those waters flood the riparian wetlands along the St. Louis and can back up into the principal

[22] Fereidoun Rezanezhad, Jonathan S. Price, William L. Quinton, Bernd Lennartz, Tatjana Milojevic, Philippe Van Cappellen. Structure of peat soils and implications for water storage, flow and solute transport: A review update for geochemists, in *Chemical Geology*. 429 (2016) 75–84.

streams on the Fond du Lac Reservation—Fond du Lac Creek, Stoney Brook, and Simian Creek—the wetlands adjacent to those streams, and numerous adjacent smaller creeks and wetlands, contaminating Fond du Lac Reservation lands.

PolyMet suggested that "the potential export of SO_4 [sulfate] and MeHg [methylmercury] is expected to be the same as background wetlands and *likely* no different with the Project in operations as occurs now in existing conditions" (Cross-Media Analysis Appx. F, p. 12; emphasis added). Given the substantial changes in surface water hydrology that will be the direct result of pit dewatering and wetland under-drainage, it is inconceivable how such a conclusion could be arrived at, when the opposite conclusion is the most parsimonious and precautionary. The lack of consideration of these potential impacts in loading estimates of sulfate, mercury and methylmercury and complete absence of any monitoring of wetland water quality over the operation of the Mine means that not only are these loads unaccounted for in the mass balances used to justify meeting permitting thresholds, but also that cumulative contributions to downstream loads cannot be detected nor mitigated under the current proposal, resulting in irreparable harm to downstream resources.

As described in Mr. Schweisberg's April 29, 2021 Memorandum for the Band ("Schweisberg 2021"),[23] in turn, benthic macro-invertebrates, fish, amphibians (e.g., frogs, salamanders), reptiles (e.g., turtles, snakes), wetland dependent mammals (e.g., river otter, mink, beaver), and wading and other water birds (e.g., herons, egrets, ducks and geese) that feed in these systems become contaminated with mercury, which biomagnifies from prey to higher trophic level predators (including piscivorous birds, e.g., bald eagles and ospreys).

As also described in Schweisberg 2021, over 2,400 acres of the floodplain wetlands along the St. Louis River contain organic soils and are seasonally flooded. Fluctuating water levels in these riparian muck and peat wetlands will create ideal conditions (i.e., oxidation and reduction) for enhancing the methylation of mercury. As these seasonally flooded floodplain and riparian wetlands dry out periodically in summer, the oxidizing and re-wetting action makes the wetlands efficient sources of methylmercury that is transported along the stream corridors and spread throughout much of hydrologic system in the Fond du Lac Reservation.[24]

The wildlife resources and diverse fish assemblages that use the Partridge, Embarrass, and St. Louis Rivers, their riparian wetlands, and the smaller streams and creeks and their adjacent wetlands are already contaminated with sulfides and sulfate, and methylmercury. The Project's discharges will add to the existing loads of those contaminants and be available to fish and wildlife that consume the plant and animal food sources containing elevated levels of methylmercury. In turn, those contaminated food sources—fish (e.g., northern pike, largemouth bass, walleye),[25]

[23] *See* Attachment 2, Ex. 31.
[24] The last catastrophic flood in the St. Louis River watershed occurred in the summer of 2012.
[25] The Band's restoration efforts for lake sturgeon will likely be compromised by the contamination. With respect to those efforts, the Band also has significant concerns regarding

waterfowl (e.g., ducks), and wetland dependent mammals (e.g., river otter, mink, moose)—will be available to Band members that catch or trap and consume them from the St. Louis River and the three principal streams and adjacent wetlands. Accumulation of high levels of methylmercury in the food chain is a continuing and major concern.

D. Discharges of Mercury and Sulfate are Not Adequately Regulated by the General Construction Stormwater Permit.

As noted above PolyMet was issued general permit coverages for construction stormwater discharges for the Project. The stormwater general permit authorizes discharges from the draining of over 900 acres of wetlands, which are dominated by peat bogs. This activity will release significant amounts of mercury and sulfates into downstream waters that will reach the St. Louis River and its riparian wetlands along the Reservation, as well as affect several of the streams and creeks that flow into the St. Louis River when flood waters back up into the Reservation. Storage of oxidized peat overburden in the unlined laydown area for 11 years would result in repeated flushes of methylmercury as well as inorganic mercury. Although the PolyMet FEIS suggests (FEIS 5-227) that the impact of stored mercury on loading of inorganic mercury has been considered as part of its mercury mass balance, there are assumptions about the flushing effect diminishing over time. Given the mass of mercury and methylmercury in the peat materials, the pool is effectively limitless over the time span of operations. Nothing in the permitting record demonstrates that this issue has been addressed or even considered. There is no provision in the construction stormwater general permit for addressing specific water quality issues. The general permit leaves mercury completely unaccounted for and unregulated, and that is an unacceptable result. For a project of this extent, scope, and duration, and considering the contaminants (e.g., mercury, methylmercury) that stormwater will carry, construction stormwater discharges should be regulated under an individual NPDES permit.

E. Direct Discharges of Water, Sulfate and Mercury to Surface Waters and Wetlands Will Increase Methylmercury Production During Project Operations.

Prior Branfireun expert memoranda provide a detailed conceptual overview of the mechanisms by which Project discharges of sulfate and mercury will enhance methylmercury production in the Partridge and Embarrass watersheds (tributaries of the St. Louis River) and that this methylmercury production presents an environmental risk that is completely unaccounted for in permitting associated with the Project.[26] Headwater tributaries that will receive discharges from the Project are low in sulfate, and are already elevated in the percentage of total mercury that is present as methylmercury (up to nearly 10%) indicating a high methylmercury production potential in their watersheds.[27]

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elevated specific conductance, which may inhibit survival of fry and fingerlings (for which there is evidence of sensitivity to high salinity).

[26] *See supra* n.4.

[27] Branfireun, 2015 at Section 2.1.1 (Attachment 2, Ex. 24).

Seven direct wastewater outfalls (SD004-SD010) associated with the mine processing facility will discharge to the headwater wetlands of a single tributary north of the tailings basins (Trimble Creek) increasing water loading by several million gallons per day, and supplying hundreds of pounds of sulfate per year (based on PolyMet's own data), affecting ecological and biogeochemical function of these wetlands. These loads (in addition to any seepage that is not contained by the proposed capture system) would result in an increase in methylmercury production precisely at a location in the watershed that would result in the greatest environmental harm—a headwater wetland that then supplies water and solutes to downstream.[28]

The specifics of these discharges merit deeper consideration beyond the analyses in prior Branfireun Opinions in order to quantify potential increases in loading. The NPDES/SDS documents for the Project stated that rainwater coming in contact with tailings and plant site materials, Colby Lake water used for processing, and water from the pit dewatering process and Mine site construction activities will be captured in a seepage capture system. Some of that seepage will be returned to the tailings basin and some will be treated in a Wastewater Treatment System ("WWTS") and subsequently discharged from the site.

