**Conservation Organizations'**
**Comments on the Supplemental Final EIS**
**for the NorthMet Project**

**Submitted to the Minnesota Department of Natural Resources**

December 21, 2015

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## 1.0 Introduction

The undersigned groups (Minnesota Center for Environmental Advocacy, Center for Biological Diversity, EarthJustice, Sierra Club North Star Chapter, Friends of the Boundary Waters Wilderness, Save Our Sky Blue Waters, Northeastern Minnesotans for Wilderness, Friends of the Cloquet Valley State Forest, Voyageurs National Park Association, and the National Parks Conservation Association) (collectively, "Conservation Organizations") submit these comments on the Final Environmental Impact Statement (FEIS) for the proposed NorthMet Project and Land Exchange.

The Center for Biological Diversity (Center) is a national, nonprofit conservation organization with more than 900,000 members and online activists dedicated to the protection of endangered species and wild places. The Center has an office in Duluth, Minnesota, and has hundreds of members who reside within and/or regularly use, enjoy, and recreate on public lands and waters in northeastern Minnesota, including on the Superior National Forest. The Center, its staff, and its members and the interests of its staff and members would be significantly harmed and injured if the proposed project is approved and allowed to be implemented.

Earthjustice is a non-profit environmental law organization, defending the right to a healthy environment for all, using the law to fight for the earth and its inhabitants since the early 1970s. Earthjustice works with individuals and organizations to realize that mission and ensure the implementation and enforcement of our environmental laws.

The mission of the Friends of the Boundary Waters Wilderness is to protect, preserve and restore the wilderness character of the Boundary Waters Canoe Area Wilderness (BWCAW) and the Quetico-Superior Ecosystem. We have nearly 3,000 members in Minnesota and across the United States, and regularly communicate with about 27,000 supporters. Our organization values healthy ecosystems, clean water, wilderness character, and primitive recreation. Our supporters enjoy the Superior National Forest and the BWCAW for canoeing, camping, fishing, hunting, bird-watching, and many other reasons, as well as the region's natural, largely-undeveloped character. The risks to many of these activities and attributes from nonferrous mining have been a significant concern for our organization for many years.

The Friends of the Cloquet Valley State Forest is a 501(c)(3) non profit organization dedicated to the protection and preservation of the natural and cultural resources of the Cloquet Valley State Forest and promotes responsible enjoyment of this unique treasure. The Cloquet River flows through our forest and into the St. Louis River. The people and the flora and fauna of the Cloquet River Valley are intimately connected with the fate of our river. Our members' concerns range from the health of the people to the legacy of the land, water and ecosystem we leave to the coming generations. Many of us make our livings by relying upon sustainable tourism, the natural world, art, and agriculture, and anything that disrupts the ecosystem is a threat to our livelihoods and well being.

The Minnesota Center for Environmental Advocacy (MCEA) is a Minnesota-based non-profit environmental organization, the legal and scientific voice protecting and preserving Minnesota's wildlife, natural resources, and the health of its people. MCEA has members across the state of Minnesota, some of whom live and recreate near the proposed mine. The proposed NorthMet

project has environmental implications for many of the areas of MCEA's work, including water quality, natural resources, energy policy and public health.

Northeastern Minnesotans for Wilderness (NMW) is a nonprofit regional conservation organization whose core mission is to advocate for the preservation and protection of public lands, designated wilderness areas, national parks, national forests, and other wild places in the Minnesota Arrowhead Region, especially the Boundary Waters Canoe Area Wilderness, the Superior National Forest, and the Quetico-Superior ecosystem. Since its founding in 1996, NMW has grown to represent over 2400 members and supporters, almost all of whom live in Minnesota. The majority of our members and supporters reside year-round or seasonally in the three-county Minnesota Arrowhead Region, own property in the three-county area, and will be directly impacted by the NorthMet Project. Our members and supporters also visit and recreate throughout the three-county area.

Save Our Sky Blue Waters (SOS) is a Duluth-based grassroots non-profit organization dedicated to protecting our region's waters, forests and wildlife. SOS formed in response to proposed copper-nickel sulfide mining and exploration in Minnesota's Arrowhead region and the headwaters of Lake Superior and throughout the Superior National Forest. The health of the St. Louis River watershed is a key component of our mission. SOS is a non-profit public interest environmental education and advocacy organization. The issue of potential toxic sulfide mining in northeast Minnesota may greatly impact our organization and citizens across the region.

The Sierra Club is a national nonprofit organization of approximately 600,000 members dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Club's particular interest in this case stems from the proposed project's potential impacts on Minnesota's natural resources and public health, including: risks to water quality, loss of wetlands, harm to wildlife, and cumulative impacts from mining. The North Star Chapter of the Sierra Club has approximately 14,292 members in the state of Minnesota.

The mission of Voyageurs National Park Association is to protect and promote the natural, recreational, and historic resources of Minnesota's Voyageurs National Park. VNPA and our supporters across the state serve as a voice for this water-based national park and its nearly 250,000 annual visitors who enjoy kayaking, canoeing, boating, camping, and fishing there each year, and contribute more than $16 million to the local economy. The proposed NorthMet project, individually and cumulatively, may have dramatic environmental implications for the water quality and health of the fish and wildlife in Voyageurs and Northern Minnesota. These implications necessitate sound science and analysis.

Since its founding in 1919, the National Parks Conservation Association (NPCA) has been the independent, nonpartisan voice working to strengthen and protect our nation's natural, historical, and cultural heritage. Together with its more than one million members and supporters nationwide, including 20,000 in the state of Minnesota, it uses the legislative system, the power of public opinion, and the courts to shape public policy to protect national parks. The proposed NorthMet project has environmental implications for national parks in Minnesota. Additionally, NPCA is a co-chair of the Healing Our Waters Great Lakes restoration coalition, which has successfully advocated to establish and sustain the Great Lakes Restoration Initiative (GLRI), which has helped improve the water quality of all of the Great Lakes. The NorthMet project would be located within the Lake

Superior watershed and pose an ongoing pollution threat to Lake Superior long after the proposed mining period stops.

These comments reference and incorporate the attached reports of the following technical experts:

- Dr. David Chambers, geophysicist; focus: mining engineering and planning;
- Keith Gadway, environmental engineer; focus: groundwater transport of pollutants
- Dr. Paul Glaser, wetland geohydrologist; focus: hydrology and wetlands;
- Dr. Tom Myers, hydrogeologist; focus: hydrologic modeling;
- Dr. Glenn Miller, geochemist, focus: water quality and treatment;
- Dr. Ann Maest, geochemist, focus: geochemistry and water quality
- Dr. Michael Malusis, geotechnical and geoenvironmental engineer; focus: barrier and containment strategies; and
- Victoria Stamper, air quality specialist; focus: air quality

Please consider these expert reports and associated attachments independent parts of the record herein. In addition, the Conservation Organizations are delivering with these comments a DVD of reference materials and additional supporting documents. Please ensure that these reference materials are also included in the record and made part of this submission. If DNR requires hard copies of the reference and supporting documents to ensure that they are made part of the record, please let us know and we will supply hard copies.

As an introductory matter, the 37 days offered for this comment period was far too short to review such a voluminous record. Although the public has had other opportunities to comment on earlier drafts of the EIS, this draft has changed significantly since the previous version. The Supplemental Draft EIS, released in late 2013, was an already-bloated[1] 2481 pages with appendices. The FEIS was released at 3568 pages with the appendices. The Co-Lead Agencies drafted nearly 1100 additional pages for the FEIS, in addition to other textual changes that did not lengthen the document but changed the content, sometimes significantly. Although the agencies did make the Preliminary FEIS available for review prior to the comment period, the document underwent additional changes before it was released as a FEIS. The only way to identify these changes would have been to simply sit down and read the document, a Herculean task in and of itself before one even has an opportunity to gather one's thoughts to prepare comments for the Co-Lead Agencies.

Moreover, the FEIS also includes tens of thousands of pages of Reference Materials. Although the Co-Lead Agencies alleged previously that Reference Documents are not part of the record for the public[2] these documents are not ancillary; in many cases they are the only place that substantive work and results are described. Appendix A, in which the Co-Lead Agencies respond to comments by "theme," makes clear the extent to which the Co-Lead Agencies rely on Reference Materials. At many points where comments point out a lack of detail on any aspect of the mine, the reader is

[1] CEQ regulations recommend that EISs for complex projects should not exceed 300 pages. 40 C.F.R. § 1502.7 (2015).

[2] *See* Co-Lead Agencies response letter to MCEA's request for comment period extension. March 11, 2014 (attached as exhibit 1a).

referred to one or more reference documents.[3] In other words, the Reference Documents are an integral part of the FEIS for any detail-oriented commenter.. Because of the unacceptably short comment period, Conservation Organizations reserve their right to supplement these comments with additional arguments and materials.

Second, we note the extraordinary degree to which the FEIS relies upon work completed by PolyMet or its consultant, Barr. In the reference documents, 112 are Barr Engineering and 48 are PolyMet.[4] Many of those documents were produced in 2014 and 2015. In contrast, there are only five reference documents from ERM, DNR's consultant, and only one of those in 2014. Although 93 documents are cited to MDNR, the vast majority are publications or database citations, rather than specific work done on this mine site or for this FEIS. It is unclear why DNR would not have used its own consulting firm, ERM, or its own employees to complete at least some of the extensive work done by Barr and PolyMet, given that PolyMet bears the costs. It gives the reader the general impression that, in the wake of public comments on the SDEIS, the Co-Lead Agencies simply asked the project proponent for additional work to defend its project in the FEIS, rather than the Co-Lead Agencies making an effort to give serious consideration or independent evaluation to comments.

Third, the Co-Lead Agencies' efforts at "categorizing" the comments resulted in a failure to respond to technical and specific comments, many of which were made by groups or individuals with considerable expertise. Categorizing comments by "theme" placed general public comments in the same category as specific comments by experts, resulting in a lack of response to expert and technical comments. The Conservation Organizations will point out these deficiencies where they occur below, but this is a persistent problem throughout. As a result, the Conservation Organizations emphasize that our previous comments submitted on the SDEIS in early 2014 remain valid, and largely unaddressed.

## 2.0 Details of Financial Assurance Must Be Disclosed to Effectively Assess Mitigation Measures and Socioeconomic Impacts.

All predictions made by the FEIS regarding activities after closure, including but not limited to reclamation, mitigation measures, water treatment, transitions to new technology including reverse

[3] Theme LU02; examples are too numerous to cite but a few examples follow: FEIS A-212 (referring the reader to "data collection and subsequent analyses are documented in . . . PolyMet 2015j, PolyMet 2015m, PolyMet 2015q, and Barr 2015f. Additional relevant documentation includes . . . Barr 2010c, Barr 2012b, and Barr 2015g, as well as PolyMet 2011" for additional information on mercury; FEIS A-374 (referring the reader to " the corresponding Geotechnical Data Packages for the Tailings Basin (PolyMet 2015l, as cited in the FEIS), Hydrometallurgical Residue Facility (PolyMet 2014c, as cited in the FEIS), and stockpiles (PolyMet 2014p, as cited in the FEIS), as well as the Flotation Tailings Management Plan (PolyMet 2015n, as cited in the FEIS), Residue Management Plan (Polymet 2014r, as cited in the FEIS), and the Rock and Overburden Management Plan (PolyMet 2015h, as cited in the FEIS)" for additional information on tailings and construction materials); FEIS A-530 (referring the reader to the Wetlands Data Package and Reclamation Plan for information on wildlife impacts); FEIS A-582 (referring the reader to the Water Modeling Data Package for the Plant Site (PolyMet 2015a) for an explanation of model calibration factors and concentration caps.)

[4] Most of the remaining documents are citations to literature, rather than original work completed on PolyMet's proposal.

osmosis (RO) at the Waste Water Treatment Facility (WWTF) are unsupported without analysis of financial assurance.[5] This FEIS also relies to an extraordinary degree on "adaptive management" strategies—used incorrectly here as merely monitoring plans with general descriptions of potential strategies that could be used if problems arise—that will require action after Year 20, when PolyMet says it will cease mining operations. But adaptive management strategies can only be deployed if there is money to pay for them. Thus, all adaptive management strategies identified in the FEIS are also unsupported without specific financial assurance information.

Dr. Chambers elaborated on the specific legal and scientific obligations of an agency overseeing environmental review of a mining operation to provide financial assurance details. In addition, the Conservation Organizations have attached an example of an EIS with adequate financial assurance details, the FEIS for the Idaho Cobalt Mine.[6]

The Co-Lead Agencies have continually alleged that there is no obligation to provide financial assurance information until permitting.[7] The FEIS states that "[n]either NEPA nor MEPA rules require that all financial assurance mechanisms be in place before the EIS is finalized."[8] However, the Co-Lead Agencies misstate concern here. The Conservation Organizations are not suggesting that any financial assurance mechanisms should be in place before the EIS is finalized. We are saying that details regarding the financial assurance package need to be included the FEIS in order to understand the potential impacts of the project as analyzed under NEPA or MEPA.

The FEIS is limited to statements that there will be a financial assurance package of some sort, and that it will meet the requirements of Minnesota Rules. If this was all the information required for an EIS to assess potential impacts and mitigation measures, than an EIS could be quite short. The section on water quality impacts, for instance, could simply state that the mine is governed by the Clean Water Act and therefore will not violate any water quality standards or other state or federal laws. But that is not how adequate EISs are written. Rather, under state and federal law, EISs must provide substantive analysis and scientific support for their statements. It is not enough to allege that the project will have no impact because it will comply with the law; if the FEIS concludes that the project will have no significant impact, the FEIS must demonstrate that the project is designed to comply with the law, and capable of minimizing potential impacts to support its statements.

The reason for this is that NEPA is designed to be more than a box to be checked by agencies; an EIS is an action-forcing document designed to ensure that agencies have thoroughly studied the impacts of a project before making any irretrievable commitment of resources.[9] The EPA has estimated that total liability for cleanup of all hardrock mines across the US is between $20 and $54 billion.[10] This particular FEIS states the need for extensive work after closure, including the

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[5] MCEA 2, 26-33; Friends 37, 43-47; CBD 34-36, 43-46.
[6] Attached as Exhibit 2a (Financial Assurance Cost Estimate for the Idaho Cobalt Project).
[7] See, e.g., FEIS A-367 ("FEIS Section 3.2.2.4 provides available details regarding financial assurance as required under NEPA/MEPA...Additional details on the financial assurance that would be required for the project would be addressed during permitting.")
[8] *Id.*
[9] *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332 (1989).
[10] 1 Identification of Priority Classes of Facilities for Development of CERCLA Section 108(b) Financial Responsibility Requirements; Priority Notice of Action, Environmental Protection Agency, July 28, 2009, Section V, Document ID: EPA-HQ-SFUND-2009-0265-0001, available at

requirement that two active waste water treatment plants with a particularly expensive form of treatment run for an indefinite period of time. Without adequate financial assurance determined and supported in the FEIS, a foreseeable impact of any mine would be that, upon closure, whether planned or unplanned, there will be insufficient funds available and either the state or federal government will need to bear the cost of reclamation, cleanup and long-term treatment—or those activities will not take place and the site will cause significant impacts to the environment. Any agency that permits a mine without determining whether the financial assurance amount is adequate has not assessed this impact, and risks making an irretrievable commitment to a project without fully understanding the consequences, in violation of NEPA.

