DATE: April 29, 2021

FROM: Matthew Schweisberg, PWS, Principal
Wetland Strategies and Solutions, LLC

TO: Prepared for the Fond du Lac Band of Lake Superior Chippewa

SUBJ: Polymet NorthMet 401(a)(2) Certification Remand

Summary and Conclusions

- The proposed NorthMet Mine project would result in the discharge of waters containing inorganic mercury, methylmercury, sulfides and sulfates, and dissolved organic matter to tributaries of the Embarrass and Partridge Rivers. The Embarrass and Partridge Rivers are direct tributaries of the Saint Louis River, which forms the northern and eastern boundaries of the Fond du Lac Band ("FDL" or "Band") Reservation.
- There are extensive riparian (floodplain) wetlands along the Saint Louis River that contain organic-rich soils, i.e., mucks and peats. Fluctuating water levels in these riparian muck and peat wetlands would create ideal conditions (i.e., oxidation and reduction) for enhancing the methylation of mercury.
- As there is a direct surface water connection between the Mine and Plant sites and the riparian wetlands along the FDL Reservation, I expect that the contaminated discharges from the NorthMet Mine would be transported to these riparian wetlands.
- In addition, I expect that late fall, winter, and spring flooding on the Saint Louis River would back up waters into at least the three major streams on the Reservation—Fond du Lac Creek, Stony Brook, and Simian Creek—and the wetlands adjacent to those streams. As such, the contaminated discharges from the Mine and Plant may easily reach and contaminate these three streams and their adjacent wetlands within the Reservation.
- Fish and wildlife resources that use the Saint Louis River, its riparian wetlands, the three streams, and their adjacent wetlands would be exposed to mercury and methylmercury, would consume plant and animal foods containing elevated levels of methylmercury, and in turn be available to higher trophic levels as well as to humans that catch and consume fish from the Saint Louis River. Biomagnification in the food chain is a major concern. Among other species, the Band's restoration efforts for lake sturgeon may be compromised.
- The consumption of methylmercury contaminated foods by fish and wildlife and by humans would impair Designated Uses for the Saint Louis River and the three streams on the Reservation as well as wetlands adjacent to those areas.
- The degradation of Reservation waters and wetlands will result in non-compliance with the Designated Uses and Antidegradation standards of the FDL Water Quality Standards.

Introduction

This is a synopsis of my opinions regarding whether PolyMet's proposed NorthMet mine project ("the Mine") discharges "may affect" the Fond du Lac Reservation's wetland and other water resources due to non-compliance with the Band's water quality standards. My comments here are centered mostly on wetlands. To compile this synopsis, I reviewed a variety of information including, among others,

- File documents, such as
    - portions of the MDNR 2015 FEIS, Appendices, and ROD, and related documents at the MDNR's web site dedicated to the project;
    - PolyMet's application for a CWA Section 404 Permit, the 2019 Army Corps Section 404 Permit and ROD, and the 2021 Army Corps notice suspending that permit; and,
    - MPCA 2018 Section 401 Water Quality Certification and related document's at PCA's web site dedicated to the project.
- The Band's web site for relevant information regarding the Reservation, including,
    - the environmental setting;
    - fish and wildlife resources
    - natural resources management; and,
    - cultural resources.
- PolyMet's web site;
- On-line mapping resources, such as the USDA-NRCS Web Soil Survey and the U.S. Fish and Wildlife Service-National Wetland Inventory;
- Fond du Lac Reservation, Joint Comprehensive Wetland Protection and Management Plan, Fond du Lac Reservation – Office of Water Protection; Carlton County – Planning and Zoning St. Louis County – Planning Department City of Cloquet (January 2006);
- Scientific articles regarding mercury and mercury methylation, methylmercury impacts upon wetlands and other aquatic resources; and,
- Several maps of the principal watersheds for the Saint Louis, Embarrass, and Partridge Rivers.