Although there are no effluent limits in the NPDES/SDS permit for any surface discharge outfalls, internal waste stream operating limits (WS074) propose that mercury concentrations will be set at 1.3 ng/L for total mercury, and 10 mg/L for sulfate. The internal treated waste stream from WS074 will be sent to SD001 and then divided into multiple discharge outfalls (SD002 to SD011), each of which will discharge into the headwaters of the Embarrass River. The MPCA NPDES/SDS permit (Table 2.1, p. 10) identifies estimated average discharges of 0.24 million gallons per day (MGD) in mine year 1, increasing to 0.39 MGD in mine year 10 and maximum discharges of 0.29 MGD in mine year 1, increasing to 0.57 MGD in mine year 10 from *each* of the 10 outfalls northwest and north of the tailings basin in the Embarrass River watershed.

Even if PolyMet is able to reduce effluent concentrations of mercury and sulfate to the stated levels using its proposed waste-water treatment plant, this additional water input will deliver over 100 kg of sulfate, and nearly 5 g of mercury per year from the seven outfalls discharging to the headwater wetlands of Trimble Creek. These wetlands alone cover an area of 1198 acres (485 ha). Prorating these discharges and conservatively estimating that additional discharges may only interact with 50% of the total wetland area, the loading of sulfate and mercury from the mine are equal to ~11% and ~16% respectively of that annually deposited from the atmosphere in rain based on regional historical data for Minnesota.

Brigham et al. (2021) considered long-term data from four lakes in Voyageurs National Park in northern Minnesota and demonstrated that lake methylmercury concentrations are declining as a result of the "decline in atmospheric Hg [mercury] deposition as well as a decline in *sulfate deposition, which is an important driver of mercury methylation in the environment.* (emphasis added). Results from this case study suggest that regional- to continental-scale

[28] Branfireun 2019 at Section 2.1.2 (Attachment 2, Ex. 25).

decreases in both mercury and sulfate emissions have benefitted aquatic resources." These substantial increases in loadings of both sulfate and mercury in wetlands proximal to the Project effectively undo progress toward reductions in these deleterious compounds. Brigham et al. (2021) found that overall, a 22% decrease in total mercury deposition over a 20-year period in Minnesota was associated with a nearly proportional 27% decrease in lake water total mercury concentrations. However, methylmercury concentrations declined by 44%, linked to an also nearly proportional mean decrease in water sulfate concentrations of 45% due to the fundamental biogeochemical role of sulfate in the mercury methylation process. Moreover, Brigham et al. conclude that "For the three lakes with long-term biomonitoring, temporal patterns in biotic THg concentrations were similar to patterns in $MeHg_{aq}$ concentrations". If the same relative changes observed for Minnesota surface waters measured by Brigham et al. (2021) are applied to the increases stated here, a *>10% increase in* methylmercury *concentrations* in surface waters and concomitant increases in biota would be anticipated as a result of already approved discharges of sulfate and mercury from Mine operations in these headwater streams of the Embarrass River, a tributary of the St. Louis River.

PolyMet contends that sulfate loadings only lead to increases in methylmercury production in "certain limited circumstances" (Barr, 2018). However, sulfate stimulation of methylmercury production is well-established scientifically as the rule, not the exception, with numerous consistent examples. The most pertinent examples are from the Marcell Experimental Forest in Minnesota, where an experimental increase in sulfate loading of ~4x historical levels resulted in an average increase in peat methylmercury concentrations of 35% (an increase from 5.59 to 8.61 ng/g d.w.) which was reflected in pore water concentrations (Coleman-Wasik et al., 2012; 2015). These changes translated into increases in methylmercury concentrations in waters flowing from the experimental wetland (Jeremiason et al., 2006), supporting the findings of Brigham et al. (2021). Further, Berndt et al. (2016) make it clear that methylmercury in the St. Louis River watershed is dominantly derived from wetlands, net methylmercury production is most pronounced at relatively lower sulfate concentrations, and that concentrations are highest in shallow groundwater seeping from wetlands under rewetting conditions and that most of this methylmercury is associated with wetland-derived dissolved organic matter ("DOM") (Berndt and Bavin, 2009). Indeed, from the perspective of methylmercury production and downstream impacts on aquatic life, the proposed water discharges create a worst-case scenario in this location.

For the Trimble Creek headwater wetlands, the additional water loading from the Mine processing operation alone will further contribute to the export of inorganic mercury and methylmercury through the exchange of mercury and methylmercury from the solid peat material. The concentrations of a chemical will always move towards an equilibrium between that in the solid (soil) and dissolved (porewater) forms. The loading of more dilute water will result in the release of mercury and methylmercury from the solid peat. Using average concentrations of total mercury (92.05 ng g^{-1}) and methylmercury (5.05 ng g^{-1}) in wetland soils from a range of wetland types across the St. Louis River Watershed, (Branfireun et al. 2009), wetland area data indicated above, and data on Minnesota wetland soil physical properties (bulk density of 0.15 g cm^{-3}; Boelter, 1968), the total mass of mercury and methylmercury in only the top 30 cm of moderately decomposed peat soils is *20.1 and 1.1 kg respectively* in these 1198 acres of impacted headwater

wetlands without consideration of any additional methylation due to excess sulfate supply. Given that the solid phase is >99% of the mass of mercury and methylmercury in the terrestrial environment (Coleman-Wasik et al., 2012), this is a substantial pool in proximal wetlands that is available for exchange and transport.