## 3.0 The FEIS Must Assess the Underground Mine Alternative as a Feasible and Prudent Alternative.

NEPA requires agencies to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources."[11] "An agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action."[12] MEPA similarly requires that an EIS "compare the potentially significant impacts of the proposal with those of other reasonable alternatives to the proposed project."[13] Additionally, the Clean Water Act prohibits the discharge of dredge and fill material "if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem."[14] Where a proposed action is not "water dependent," practicable alternatives that avoid special aquatic sites are presumed to be available, unless clearly demonstrated otherwise.[15] In other words, the permit applicant bears the burden of showing that no practicable alternatives with less adverse impact are available.

The alternatives section is considered "the heart" of an EIS.[16] The Co-Lead Agencies are expected to "[r]igorously explore and objectively evaluate all reasonable alternatives" and "[d]evote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits."[17]

The NorthMet environmental review process identified underground mining as an alternative for assessment, but the Co-lead Agencies ruled it out. They concluded "that the Underground Mining Alternative is not . . . a reasonable alternative because it would not be economically viable and therefore it would also not meet the Purpose and Need."[18] This conclusion rests on errors and discrepancies in the estimates of mining costs, as explained below.

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http://www.regulations.gov/#!documentDetail;D=EPA-HQ-SFUND- 2009-0265-0001 (hereinafter "EPA Hardrock Mining Notice")

[11] 42 U.S.C. § 4332(E); 40 CFR § 1508.9(b).

[12] *Northwest Envtl. Defense Center v. Bonneville Power Admin*., 117 F.3d 1520, 1538 (9th Cir. 1997).

[13] Minn. R. 4410.2300(G).

[14] 40 C.F.R. § 230.10(a).

[15] *Id.*

[16] 40 C.F.R. § 1502.14; *see also Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664 (7th Cir. 1997) (when preparing an EIS, an agency must consider all reasonable alternatives in depth, and "[n]o decision is more important than delimiting what these 'reasonable alternatives' are").

[17] 40 C.F.R. § 1502.14.

[18] FEIS 3-160.

Furthermore, the FEIS states that "the geology outside of the open pit has not been characterized enough to support a mine plan and is beyond the boundaries of the NorthMet Project area, so it is not reasonable to include for consideration of the Underground Mining Alternative."[19] This statement is not true. While PolyMet may not yet have prepared a mine plan or assessed the economic viability of resources outside of the pit envelope, the geology for at least some of these resources is characterized enough to support a mine plan should PolyMet choose to prepare one. And while we do not find a specific definition of the "NorthMet Project area" in the FEIS, it is generally treated as including the entire area designated as the "mine site."[20] At least some of the additional mineralization that is well-characterized is found within what the FEIS shows as the project area.

The determination that an underground mine is not a reasonable alternative is not supported by the evidence. This issue was raised in our comments on the SDEIS at MCEA 2, 33-35, Friends 2, 48, 51-52; and CBD 108-110. It was also raised in a supplemental letter to Forest Supervisor Brenda Halter on October 8, 2015.[21] All of these materials are incorporated herein.

**The determination that underground mining would not be economically viable rests on errors and discrepancies in estimating costs of mining.**

The basis of the FEIS's economic analysis is quite simple: a value was calculated for the amount of ore to be mined on the one hand, and for the total costs of mining that ore on the other. If the costs were greater than the value of the ore, the mine was deemed not economically viable. The FEIS analyzed five mining rates ranging from 2000 tons per day to 15,000 tons per day.[22] To simplify the following discussion, we focus on the 7500 tons-per-day scenario because that is the scenario with the most positive economics according to the FEIS analysis.[23] The Co-lead Agencies presented an overall loss for this scenario of $168 million.[24] It appears that all of the numbers used in the Co-Lead Report were taken directly from Foth Infrastructure & Environment, LLC, Economic Assessment of Conceptual Underground Mining Option for the NorthMet Project (Oct. 2012) (hereinafter, Foth 2012), which was prepared on behalf of PolyMet and is also provided in Appendix B of the FEIS.[25]

***Operating costs***

The FEIS divides total estimated costs of mining into operating costs and pre-production capital costs.[26] Operating costs on a per-ton basis are provided in Table 1 of the Co-Lead Report. At the 7500 ton-per-day level, total operating costs are estimated at $49.00 per ton, and pre-production capital costs are estimated at $250 million total.[27]

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[19] FEIS 3-159.
[20] *See, e.g.,* FEIS 1-5 and 3-1, and Figures 3.2-1 and 3.2-7.
[21] Letter from Jane Reyer to Brenda Halter (Oct. 8, 2015) (attached as exhibit 3a).
[22] FEIS App. B, Co-Lead Agencies, Underground Mining Alternative Assessment for the NorthMet Mining Project and Land Exchange EIS at 7 (Sept. 27, 2013) (hereinafter, app. B).
[23] *Id.*
[24] *Id.*
[25] *Compare* App. B tbl. 2 at 7, *with* app. B Attachment 1 at tbl. 3 following page 15.
[26] App. B at 7.
[27] *Id.*

Foth 2012 divides operating costs into three components: mining costs, processing costs, and general and contingency costs.[28] The Foth 2012 report estimates costs for the 2000 and 5000 ton scenarios, and then adjusts these for the larger scenarios.[29] To arrive at its estimates, Foth drew from several sources, including InfoMine (an online model commonly used by the industry), examples from other mines drawn from 43-101 reports filed on SEDAR, and a memo prepared for this purpose by AGP Mining Consultants Inc. (AGP), which has done much of PolyMet's engineering work.[30]

For mining costs, the Foth 2012 report provides cost estimates for both room-and-pillar mining and long-hole open stoping. Many of the estimates did not include cemented backfill, although Foth states "Cemented backfill typically represents roughly 20 percent of mining costs."[31] The report settles on a mining cost of $40 per ton for the 5000 tons-per-day scenario. This amount is significantly higher than any estimate from any source used in the Foth 2012 report.

The only source that estimates mining costs above $30 per ton for the 5000 tons-per-day scenario is the AGP Memo, which Foth reports as $44 to $52 at 5000 tons per day for long-hole stoping.[32] However, the AGP Memo provides this figure for *total* operating costs (including processing and administrative),[33] while the Foth 2012 report uses it for mining costs only. The Foth 2012 analysis then goes on to add processing and administrative costs *again* to reach a total operating cost, which doubles the estimated processing and administrative costs included in the total operating cost estimate.

The estimates that Foth 2012 later uses for processing and "general and contingency" costs are $13 and $3.50 per ton, respectively.[34] If these are subtracted from the AGP total operating costs, the AGP estimate for mining costs alone is $22.50 to $33.50 per ton at the 5000 ton-per-day level.

Foth 2012 also included cost estimates from InfoMine.[35] InfoMine estimates the cost of long-hole stoping with sand backfill at $20 per ton for 5000 tons per day; adding 20 percent to that for cemented backfill gives $24.00 per ton, very much in line with the AGP report. Finally, Foth 2012 included one comparison mine, Podolsky/Levack/McCreedy West in Sudbury, Ontario, which has mining costs of $38 for 2250 tons per day.[36] Scaling that to 5000 tons per day would come to about $26 per ton. These are all of the estimates provided, and they agree to a remarkable extent. And yet

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[28] App. B Attachment 1 at 6-7.
[29] Costs-per-ton go down as the amount mined per day increases. For example, Foth calculated the total operating cost-per-ton for 5,000 tons per day at $56 per ton, as compared to $49 per ton for 7,500 tons per day. This is complicated by the fact that the reduction is not linear; the costs-per-ton go down rapidly at the 1,000 to 2,000 to 5,000 tons-per-day level, but the decrease begins to flatten above that point, with little cost decrease on a cost-per-ton basis for large-scale mining.
[30] Gordon Zurowski, Memorandum re: High Underground Costs (Nov. 11, 2011) (attached as Exhibit 3b) (hereinafter, "AGP Memo")
[31] App. B Attachment 1 at 7.
[32] App. B Attachment 1 at 7. In contrast, the figures given in the AGP memo are $42 to $50. Foth gave no explanation for this discrepancy.
[33] Ex. 3b at 2.
[34] App. B Attachment 1 at 7-8.
[35] *Id.*
[36] *Id.*

Foth 2012 sets the estimate for 5000 tons-per-day at $40 per ton. This cost estimate has no support in the record.

The $40 figure seems less inflated for room-and-pillar mining, but is still questionable. The only source cited by Foth 2012 is InfoMine, which gives a $32 per ton cost at 5000 tons per day, without backfill.[37] Adding 20 percent to that gives $38.40. However, the Foth 2012 report fails to mention that AGP estimated room-and-pillar mining without backfill at $22 to $28 per ton, which with 20 percent added would be $24.40 to $33.60.[38] The Foth 2012 report provides no comparison mines for room-and-pillar mining. At any rate, the alternative of underground mining should not be eliminated from NEPA review based on economics if *any* environmentally acceptable underground mining method shows a profit in the screening analysis; more expensive methods should be irrelevant to this analysis.

Using its $40-per-ton estimate for the 5000 ton-per-day scenario, Foth estimated $33-per-ton for a 7500 ton-per-day scenario.[39] This amounts to a 17.5 percent reduction. Using the same percentage reduction for the maximum cost estimate from any source ($33.50, the maximum amount in the AGP memo) gives a figure of $27.64 per ton. Once again, in the context of eliminating an alternative from NEPA review based on economics, the lower (or at least average) cost estimates should be used, and this estimate is still on the high end of the various figures given by Foth 2012. We also point out that AGP does not provide a basis for its estimates; as far as we can tell, there is no support for its estimates in the record. Nonetheless, for the sole purpose of showing that the economic analysis included in the FEIS does not indicate an operating loss for at least one scenario, we will use $27.64 as an estimated mining cost.

The second of the three categories of costs included in total operating costs is processing costs. Foth adopts the InfoMine processing cost for a three-concentrate flotation mill of $13 per ton at 5000 tons per day, after noting comparable values at Copperwood in Michigan ($11.75 per ton) and Lac des Iles in Thunder Bay ($14 per ton).[40] It goes on to scale this to $12.50 per ton for the 7500 tons-per-day level.[41] Remarkably, the report ignores PolyMet's own processing cost estimate for processing ore from the open pit, which is $6.99 per ton.[42] We were unable to extrapolate this to a smaller operation because of unknown scaling factors, but would expect this to be considered in a legitimate economic analysis.

The last of the three categories of operating costs is administrative costs. Because different mines label this category differently, it is difficult to compare the numbers from various sources. Foth does not provide an InfoMine estimate for this cost. The examples provided include $3.30 for general and $2.00 for contingency per ton at Lac des Iles (presumably for a total of $5.30 per ton); and $3.35 per ton for general and administrative at Copperwood. The report settles on an estimate of $3.50 per ton.[43] This cost apparently does not change based on tonnage; the same cost-per-ton is used in all

[37] *Id.*
[38] Ex. 3b at 2.
[39] No basis for this calculation is provided. Foth 2012 at 9.
[40] App. B attachment 1 at 7.
[41] *Id.* at 10.
[42] Exhibit 3c (AGP, Updated NI 43-101 Technical Report on the NorthMet Deposit 22-2 (Jan. 14, 2013)).
[43] App. B attachment 1 at 7-8.

scenarios.[44] Again, the report completely ignores PolyMet-specific information, which estimates "general and administrative" cost for the open pit mine at $0.66 per ton.[45]

Using the numbers discussed above, Foth 2012 reaches a total of $56.50 per ton for total operating costs at the 5000 ton-per-day level, and $49 per ton at the 7500 ton-per-day level. Based on the above discussion, these estimates are clearly inflated. Even if the processing and administrative costs are not adjusted based on PolyMet's own estimates, and the only correction made is for the discrepancy in the AGP figures, the estimate at the 7500 ton-per-day level would be $42.64.

***Capital Costs***

Capital costs are also significantly overstated because they fail to account for the savings that PolyMet will achieve due to the use of an existing processing plant. Rather than using PolyMet-specific information, estimates were based on industry costs drawn from InfoMine.

Foth provides separate InfoMine estimates for mine capital costs and processing plant capital costs. The Foth 2012 report estimated mine capital costs at 7500 tons per day at $125 million for room-and-pillar mining without backfill (adding 20 percent gives $150 million) and $115 million for long-hole stoping with sand backfill (adding 20 percent gives $138 million).[46]

For the processing plant, Foth 2012 provides an InfoMine estimate for a three-concentrate flotation mill of $98 million at the 7500 tons-per-day level, which Foth adopts as its estimated processing plant cost.[47] However, PolyMet provides an estimate of its own processing plant at 32,000 tons per day, which is $63 million.[48] The significantly lower cost is the primary savings that PolyMet will achieve by using an existing processing plant.

Again there are scaling considerations; the total capital cost at 7500 tons-per-day should be lower than the cost at 32,000 tons per day. However, again solely for the purpose of this discussion we will use the $63 million estimate. Foth also added a contingency amount of approximately 10 percent to the mine and process plant capital costs to calculate the total capital costs.[49] Adding 10 percent contingency gives a total capital cost of $234 million for long-hole stoping. This is in comparison to a $250 million estimate used by Foth and the Co-lead agencies.

***Total Cost***

To be clear, we are not arguing that the amount presented here is an appropriate estimate of underground mining. We think that that estimate would be significantly less based on a number of factors described above for which we have made no adjustment. Our only purpose here is to show that after correcting only the two most obvious discrepancies in the economic analysis prepared by Foth, the analysis does not show a loss at the 7500 ton-per-day level. Using an operating cost of $42.64 per ton and a total pre-production capital cost of $234 million results in a net profit of $39 million.

**Mineralization outside the pit envelope**

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[44] *Id.* at 10.
[45] Ex. 3c at 22-2.
[46] App. B attachment 1 at 11.
[47] *Id.*
[48] Ex. 3c at 21-5, tbl. 21-2.
[49] App. B attachment 1 at 11.