According to the FEIS, the Mine and Plant would have direct adverse effects on at least 900 acres of wetlands and indirect adverse effects on at least 27 additional acres. Considering Mine and Plant operations over the course of active mining, mine closure, and maintenance activities, indirect adverse impacts to wetlands from WWTP plant discharges; from uncaptured and/or under-treated stormwater runoff; from contaminated groundwater migration and discharge to surface waters; and to fish and wetland dependent wildlife, indirect adverse effects would almost certainly be far greater. The above activities, particularly monitoring and long-term maintenance, would likely consume in excess of 60 years and quite possibly more than a century.

Project Facilities Setting

The proposed Mine and Plant sites drain to the Partridge and Embarrass Rivers, both tributaries of the Saint Louis River. The Transportation and Utility Corridor crosses over Wyman, Longnose, and Wetlegs Creeks, which drain to the Partridge River. The Saint Louis River forms the northern and eastern borders of the FDL Reservation. The Mine and Plant are located approximately 70 miles upstream of the FDL Reservation and there is a direct surface water connection between the Mine and Plant sites and the Reservation. Discharges at the Mine and Plant sites clearly have the potential to adversely affect wetland and water resources adjacent to and on the Reservation. See FEIS Chapter 5.

Wetlands

The Saint Louis River forms the northern and eastern boundaries of the Reservation. Riparian wetlands that exist along those two boundaries (i.e., the river shoreline) total approximately 9,400 acres. Of these wetlands, the USFWS-National Wetland Inventory classification indicates that approximately 2,400 acres (25%) are seasonally flooded basin or flat. These wetland types have extensive organic soils (e.g., Giese muck, Bowstring). Seasonally flooded wetlands experience fluctuating water levels; flooded in mid to late winter and spring, then drying out when water levels recede in summer and early fall. The fluctuating water levels in these organic-rich riparian wetlands are known sites where mercury methylation occurs.

Along these boundaries, there also are numerous streams and creeks (e.g., Fond du Lac Creek, Stony Brook, Simian Creek) that connect more interior Reservation wetlands to the River, including some wild rice areas. The wetlands are predominantly forested, shrub, and emergent types. Many of these wetland areas flood periodically (often backwater flooding from the Saint Louis River) and contain organic soils (e.g., Loxley muck, Dawson muck, Greenwood mucky peat). [1]

Anticipated Impacts From the Mine and Plant Sites

Section 5.2.2.3 of the FEIS describes several approaches that would be employed for the Mine site to control or prevent off-site discharges of untreated process water and surface water runoff; to control and capture groundwater seepage; to control discharges of contact water; and to limit the oxidation of the sulfide minerals in the pit walls and backfilled waste rock, and reduce the amount of metals leaching to the pit water. FEIS pages 5-101 to 5-103 describe these approaches in more detail. The FEIS includes statements such as,

- No water would be discharged off site;[2]

[1] The last catastrophic flood (the "Solstice Flood") on the Saint Louis River occurred in 2012.

[2] There is little documentation contained in the FEIS that supports this contention. In fact, other places in the FEIS offer conflicting information.

- During periods of high precipitation or during spring snowmelt, partial dewatering of the East Pit (to the WWTF and ultimately to the Tailings Basin) may be required to allow placement of the waste rock;
- The mine pits would remain permanently and potentially serve as long-term sources of contamination; and,
- *The affected groundwater in this flowpath would migrate slowly towards the Partridge River. (emphasis added)*