If partition coefficients (LogKd) values for wetland soils typical of northern Minnesota are applied as described in prior sections then the effective concentration of the discharged process waters after interacting with wetland soils will be 6.91 ng L^{-1} inorganic mercury, and 1.59 ng L^{-1} methylmercury, for a sum *Total mercury concentration of 8.50 ng* L^{-1}. *These concentrations exceed the proposed 1.3 ng* L^{-1} *concentration to meet State water quality guidelines by over 650%, and the Band's water quality standard by 1300%.*

Even if mixing is with a more limited area of the wetlands, and/or soil contact time is too short for equilibrium to be reached, it is certain that the total mercury concentration of discharged water will be elevated above 1.3 ng L^{-1} before reaching headwater tributaries. Although the porewater concentrations that are calculated above are in the range of those observed in many wetlands, this is a calculation that is highly sensitive to the value of LogKd and is not predictive; empirical values for peat and porewater mercury concentrations are not known for the wetlands in question (but could be easily measured). The intent of the calculation is to illustrate that there are a wide range of mechanisms that can only result in an *increase* in mercury concentrations. The degree to which concentrations increase may be over or underestimated, however given that these changes are exclusively the result of the Project's operations, they are a direct effect that will add to the cumulative load of inorganic mercury and methylmercury of the St. Louis River and its tributaries.

F. Increase in Methylmercury Production From Sulfate and Inorganic Mercury Loading Poses Risks for Human and Ecological Health.

Many peer-reviewed scientific studies have shown that any increases in water column methylmercury concentrations will increase methylmercury concentrations in food webs (Harris et al., 2007; Knightes et al., 2009, Schartup et al., 2019). For example, the EPA assumed a linear relationship between inorganic mercury inputs and fish methylmercury concentrations for regulatory determinations when assessing the potential impacts of increased air deposition of mercury across the United States on fish mercury concentrations in lakes and rivers (https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=OST&dirEntryId=74661). The slope of the relationship between increasing methylmercury concentrations in water and biological concentrations at the base of the food web is affected by water quality parameters such as dissolved organic carbon (Schartup et al., 2018) but a linear increase in food web concentrations is expected to result from increasing aqueous methylmercury concentrations. This is particularly problematic for the Project's operations that are expected to substantially increase methylmercury inputs to the Saint Louis River, which is already impaired, and several tributaries upstream of the Fond du Lac

Reservation. Piscivorous fish already have high body burdens of methylmercury,[29] thus additional increases pose elevated exposure risks for both Band members and wildlife.

Band members rely on aquatic resources harvested from these freshwater ecosystems for subsistence foods and as part of their traditional fishing activities that are essential for maintaining and protecting culture. In addition to the deleterious impacts of methylmercury on human health (summarized below), studies for other indigenous groups have shown substantial social costs associated with restricted traditional hunting and fishing due to environmental contaminants including increases in depression, suicide, and addiction (Van Oostdam et al., 2005). As noted herein, hunting and fishing activities have already been limited due to environmental pollution within the Band's Reservation (and its Ceded Territory). Any further increase in pollution poses unacceptable risks to the Band's traditional lifestyle, culture, and health and violates environmental justice considerations. Methylmercury is the only form of mercury that bioaccumulates in food webs. It undergoes facilitated transport in the human body because it resembles an essential amino acid and is able to cross the protective blood-brain and placental barriers in the human body (Clarkson et al., 2007). The predominant pathways for human exposure to methylmercury is from consuming contaminated fish (Mahaffey et al., 2009). The developing brain is the most sensitive endpoint for methylmercury toxicity and methylmercury exposure for children and pregnant women has been linked to neurodevelopmental delays that persist over a lifetime (Debes et al., 2016). Methylmercury exposure is also associated with a variety of other adverse health effects; for example, high concentrations of methylmercury in blood and tissue samples from adults have been strongly associated with adverse cardiovascular impacts (Virtanen et al, 2005). Cardiovascular abnormalities are also associated with prenatal exposures to methylmercury (Stern et al. 2005). Biologically, there does not appear to be a safe level of methylmercury exposure for humans. Studies have shown adverse effects on brain development in children with prenatal methylmercury exposures similar to or below the RfD (Karagas et al. 2012).

G. Downstream Impacts on Water Quality and Designated Uses of Natural Resources in the St. Louis River.

Changes in the concentrations of sulfate, inorganic mercury and methylmercury in wetlands have been directly linked to surface water quality in Minnesota. For example, Jeremiason et al. (2006) clearly demonstrate that increases in methylmercury production resulting from an experimental addition of sulfate resulted in a 3-fold increase in methylmercury concentrations in wetland pore waters, and these increases translated into a 2.4-fold increase in methylmercury export to surface waters. Wiener et al. (2006) identify "pH, dissolved sulfate, and total organic carbon (an indicator of wetland influence) as factors influencing methylmercury concentrations in lake water and fish" indicating not only a connection with sulfate and methylmercury in fish, but also the degree of wetland influence at the catchment scale.

[29] *See supra* n.11.

PolyMet has based its contention that the Project will not cumulatively impact downstream water quality exclusively on a mass-balance model to predict the potential impacts of project development and operations on sulfate, mercury, and other solutes. This approach is fatally-flawed. The mass-balance model is inappropriate to apply to reactive solutes and does not account for mercury release from any of the effects identified above, nor does the model consider methylmercury at all. Technical documents submitted to dispel concerns about both the potential for exceedances in the release of mercury and sulfate (see Barr, 2018) lay bare the complete reliance on unconstrained mass balance estimates, unproven storm and wastewater capture techniques, and the avoidance of the quantification of releases of mercury, methylmercury and sulfate outlined above in order to draw the conclusion of *de minimus* impacts. This conclusion is unsupported by data, scientific consensus in the literature, or even a sound conceptual model.

The combination of both direct and indirect effects on mercury release and methylmercury production will have impacts that will reach far downstream. *All* of the potential impacts and subsequent discharges identified above (which are beyond those currently considered in the PolyMet application) will have a cumulative effect on downstream waters, including the St. Louis River. Headwater streams such as the upstream tributaries of the Partridge and Embarrass Rivers will be directly impacted by the Project, and these streams strongly regulate the downstream water quality of the larger rivers that they supply (Bishop et al., 2008; Klaminder et al., 2006). Headwater stream chemistries can be predicted from the mixed chemistry of the downstream river (see Temnerud et al., 2010), revealing the important control of source waters on downstream resources. Thus, there can be no scientific disconnection made between the mercury, methylmercury and sulfate loading to the source waters impacted by the Project and the larger rivers that they supply. Sulfate is often treated as a quasi-conservative solute (i.e. it moves with surface waters in a relatively unreactive way) in the context of hydrological studies (e.g. Christopherson and Hooper, 1992), and as such additional loading to the headwaters of the St. Louis River will contribute to the cumulative sulfate load. Under higher flow conditions, this additional sulfate will be delivered to extensive riparian wetlands associated with the lower reaches of the St Louis River, contributing to enhanced sulfate reduction and methylmercury production far from the Project. The total area of hydrologically connected riparian wetlands in the Embarrass, Partridge Rivers and the receiving St. Louis River above the Fond du Lac Reservation is approximately 9,183 acres, with an additional approximately 41,782 acres within the 100-year floodplain. Berndt et al. (2016) determined that a substantial amount of the methylmercury in the St. Louis River is derived from wetlands such as these during high flow periods, making any cumulative increase in sulfate loading critical to fully quantify.