The existence of ore outside the pit envelope is a critical factor in determining whether an underground mine will be economical, because limitation to the pit envelope artificially limits the amount of ore of a particular grade that is available for mining. Co-Lead Report Table 2 provides net metal value for the five mining scenarios. Dividing this number by the total tons to be mined provides a value per ton. This exercise reveals that at the lower production rates, the minerals to be extracted have a higher per-ton value. The range is from $60.40 per ton for the 5 million ton scenario to $41.42 per ton for the 100 million ton scenario. These values are apparently based on how much ore there is in the pit envelope for each of the net metal values. That is, there are 5 million tons of mineable ore within the pit envelope with an average metal content worth $60.40 per ton; 30 million tons with an average metal content worth $51.73 per ton; and 50 million tons with an average metal content worth $47.72 per ton.

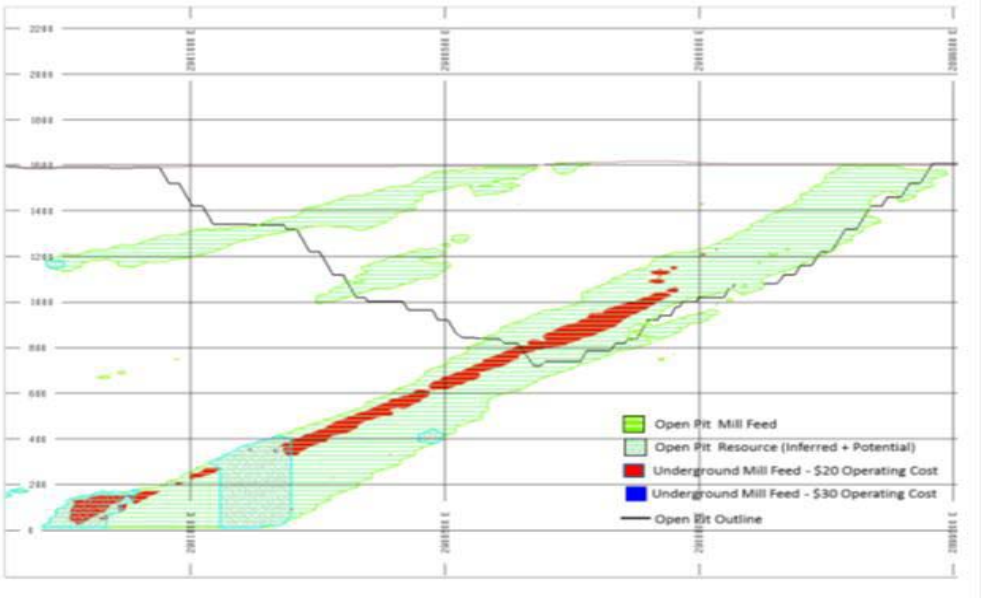
Including mineralization beyond the pit envelope would affect the amount of ore available at each net-value-per-ton level. As an example, assume that the mine could be extended into an area that would provide 50 percent more ore of a given grade than is available within the pit envelope. The outcome would be that, for example, 30 million tons of ore would grade at $53.85 per ton (the Co-Lead Report Table 2 net metal value per ton for 20 million tons of ore) rather than $51.73 per ton. Mining costs might go up somewhat due to the increased area to be mined, but other costs would remain the same. This could add up to $2.12 per ton in net value, or a total of $60 million to the mine's profit in the 7500 tons-per-year scenario.

AGP prepared both the mine plan and PolyMet's NI 43-101 Technical Report, and thus is very knowledgeable about the NorthMet deposit. The AGP report for the underground mining economic analysis provides the following table, which indicates that for one 5000 ton-per-day scenario, more than half of the economic ore lies outside of the proposed pit:[50]

| Economic Cutoff Value ($/ton) | Mining Method | Mill Feed Tonnage (millions) | | | Mining Rate (tons/day) | Approximate Mine Life |
|---|---|---|---|---|---|---|
| | | Total | Within Proposed Pit | Outside Proposed Pit | | |
| $7 - $8 | Open pit | 225 [1] | 225 | 49 | 32,000 | 20 years |
| $20 | UG | 18 [2] | 7.8 | 10.2 | 5,000 | 10 years |
| $30 | UG | 0.7 [2] | 0.5 | 0.2 | 1,000 | 2 years |

A graphic representation is also provided:

[50] Ex. 3b at 3.




*North-South Cross-section of one area of proposed mine, showing the resources available under different mining methods by color and the open pit outline.*

In light of this evidence, Foth 2012 goes into several obfuscations as to why an economic assessment of an underground mine should be limited only to the ore in the proposed pit. The obfuscation begins with Foth's special definition of "NorthMet deposit" for the purposes of the Underground Mining analysis: *"The term NorthMet deposit used in this report will refer to NI 43-101 compliant measured and indicated mineral resources within the open pit."*[51] The Co-Lead Agencies use information straight from the Foth 2012 report without mentioning this special definition. They thus state "The NorthMet deposit is considered to be a near-surface, bulk, low-grade mineralization,"[52] when the reality is that most of the mineralization at the NorthMet site is *not* near-surface. For example, "NorthMet consists of seven igneous units that dip southeast, with most economic sulfide mineralization in the lowermost unit."[53] And:

> Though grades vary, Unit 1 is also mineralized to the east of the deposit, down-dip (south) to depths of at least 2,500 feet, and past the limits of expected pit development in the west. The development of waste rock stockpiles over these areas is not expected to encumber any material that could reasonably be classed as ore because the upper units are barren and the Unit 1 mineralization is from 1,700 to over 2,500 feet below ground surface.[54]

Furthermore, the statement in the FEIS that "the geology outside of the open pit has not been characterized enough to support a mine plan" is flatly untrue for at least some areas. According to PolyMet's 2013 43-101 SEDAR filing, ore within the pit envelope accounts for "significantly less than half of measured and indicated resources."[55] Under Canadian regulations, "measured" and

[51] App. B attachment 1 at 3 (emphasis in original).
[52] App. B at 5.
[53] PolyMet 2007b at 13 (PolyMet NorthMet Geology and Resource Background (Jan. 2007)).
[54] *Id.* at 24.
[55] Ex. 3c at 22-3.

"indicated" resources are used to estimate the economic viability of a potential mine. The focus of the Foth 2012 report on the identification of "mineral reserves" as a limiting factor is just another obfuscation; the term "mineral reserves" carries no additional meaning in regard to the level of characterization of the geology. Rather, "mineral reserves" simply indicates measured and indicated resources for which a mining company has prepared an economically viable mine plan.[56]

The reality is that the *only* reason that the economic assessment for underground mining of the NorthMet deposit has been limited to the ore within the pit envelope is because this is the ore that PolyMet plans to mine in its first stage of open pit mining. Mineral reserves were delineated based on economics and other factors *specific to open pit methods*. This has nothing to do with the level of characterization of the geology. And using the same specified ore body to assess the economic viability of underground mining is an exercise designed to fail.

Measured and indicated resources do not become mineral reserves until a mine company has a mine plan showing that they can be mined economically using a particular mining method. To put it another way, with regard to an underground mine, minerals within the pit envelope can no more be referred to as "mineral reserves" than can those outside of the pit envelope. Cutting the assessment off at the boundary of the proposed pit is completely arbitrary.

The Foth 2012 report is at best disingenuous in its explanation of the deposit and what is known about it:

> There is mineralized rock outside of the volume of rock contained within the proposed open-pit. This mineralized rock occurs below the open-pit. While this mineralized rock is excluded from this report, speculatively it may be possible for it to be economically viable to extract decades in the future. *Only approximately 10% of the measured and indicated resource is below the open-pit.*[57]

Compare this to the statement from PolyMet's SEDAR filing quoted above: "The pit plan is not fully optimized and *the 20-year permit application covers significantly less than half of the measured and indicated resources.*"[58] The SEDAR filing reports measured and indicated resources of 442 to 694 million tons.[59] Mineral reserves (i.e., measured and indicated resources within the pit envelope) are reported at 274.7 million tons.[60]

Perhaps the Foth 2012 statement can be regarded as technically true if only 10 percent of measured and indicated resources lie *directly underneath* the planned pit; however it is clearly not true that only 10 percent of the measured and indicated resources are located outside the pit envelope at a depth amenable to underground mining.

Foth 2012 goes on to discuss "inferred resource" to further confuse matters:[61] "The majority of inferred resource defined by PolyMet (2008) is below the open-pit. There is a lack of geological data

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[56] CIM Definition Standards for Mineral Resources and Mineral Reserves (May 10, 2014) (attached as exhibit 3d).
[57] App. B attachment 1 at 3 (emphasis added).
[58] Ex. 3c– at 22-3 (emphasis added).
[59] *Id.* at 1-5 to 1-6.
[60] *Id.* at 15-3.
[61] Inferred resources have a lower level of confidence and cannot be used to establish mineral reserves. Ex. 3d.

to characterize the deep mineralized rock that in turn results in a lack of geological confidence leading to the inferred classification."[62] Once again, this may be technically true as applied only to the *inferred* resources, and yet misleading in regard to measured and indicated resources. In other words, the presence of inferred resources at depth does not mean that significant amounts of measured and indicated resources are not also present at depth. While it is likely true that PolyMet has insufficient information for some areas of mineralization to include them in an economic analysis, it is also true that there are mineralized areas outside of the mine pit for which it does have sufficient information.

In the 1970's U.S. Steel (USS) engaged in a very extensive program of drilling to define an underground mining resource. According to PolyMet's geology background document "There is every indication that the sampling and analytical work performed by USS was thorough, professional, of a high standard, and reliable."[63] All of the USS drill core and data is available to PolyMet, and much of it is in PolyMet's database.[64] As of 2007, USS had obtained more linear feet of drill core and had drilled almost as many holes as PolyMet.[65] The USS drilling was all done with the intent of developing an underground mine, and is thus concentrated in the areas where mineralization was known to be greatest at depth. While about 50 percent of the USS drill core has not yet been assayed, it is available at the Coleraine Minerals Research Laboratory.[66]

NEPA requires agencies to undertake necessary research when important relevant information is not readily available but could be obtained.[67] Refusing to assess an important and potentially viable alternative based on lack of information when the missing information is obtainable does not comply with NEPA.

As a final note, we object to the lack of documentation of the figures provided by Foth and accepted by the agencies. We do not object to the use of InfoMine for estimated costs; in fact we think that it is a more reliable source than analog mines chosen at the discretion of PolyMet's contractor, who has every reason to identify the costliest mines possible for the analysis. However, it is unclear how or why the InfoMine figures that were included were chosen. For example, underground mine cost data available from InfoMine includes production rates up to 45,000 tons per day.[68] The analysis needs to explain why Foth limited its InfoMine estimates to the 5000 ton-per-day level and used its own scaling factors (which also need explanation) for the larger scenarios.

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[62] App. B attachment 1 at 3.
[63] Polymet 2007b (PolyMet NorthMet Geology and Resource Background) at 38.
[64] *Id.* at 38-39.
[65] *Id.* at 5, Table 2.
[66] *Id.* at 33-34, 37.
[67] 40 C.F.R. § 1502.22; *National Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 733 (9th Cir. 2001) ("The Parks Service's lack of knowledge does not excuse the preparation of an EIS; rather it requires the Parks Service to do the necessary work to obtain it"); *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1244 n.5 ("NEPA law requires research whenever the information is significant. As long as the information is . . . essential or significant, it must be provided when the costs are not exorbitant in light of the size of the project and the possible harm to the environment").
[68] InfoMine, *Mining Cost Models*, InfoMine http://costs.infomine.com/costdatacenter/miningcostmodel.aspx#more-cost at 4 (last visited Dec. 17, 2015) (attached as exhibit 3e).

Throughout the exercise, the Foth cost estimates are given with no explanation as to why any particular number was settled on. For each parameter, the Foth 2012 report lists figures from different sources, and then comes up with a number without any explanation or reasoning. It justifies those numbers by comparisons to other mines, but provides no explanation of why the mines used were chosen. The costs from analog mines are consistently higher than those from InfoMine, which is commonly used by the industry and would provide a less biased assessment.

It is also unclear what information either Foth or the agencies rely on for statements relating to characterization of the ore body. For example, where is the data indicating that the NorthMet deposit is a "shallow" ore body, or that less than 10 percent of the measured and indicated resource is below the open pit? If the Co-lead agencies in fact did any independent evaluation of the Foth report, they need to make their analysis transparent. NEPA requires that the underlying data that forms the basis of conclusions in the FEIS be made available to the public.[69]

The obfuscations and biased analysis of PolyMet's contractor and the failure of the Co-lead Agencies to properly review the contractor's work or perform their own independent analysis has resulted in the summary rejection of an alternative that could result in significantly less environmental harm than the proposed project, in violation of NEPA, MEPA, and the Clean Water Act. Before going forward toward permitting an open pit mine and all the destruction that entails, the agencies must take an honest, hard look at the possibility that an underground mine might be a viable option.

## 4.0 The Co-Lead Agencies erroneously rejected the backfilling of the West Pit.

The Co-Lead Agencies failed to take a "hard look" at this alternative, instead eliminating it as an alternative without substantive analysis.[70] (MCEA 2, 33, 35–39; Friends 2, 49–52; CBD 110–111) Under NEPA, the FEIS must:

> examine all reasonable alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.[71]

The Co-Lead Agencies claimed that the West Pit backfill would not provide substantial environmental benefits. Yet they concede that "the opportunity to reclaim wetlands vegetation at the Category 1 Stockpile footprint area and not having to treat seepage from the Category 1 Stockpile" would be "measurable environmental benefits offered by backfilling the Category 1 Stockpile into the West Pit."[72] Nevertheless, the Co-Lead Agencies eliminated the alternative for consideration based on several factors, which are addressed below:

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[69] *See* 40 C.F.R. § 1502.21; *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1150 (9th Cir. 1998) ("NEPA requires that the public receive the underlying environmental data from which a Forest Service expert derived her opinion").
[70] FEIS at 3-161.
[71] CEQ, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18,026 (Mar. 23,1981).
[72] FEIS at 3-161.

- *Backfilling would affect the water quality in the West Pit by increasing constituent loads, so additional mechanical treatment of water in the West Pit may be required for a certain timeframe following backfilling. However, there would be no effect on surface water quality discharged to the environmental because mechanical treatment of water from the West Pit would still be required in the long term.*[73]

  **Response**: Backfilling may actually decrease required mechanical water treatment at the site because it eliminates the Category 1 stockpile, currently identified as an indefinite source of pollution. It is hard to imagine how the treatment in the West Pit as a result of a backfill could be longer than the projected time for treatment of the Category 1 stockpile. Additionally, the potential for additional mechanical treatment is speculative at best, as the Co-Lead Agencies did not attempt any modeling to support this hypothesis.