For the Plant site, these types of statements include,

- Tailings Basin pond water would be sent to the WWTP for treatment and discharged to surface water as necessary. The purpose of the WWTP would be to treat water for discharge to the environment when the NorthMet Project Proposed Action has excess water that could not be stored in the Tailings Basin pond. The WWTP would include a reverse osmosis unit or equivalent technology that would meet water quality targets;[3] *A small portion of groundwater would bypass the containment system and enter into groundwater flowpath. Groundwater would then emerge in surface waters north, northwest and west of the Tailings Basin* (emphasis added);
- On the southern side of the Tailings Basin, *an existing seepage containment system would be upgraded by PolyMet to achieve 100 percent capture of tailings surface and groundwater seepage that otherwise would flow into Second Creek, a tributary of the Partridge River.* (emphasis added) Improvements to capture efficiency of the existing dam may include lining the upstream dam face with bentonite and injecting grout into the dam. A second dam could be constructed approximately 500 ft downstream of the existing dam where the geography is more constricted. This potential second dam may be earthen with a clay or concrete cutoff wall extending to bedrock; and,
- Tailings Basin pond elevation would be controlled by pumping any excess pond water to the WWTP. *An emergency overflow channel would be constructed as a backup means of controlling pond elevation, but discharge from the emergency overflow would not be expected. The emergency overflow is provided for protection of the dams in the rare event that freeboard within the Tailings Basin is not sufficient to contain all stormwater. Such instances have the potential to occur in the event of a probable maximum precipitation rainfall event. Probable maximum precipitation rainfall events are rare.* (emphasis added)

First, engineered controls such as those described in the FEIS are almost never 100% effective. The FEIS recognizes this fact, that problems can arise as a result, and describes contingencies to address that recognition. Rare and/or unusual catastrophic events can and do occur, especially at

[3] There is no documentation contained in the FEIS that supports this contention.

large mines.[4] More often, non-catastrophic problems can occur that discharge untreated or under-treated mine waste to surface waters. The FEIS appropriately acknowledges that small amounts of leakage from the two WWTF equalization basins, from the East and West Pits, and from the Ore Surge Pit would occur and eventually reach the Partridge River (FEIS, 5-121-124).

In addition, there appears to be no recognition that two or more of the described approaches may not operate as effectively as anticipated or they may malfunction, and that more than one malfunction may occur at the same time. It is not unreasonable to expect that concurrent problems could occur. If that were to happen, it would likely result in discharges to surface waters that exceed water quality standards and that drain to the Saint Louis River and are transported to downstream Reservation waters and wetlands. Such discharges would likely result in non-compliance with both the Designated Uses and Anti-Degradation requirements of the FDL Water Quality Standards.

FDL's Water Quality Standards

The principal contaminants of concern from the proposed Mine and Plant are mercury/methylmercury and sulfides/sulfates. Methylmercury is highly toxic to all aquatic life and bioaccumulates and biomagnifies in the food chain, especially in fish and wetland dependent wildlife. Microbes are key players in the methylation of mercury, and sulfides/sulfates are believed to enhance that process, especially in the presence of dissolved organic matter that is commonly produced by wetland soils, i.e., muck and peat, that are present in most of the wetlands at the Mine and Plant sites, and along the Saint Louis River in riparian wetlands. As described above, there is a direct surface water connection between the Mine and Plant Sites and the Reservation, principally via the Embarrass and Partridge Rivers which drain to the Saint Louis River.

The FEIS states that the WWTF and the WWTP would be designed to meet Minnesota water quality based effluent limits that are protective of the GLI 1.3 ng/L mercury standard.[5] In contrast, the standard as approved by the U.S. EPA for FDL Reservation waters and wetlands is half that at 0.7 ng/L. It is difficult to believe that the discharged water from the Mine and Plant sites could meet that lower standard when those waters reach Reservation waters and wetlands. In any event, there is no data or other relevant information in the FEIS to support that the lower standard would be met at the Reservation.

[4] Two of the most recent are the 2015 Mount Polley tailings dam failure in British Columbia and the 2016 Samarco tailings dam failure in Brazil. Recently published research indicates that the rate of severe tailings dam failure is increasing globally because of, not in spite of, modern mining technology. See http://csp2.org/files/reports/Bowker%20%26%20Chambers%20-%20Risk-Public%20Liability-Economics%20of%20Tailings%20Storage%20Facility%20Failures%20%E2%80%93%2023Jul15.pdf

[5] Again, there is no documentation contained in the FEIS to support this contention.

FDL Wetland Water Quality Standards

Considering the discharges from the Mine and Plant sites described above, I expect non-compliance with two standards to occur.