The potential for transport of either methylmercury or inorganic mercury considerable distances from the Project to downstream locations where they contribute to ecosystem impairments is not speculation. A very recent published paper used natural abundance stable isotopes of mercury to trace the origins of mercury in biota in the St. Louis River Estuary (Janssen et al., 2021), and shows unequivocally that SLRE sediment mercury showed significant proportions attributed to industrial sources likely associated with in the estuary. Importantly, some locations well upstream of the estuary also had significant proportions of industrial mercury, indicating the long-distance river transport of industrially-derived mercury from unidentified

upstream sources. The mercury in biota and fish was a more complex pattern but also reflected these differences, clearly demonstrating that the locations of mercury release, methylation, and bioaccumulation need not be spatially contiguous.

The releases of mercury, methylmercury and sulfate from the headwater region of the St. Louis River will be cumulatively impacted by the Project, and the releases of total mercury and sulfate will far exceed estimates provided by PolyMet in support of the Project's 401 Certification. Further, methylmercury loading to surface water will be increased due to direct and indirect effects of the Project. This aspect of the Project has never been considered in any environmental assessment or permit application associated with the Project, despite it being the only variable that directly links to mercury bioaccumulation and biomagnification in biota. These releases will cumulatively affect water quality standards, downstream ecosystem function, and designated uses of aquatic resources by the Band and other downstream aquatic resource stakeholders.

H. Expected Downstream Exceedances of Fond du Lac's Approved Specific Conductance Standard.

The Band's concerns for protecting aquatic resources from Project pollutants discharged upstream of the Fond du Lac Reservation is not limited to mercury bioaccumulation and human health impacts. The Band also clearly communicated its concerns about elevated specific conductance from existing upstream mining sources, and the additional loading that would likely occur from the proposed PolyMet project, early and consistently throughout the environmental review process to the federal and state co-lead agencies. Specific conductance is the ability of a material to conduct an electric current measured in microSiemens per centimeter (µS/cm) standardized to 25°C. Specific conductance reflects concentrations of dissolved ions, including metal and other contaminants from mining, other industrial activities, and agriculture. Sulfate is a major constituent of the measured specific conductance in the St. Louis River.

The Band adopted a numeric aquatic life use criterion for specific conductance of 300 µS/cm to protect sensitive macroinvertebrate species and the relatively high biodiversity in the Band's waters. These macroinvertebrates are an integral part of the aquatic food web, processing nutrients and detritus and providing food for fish, birds, and other animal species. The Band considers its water quality standards the foundation for protecting its high-quality waters without degradation, through both narrative and numeric criteria and a robust antidegradation policy.

Through the Band's long-term water quality monitoring program, the Band has collected thousands of data points on all Reservation waterbodies for more than 20 years, and that data confirms that natural or ambient conductivity is very low—below the Band's new criterion everywhere with the exception of the St. Louis River, where it is routinely exceeded, depending upon discharge rates. Historic data from the St. Louis River clearly shows that, prior to iron mining evolving to include taconite processing in the 1950's and 60's, natural background conductivity levels were also low (generally below 200 µS/cm). The Band has long recognized, through years of extensive review of mining permits and environmental assessments, that elevated specific conductance is a water chemistry "signature" for mining discharges. The Band's concerns

regarding specific conductance also relate to the Band's long-term efforts to reestablish native lake sturgeon (*Acipenser fulvescens*), a culturally important species, in the St. Louis River.

The Band notes:

> Lake sturgeon have been successfully reproducing in the estuary for several years, and Fond du Lac Resource Management Division's successful reintroduction and tracking efforts in the upper river have been documented.[30] After the construction of hydroelectric facilities on the St. Louis River in the early 1900's, the lake sturgeon population in the upper St. Louis River was isolated from the lower estuary and Lake Superior.[31] The remaining sturgeon population was likely extirpated due to exploitation and pollution from the wood products industry and municipal waste. In addition, many of the upper tributaries were dammed during the extensive white pine logging era (1800's) in order to float logs down during the high water spring runoff. Pollution and degraded water quality has been identified as a factor limiting sturgeon abundance in many locations.[32]
>
> The conclusion at FEIS 4-275 that "There are no known occurrences of lake sturgeon and not likely habitat for lake sturgeon within the NorthMet Project area" neglects to consider that downstream water quality effects may result from the Proposed Project. This will result in another degradation of the Band's downstream water quality that is explicitly relevant to our stated resource management goals for lake sturgeon.

A dramatic recovery in lake sturgeon abundance in Rainy River and Lake of the Woods followed improvements in water quality in the Rainy River, which resulted from substantial reductions in the amount of wood fiber and untreated chemical wastes discharged by upstream pulp and paper mills.[33] Evidence from hatchery rearing studies show that juvenile sturgeon can only tolerate salinity < 23 ppt.[34] The Band is concerned about protecting the both the habitat and water quality necessary to support its reintroduction efforts. Uncontrolled contaminant loading

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[30] *Lake Sturgeon Restoration in the Upper St. Louis River, Minnesota,* FDL poster presented at the Great Lakes Lake Sturgeon Coordination Meeting, 3 – 4 December 2012, Sault Ste Marie, MI

[31] *Id*.

[32] Dick, T. A., et al 2006. COSEWIC assessment and update status report on the lake sturgeon (*Acipenser fulvescens*) in Canada. Ottawa, Ontario. 107 p.

[33] Mosindy, T. E. and J. Rusak. 1991. An assessment of the lake sturgeon population in Lake of the Woods and Rainy River. Lake of the Woods Fisheries Assessment Unit Report 1991- 01. Ontario Ministry of Natural Resources. Kenora, Ontario. 66 p.

[34] A Review of Lake Sturgeon Habitat Requirements and Strategies to Protect and Enhance Sturgeon Habitat March 2011. Steven J. Kerr, Michael J. Davison and Emily Funnell, Fisheries Policy Section, Biodiversity Branch Ontario Ministry of Natural Resources.