  Submerging the Category 1 stockpile would remove the last permanent stockpile on the site, improving aesthetics and potentially allowing greater recreational use of the site after closure.[74]

- *Moving the waste rock from the stockpile into the West Pit would result in prolonged dust, air, and noise emissions, but these would be unlikely to exceed the respective maximum years modeled during operations.*

  **Response:** Noise, dust and air emissions are only an issue during operations; perpetual active water treatment and the aesthetics of the site remain for centuries after closure. Any advantages in the latter would certainly outweigh this minimal impact.

- *Backfilling the West Pit would encumber private mineral resources that are deeper than the proposed West Pit. Such an encumbrance is in conflict with the terms of PolyMet's current private mineral leases. The PolyMet lease agreements could be renegotiated, which might involve monetary compensation for the mineral owners if the minerals are encumbered.*

  **Response:** As Conservation Organizations noted in 2014, PolyMet has not provided any support for this claim, including a copy of any lease or other contract. PolyMet has also not provided any support for the notion that this pit could or would be remined, something that is quite unusual.[75] It would be far more likely that PolyMet or another entity would choose to expand the proposed mine deeper, perhaps into an underground mine, rather than close and reclaim the site, if the minerals underneath were found to be economically desirable.

  Moreover, PolyMet's current reclamation plan also encumbers deeper mineral rights, probably beyond reach without extraordinary expense. Dr. Myers notes that to access these minerals after reclamation, "the large volume of pit lake water will need to be entirely pumped and treated to meet the 10 mg/l sulfate requirement, and the cost and time required for pumping and treating the entire pit lake prior to remining effectively eliminates this as a possibility."[76] The presence of polluted water that must be pumped and treated before discharge may be a greater burden than simply digging out additional rock.[77]

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[73] FEIS at 3-161.
[74] See also Miller 2015 for further analysis of their argument.
[75] Miller Report attached to SDEIS comments, 2014, at 6.
[76] *Id.* at 5; *accord* Myers Report attached to SDEIS comments, 2014, at 2.
[77] Miller 2015.

- *[B]ecause of the temporal effect that the stockpile would have, the [wetlands and vegetation at the Category 1 Stockpile footprint area] would be required to be mitigated regardless of future backfilling or not.*

  **Response:** The Co-Lead Agencies are confusing benefit to the company with benefit to the environment. There is still an environmental benefit to reclaiming wetlands at the site, even if the company cannot claim mitigation credits for it. There is value to wetland restoration within the same watershed, which PolyMet only partially proposes, and on-site mitigation.[78]

  Additionally, as the FEIS noted, such wetland reclamation credits may be used for contingency mitigation,[79] perhaps for the significant indirect wetland impacts this project is likely to have. These wetlands would offer a financial advantage to PolyMet, allowing it to save the cost of restoration for contingency mitigation elsewhere or, if PolyMet does not need the credits, it could establish a wetland bank and sell the credits to other entities, perhaps other mining companies that need wetland credits within the St. Louis River watershed.[80]

- *[T]he costs associated with backfilling, additional water treatment rates, and encumbrance compensation determined in revised lease agreements may affect the ability of PolyMet to secure financing.*[81]

  **Response:** As noted by the Conservation Organizations in 2014, this is an assertion by PolyMet offered without any support whatsoever. It is speculative and the agencies are abdicating their duty to independently verify statements by the company.[82] Moreover, it gives a project proposer extraordinary and unjustified control over the alternatives analyzed if an alternative is dismissed based on an unsupported statement by the company that an alternative "may affect the ability" of the company to secure financing. The Conservation Organizations are only asking at this stage that the West Pit Backfill be given consideration as an alternative in the FEIS, not that it necessarily be adopted.

The approach taken to this alternative is to speculate on its comparative benefits and drawbacks without any real information, rather than gathering the information first and then making the comparison. The Co-lead Agencies reject this alternative prior to obtaining the very information that they purport to be using to judge it.

## 5.0 The EIS must include the alternative of dry stacking the tailings.

The Co-Lead Agencies have improperly eliminated dry stacking or paste tailings as an alternative to using the pre-existing LTV tailings basin. Under NEPA, the FEIS must:

> examine all reasonable alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or

[78] Minn. Stat. § 8420.0100.
[79] FEIS at 5-371.
[80] Minn. Stat. § 8420.0526.
[81] FEIS at 3-162.
[82] 40 C.F.R. § 1506.5(a)

> feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.[83]

Although PolyMet wishes to use the old LTV tailings basin because it is located on the site that they have agreed to purchase, alternative methods of storing waste are technically feasible, environmentally preferable, and avoid what is possibly the most devastating impact that could occur at a mine site—the collapse of a tailings basin, resulting in widespread impacts that could travel and diffuse for tens or even hundreds of miles when waste spills into moving water.

We have attached a letter from Dr. David Chambers of the Center for Science in Public Participation. Dr. Chambers has extensive knowledge of both the tailings dam collapse at the Mount Polley mine in British Columbia in 2014 as well as PolyMet's tailings dam design. In his report, Dr. Chambers observes that there is no engineering reason for tailings dams to fail at the rate that they do, and that this is a "prime indicator that something is wrong with the way tailings dams are designed, constructed, and/or operated."[84] Dr. Chambers also notes that the tailings basin construction method used at the PolyMet site is the least safe construction method, and that PolyMet will continue to use this method. "Extending a risky design on top of an old design that itself poses higher risk, against the recommendation of the Mt. Polley Expert Panel for dry closure, for a facility that has not yet received regulatory approval, would not be recognizing the long-term risks being posed to the public."[85] Dr. Chambers also recommended that the Hydrometallurgical Residue Facility should be constructed using dry stack methods.[86]

Dr. Chambers' review was submitted to the Co-Lead Agencies on April 30, 2015, after the release of the report of an independent expert panel that investigated the cause of the Mt. Polley disaster. Although this was after the close of the comment period for the SDEIS, it was submitted well in advance of the FEIS in hopes that the Co-Lead Agencies would recognize the value of the Mt. Polley recommendations and the inherent risks in PolyMet's use of an old tailings dam designed to store tailings in a way that is no longer considered safe.

The Co-Lead Agencies, in response to Dr. Chambers' work, provided only a single paragraph. They concluded that dry stack tailings did not offer a significant environmental benefit as an alternative. The analysis is dismissive, failing to provide support or analysis consistent with NEPA's requirements.[87] The three reasons given are addressed below:

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[83] Ex. 4a.

[84] Letter from David Chambers, PhD physical geography, to Betsy Daub, Policy Director, Friends of the Boundary Waters 2 (Apr. 30, 2015) (attached as exhibit 5b).

[85] *Id.*; *accord* Independent Expert Engineering Investigation and Review Panel, Report on Mount Polley Tailings Storage Facility Breach (2015) (attached as exhibit 5c).

[86] Ex. 5b.

[87] 40 C.F.R. § 1502.22. One court explained "Section 1502.22 clearly contemplates original research if necessary" and held that "NEPA law requires research whenever the information is significant. As long as the information is . . . essential or significant, it must be provided when the costs are not exorbitant in light of the size of the project and the possible harm to the environment." *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1244 n.5 (9th Cir. 1984). NEPA "envisions that program formulation will be directed by research results rather than that research programs will be designed to substantiate programs already decided upon." *Id.*

- *Industry standard for dry stacking includes the use of a basin liner. Construction of a basin liner on the existing LTVSMC tailings basin has been evaluated and determined not to be feasible.*

  **Response:** As observed by Dr. Chambers, the reason that a basin liner is not feasible is because the tailings basin is not a stable structure, which should bear more heavily on the Co-Lead Agencies' decision.[88] Moreover, this comment ignores the fact that a dry-stacking facility could be built somewhere other than the existing LTVSMC tailings basin.

- *Use of dry stack technology would require a new tailings basin to be constructed in a different location as a lined dry stack basin. A separate dry stack tailings basin would increase footprint effects of the project.*

  **Response:** The impacts of this could potentially be minimal. Unlike an open-pit mine, where some impacts on wetlands, streams and other natural features may be unavoidable due to the precise location of a mineral deposit, a dry-stack tailings facility has more flexibility when it is sited. The Co-Lead Agencies must investigate potential sites for a dry-stack facility that could minimize impacts. It may even be possible to site it elsewhere on the LTVSMC property in an area that is already mining-impacted.

- *The proposed Project addresses legacy water quality issues of the LTVSMC tailings basin while making use of the brownfield site for tailings disposal. A separate dry stack tailings basin would not address LTVSMC tailings basin legacy issues.*

  **Response:** PolyMet would still take possession and legal responsibility for permitting at the LTVSMC site. Discharges from the tailings basin would be required to meet state water quality standards and other state and federal environmental laws regardless of whether PolyMet uses it as a disposal site in any event. (See also Section 6 of these comments on the no-action alternative, addressing Cliffs Erie's legal responsibilities to ensure that this site meets state and federal law).

As with the West Pit backfill alternative, the Co-lead Agencies have inappropriately prejudged this alternative, making assumptions about the benefits and drawbacks that are the very things that an alternatives analysis is designed to reveal.

Finally, the current design for the tailings basin does not meet the requirements of Minnesota Rule 6132.2200. Dry-stacking is an alternative made reasonable by virtue of the fact that it is the only way that this mine can comply with Minnesota law. This rule states:

> B. A reactive mine waste storage facility must be designed by professional engineers registered in Minnesota proficient in the design, construction, operation, and reclamation of facilities for the storage of reactive mine waste, to either:
>
> > (1) modify the physical or chemical characteristics of the mine waste, or store it in an environment, such that the waste is no longer reactive; or
> >
> > (2) during construction to the extent practicable, and at closure, permanently prevent substantially all water from moving through or over the mine waste and provide for the collection and disposal of any remaining residual waters that drain from the mine waste in compliance with federal and state standards.

[88] David Chambers & Stuart Levit, Center for Science in Public Participation (CSP2), to Co-lead Agencies (December 7, 2015) [hereinafter "Chambers and Levit 2015"].

Mine waste includes tailings.[89] "Reactive mine waste" is defined as waste "that is shown through characterization studies to release substances that adversely impact natural resources."[90] In other words, "reactive waste" is not limited to waste that creates acidic conditions. Heavy metals can leach from rock under many conditions, some of which do not involve a low pH; whenever those conditions result in a great enough release of metals to adversely affect natural resources, the rock is deemed "reactive." Thus the PolyMet tailings will be "reactive" even if they do not result in acid drainage, because they have been characterized (by PolyMet's modeling) to release (at a minimum) copper, nickel, lead, and arsenic at levels far above surface and/or groundwater quality standards.[91]

Rule 6132.2200(2)(B) provides two possible means of handling reactive mine waste after closure. Either the waste rock, tailings, and exposed rock must be left in such a way that they are not "reactive" (i.e., they no longer leach heavy metals), or the facilities must be closed in a way that "permanently prevent[s] substantially all water from moving through or over" them. Taken together, the import of the regulations is that nonferrous mine waste and mine pits must be closed in a way that does not result in a significant amount of water that will have to be treated before it can be discharged to the environment.

The Statement of Need and Reasonableness for this rule makes it clear that the point of Rule 6132.2200(2)(B) was to preclude perpetual or long term water treatment as a closure option:

> [M]erely collecting contact water and treating it in order to meet water quality discharge standards, without a substantial effort to minimize the amount of water contacting the waste, has been rejected. While this method may provide acceptable results during active operations, when the permittee is present, the potential for long-term failure of such a system, when the operator is no longer available to correct the situation, is too great. Because of the necessity to provide a permanent solution to the water quality concerns related to reactive mine wastes, the two required methods of storing these wastes are the only reasonable methods currently available.[92]

The current plan for the tailings basin allows the tailings to remain reactive and allows a significant amount of water to move through the tailings. It thus does not meet the regulatory requirements. The Co-lead agencies should assess the dry stack alternative as the only suggested alternative that might meet the requiremnts of state law.

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[89] Minn. R. 6132.0100, subp. 16.
[90] *Id.*, subp. 28.
[91] PolyMet, "NorthMet Project Water Modeling Data Package, Vol. 2 – Plant Site" Version 11, pp. 168-202 and Attachment F (March 13, 2015) (NorthMet FEIS Reference PolyMet 2015j). The figures in this document show that the tailings will continue to leach metals at levels above the standards for more than 200 years, which is the point at which the illustrations end.
[92] Minn. Dep't of Natural Res., Nonferrous Metallic Mineral Mineland Reclamation Rules Statement of Need 22 (2008) (attached as exhibit 5a).

## 6.0 The EIS must provide information on what can be expected under the "no action" alternative in such a way that it can be compared to the impacts of the proposed mine.

The FEIS does not adequately assess the "no action" alternative. This issue is presented at MCEA 40 and CBD 107–108, which along with cited exhibits and references are incorporated herein.

An EIS must include "no action" as one of its alternatives.[93] "No action" in situations like the proposed NorthMet mine and land exchange could mean either that the mine would not be permitted or implemented, or that the land exchange would not occur.[94] Importantly, when the choice of no action by the lead agencies would result in "predictable actions by others," this consequence of the no action alternative needs to be considered and included as part of the no action analysis in the FEIS.[95] Although the NorthMet FEIS purports to do this, it does not provide adequate information about the environmental conditions that would be expected under the No Action Alternative. This violates 40 C.F.R. § 1502.14(b), which requires the FEIS to "devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits." The FEIS does not contain sufficient detail on the predicted water quality at the Plant Site and in the Embarrass River watershed under the No Action Alternative to allow an evaluation of the comparative merits of the Proposed Action.

In fact, the FEIS completely fails to provide *any* information on the expected water quality at the Plant Site and in the Embarrass River watershed under the No Action Alternative. Instead, the predicted water quality under the Proposed Action is exhaustively compared to a modeled "Continuation of Existing Conditions" (CEC) scenario, which ignores the existing responsible party (Cliffs Erie)'s legal obligation to clean up and manage the site consistent with state and federal environmental laws. In addition to the violation of 40 C.F.R. § 1502.14(b), this violates the requirement that the FEIS provide a "hard look" at the impacts of the Proposed Action. By repeatedly comparing the polluting effect of the Proposed Action with an already polluted situation that is presumed to continue (but which in reality would not and could not continue under existing law), the FEIS presents an inaccurate assessment of the impacts of the Proposed Action.