1. 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 downstream water quality, recreation, resilience against climatic effects, sediment/shoreline stabilization, 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, I expect that discharged waters from the Mine and Plant sites containing elevated levels of mercury and sulfates will interact with dissolved organic matter to generate methylmercury that will be transported downriver to Reservation waters and wetlands, especially in the event of floods. Methylmercury will bioaccumulate and biomagnify in fish and other aquatic life in the River, streams and wetlands and impair designated uses such as subsistence fishing, warm water fish, wildlife (especially piscivorous birds and mammals such as herons and river otter), and, potentially, wild rice 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 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 above sections, the unavoidable leakages and releases of process water, leachate, and stormwater containing mercury, sulfides/sulfates, and inorganic and methylmercury, will almost certainly result in degrading the ecological functions and services of the affected Reservation waters and wetlands, including existing uses, as well as the loss of their ecological integrity.

Matthew Schweisberg, PWS

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 http://www.linkedin.com/pub/matt-schweisberg/39/912/2b/

EXPERTISE and SKILLS

- Coastal and inland wetland, stream, aquatic resource
  - identification and delineation
  - ecological functions and services, and condition assessment
  - compensatory mitigation
- Coastal and inland wetland, stream, and aquatic resource restoration and creation
- Coastal and inland wetland, stream, aquatic resource assessments
- Risk assessment, natural resource damage assessment, and compliance issues at CERCLA and other hazardous waste sites
- Expert in the Clean Water Act (CWA) Section 404 Program, especially CWA jurisdictional determinations; permitting regulations (§404(b)(1) Guidelines); controversial cases, especially §404(c) actions; and enforcement issues
- Testimony: Federal grand jury, expert witness, expert witness team supervision on wetland regulatory, science, and technical matters for federal, state, and private civil litigation involving energy exploration and production, residential development, agricultural conversions, and CERCLA remedies
- Instructor for courses in wetland regulation; restoration and creation; wetland ecology; and wetland identification and delineation for EPA, other federal agencies, NGOs, and at the university level
- Policy, regulatory and technical advice and assistance for clients seeking to navigate regulatory issues related to coastal and inland wetlands and other aquatic resources.
- Exemplary analytical, writing, communication skills

CERTIFICATIONS

Professional Wetland Scientist (PWS) Certification #723, Society of Wetland Scientists Professional Certification Program

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EDUCATION

B.S. Wildlife Management, University of Maine

PASSIONS

- ESG issues, esp. wildlife and wildlife habitat; wetland and other aquatic resources protection; human rights; transparent and honest government; free press

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WORK EXPERIENCE - Current (see Linkedin profile)

Principal, Wetland Strategies and Solutions, LLC
Merrimac, MA (www.wetlandsns.com)
2012 - Present

WSS provides scientific expertise, unsurpassed regulatory knowledge, and exceptional negotiation skills for clients to avoid and minimize delays, meet critical interests, and achieve project objectives. WSS provides key insight to develop practical strategies and achieve sensible solutions for timely, cost-effective, and environmentally sensitive results. WSS employs a technical approach that is always based upon landscape and watershed considerations to ensure that wetlands, streams, and other aquatic resources, including the fish and wildlife that depend on those resources, are viewed in their proper ecological context. WSS supports interactions with regulators at the federal, state, and local levels to ensure that science, regulation, policy and decision-making are integrated appropriately.

Associate, Burnside Environmental Group, LLC
Boston, Massachusetts (www.burnsidegroup.com)
2012 - Present

Burnside Environmental Group works on behalf of clients throughout the United States to provide specialized litigation support services and develop legal strategies for civil or criminal environmental enforcement actions.

Member, Board of Directors
Society of Wetland Scientists (www.sws.org)
2015 - Present

The international Society of Wetland Scientists (SWS) promotes understanding, conservation, protection, restoration, science-based management, and sustainability of wetlands world-wide.

Chair, Ethics Committee (Member, Board of Directors)
Society of Wetland Scientists-Professional Certification Program (www.wetlandcert.org)
2016 - Present

The SWS-PCP helps the public identify qualified individuals to identify, assess and manage the Nation's wetlands and other aquatic resources. This program is intended to meet the needs of professional ecologists, hydrologists, soil scientists, educators, agency professionals, consultants, and others who practice wetland science.