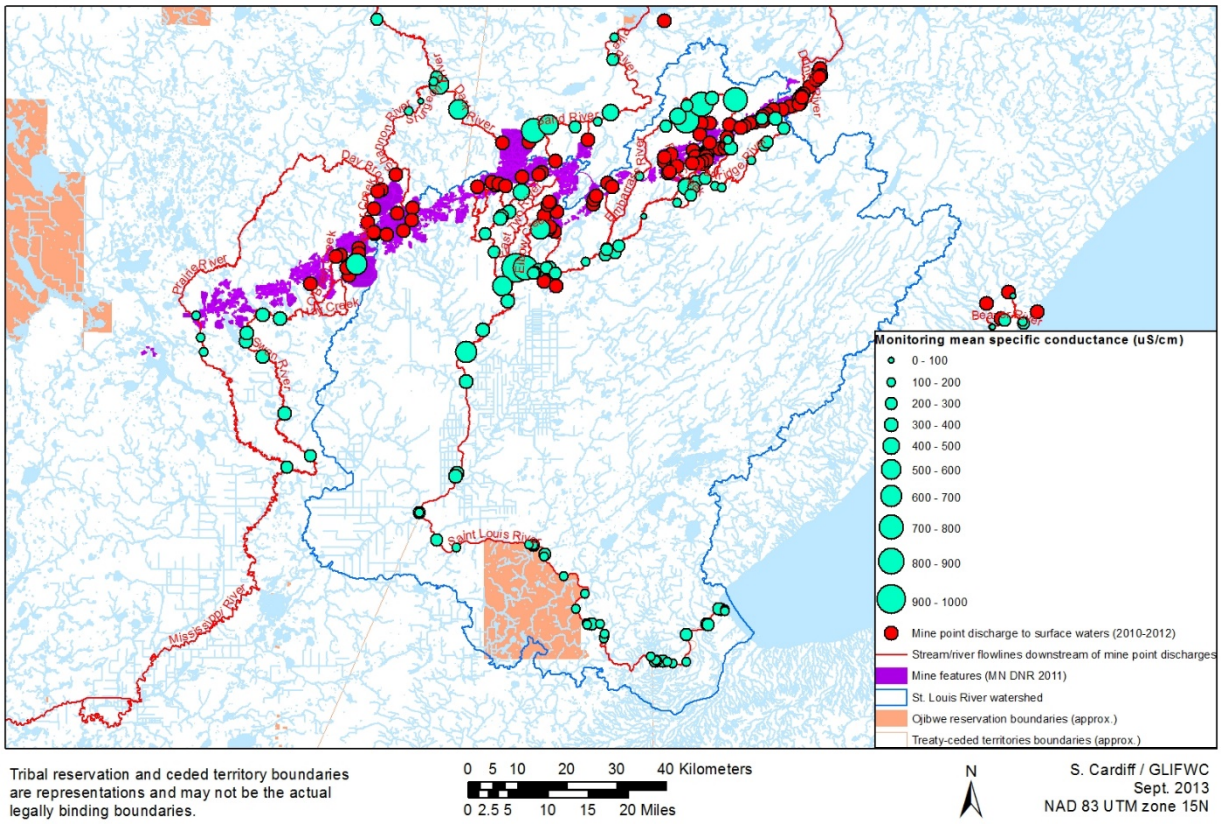
from existing mine facilities, along with elevated constituents from the Project, will affect the successful establishment of a sustainable lake sturgeon fishery throughout the St. Louis River.

Scientific literature suggests that early life stages are particularly sensitive to high salinity (another common term referencing high dissolved salts or high ionic strength). The Band's ongoing radiotelemetry surveys of slowly maturing lake sturgeon that it stocked as eggs, fry and fingerlings over more than 20 years shows that these fish are using the entire reach of the St. Louis River from the Reservation, all the way upstream to the low-head dam at Forbes (near the United Taconite Fairlane facility). These fish are approaching reproductive age, and the Band's goal of reestablishing a self-sustaining lake sturgeon fishery in the St. Louis River depends upon high water quality, not only for the fish themselves but also to support their food base, which includes benthic macroinvertebrates.

During the SDEIS process for the NorthMet project, tribal staff conducted analysis of specific conductance downstream of mine discharges using agency monitoring data (1990-2013) as part of a tribal cumulative effects analysis. *See* Attachment 2, Ex. 7 at 16-18. Analysis of specific conductance downstream of Mine discharge sites indicated that specific conductance was highest nearest to Mine discharge sites, and tended to only gradually decrease downstream of mine discharge sites. Linear regressions demonstrated that specific conductance was significantly negatively related to distance across all sample sites ($P < 0.01$, $R^2 = 0.15$; $n = 123$ sites; Fig. 4) and within the St. Louis River and Swan River systems ($P < 0.05$, $R^2 = 0.18$ and 0.52, respectively; Fig. 5). This analysis included stream and river monitoring only (not lakes). The regression suggests that specific conductance could drop to 150 µS/cm only 203 km (126 mi) downstream of the nearest upstream mine discharge site.

continued next page

Specific conductance downstream of mine point discharges (1990-2013)



Methods as follows (in appendix to Tribal Cumulative Effects Analysis):

We associated downstream water quality monitoring points with upstream discharge points based on the listed receiving waters in discharge data, the position of the discharge sites and water features in satellite imagery, and flow direction in the National Hydrography Dataset. We traced upstream and downstream of discharge and monitoring points using the Utility Network Analyst in Arc GIS. We joined a table of related discharge points and monitoring points with tables of summary measurements (maximum, minimum, and mean) of discharge measurements and monitoring measurements restricted to individual characteristics (e.g. specific conductance) and the time period of DMR data availability (2001-2012). We selected the downstream monitoring point with the desired measurement (e.g. specific conductance) that was nearest to a group of discharge points related to a particular facility. We excluded further monitoring points if downstream of a selected monitoring point to avoid using the same discharge data twice in the analysis. We also excluded non-surface water discharge sites and NPDES discharge sites were listed as surface water monitoring rather than discharge measurements. We analyzed the mean discharges at the selected downstream monitoring points and the mean discharges of the related upstream discharge points. Since each discharge point was already a mean of multiple measurements, we multiplied that mean by the number of measurements at that site, summed that

across the multiple sites related to the monitoring point, and divided by the total number of measurements for those sites. This yielded a discharge mean that was not biased by more measurements at one discharge site than at others. We conducted a linear regression of the discharge and monitoring data. Sample size varied by site because of differences in number of measurements between sites.