Furthermore, the "Existing Conditions" that were modeled by PolyMet and disclosed in the FEIS do not actually reflect currently existing conditions, because Cliffs Erie has already taken steps to address water quality issues at the site as required by a consent decree with MPCA. Cliffs Erie and MPCA entered into a judicially enforceable consent decree in March 2010, with Cliffs Erie agreeing to take corrective actions to resolve "all alleged violations" of its NPDES permits at these locations.[96] Pursuant to the consent decree, Cliffs Erie was required to submit "Short-Term Mitigation Evaluation Plans" for each of the three locations.[97] Cliffs Erie was also required to submit

[93] 40 C.F.R. § 1502.14(d).
[94] Ex. 4a at 4. Agencies must also consider the "no action" that would happen if one agency did not act but the other was forced to proceed, as is the case if there is no land exchange here (i.e. no action for the Forest Service) but if there is nonetheless a mine permitted.
[95] *Id.*; *Oceana v. Bureau of Ocean Energy Mgmt.*, 37 F. Supp. 3d 147, 171 (D.D.C. 2014).
[96] Consent Decree, Minn. Pollution Control Agency v. Cliff's Eerie, L.L.C. at 15 (attached as exhibit 6a).
[97] *Id.* at 30.

"detailed Field Studies Plan Outlines" for each location.[98] And, "Long-Term Plans" were required to identify mitigation strategies to address elevated concentrations of sulfates and other parameters of concern at each location.[99] Each of these corrective actions were required to be approved by MPCA, and would then become "an integral and enforceable part" of the consent decree.[100] If Cliffs Erie fails to comply with the consent decree, it is required to pay monetary penalties to MPCA.[101]

In addition to failing to adequately address and disclose the corrective actions that have already been taken by Cliffs Erie at the LTV sites in its analysis and disclosure of "existing conditions," the FEIS also fails to assess the additional corrective measures that will continue to be undertaken by Cliffs Erie in the event the no action alternative is chosen. The very purpose of the consent decree is to bring Cliffs Erie into compliance with the NPDES permit requirements at the LTV tailings basin and mine site, along with the Dunka Pit. Cliffs Erie coming into compliance with the Clean Water Act is not only "predictable" and "reasonably foreseeable," but also legally required under both the consent decree and the Clean Water Act. Thus comparing in the FEIS the proposed action with a no action alternative where pollution would continue indefinitely at the plant site is both inaccurate and unlawful under NEPA.

The FEIS also fails to describe the foreseeable impacts of the no action alternative at the mine site. According to the Draft Record Of Decision (DROD): the reason the Forest Service is conducting this land exchange is that if it does not, PolyMet is likely to litigate its right to build an open pit mine on Forest Service property acquired under the Weeks Act, and the outcome of that suit is uncertain. In other words, the Forest Service believes that there is a significant chance that the no action alternative would result in an open pit mine on Forest Service land. Although we agree that this outcome is not certain, if it is foreseeable enough that the Forest Service is trading away a ten-square-mile contiguous piece of property with irreplaceable resources in order to avoid it, it is surely certain enough to assess in the FEIS. Indeed, the Forest Service's actions to avoid this scenario prove that it is already effectively foreseen.

The Forest Service has the established right to impose conditions on mining operations to protect natural resources in situations like this one, where the Forest Service owns the surface and a private party owns the mineral estate.[102] Because the mine as proposed would violate so many of the provisions of the Superior National Forest Land and Resource Management Plan (Forest Plan), the Forest Service would undoubtedly impose many additional requirements if the mine were to be built on Forest Service land. The Forest Service cannot assume for the purposes of NEPA that an open pit mine on Forest Service land would have the same impacts as an open pit mine on non-Forest Service land.[103]

We understand that the Forest Service does not want this mine on its property, and we can hardly blame it. We also understand that the Forest Service sees an advantage in obtaining other land in exchange. *But neither we nor the Forest Service know that this is the environmentally preferable outcome, and the FEIS does nothing to enlighten us.* The whole point to the NEPA process is to look at the actual

[98] *Id.* at 31.
[99] *Id.* at 33.
[100] *Id.*
[101] *Id.* at 37.
[102] *Duncan Energy v. U.S. Forest Service,* 50 F.3d 584 (8th Cir. 1995).
[103] *Center for Biological Diversity v. U.S. Dept. of Interior,* 623 F.3d 633, 642–43 (9th Cir. 2010).

expected environmental effects of the range of alternatives in a given situation. In this particular situation, it is unclear that there will be any on-the-ground environmental benefit of Forest Service ownership of the nonfederal lands, as opposed to the current owner. Will water quality, vegetation, wildlife, or ecosystem services benefit from the change of ownership? FEIS that goes into this alternative at length. On the other hand, would these natural resources benefit from Forest Service ownership of the mine site, if a mine will be built regardless? The FEIS tells us absolutely nothing about this possibility.

The Forest Service is hiding behind its legal position when it says that if there is no land exchange, there will be no mine. But the Forest Service cannot have it both ways. If an open pit mine on the Superior National Forest is foreseeable enough to drive this entire action, it is foreseeable enough to require assessment under NEPA.

## 7.0 The FEIS fails to provide adequate analysis of the effectiveness of mitigation measures, and the impacts of reasonably foreseeable accidents and failures.

Where the FEIS relies on mitigation measures as its reason for not disclosing impacts should those mitigation measures fail, it must include a discussion of the efficacy and certainty of the mitigation measures. That discussion must include whether the measures are proven or theoretical and the degree to which they have worked as planned at other facilities. The agencies must also assess the probability of accidents, and make a holistic assessment of accident risk for all mining features.

PolyMet relies on a number of engineered systems to minimize impacts on the environment from the proposed mine. This is no different than what is done for every modern industrial mine around the world; indeed it is legally required in virtually any jurisdiction. Each mine plan is designed to address the particular difficulties of the site, the ore body, and the mining and processing methods. The FEIS presents the NorthMet mine plan as though it identifies the perfect engineered systems that will result in a mine with no accidents, no failures, and no errors in the systems as designed, installed, or maintained. Mining companies throughout history have laid out plans to minimize environmental impacts. And yet significant environmental impacts often occur, as demonstrated in recent global mining catastrophes highlighted in the media. Given the size of the proposed mine and its location in one of the wettest parts of the United States, concern for accidents, failures, and unforeseen design, installation, and maintenance errors should be heightened rather than dismissed. NEPA requires that to the extent that errors, accidents, and failures are reasonably foreseeable over the expected life of the project (i.e., more than five hundred years), the potential impacts must be disclosed in the FEIS. The FEIS completely fails to meet this requirement.

This shortcoming affects virtually every aspect of the mine plan and the FEIS. It was raised generally and in relation to several specific mine features in our comments on the SDEIS at MCEA 3, 5–6, 22, 40–54; Friends 1–8, 32–37, 39–40; CBD 33–45, 57–59; and in our supplemental letter on the Mt. Polley tailings basin disaster in British Columbia. All of these materials along with exhibits cited therein are incorporated herein.

The legal requirement begins with the most elementary aspect of NEPA review: an EIS must disclose all reasonably foreseeable significant impacts of a proposed project.[104] Both the CEQ and the courts recognize that this involves some conjecture; in many situations, whether or not a particular impact will occur cannot be known with any certainty at the time an EIS is prepared. But

[104] 40 C.F.R. §§ 1502.16, 1508.8(b).

this does not allow an agency to ignore the possibility of impacts. In the face of uncertainty, an agency must provide a scientifically defensible assessment of the likelihood of the impact's occurrence, and a discussion of the potential effects commensurate with the likelihood and severity of those effects.[105]

In a situation where errors, accidents, and failures could result in significant impacts, "[t]hat circumstance obliges the agency to undertake risk assessment: an estimate of both the consequences that might occur and the probability of their occurrence."[106] While "NEPA does not require consideration of risks that are 'merely speculative' or 'infinitesimal,'"[107] it also does not allow an agency to ignore risks based on unsupported assumptions that errors, accidents, and failures will not occur.

To use waste storage facilities as an example, the FEIS Response to Comments Theme GT 15[108] acknowledges that: "If incorrectly designed, constructed or managed, or from other unforeseen circumstances, waste material storage facilities would have the potential to result in increased hydrologic and/or water quality effects and could potentially lead to slope or dam failure." Pursuant to NEPA, this acknowledged fact necessitates a risk assessment addressing "an estimate of both the consequences that might occur and the probability of their occurrence." In the NorthMet FEIS, however "hypothetical failure scenarios are not assessed," apparently because the Co-Lead Agencies believe that "design and safety requirements, including adaptive management procedures" will work perfectly for hundreds of years.[109]

Theme WR 129 makes the statement: "With appropriate monitoring and pre-planned contingency actions, and adequate financial assurance, it is technically feasible to maintain the operation of engineered systems indefinitely into the future." Unfortunately, technical feasibility has never been enough to prevent accidents and failures. And history is replete with engineered systems that theoretically should have worked perfectly, but nonetheless eventually revealed that the engineers who designed them or the workers who built and maintained them were not themselves infallible, not to mention myriad external forces beyond human control.

***Human Error***

It is often noted that while the safety and reliability of engineered systems in-and-of-themselves continues to improve over time, the propensity for human error does not. Across numerous industries, the percentage of errors caused by human error is estimated at about 80 percent. Thus despite the technological advances that have been made in aviation, maritime shipping, medicine, IT, and many other industries, accident and failure rates decrease far more slowly than would be expected given improvements in technology.[110]

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[105] *See* 40 C.F.R. § 1502.22.
[106] *City of New York v. U.S. Dep't of Transp.,* 715 F.2d 732, 746 (9th Cir. 1983).
[107] *Alaska Wilderness League v. Kempthorne*, 548 F.3d 815, 832-33 (9th Cir. 2008).
[108] FEIS App. A.
[109] *Id.*
[110] *See, e.g.,*Scott Shappell *et al.*, Fed. Aviation Admin., "Human Error and Commercial Aviation Accidents" (July 2006)) (attached as exhibit 7a); Clifford B. Baker & Ah Kuan Seah, Am. Bureau of Shipping, Maritime Accidents and Human Performance 225 (Am. Bureau of Shipping, 2004) (attached as exhibit 7b).

In a study of "operation events" that represented some sort of operations failure at nuclear power plants, the U.S. Nuclear Regulatory Commission made the following observations:

1. Human error contributed significantly to risk in nearly all events analyzed. Forty-one percent of events involved partial or complete loss of either onsite or offsite power, 22 percent involved loss of Emergency Core Cooling Systems (ECCS) and 19 percent involved loss of feedwater. . . . The average human error contribution to the change in risk was 62 percent.

2. Latent errors were present in every event analyzed and were more predominant than active errors by a ratio of 4 to 1. Latent errors were noted in all facets of performance studied, including operations, design and design change work practices, maintenance practices and maintenance work controls, procedures and procedure development, corrective action program, and management supervision. . . .

3. Without exception, the operating events analyzed included multiple contributing factors. On the average, the thirty-seven events contained four or more human errors in combination with hardware failures. Fifty percent of events contained five or more errors. Many events contained between six and eight human errors.

4. Human errors can result in the failure or increased likelihood of failure of risk-significant equipment. For a sample of ten events with the highest event importance, human error was determined to contribute to component failure. There were three events where a single human error contributed to a single PRA [Probabilistic Risk Assessment] basic event, and seven events where multiple human errors contributed to multiple PRA basic events. . . .

5. Design and design change work practice errors were present in 81 percent of events, maintenance practices and maintenance work control errors were present in 76 percent of events, and operations errors were present in 54 percent of events. Additionally, more maintenance and operations errors mapped to basic events in the PRA model than did design and design change errors.

6. Forty-one percent of the analyzed events demonstrated evidence of failure to monitor, observe, or otherwise respond to negative trends, industry notices, or design problems. This suggests that inadequacies in licensee corrective action programs may play an important role in influencing operating events.[111]

These findings are mirrored in the recommendations of the Independent Expert Engineering Investigation and Review Panel on the Mt. Polley Tailings Storage Facility Breach in British Columbia. While the focus of the report was on dam design and construction and the underlying geology, the Independent Panel turned its attention squarely toward human error in its recommendations:

> Tailings dams are complex systems that have evolved over the years. They are also unforgiving systems, in terms of the number of things that have to go right. Their reliability is contingent on consistently flawless execution in planning, in subsurface investigation, in analysis and design, in construction quality, in operational diligence,

[111] U.S. Nuclear Reg. Comm., Review of Findings for Human Performance Contribution to Risk in Operating Events xi (2002) (attached as exhibit 7c).

> in monitoring, in regulatory actions, and in risk management at every level. All of these activities are subject to human error.
>
> Human error is often, if not always, found to play a key role in technological failures. And human error will always be with us, as much as we might wish it to be otherwise. This is why failures invariably bring about improvements in technology that help compensate for human error. In perhaps the most notorious containment failure, double-hulled tankers were mandated after the *Exxon Valdez* oil spill. Similarly, improvements to rail tank cars are being adopted in the wake of the Lac-Mégantic tragedy. But tailings dams have no such redundancies. Without exception, dam breaches produce tailings releases. This is why best practices can only go so far in improving the safety of tailings technology that has not fundamentally changed in the past hundred years.
>
> Improving technology to ensure against failures requires eliminating water both on and in the tailings: water on the surface, and water contained in the interparticle voids. Only this can provide the kind of failsafe redundancy that prevents releases no matter what. In terms of portfolio risk, Appendix I shows that this works by reducing the inventory of active tailings dams subject to failure in the first place. Simply put, dam failures are reduced by reducing the number of dams that can fail.[112]

The Independent Panel recommends that all future tailings storage facilities be in the form of dry stack tailings because failures due to human error cannot be completely guarded against, and dry stack tailings facilities cannot fail. To repeat the words of the Co-Lead Agencies: "If incorrectly designed, constructed or managed, or from other unforeseen circumstances, waste material storage facilities would have the potential to result in increased hydrologic and/or water quality effects and could potentially lead to slope or dam failure."[113] Recognizing that this potential *always* exists at conventional dams due to the stubborn problem of human error, the Panel recommended a method that will not lead to hydrologic or water quality effects regardless of human error.

It should be obvious from this discussion that as long as engineered systems are dependent on human design, operation, and maintenance, theoretically perfect engineering will not eliminate the risk of accidents, failures, and releases of pollutants to the environment. The risk of human error is always foreseeable. While it is true that the likelihood of a given failure event and the degree of impact it would have are unknown, this does not foreclose a qualitative discussion of the risk. Furthermore, statistical analyses exist for many mine features that allow for a quantitative assessment; some of these are discussed below.