Member (ex officio), Board of Directors
Association of State Wetland Managers, Windham, ME (www.aswm.org)
(representing the Society of Wetland Scientists & the Society of Wetland Scientists-Professional Certification Program)
2016 - Present

The ASWM is a nonprofit membership organization that promotes and enhances protection and management of wetland resources, the application of sound science to wetland management efforts, and provides training and education for our members and the public.

WORK EXPERIENCE - Past

Member, Board of Directors
Vice President for Education
Massachusetts Association of Conservation Commissions
Belmont, MA (www.maccweb.org)
2013 - 2020

The MACC provides policy, technical, and educational assistance to the municipal Conservation Commissions of the 351 towns and cities in Massachusetts.

Instructor
Eagle Hill Institute
Steuben, Maine (www.eaglehill.us)
2013 - 2019

Co-instructor for five-day, intensive course in wetland identification, delineation, and ecology

Chief, Wetlands Protection Program 2004 - 2012
Senior Mediator, Alternative Dispute Resolution Program 1997 - 2012
U.S. EPA, New England Region, Boston, MA

As Chief of the Wetlands Protection Program, managed all aspects of the Region's Wetlands Protection Program, including controversial policy and technical matters, major project review, impact analysis, represented the Region in all matters related to the CWA Wetlands Program.

As Senior Mediator for the Region's Alternative Dispute Resolution Program, mediated and facilitated multi-party environmental and public policy disputes.

Member, International St. Croix River Watershed Board 2008 - 2012
International Joint Commission, Washington, D.C. (https://www.ijc.org/en/scrwb)

As a U.S. member on the International Joint Commission's International St. Croix River Watershed Board, represented the U.S. Government's interests on the Board that manages this international waterway.

Senior Wetland Ecologist 1985 - 2012
Enforcement Coordinator 1985 - 1995
U.S. EPA, New England Region, Boston, MA

- Major project review and impact analysis, including team leader for controversial project management
- Technical, policy and regulatory training for internal/external parties
- Ecological assessment of non-wetland ecosystems/habitat
- Special policy-related projects and issues (e.g., Superfund, agriculture industries)
- Conceptual design, review, and monitoring of coastal / inland wetland, stream, other aquatic resource restoration and creation projects; identification and boundary determination of wetlands and other waters for Clean Water Act jurisdiction; and assessment of wetland and stream ecological functions
- Planned/managed/implemented all aspects of Region's wetlands enforcement program, including long-term direction/targeting
- Managed enforcement staff and coordinated contractor support staff; oversight of all enforcement cases

- Developed and implemented outreach/education efforts for regulated public, local, state, and federal officials

Secretary-General 2000 - 2004
Society of Wetland Scientists Board of Directors
http://sws.org

Served as Secretary-General for the Board of Directors, managing membership policies, society by-laws, and annual elections of officers.

Instructor 1996 - 2001
New England Wild Flower Society
Framingham, MA

Taught coastal / inland wetland/stream/aquatic resource restoration and creation; wetland identification and delineation; and wetland/stream/vernal pool ecology

Environmental Scientist 1979 - 1985
U.S. EPA
Office of Water, Wetlands Division
Washington, D.C.

Supported technical/policy issue management, state program assumption, and management of controversial cases for the National Wetlands Program

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PROJECT EXPERIENCE

Management/coordination of projects involving wetland, stream, and other aquatic resource issues (e.g., impact assessment, restoration/creation/mitigation, alternatives analysis) involving transportation, energy, mining, agriculture, commercial and port development, and hazardous waste (Superfund) cleanup. Among others, managed and/or served as the technical expert for projects involving:

- Dam removal and aquatic resource restoration
- Transportation, such as major highways, airport expansions, and large rail line extensions;
- Energy, such as wind turbine fields, ground-mounted solar panel fields, oil and natural gas exploration and production, and natural gas and electrical transmission lines;
- Agriculture conversion, such as turf farms, rice culture, and cranberry bogs;
- Marine cargo port construction and marina development;
- Surface Mining;
- Residential subdivision development;
- Resort development/expansion, such as ski and golf resorts;
- Shopping mall and industrial and commercial business park development; and,
- Hazardous waste site remedies.