IV. NONCOMPLIANCE WITH BAND WATER AND WETLANDS QUALITY STANDARDS[35]

A. The Band's Water Quality Standards.

The principal contaminants of concern from the Project are mercury, methylmercury due to their impacts on wildlife and fish consumers, and sulfides/sulfates due to the direct effect on wild rice as well as the role in the mercury cycle affecting fish and fish consumers. In addition, elevated specific conductance is a water chemistry "signature" for mining discharges with adverse impacts to sensitive aquatic life, particularly many benthic aquatic insects.

Considering the direct and indirect discharges from the Project, it is expected that there will be non-compliance with the following Fond du Lac Water Quality Standards:

Antidegradation

> Section 105(a).3. Degradation of water quality shall not be permitted where it will be injurious to existing or designated uses. The Reservation Business Committee or appropriate permitting authority shall impose the most stringent regulatory controls for all new and existing point sources, and shall impose cost effective and reasonable best management practices for non-point sources and wetland alterations.

As described above, Project discharges will increase the loading of sulfates, mercury, methylmercury and specific conductance to the Embarrass and Partridge Rivers. Those rivers drain to the St. Louis River and its riparian wetland systems, then flow downstream to the Fond du Lac Reservation. Consequently, increased loading of those contaminants will occur to the streams and adjacent wetlands of the Fond du Lac Reservation that have surface connections to the St. Louis River. In particular, the water quality classification for Stoney Brook is Aquatic Life, Cold Water Fisheries, which likely is for brown and brook trout.

> Section 105(b).1. Lowering of Water Quality. A significant Lowering of Water Quality is de-fined as: . . . 2) a new or increased loading of a pollutant from any regulated existing or new facility, either point source or non-point source, for which

[35] The Band's water and wetlands quality standards cited and discussed in this Section are included in Attachment 2, Exhibit 28.

> there is a control document or re-viewable action, as a result of any activity including, but not limited to . . .
>
> A. Construction of a new regulated facility modification of an existing regulated facility such that a new or modified control document is required; . . .
>
> E. Other deliberate activities that, based on the information available, could be reasonably expected to result in an increased loading of any pollutant to any waters of the Fond du Lac Reservation.

There will be a lowering of water quality as defined under either Section 105(b)(1)(A) or (E). Regarding Section 105(b)(1)(A), PolyMet proposes a "new . . . loading of a pollutant from . . . [a] new facility . . . as a result of . . . [c]onstruction of a new regulated facility." The Project permits are "control documents" and reviewable actions. Section 105(b)(1)(E) also applies. As described above, the increased loading of sulfates, mercury, and methylmercury to the streams and wetlands of the Fond du Lac Reservation described above will significantly lower the water quality of affected Reservation waters and wetlands.

Those conditions will cause non-compliance with the Band's Anti-degradation standards.

> Section 105(c). "[A]ny entity seeking to lower water quality in an Exceptional Resource Water or create a new or increased discharge of bioaccumulative substances of immediate concern or other pollutants must first submit an antidegradation demonstration for consideration and approval or disapproval by the Reservation Business Committee."

As described above, the Project's discharges will result in both (1) lower water quality in Fond du Lac Creek, Stoney Brook, and Simian Creek, and their adjacent wetlands, which are all Exceptional Resource Waters for relevant pollutants and (2) a new or increased discharge of bioaccumultative substances (e.g., mercury) of immediate concern or other pollutants. PolyMet has not submitted an antidegradation demonstration to the Band for its consideration and approval with respect to all pollutants in PolyMet's discharges. Accordingly, PolyMet has not complied with Section 105(c) and the Band's antidegradation policy and implementing procedures. Until PoyMet complies with Section 105(c), the Band's antidegradation procedures cannot take place and PolyMet is in violation of the Band's antidegradation policy and implementing procedures for all pollutants in its proposed new discharges.

Narrative Standards

> Section 301.a. Waters of the Fond du Lac Reservation shall be free from suspended and submerged solids or other substances that enter the waters as a result of human activity and that will settle in the bed of a body of water or be deposited upon the shore of that body of water to form putrescent or otherwise objectionable deposits, or that will adversely affect aquatic life.

The discharges from the Project will carry sulfates, mercury, and methylmercury down-stream to Reservation streams and wetlands connected to the St. Louis River. As water flow velocities decrease in the streams and wetlands, some of those contaminants will settle on the stream bottoms and in the sediment of the wetlands. Methylmercury in the sediments especially will be ingested by benthic aquatic invertebrates, then by other aquatic life that feeds on those invertebrates, then by higher trophic level aquatic life. Those contaminants will substantially harm benthic invertebrates, the higher trophic level aquatic life that feed on those invertebrates, and also be assimilated by some wetland vegetation. In turn, Band members will be prevented or con-strained from the traditional use of those contaminated fish and wildlife and plants.

> Section 301.n. Water quantity and quality and habitat alterations that may limit the growth and propagation of, or otherwise cause or contribute to an adverse effect to wild rice and other flora and fauna of cultural importance to the Band shall be prohibited.

The discharges from the Project described above will undeniably contribute to an adverse effect on flora and fauna of cultural importance to the Band. The adverse effects upon aquatic invertebrates, fish, wetland dependent mammals, waterfowl and waterbirds and other piscivorous birds will harm those species, as explained above. Of particular cultural importance is the use of flora and fauna in ceremonies; continuing subsistence fishing in the St. Louis River and being able to consume the catch; hunting and harvesting; and the preservation of wetlands for the maintenance of traditional medicinal plants. The discharges from the Project may not necessarily outright prevent Band members from maintaining these cultural traditions, but it will inhibit them through subsistence-level consumption restrictions of aquatic species due to cumulative increases in mercury bioaccumulation.

Designated Uses

> Section 302.B. Wildlife. All surface waters capable of providing a water supply, vegetative habitat and food, including but not limited to wild rice, and prey for the support and propagation of wildlife located within the Fond du Lac Reservation.

As described above, discharges from the Project will increase loading of sulfates, mercury and methylmercury in the St. Louis River and its riparian wetlands, as well as the streams and wetlands with direct surface water connections to the St. Louis River. Those contaminants will harm plant, fish and wildlife species that Band members use and depend upon.

> Section 302.C.2. Warm Water Fisheries. A stream, reach, lake or impoundment where water temperature, habitat and other characteristics are suitable for support and propagation of warm water fish and other aquatic life, or serving as a spawning or nursery area for warm water fish species. Examples of warm water fish species include large mouth bass and bluegills.