Modern industry has developed many methods of assessing risks from engineering and materials failures, natural catastrophic events, and human error. These methods are used routinely by responsible safety and financial managers in many industries, including mining. These methods draw

[112] Ex. 5c at 120 (Mt. Polley report).
[113] FEIS App. A. Theme GT 15.

from past experience to quantify the risk of accidents and failures at industrial facilities, including those caused by human error.[114]

A good example of the assessment and disclosure of risks based on statistics drawn from past experience is provided by the U.S. EPA's assessment of the potential impacts of the proposed Pebble Mine in Alaska.[115] The Co-Lead Agencies dismiss this report, saying it does not address a specific mining proposal, and is therefore not applicable.[116] But historical experience at mining sites in general can and should inform the statistical risk of accidents at a particular mine site. While the FEIS may point out situations where it has mitigated risk as compared to other sites, it is not appropriate to evaluate risk in a vacuum. Indeed, there are some cases where statistical risk at a generic mine appears indistinguishable from statistical risks at the PolyMet site. For instance, there is no reason why PolyMet's pipelines are less likely to break or cause spills than pipelines at other locations. And while PolyMet's wastewater treatment strategy may be unique to the pollutants at the site, there is no reason why their technology is less likely to break down. In fact, as observed by Dr. Miller, it may be more likely to break down due to its complexity.[117] Similarly, PolyMet's tailings dam seems just as vulnerable to breach as tailings dams at other locations, if not more so.[118]

***Effectiveness of mitigation measures***

In addition to the potential for errors, accidents, and failures, an important factor in assessing the risk of unexpected consequences is the uncertainty of mitigation measures designed to prevent those consequences. To use the tailings basin seepage containment system as an example, a risk assessment must account for the extent to which the actual performance of the system in the field remains an unknown. As discussed below, the record contains no examples of similar systems achieving the level of capture assumed by the FEIS. While the design may work perfectly in a software model, conditions and events in the real world rarely conform to theoretical designs. Established mitigation measures have a history that can be used to estimate the uncertainty and risk that outcomes will not match the theoretical or modeled expectations. The fact that success rates for a mitigation measure are not available does not provide a reason to assume that it will work perfectly. To the contrary, it increases the uncertainty that the measure will perform as designed. The FEIS must disclose and discuss the unknowns of the systems and mitigation measures proposed for this project, and what that uncertainty means in terms of risks to the environment.

NEPA requires that an EIS include a discussion of "means to mitigate adverse environmental impacts."[119] The NorthMet FEIS is replete with mitigation measures; however it does not address

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[114] *See* Australian Gov't Dept. of Res., Energy, and Tourism, Leading Practice Sustainable Development Program for the Mining Industry, Risk Assessment and Management (2008) (attached as exhibit 7d); P.E. Brown, *et al.,* "Evaluation of the Hydrogeological Risk in the Siting of Mining Operations," IMWA Proceedings 1988 (2012) (attached as exhibit 7e); U.S. Nuclear Regulatory Comm., Fact Sheet on Probabilistic Risk Assessment (Oct. 2007) (attached as exhibit 7f); N. Pavan Kumar, "Risk Analysis by Using Failure Mode and Effects Analysis for Safe Mining," Int'l Journal of Science and Research 3:2512 (Nov. 2014) (attached as exhibit 7g).

[115] U.S. EPA, An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska (Jan. 2014) (attached as exhibit 7h).

[116] FEIS A-367.

[117] Miller 2014.

[118] Chamber 2015.

[119] 40 C.F.R. § 1502.16(h).

the uncertainty of their effectiveness or the risk that they will not operate as intended. Rather, it assumes that all mitigation measures work perfectly, for hundreds of years if not forever. This is not the approach to mitigation measures required by NEPA:

> [NEPA] does require that an EIS discuss mitigation measures, with "sufficient detail to ensure that environmental consequences have been fairly evaluated." *Methow Valley,* 490 U.S. at 352, 109 S.Ct. 1835. An essential component of a reasonably complete mitigation discussion is an assessment of whether the proposed mitigation measures can be effective. *Compare Neighbors of Cuddy Mountain v. U.S. Forest Service,* 137 F.3d 1372, 1381 (9th Cir.1998) (disapproving an EIS that lacked such an assessment) *with Okanogan Highlands Alliance v. Williams,* 236 F.3d 468, 477 (9th Cir.2000) (upholding an EIS where "[e]ach mitigating process was evaluated separately and given an effectiveness rating"). The Supreme Court has required a mitigation discussion precisely for the purpose of evaluating whether anticipated environmental impacts can be avoided. *Methow Valley,* 490 U.S. at 351–52, 109 S.Ct. 1835(citing 42 U.S.C. § 4332(C)(ii)). *A mitigation discussion without at least some evaluation of effectiveness is useless in making that determination.*[120]

Furthermore, the "evaluation of effectiveness" must be supported by substantive evidence:

> [T]he Court holds that the Corps' reliance on mitigation measures that were unsupported by any evidence in the record cannot be given deference under NEPA. The Court remands to the Corps for further findings on cumulative impacts, impacts to ranchlands, *and the efficacy of mitigation measures.*[121]

Several examples are provided below for which the FEIS fails to provide information about the uncertainty of the effectiveness of particular engineered systems or mitigation measures.

### *Adaptive Management*

Rather than preparing a risk assessment to account for uncertainty and potential errors, accidents, and failures, the FEIS repeatedly invokes the phrase "adaptive management." Whatever might go wrong with the project, all will be corrected by adaptive management. This approach also runs afoul of NEPA, because it postpones the disclosure of environmental impacts until after a project has been undertaken. Most of the promises of adaptive management in the FEIS amount to nothing more than the promise to make changes after problems occur.[122]

While of course a company must make changes if problems occur, this cannot substitute for revealing the potential for problems before the project is permitted. As the U.S. Court of Appeals for the Ninth Circuit puts it, "The agency cannot increase the risk of harm to the environment and

[120] *South Fork Band Council v. Dept. of Interior*, 588 F.3d 718, 727 (9th Cir. 2009) (emphasis added).
[121] *Wyoming Outdoor Council v. U.S. Army Corps of Eng'rs,* 351 F. Supp. 2d 1232, 1238 (D. Wyo. 2005) (emphasis added).
[122] For a review of PolyMet's adaptive management promises and their failure to meet the requirements of a true adaptive management plan, *see* Chambers & Levit 2015.

then perform its studies. . . . This approach has the process exactly backwards."[123] In adopting 40 C.F.R. 1502.22(b), which addresses how to proceed in the face of uncertainty, the CEQ stated:

> It must be remembered that the basic thrust of an agency's responsibilities under NEPA is to predict the environmental effects of proposed action before the action is taken and make those effects known. Reasonable forecasting and speculation is thus implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as "crystal ball inquiry."[124]

Furthermore, adaptive management plans are themselves subject to the same risks and uncertainty that pertain to engineered systems as initially planned. The FEIS mentions a number of possible "fixes" for problems that may arise, but once again fails to discuss the uncertainty as to whether they will actually be effective. The FEIS simply assumes that all problems can be fixed. As the U.S. District Court for the Western District of Wisconsin put it in addressing unplanned, unpredicted water quality violations at the Flambeau Mine in Wisconsin: the mining company could not be expected to end its discharges, because to do so would require it to "stop the rain."[125] If the history of mining and hazardous waste sites has taught us anything, it is the unfortunate reality that not all unforeseen results can be fixed to the point of meeting environmental standards.

Although the FEIS relies on promises of "adaptive management" to evade an assessment of risks to natural resources, it does not provide adequate adaptive management plans to cover most of these risks. These statements amount to little more than promises to fix any problems that occur. The FEIS provides no basis for the assumption that impacts can and will be limited to the impacts discussed in the FEIS.

The reference documents include several adaptive management plans for different systems, which are reviewed in comments from the Center for Science in Public Participation (CSP2).[126] As CSP2 points out,

> PolyMet's proposed use of Adaptive Management is problematic because most of its applications do not include important features of adaptive management. Most of the proposed Adaptive Management Plans are in fact more akin to normal project management where project activities and plans are modified as necessary and appropriate based on changed conditions, failed activities, leaks, improvements in available technologies, etc.

CSP2's comments on adaptive management plans are incorporated herein by reference.

There are essentially two categories of Adaptive Management measures discussed in the FEIS. The first are systems that are designed with some flexibility involved and with some planning of the steps to be taken if certain contingencies occur. The FEIS refers to these systems as "adaptive," while other systems are referred to as "fixed."[127] The adaptive systems are the Waste Water Treatment

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[123] *National Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 733 (9th Cir. 2001) (internal citations omitted).
[124] 51 Fed. Reg. 15,618 (1986).
[125] *Wisc. Res. Prot. Council, No. 11-cv-45-bbc (W.D. Wisc. Aug, 1, 2-014).* Opinion and Order (July 24, 2012) at 35.
[126] Chambers 2015 Attachment at 14-19.
[127] *See* FEIS at 3-55 to 3-57 (Figures 3.2-12 and -13).

Plant and Facility, the Category I Stockpile cover, the HRF cover, and the Tailings Basin pond liner. All other systems are considered "fixed," including the containment and collection systems and the HRF liner. The FEIS does not provide true adaptive management plans for any of the fixed systems, and no arrangement is planned to ensure that they can be paid for if needed. In regards to these systems, CSP2 notes: "It is not sufficient to just monitor activities and commit to possibly implementing from a list of contingencies when a problem is discovered. This is not adaptive management - it is the mine operator responding to a problem without clear commitment to meaningful adaptive process or outcome."

The FEIS includes a section entitled "Contingency Mitigation" starting on page 5-239. These are measures that are "not initially included in financial assurance," and hence it is completely unclear how they will be paid for, particularly if the condition does not arise or is not discovered until after the mine closes and PolyMet no longer has a source of revenue. The list of potential problems includes:

- Overflow of process water sumps or ponds;
- Water quality problems in streams due to rail transport;
- Groundwater quality noncompliance due to liner issues;
- West Pit water not as expected;
- Greater inflow to pits than expected;
- New surface seepage locations below the Tailings Basin;
- Tailings Basin water not as expected;
- Water quality downstream from Tailings Basin not as expected;
- Northward flow of pit water.

For each of these potential problems, the FEIS suggests mitigation measures that could be used to address the problems if they arise. These suggestions do not come close to constituting an adaptive management plan, and this particular section of the FEIS does not refer to them as such. But throughout the FEIS and especially in the Response to Comments, these suggestions are elevated to the status of "adaptive management," making it appear that PolyMet and the Co-lead Agencies have a plan to address problems that arise, when that is simply not true.

In general, wherever a question is raised regarding the certainty of the mine plan and the engineered systems' ability to meet regulatory requirements and otherwise protect the environment, the response is that no assessment is needed, because "adaptive management" will be used to fix the problem. For example, Comment Theme GT 15 states, "The SDEIS does not properly address the potential environmental consequences of a geotechnical failure due to unplanned and catastrophic events (e.g. extreme weather events, equipment failure, human error) at the Tailings Basin, Hydrometallurgical Residue facility, stockpiles, or pit." The response is, "Because the risk of failure is mitigated through application of design and safety requirements, including adaptive management procedures, the potential effects of hypothetical failure scenarios are not assessed in the FEIS."[128] But there is no adaptive management plan that addresses problems that arise due to extreme weather events, equipment failure, and human error.

[128] FEIS App. A.

As another example, Theme AQ 05 asks about "sulfates and toxic metals . . . that are not captured for treatment." The response: "The NorthMet Project Proposed Action is designed to capture sulfates and metals with engineering controls and adaptive management." But there is no adaptive management plan (and no money will be set aside) to address solutes that leach to groundwater. Although the list cited above does mention some potential ways that the problem could be addressed, the FEIS does not review the efficacy of those methods and how they would be paid for.

Regardless of whether the suggestions for possible "fixes" described for the problems listed above are referred to as "adaptive management" or as "contingency mitigation," they do not obviate the need to provide disclosure of the risk of the problem occurring, and the potential impacts if the problem does occur. The FEIS and reference documents provide absolutely no support for the assumptions that these measures will work at this site and that money will be available to pay for them. This violates the NEPA requirement that mitigation measures be described in sufficient detail to determine whether the risks to the environment can in fact be avoided.[129]

One of the FEIS sections that relies most heavily on "adaptive management" without an adaptive management plan is the section on indirect impacts to wetlands. According to the Executive Summary,

> In the event that the required wetland monitoring identifies additional indirect effects, permit conditions would likely include a plan for adaptive management practices to be implemented, such as expanded monitoring and hydrologic controls. Additionally, compensatory mitigation would be required if indirect impacts were identified during annual reporting. Permit conditions would likely include an adaptive management plan to account for any additional impacts that may be identified in the annual monitoring and reporting.[130]

The words "adaptive management practices . . . such as expanded monitoring and hydrologic controls" come up in several places,[131] but just what those "hydrologic controls" might be is never revealed.

Similarly, the introduction to the section on indirect impacts to wetlands states, "permit conditions would include an adaptive management plan, summarized below, to account for any additional effects that may be identified in the annual monitoring and reporting."[132] As far as we can tell, there are no adaptive management practices identified for indirect wetland impacts, nor is there an adaptive management plan to guide what will be done when monitoring reveals a certain level of impact. Perhaps the words "adaptive management plan, summarized below" are a misprint; what is summarized below in that section of the FEIS is an adaptive *monitoring* plan.[133] Two paragraphs are provided under the heading "Indirect Effects Mitigation."[134] This section begins, "If it is determined that indirect wetland effects occurred based on the criteria effects threshold levels, PolyMet would work with the appropriate agencies to respond, which could require PolyMet to provide compensatory mitigation for any documented indirect effects." This section discusses only compensatory mitigation – absolutely nothing about adaptive management to maintain hydrology,

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[129] *South Fork Band Council v. Dept. of Interior*, 588 F.3d 718, 727 (9th Cir. 2009).
[130] FEIS ES-38.
[131] *See, e.g.,* FEIS 5-257, 5-361, 5-371, 5-394.
[132] FEIS 5-397.
[133] *See* PFEIS 5-406.
[134] *Id.*

water quality standards, or vegetation. In sum, despite appearing to promise that adaptive management measures would be used to address indirect impacts to wetlands, no such measures are identified, and it does not appear that this is in fact the plan.

This is particularly problematic for certain indirect impacts such as degradation of water quality, which cannot be mitigated under Clean Water Act regulations.[135] Thus if an EIS predicts violations of water quality standards, the Section 404 permit must be denied. The Co-lead Agencies have refused to assess whether the project might result in water quality standard violations in wetlands, but promise to monitor after the project is permitted. And the outcome if violations are discovered will apparently be to require compensatory mitigation. This is clearly not sufficient to meet the requirements of either NEPA or the Clean Water Act.