Managed review of projects involving numerous federal and related state statutes, including

- Clean Water Act, Rivers and Harbors Act;
- National Environmental Policy Act;
- Endangered Species Act;
- USDA Food Security Act—Swampbuster program;
- Federal Energy Regulatory Commission-Dam/Hydropower licensing program;
- Marine Protection, Research, and Sanctuaries Act;

- Water Quality Standards program;
- National Pollutant Discharge Elimination System program; and
- Massachusetts and multiple state wetlands and water quality protection programs.

AFFILIATIONS

Society of Wetland Scientists
Society of Wetland Scientists - Professional Certification Program
Association of State Wetland Managers
Association of Massachusetts Wetland Scientists
Maine Association of Wetland Scientists
New Hampshire Association of Natural Resource Scientists
Society of Soil Scientists of Southern New England
Society of Soil Scientists of Northern New England
New England Hydric Soils Technical Committee (charter member)
Massachusetts Association of Conservation Commissions
Oversees Press Club Foundation

EXPERT TESTIMONY

- for EPA in U.S. v. Ottati and Goss, NH, 1987 (re: wetland evaluation/assessment issues and remedies at Ottati and Goss Superfund site)
- for Massachusetts Department of Environmental Protection in Adjudicatory Hearing in Dantuc Realty Trust (Robyn Estates) v. MassDEP, 1988 (re: condition of existing wetland and assessment of ecological functions)
- for Massachusetts Department of Environmental Protection in Adjudicatory Proceeding in MassDEP v. Arthur Hoeg *et al*., 1993, (re: condition and extent of existing and previous wetland, and assessment of its ecological functions)
- for EPA in U.S. v. Cumberland Farms, Inc., *et al*, Massachusetts, 1996 (re: wetland delineation, evaluation, assessment issues and remedies)
- for EPA in U.S. v. Charles Johnson *et al*., Massachusetts, 2003 and 2011 (re: wetland delineation, evaluation, assessment issues and remedies)
- for plaintiff in Sarpy *et al.* v. ExxonMobil, Extex, and Meridian Corps., Louisiana, 2013 – 2015 (re: ecological harm from legacy oil and gas exploration and production, and wetland restoration)
- for plaintiff in D&D Cajun Ventures LLC *et al*. v. Atlantic Richfield Company *et al*., Louisiana, 2016 (re: ecological harm from legacy oil and gas exploration and production, and wetland restoration)
- for plaintiff in Iberville Parish School Board and the State of Louisiana v. BP America Production Company *et al.*, Louisiana, 2016 (re: ecological harm from legacy oil and gas exploration and production, and wetland restoration)
- on behalf of the Clean Water Fund re the Tennessee Gas Pipeline Company's proposed Connecticut Expansion Project, Massachusetts, 2016 (MA OADR Docket No. 2016-020) (re: ecological harm and alternatives)
- on behalf of the Sierra Club, Maine Chapter, re New England Clean Energy Connect Project, Maine, comments to the U.S. Army Corps of Engineers, 2020 (Public Notice NAE-2017-01342) (re: alternatives, impacts, regulatory compliance)
- on behalf of the Trustees for Alaska, Wild Salmon Center, *et al.* re: the proposed Pebble Mine, southwest Alaska, 2018-2020 (adverse ecological impacts to wetlands, fish and wildlife)
- on behalf of private landowner for litigation involving wetland issues, Lincoln, MA, 2019 - ongoing

- for plaintiffs in Gayle Baker, Donald J. Brunnelle, Judith A. Brunnelle, Jane Fraser, Burke McCall Harrison, Vicki S. Harrison, Judith C. Phillips, Robert W. Williamson, and Renee J. Williamson v. Mortgage of America Lenders, LLC, in U.S. District Court for the Southern District of Georgia Brunswick Division; October 2017—ongoing.