Most of the streams and creeks on the Reservation support warm water fish. The diversity of aquatic life residing in those streams and creeks, and their adjacent wetlands will be degraded by the Mine facilities discharges causing increased loadings of sulfates, mercury, and methylmercury.

> Section 302.C.3. Subsistence Fishing (netting). That portion of the Fond du Lac Reservation necessary to provide a sufficient diet of fish in order to sustain a healthy, current, on-Reservation population, including any stream, reach, lake or impoundment where spearing, netting or bow fishing is allowed as provided under applicable Band conservation laws.

The loading of contaminants listed above in Fond du Lac Reservation streams and wetlands in turn will impair resident and transient fish species. The existing fish consumption advisories already constrain the ability of Band members to safely consume a full diet of fish. The discharges from the Project will further constrain that ability.

Numeric Standards

> Appendix 1. Human Health Chronic Standard, Mercury.

As described above, there is a direct surface water connection between the Project's Mine facilities and the Fond du Lac Reservation, principally via the Embarrass and Partridge Rivers which drain to the St. Louis River. The FEIS states that the WWTF and the WWTP (which were later combined into a single facility at the Plant site) would be designed to meet Minnesota water quality-based effluent limits that are protective of the GLI 1.3 ng/L mercury standard.[36] In contrast, the standard as approved by the EPA for Fond du Lac Reservation waters and wetlands is half that at 0.77 ng/L. It is inconceivable that the discharged water from the Project's Mine facilities could meet that lower standard when those waters reach Reservation waters and wetlands. Regardless, there is no data or other relevant information in the FEIS or record to support that the lower standard would be met in the St. Louis River at the Reservation, and no consideration is given to methylmercury in water or other media. As such, the Project's discharges will contribute to an exceedance of the Band's numeric mercury water quality standard.

> Section 301(k). Existing mineral quality shall not be altered by municipal, industrial and in stream activities or other waste discharges so as to interfere with the designated uses for a water body. Since Aquatic biota in this ecoregion are known to be sensitive to the effects of elevated ionized substances (cations and anions) in the water, the specific conductance in all waters of the Reservation shall not exceed an annual average continuous exposure of 300 µS/cm. Exceedances of this numeric condition are indicative of polluted conditions.

Based on the land and environmental impacts, discharges, and releases of pollutants, such as sulfate (an acid anion), from the Project, there will be additional increases, and variability in,

[36] There is *no* documentation contained in the FEIS or record to support this contention.

conductance in the St. Louis River that will reach the Band's downstream waters. In fact, PolyMet estimates specific conductance in its discharges to range from 753-960 µS/cm, which is more than double the Band's numeric standard of 300 µS/cm. Levels of specific conductance persist for at least 126 miles downstream of the nearest upstream discharge site.[37] Accordingly, PolyMet will violate the Band's numeric standard for specific conductance.

B. The Band Wetlands Water Quality Standards.

Considering the discharges from the Project, it is expected that there will be non-compliance with the following:

Wetlands Water Quality Standards

> Section 701. Designated Uses. For all wetlands, as defined by the Cowardin classification scheme, the uses to be protected include, but are not limited to—baseflow discharge, cultural opportunities, flood flow attenuation, groundwater recharge, *indigenous floral and faunal diversity and abundance,* nutrient cycling, organic carbon export/cycling, protection of down-stream water quality, recreation, resilience against climatic effects, sediment/shoreline stabili-zation, surface water storage, *wild rice,* and *water dependent wildlife* to the extent that such uses, functions, and values occur as represented by reference wetlands. (emphasis added).

As described above, it is expected that discharged waters from the Project containing elevated levels of sulfates and mercury will interact with dissolved organic matter to generate additional methylmercury that will be transported downriver to the Band's Reservation waters and wetlands, especially in the event of high flows. Methylmercury will bioaccumulate and biomagnify in fish and other aquatic life in or dependent upon the St. Louis River, streams and wetlands and impair designated uses such as subsistence fishing, warm water fish, wildlife, especially piscivorous birds and mammals such as herons, ducks, mink, river otter, bald eagle. The consumption of methylmercury contaminated foods by humans has resulted in fish consumption advisories and impairs Designated Uses for the St. Louis River and the three major streams on the Reservation as well as wetlands adjacent to those areas.

> 3. Section 703 Antidegredation
> Tier I: For all wetlands, using the Cowardin classification scheme, there shall be no degradation of existing uses.
>
> Tier II: Using the Cowardin classification scheme: there shall be no net loss to the water quality, functions, area, or ecological integrity of high quality lacustrine, lacustrine fringe, palustrine, riverine, and slope wetlands, unless, after satisfying applicable antidegradation provisions including avoidance, minimization, and

[37] Attachment 2, Ex. 7 at 13 (Tribal Cumulative Effects Analysis).

> mitigation/replacement requirements, the authorized tribe determines that allowing degradation is necessary to accommodate important social or economic development in the area in which the wetlands are located.

As described in the FEIS, the Band's April 30, 2021 Submission and above, the Project's unavoidable leakages and releases of process water, leachate, and stormwater containing inorganic mercury and methylmercury, and sulfides/sulfates will almost certainly result in degrading the ecological functions and services of the affected Fond du Lac Reservation wetlands, including existing uses, as well as the loss of their ecological integrity.

V. TREATY RIGHTS AND ENVIRONMENTAL JUSTICE IMPACTS

Under the Treaty of LaPointe of September 30, 1854 ("1854 Treaty"), 10 Stat. 1109, in exchange for ceding large portions of land in northeastern and east-central Minnesota, several member Bands of the Minnesota Chippewa Tribe, including the Fond du Lac Band, retained the right to hunt, fish, and gather in their Ceded Territory in northeastern Minnesota. *Id.* art.1. Those Band members, including members of the Fond du Lac Band, rely to this day on their Treaty rights to hunt, fish and gather within the Ceded Territory for subsistence and as an integral part of their culture. The 1854 Treaty also established a Reservation along the St. Louis River for the Fond du Lac Band as the Band's permanent homeland where Band members all have the right to hunt, fish and gather. *Id*. art. 2.