***Issues of cost and perpetual maintenance and operation***

Issues in relation to specific engineered systems are discussed below, including: errors, accidents, and failures; the uncertainty of mitigation measures; and unfounded promises of adaptive management. However, two other factors affect uncertainty and risk for all systems at the proposed NorthMet project: cost and financial assurance; and the length of time that systems will need to operate.

In regard to cost and financial assurance, many problems that could occur would not surface until after mining ends and the company no longer has a source of revenue. As an example, the tailings basin leachate containment and collection system will likely need to operate for centuries after mining has ended. A series of mishaps, errors, and negligence might result in a blocked drain, a build-up of water, and a significant rupture in the containment wall. Fixing the system would no doubt be expensive.[136]

PolyMet will not be required to post financial assurance at the outset to cover this or other unplanned events, because Minnesota regulations only require financial assurance for *predicted* reclamation needs. If things do not go according to prediction to the extent that a permit violation may result, the DNR may require financial assurance *at the time when the potential violation is discovered.*[137] In this example, because the problem would not occur until after mining has ceased, there would be no source of financing. Whether it is called "mitigation" or "adaptive management," it is not effective if there is no way to pay for it.

Furthermore, even before mining ceaases, there is no guarantee that the mining company will have the money for additional financial assurance to cover contingencies as they arise. In fact, a typical scenario at a mine that becomes a Superfund site is that the mine begins with financial assurance set aside to cover reclamation costs, just as is planned for PolyMet. A problem occurs, which in this case could be anything on the list above, or many other possibilities that have not yet been recognized. Environmental standards are violated, and the regulatory agency seeks money from the mining company to address it. Often it is precisely this cost that drives the mining company into bankruptcy.

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[135] 40 C.F.R. § 230.10(b).

[136] To be clear, we are not arguing that this particular scenario will occur, or that the FEIS must specifically assess this scenario. What we are arguing is that the FEIS must describe the things that could go wrong, the approximate chance that *something* will go wrong with each particular system, and the range of consequences that could occur.

[137] Minn. R. 6132.1200(2) and (3).

In regard to the length of time over which systems may need to be maintained and/or operated, a number of risks become foreseeable that would not be an issue for a project that would be maintenance-free within a reasonable time following the cessation of mineral extraction. For example, over a 500-year period the risk of societal change resulting in a disruption in regulatory oversight or the failure of financial institutions becomes foreseeable, where it would not be considered foreseeable over a 50-year period.

The FEIS does not discuss the fact that governments and other institutions do not last as long as may be necessary to ensure the continued maintenance and/or operation of systems at the NorthMet site. However, the same issue has been thoroughly vetted in the context of storage and disposal of nuclear waste, where governments and experts have uniformly reached the conclusion that long-term storage requiring active maintenance is ultimately not an appropriate option. Quoting from the International Atomic Energy Agency:

> All human made facilities require maintenance to preserve their integrity. It follows that if the integrity of a structure is essential to protecting the health and safety of people and the environment, ongoing maintenance will be required to avoid gradual deterioration of the protection afforded by the facility. Ongoing maintenance requires the continued existence of authorities and institutions that can ensure that essential maintenance is carried out.
>
> . . . . .
>
> Since adequate protection of humans and the environment will continue only as long as maintenance is continued on storage facilities, and since some of the radioactive material in storage will remain hazardous for many thousands of years, maintenance — or institutional control — would be required for such periods of time or until permanent disposal is implemented. *A review of world history reveals that turmoil and change usually occur in much shorter periods of time and therefore that it is unlikely that any societal infrastructure currently in place or envisaged would last for the time period needed.*[138]

And:

> The safety of long term storage requires the maintenance of the industrial, regulatory and security infrastructure as described in previous sections. Long term safety also requires that future societies will be in a position to exercise active control over these materials and maintain effective transfer of responsibility, knowledge and information from generation to generation. Long term storage is only sustainable if future societies can maintain these responsibilities.
>
> Active controls cannot be guaranteed in perpetuity because there is no guarantee that the necessary societal infrastructure can be maintained in perpetuity. Therefore, for the types of radioactive wastes considered here—wastes that remain hazardous for thousands of years—perpetual storage is not considered to be either feasible or acceptable.[139]

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[138] IAEA, The Long-Term Storage of Radioactive Waste: Safety and Sustainability (2003) (attached as exhibit 7i) at 6 (emphasis added).
[139] *Id.* at 12.

As consistently acknowledged by nuclear regulatory agencies, "turmoil and change" in human institutions is foreseeable over the time frames for which maintenance activities may be required at the NorthMet site. The risks to the environment from such turmoil and change therefore must be disclosed in the FEIS.

Aside from the issue of the longevity of human institutions, activities stretching over hundreds of years also present a much greater risk to the environment due simply to probabilities over time. For example, if the probability of a wastewater treatment plant malfunction and resulting release of polluted water to the environment is 1 per 50 years and wastewater treatment was planned to operate for 25 years, there would be a 50 percent probability of such an event during the lifetime of the project. On the other hand, if wastewater treatment is planned for a 500-year period, 10 such events could be expected. The probability of a major failure resulting in severe impacts would also be correspondingly higher.

Such information is absolutely critical to a determination as to whether the benefits of a project are worth the impacts and risks. If, for example, a tailings basin dam must hold for more than 500 years, and the probability of a catastrophic breach over that time approaches even 5 percent, one would hope that the Co-Lead Agencies care enough for future generations not to leave them with that risk. As one court put it: "Any substantial risk that the dam could fail would be intolerable; and, if the agency were to proceed in the face of that risk, that would constitute an abuse of agency discretion."[140] And from the Independent Panel on the Mt. Polley dam breach:

> In risk-based dam safety practice for conventional water dams, some particular level of tolerable risk is often specified that, in turn, implies some tolerable failure rate. The Panel does not accept the concept of a tolerable failure rate for tailings dams. To do so, no matter how small, would institutionalize failure. First Nations will not accept this, the public will not permit it, government will not allow it, and the mining industry will not survive it.[141]

Disclosing the statistical probability of failure over the time period that the tailings basin dam will need to hold (based on past experience, which accounts for human error, rather than on engineering calculations, which do not) would constitute the "hard look" required by NEPA. Instead, the Co-Lead Agencies have avoided learning about the probabilities of accidents and failures over an extended time frame so that they can pass the risk on to future generations without troubling their conscience.

The lack of risk assessment is a systemic problem affecting virtually every aspect of the FEIS, and time does not allow identification of all of the systems and uncertainties involved. The following discussion identifies only the most obvious issues. Preparation of a new supplemental draft EIS that provides a comprehensive risk assessment should not be limited to these issues.

### 7.1 Tailings Basin and Dam

The collapse or major breach of the tailings dam is likely the most devastating impact that could occur at the PolyMet mine. Recent reports demonstrate that the risk of tailings dam collapse is not nearly as remote as PolyMet suggests. Two hundred and fourteen tailings dams have had failures or

[140] *Warm Springs Dam Task Force*, 621 F.2d 1017, 1026–27 (9th Cir. 1980).
[141] Ex. 5c at 119 (Mount Polley Report, 2015).

accidents since 1940.[142] Since 1960, "serious" and "very serious" tailings dam failures have occurred with greater frequency.[143] Very large releases occur even at relatively small mines, such as the Mt. Polley mine.[144] Moreover, the cost of cleanup for a catastrophic failure averages $543 million.[145] This dollar value is beyond the capacity of most mining companies to cover. Nor is it required that the risk of tailings dam collapse be included in the financial assurance package.[146]

While the cited Bowker and Chambers report is not about any particular mine, the authors note how critical statistical analysis of tailings dam failures is when evaluating the potential for a collapse at any given mine:

> Having something more like "actuarial data" to refer to is important in understanding the potential magnitude of loss from an individual dam or a permitting districts portfolio of dams and TSFs [Tailings Storage Facilities]. With such low frequency high severity losses we can never assign risk to an individual TSF based on its design and receiving environment parameters. Unless it has an identified flaw that puts it at near certain risk of imminent failure, we can't say whether a given dam "will" fail. We can only say what the consequence would be in economic terms if it failed.[147]

In addition, Dr. Chambers has identified risks unique to the PolyMet Proposed Alternative tailings basin, including a choice to use the cheapest and least safe form of dam construction, and, most importantly, the choice to use wet, instead of dry, tailings storage. Dry tailings storage would eliminate the chance of tailings dam collapse, a benefit that outweighs any downsides due to the potential catastrophic impact of such a collapse.

### 7.2 Pipelines

As noted in the Friends of the Boundary Waters comments on the SDEIS and still relevant here, the FEIS does not describe the pipeline system that will be used to transport untreated and treated water and tailings.[148] A description of the length of pipeline that will be used, the various purposes, the pipeline construction and the pumping system is a necessary first step in assessing the risk of pipeline spills.

In a review of fourteen copper mines (representing 89 percent of copper mined in the United States), the conservation organization Earthworks found that every mine experienced pipeline spills.[149] The number of spills per mine over a 26 year period ranged from 2 to 54.[150]

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[142] Lindsay Newland Bowker & David Chambers, The Risk, Public Liability, and Economics of Tailings Storage Facility Failures (2015) (attached as exhibit 7j).
[143] *Id.* at 4.
[144] *Id.* at 2.
[145] *Id.*
[146] Minn. R. 6132.1200 (financial assurance must include funds for "reclamation activities" and "corrective action...if noncompliance with design and operating criteria in the permit to mine occurs.")
[147] Ex. 7j at 3.
[148] Friends 85.
[149] Bonnie Gestring, U.S. Copper Porphyry Mines 4 (2012) (attached as exhibit 7k).
[150] *Id.* at 7.

The EPA's assessment of potential mining in Bristol Bay includes a good example of a risk assessment for pipeline spills.[151] The assessment used statistics from the oil and gas industry. The assessment found:

> Although the range of published annual failure rates for U.S. oil and gas pipelines spans more than one order of magnitude (0.000046 to 0.0011 per km-yr) (URS 2000), the range for pipelines most similar to the assessment pipelines along the transportation corridor is much narrower. For example, the failure rate is 0.0010 failure/km-yr for pipelines less than 20 cm in diameter (OGP 2010), 0.0015 failure/km-yr for pipelines in a climate similar to Alaska (Alberta, Canada) (ERCB 2013), and 0.00062 failure/km-yr for pipelines run by small operators (those operating total pipeline lengths less than 670 km) (URS 2000). The geometric mean of these three values yields a failure probability of 0.0010 failure/km-yr.
>
> This overall estimate of annual failure probability, coupled with the 113-km length of each pipeline as it runs along the transportation corridor within the Kvichak River watershed, results in an 11% probability of a failure in each of the four pipelines each year. Thus, the probability of a pipeline failure occurring over the duration of the Pebble 2.0 scenario (i.e., approximately 25 years) would be 95% for each pipeline. The expected number of failures in each pipeline would be about 2.2, 2.8, and 8.6 over the life of the mine in the Pebble 0.25, 2.0, and 6.5 scenarios, respectively. The chance of a large rupture in each of the three pipelines over the life of the mine would exceed 25%, 30%, and 67% in the Pebble 0.25, 2.0, and 6.5 scenarios, respectively. In each of the three scenarios, there would be a greater than 99.9% chance that at least one of the three pipelines carrying liquid would fail during the project lifetime.[152]

The Co-lead Agencies apparently take the position that because engineered systems have progressed, the history of accidents and failures in the past has little bearing on the probability of accidents and failures in the futures. But as the Bristol Bay assessment points out:

> It may be argued that engineering can reduce pipeline failures rates below historical levels, but improved engineering has little effect on the rate of human errors. Many pipeline failures, such as the cyanide water spill at the Fort Knox mine (Fairbanks, Alaska) that resulted from a bulldozer ripper blade hitting the pipeline (ADEC 2012), are due to human errors. Perhaps more important, human error can negate safety systems. For example, on July 25 and 26, 2010, crude oil spilled into the Kalamazoo River, Michigan, from a pipeline operated by Enbridge Energy. A series of in-line inspections had showed multiple corrosion and crack-like anomalies at the river crossing, but no field inspection was performed (Barrett 2012). When the pipeline failed, more than 3 million L (20,000 barrels) of oil spilled over 2 days as operators repeatedly overrode the shut-down system and restarted the line (Barrett 2012). The spill was finally reported by a local gas company employee who happened to witness the leak. The spill may have been prevented if repairs had been made when defects

[151] Ex. 7h at 11-1 to 11-32.
[152] *Id.* at 11-5 to 11-6.

were detected, and the release could have been minimized if operators had promptly shut down the line.[153]

The assessment goes on to identify resources that could be affected by pipeline spills, and the range of potential consequences.

The risk probabilities calculated for Bristol Bay may not apply to the proposed NorthMet Mine. The lack of information about pipelines in the NorthMet FEIS makes it impossible to draw comparisons or to estimate what the degree of risk might be. However, the Earthworks Report and the Bristol Bay assessment do indicate that the risk of pipeline leaks and ruptures at any mine is not "remote or highly speculative." The FEIS thus must present information about the degree of risk and the potential consequences.[154]

### 7.3 Transportation

In the realm of transportation, risks to natural resources arise both from accidents and from inherent imperfections in modes of transport. The two most obvious transportation risks that are inadequately assessed in the FEIS are the risks of accidents and the uncertainty of containing ore dust and spillage along the transportation corridor.

While the FEIS includes a probabilistic risk assessment for accidents involving diesel fuel and PAX, the results understate the risk of accidents because of the limitation to these two materials.[155] Furthermore, the assumption that all shipments begin in Duluth[156] very significantly reduces predicted transportation impacts. Finally, the risk of accidents in regards to the shipment of waste and of mineral concentrate has been arbitrarily excluded.[157] As the FEIS states that both waste and mineral concentrate will be shipped from the facility, accidents involving these shipments are foreseeable and thus must be addressed in the FEIS.