The St. Louis River watershed (called *Chi-gamii-ziibi* by the Ojibwe) is encompassed within the Ceded Territory and has been home to the Band for centuries.[38]

> Ancestors of present day Band members resided in th[e Project] area for centuries and many Band members followed traditional practices extensively until about a generation ago when the effects of mining devastated the rice beds in the Embarrass and St. Louis River watersheds and closed access to large tracts of public (USFS) land where traditional harvest and collection areas occur. Th[e] proposed Tribal Historic district encompasses complex trail system, Indian villages, trading posts, encampments for fishing, hunting, wild rice harvest and processing, sugar bush, and other traditional subsistence practices. It includes what was essentially a 'water highway' used by the Ojibwe at the time of European contact, and subsequently by Voyagers during the era of heavy fur trading. In addition, numerous medicinal plant gathering sites, Midewewin lodges, vison quest locales and other sacred places occur.[39]

[38] Attachment 2, Ex. 9, Earth Economics – The Value of Nature's Benefits in the St. Louis River Watershed Report (Jun. 2015) (discussing the socio-economic value of the St. Louis Rivers and watershed to the Band).
[39] Attachment 2, Ex. 7, Tribal Cumulative Effects Analysis, at 8-9 (Sep. 2013).

As discussed in the Band's April 30 Submission, the area in and around the Project is located in the Band's Ceded Territory and includes the St. Louis Watershed, which has suffered from historical negative mining impacts. Over time, the Band has seen its wild rice waters (called *manoomin* in Ojibwe) degraded and its lake sturgeon wiped out by water quality degradation and pollution. The remaining fish are now so high in mercury that the Band members cannot safely feed the fish to their children. Many of these impacts are attributable to mines upstream of the Reservation and failed enforcement of Minnesota's water quality standards on the mining industry.

Construction and operation of the Project will have a combined impact on the natural and physical environment that will significantly and adversely affect the Band. The adverse cultural, social, economic, and ecological impacts to the Band are interrelated to the adverse impacts to the natural and physical environment that will result from the Project. The additional environmental effects of the Project will be significant and will have an adverse impact on the Band that appreciably exceed or will likely appreciably exceed the effects on the general population. These impacts raise significant concerns with respect to the Band's Treaty rights and environmental justice. For example, the Project will result in a loss of Band members' ability to exercise their Treaty rights within the Project area, will result in the destruction of diverse wetlands in the Ceded Territory and have adverse impacts to the Band's Reservation, including violations of the Band's federally approved water quality standards. Both the EPA and Army Corps have a trust responsibility to protect the Band's Treaty rights and must comply with environmental justice principles.

VI. RECOMMENDATIONS

The Corps should revoke the 404 Permit because there are not adequate protective permit conditions nor corrective actions that can be imposed based on the Project, as designed and permitted, to prevent the violations of the Band's water quality requirements discussed throughout this analysis. Those violations also result in infringements on the Band's Treaty rights and violate environmental justice principles. Put simply, the Project has not been evaluated, designed, or permitted to comply with the Band's water quality requirements.

In addition, the monitoring provisions described in the FEIS and other Project permits are entirely inadequate. Monitoring of *post-development* wetland water quality is explicitly *excluded* from the 401 Certification, preventing discovery of any impacts on wetland biogeochemistry—particularly methylmercury production—during the Project's mine and processing operations. In the final 401 Certification, the MPCA ultimately requires only two monitoring locations upstream of the Project, and only three downstream (potentially impacted) sites where change might be detected. Downstream monitoring sites are only on larger channels and considerable distance from potential locations of direct operational impact such as the Embarrass River wetlands discussed previously. The specification for sampling the streams only four times annually is indefensible—detection and confirmation of systematic change above natural variability will be impossible over any reasonable time period, particularly in the absence of reference monitoring of comparable systems (Branfireun 2019; Section 2.2).

A comprehensive monitoring program is essential, for example, to ensure that methylmercury in the environment is not increased as a result of the Project. In order for monitoring to be meaningful and used for, among other aspects, assessing performance of control measures (e.g., the capture and treatment of seepage), WWTF performance, and long-term ecological conditions, there should be robust baseline data, in this case for at least two to three years. In addition, and because the key adverse impacts will likely be to flora and fauna in the St. Louis River, its adjacent wetlands, and streams and wetlands within the Fond du Lac Reservation with surface water connections to the St. Louis River, biological monitoring of, among other things, benthic and macro-invertebrates, water birds and waterfowl, fish, and wetland dependent mammals should have been conducted to obtain a robust baseline profile. A vigorous long term monitoring plan should be an integral part of the approach to evaluating performance of controls, impacts to stream and wetland conditions, and to flora and fauna. Moreover, a comprehensive monitoring plan also should address the potential range of responses to problems that could arise during construction and operation of the Project's mine and its facilities, i.e., an adaptive management plan.

A template for monitoring is the DeBeer's Victor Mine which is located in a wetland-rich region of northern Ontario. DeBeer's implemented an extensive groundwater and surface water network of monitoring stations at nested spatial scales where dozens of surface water and shallow groundwater locations were sampled on a monthly basis for a minimum of 36 months pre-development to establish baseline conditions, and then throughout the entire life of mine into closure. In addition to other routine water chemistry, every water sample is analyzed for filtered and unfiltered total mercury and methylmercury using ultra-trace techniques. 500-700 small-bodied fish (young of year) are collected each year late in the open water season and analyzed for methylmercury content as biosentinels under provincial regulation; the mercury in these biota reflect mercury exposure conditions in that year only, permitting annual assessments of change both prior to, and during Mine operations. This is in addition to a large food fish monitoring program. Reference locations are also sampled for all parameters indicated above in order to de-convolve mine-related impacts from natural year to year variability. These data are reported to the provincial regulator annually and are in the public record. An excellent illustration of a biosentinel program in Minnesota was undertaken by Jeremiason et al. (2016) where concentrations of methylmercury in dragonfly larvae reflected surface water methylmercury in a high flow year. A failure to require biological monitoring of methylmercury is a regulatory omission that prevents detection of, or protection from, methylmercury impacts of the project on the environment and on human health.

In the absence of robust baseline data, operational upsets at the Project (such upsets are unavoidable) cannot be anticipated, evaluated correctly, and addressed and resolved efficiently. Due to the lack of robust baseline data, a comprehensive monitoring program, and a well-designed adaptive management plan, operational upsets will result in periodic discharges from the Project that reach Reservation water and wetlands and do not comply with the Band's Water and Wetland Quality Standards. That circumstance will result in long-term harm to Fond du Lac Reservation

waters and wetlands, the flora and fauna that depend upon those resources, and the Band's members.

ADDITIONAL REFERENCES REVIEWED

Alan H. Stern, A Review of the Studies of the Cardiovascular Health Effects of Methylmercury with Consideration of their Suitability for Risk Assessment, 98 Envtl. Res. 133 (2005).

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