Dust and spilled ore from rail transport has been identified as a risk of the proposed project from the start and remains an issue in the FEIS.[158] As with virtually every other system at the mine, the FEIS provides an optimistic estimate regarding the amount of spillage without regard for accidents, less-than-perfect maintenance, or simple uncertainty.[159] Rather than discussing the probabilities that some rail cars at some times will not achieve the predicted 97 percent reduction in spillage, the FEIS assumes that all will go as planned and recommends monitoring "to check for any potential deteriorations of water quality over time from ore spillage."[160] The Conservation Organizations agree with the Great Lakes Indian Fish and Wildlife Commission (GLIFWC): "GLIFWC does not believe that monitoring of the creeks along the rail line will be effective in preventing or minimizing impacts because once detected in monitoring, the impact will have already occurred. GLIFWC states that

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[153] *Id.* at 11-6.
[154] *See San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1029-34 (9th Cir. 2006) (risk of terrorist attack is not remote or highly speculative, and thus must be considered in EIS).
[155] FEIS 5-619 ("The odds of a potential release of hazardous materials during a transportation accident would incrementally increase if the other shipments listed in Table 5.2.13-1 were included.").
[156] FEIS 5-616.
[157] *See* FEIS App. A Response to Comments, Theme PD 37.
[158] Chambers & Levit 2015 at 18.
[159] *See* FEIS 5-164.
[160] *Id.*

cleanup of ore dust in an aquatic environment is a long and difficult process."[161] Furthermore, monitoring to identify impacts after they occur cannot take the place of disclosure of the risks of impacts in a NEPA document.[162]

### 7.4 Liners and covers

The FEIS and supporting documents do not address the uncertainties of the proposed liner and cover systems raised by comments on the SDEIS, nor do they present sufficient design specification to meet legal standards for reactive mine waste. As discussed by the expert report by Michael Malusis, incorporated with MCEA's comments to the SDEIS, there are numerous identified questions and concerns raised by the environmental review documents describing proposed liners and covers. Among these are:

1. The Tailings Basin's bentonite-amended layers' documentation: contains inconsistencies about the thickness of layers; lacks design criteria for the layers such as hydraulic conductivity and moisture retention; fails to explain how a 3 percent bentonite addition could create a proper barrier when mixed with coarse tailings; lacks information on saturation that is necessary to assess the layers as a barrier to oxygen; lacks sufficient information on wet-dry/freeze-thaw cycling and root penetration's effects on the proposed layers; includes no information on field performance benchmarks for the layers' operation; proposes three methods of creating a subaqueous bentonite seal at the bottom of the tailings pond that are experimental and have not been proven by case studies, while excluding alternatives that are proven to work as needed in this project; and incorrectly assumes that manufacturers' reported hydraulic conductivity will translate perfectly to field hydraulic conductivity.
2. The Hydrometallurgical Residue Facility's liner and cover systems' documentation: lacks data on the values of compression and swell index values used in modeling and/or gives values too low for fine tailings and slimes; incorrectly modeled LTVSMC tailings as homogeneous without consolidation test results for verification; lacks discussion of the potential for spreading and separation of GCL panel overlaps; fails to provide citations for slope stability assumptions and fails to provide for site-specific tests of the final design proposed; similarly assumes a slope for the cover that will be insufficient to avoid ponding and erosion; and significantly underestimates the actual leakage of liners in the field based on best-case assumptions and does not provide for proper testing of actual leakage potential.
3. The Category 2/3 and Category 4 Stockpiles' liner systems' documentation: lacks any liner design feature that could effectively prevent or deal with punctures; fails to justify the fact that these liners are projected to allow a higher hydraulic conductivity than is generally recommended for leach pad liners; and does not commit to rigorous geomembrane best practices for installation, observation, and testing that are required to prove efficacy at the high level projected by Polymet.

While the comments submitted on the SDEIS went into considerable detail on how to remedy the mistakes in analysis and research, it appears from the response to comments that no significant additions were made to the FEIS to correct these many omissions and mistakes. Nor does the FEIS

[161] FEIS 8-24.
[162] *National Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 733 (9th Cir. 2001).

or Response to Comments address most of Dr. Malusis's suggestions. Failure to respond to his specific comments violates CEQ NEPA regulations. "Final environmental impact statements shall respond to comments . . . . [and agencies] shall discuss at appropriate points in the final statement any responsible opposing view which was not adequately discussed in the draft statement. . ."[163] Moreover, where the FEIS did respond to his points it still fell short of assessing uncertainty and risk and disclosing the potential environmental consequences.

As discussed above, much of the FEIS is premised on assumptions that whatever the issue or problem, it will be fixed. This assumption is apparent in the responses to comments on liners and covers. For example, rather than correcting the identified slope gradient issue and properly addressing the missing information on how the Category 1 Stockpile cover would be designed to avoid root and freeze damage, the response merely says that maintenance would continue long-term to deal with erosion and tree removal.[164] Similar responses to comments regarding the stockpiles' covers need for ongoing maintenance are also made without addressing Dr. Malusis's expressed concerns.[165] This assurance does not engage the issue raised by Dr. Malusis, that the cover should be designed with known properties that prevent erosional damage before it occurs. Vague references to maintenance are not sufficient analysis of potential impacts under NEPA.

The response goes on to make conclusory statements about how liners will perform as predicted in the overly optimistic SDEIS.[166] Dr. Malusis has given an important critique on how the liners likely will not perform to expectations that goes well beyond this cursory mention, and has asked for more information on permeability issues that has not been provided. The Co-lead Agency response is insufficient under applicable law.

Similar to the failure to address Dr. Malusis's concerns for the Category 1 Stockpile, the response regarding the Hydrometallurgical Residue Facility also avoids addressing important concerns. Rather than providing the information requested, the response merely repeated lab research information.[167] This response does not address the need for site-specific testing and fails to provide additional information that is necessary to evaluate potential environmental impacts at this facility.

Responses also highlight the fact that the FEIS's analysis is incomplete. The statement that "Additional geotechnical analysis and design details would be required for permitting, including more detail on the foundation material characteristics, design details to ensure foundation and liner integrity, and details on the installation, operation, monitoring, and maintenance of the liners, covers, and stockpiles"[168] admits that the FEIS analysis does not cover significant details that will affect the degree of environmental impact. Without this information, the agencies cannot confidently say what the environmental impacts of this proposed project will be, therefore this assessment does not satisfy NEPA.

Regarding the lack of support for the assumption that liners at the hydrometallurgical facility will actually work as projected, the response to comments merely reiterates the fact that the proponent

[163] 40 C.F.R. § 1502.9(b).
[164] FEIS Appendix A, A-376.
[165] *See* A-630.
[166] *Id.* A-376.
[167] *Id.* A- 378–A-379.
[168] *Id.*

intends to use a double liner and a leakage recovery system.[169] This response is given despite an absence of information in the NEPA documents about the liners and their real-world success rate, or studies showing how they would operate in Northern Minnesota with these specific wastes. Nor does the response to comments address the concerns raised about the agencies' failure to support the assumption that bentonite will perform as expected, or that freeze-thaw cycles cause erosion and liner breakage. In response to comments that liner leakage rates used were unrealistic, the response merely reiterated that the leakage rate was based on literature values and modeling.[170] The very point of the comment was that the leakage rate should be based on more than literature values and modeling; it should include real-world testing and historic data regarding the efficacy of liners at other mines to assess the actual potential for leakage.

The response to the comment that liner leakage is often the product of mistakes in installation is similarly limited to a reiteration that PolyMet plans to use liners, completely failing to respond to the comment.[171] Liner installations involve covering uneven ground for distances as long as a mile or more with virtually no breaks or gaps. While theoretically of course this could be done perfectly, it rarely is. This is a good example of a situation where the human factor often intervenes; perfect installation requires commitment, ability, and patience that are sometimes lacking.

Across all of these responses is a marked unwillingness to address the need for consideration of both site-specific factors and the performance of the chosen technologies in the field, rather than in a best-case laboratory setting. Because this fails to recognize foreseeable risks that the liners will not perform to theoretical predictions, it does not meet NEPA requirements.

The FEIS shows a similar disregard for potential problems with the use of bentonite as a pond and bench liner at the Tailings Basin. As for other systems, the FEIS and Response to Comments simply assume that any problem can be fixed, without assessing or discussing the uncertainty of measures that might be used. Regarding concerns expressed about the untested application of bentonite plan, the Response to Comments states: "Potential measures that could bring the capture efficiency of the system to 100 percent include improvements to the existing dam such as lining the upstream dam face with bentonite and injecting grout into the dam."[172] There is no support given for this statement; it also does not acknowledge the fact that the proffered fix (another bentonite liner) is the same technology that commenters questioned in the first place. Bentonite amendment is not a universal panacea, especially when it is being used in unproven and uncertain ways that could be negated by the chemistry of the tailings at this site.

Concerning comments like Dr. Malusis's regarding the implausible uses of bentonite proposed in the preferred alternative, the response states:

> [P]ublications indicate that uniform blending is important, so that amendments would probably be applied in multiple layers, and that site-specific field tests would be required prior to full-scale application to tailings surfaces or the tailings pond bottom. . . . The [bentonite amendment] plan would be updated as necessary as part of facility permitting, with future in-laboratory material testing performed to confirm

[169] *Id.* A-9, A-593–A-594.
[170] *Id.* A-186, A-629.
[171] *Id.* A-637.
[172] *Id.* A-197; *see also id.* A-616, A-625–A-626, A-634 (same wording).

> percentage of bentonite addition requirements, and with in-field test plots constructed preceding initial cover construction activities to confirm material placement procedures. The specific methods for bentonite amendment at the Tailings Basin, including a material testing program and construction quality control plan would require approval by the facility engineer of record and PolyMet prior transitioning to full-scale implementation.[173]

This is a misunderstanding of how a NEPA document is meant to function. To the extent that the agencies agree that the effectiveness of bentonite amendments and application to the pond bottom are still untested and unproven—and therefore in need of field and laboratory tests—the environmental review cannot simply assume that the strategy will be successful. The Co-Lead Agencies cannot rely on unproven mitigation measures. As water pollution due to seepage is one of the large risks of this project, it is wholly inappropriate to put off necessary tests until after the FEIS is finalized, and even more inappropriate to assume that the results of those tests will be favorable.

In his report prepared in response to the FEIS, Dr. Malusis shows that the analysis remains flawed on key issues. He points out that mixing bentonite into tailings will be less effective than assumed. Tailings "metals will inhibit bentonite swelling as the bentonite hydrates within the mixture, possibly to the extent that the bentonite will not adequately plug the voids in the mixture. If this is the case, then the bentonite-amended tailings layer will be a poor water/oxygen barrier."[174] The current proposals for bentonite additions to dams will not effectively block water or oxygen, and therefore all of the predictions of water quality impacts that are dependent on this mitigation measure are incorrect. Dr. Malusis also indicates that important information is still missing from the FEIS. The inconsistencies regarding, and uncertainty of effectiveness for, bentonite-amended dam raises must be disclosed in the FEIS, along with disclosure of the potential environmental impacts should the plan prove less effective than assumed.

While the DNR regulation (discussed above in the section on the Dry Stack Tailings Alternative) requiring either that the tailings be rendered nonreactive or that essentially all water be prevented from moving through the tailings[175] is not mentioned in the FEIS, we would like to point out that the bentonite amendment strategy will not meet this requirement. As Dr. Malusis explains, the design proposed for the Flotation Tailings Basin does not sufficiently prevent the incursion of water. Indeed, it is designed to allow a fourth of the annual precipitation to percolate into and through the basin, and is likely to be even less effective than designed.

Environmental Impact Statements must demonstrate compliance both with NEPA and with other environmental laws.[176] The failure of the proposed project to meet regulatory requirements in this case is a good illustration of the wisdom of this NEPA requirement. No FEIS should be deemed adequate when it envisions an illegal outcome as a preferred alternative.

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[173] *Id.* A-585.
[174] Malusis 2015.
[175] Minn. R. 6132.2200(2)(B).
[176] 40 C.F.R. 1502.2(d).

### 7.5 Leachate barrier and collection systems

The FEIS and supporting documents do not address the uncertainties of the proposed leachate barrier and collection systems at the Category 1 Stockpile and the Tailings Basin. These systems are assumed to collect more than 90 percent of the leachate from these mine features, and this collection rate is critical to all of the predictions of water quality impacts from this project. If these systems do not operate as assumed, the increases in pollutants in surface and groundwater at both the mine and plant site will be significantly higher than predicted in the FEIS, to the point of violating or increasing violations of water quality standards for some constituents. For systems modeled at 99 or 100 percent capture efficiency, a change of even one percent could double the amount of pollutants predicted to enter ground and surface water.

In response to questions about the adequacy of the capture systems, the FEIS contains new information showing modeling of the operation of the capture systems.[177] Dr. Tom Myers has provided a comprehensive review of this modeling.[178] As Dr. Myers concluded regarding the Tailings Basin system,

> The FEIS' statement "[m]odel results indicate that all seepage from the Tailings Basin would be captured along the north and northwest flowpaths under all assumptions of the bedrock fracture zone thickness" is true only because the model was set up in a highly biased fashion. The model was set up to confirm: "These results indicate that the Plan site Goldsim model assumption (that groundwater seepage equal to 10 percent of the aquifer's transmissive capacity bypasses the Tailings Basin containment system) is conservative" The model was hardwired to show what the modelers were told by Polymet to make it show. The evidence for this is that the model parameters do not resemble the parameters used for other modeling and the boundaries were set to create hydraulic barriers and sinks that will not be present in the field.[179]

In his review of the SDEIS, Dr. Michael Malusis also identified numerous questions and concerns regarding the barriers. For the Category I Waste Rock Stockpile, EIS documentation: lacks information on soil content and a potential additional barrier in the wall; indicates an incorrect liner will be used for a vertical wall; is based in part on missing information (i.e. broken links in reference materials and missing documents referenced) and insufficient explanation; presumes an unrealistic permeable conductivity rate for the vertical barriers; lacks information on keying walls to bedrock; is not clear about wall thickness; and indicates an insufficient surface slope which will lead to ponding and infiltration. The Tailing Basin's groundwater seepage containment system's documentation similarly lacks information on wall keying and inward gradient, and indicates a wall thickness that will be too difficult to construct and backfill properly and is not consistent with conventional practice. It appears from the response to comments that no significant additions were made to the FEIS to correct these many omissions and mistakes.

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[177] Barr 2015b.

[178] Tom Myers, Technical Memorandum: Review of the Final Environmental Impact Statement 30-31, 37-41 (2015) [hereinafter "Myers 2015"].

[179] *Id.* at 41.

As discussed above, reliance on a mitigation measure to avoid disclosing possible impacts of a project requires sufficient evidence for the assumption that the mitigation measure will work as planned, and/or a disclosure of the degree of risk that it will not work as planned along with information about the potential impacts if it does not. Instead of providing this assessment, the FEIS and Response to Comments tell us that the barrier and capture system is both a well-established technology, and a new technology for which historic information about the efficacy of such systems is irrelevant.

In hailing the groundbreaking uniqueness of the capture systems, the Response to Comments states:

> The Co-lead Agencies acknowledge that there are existing water containment systems at other mine sites that do not operate with a high degree of capture, but these are different designs and cannot be directly compared to the system proposed for the NorthMet Project Proposed Action. The proposed containment system uses pumping on the tailings side and reinjection on the downgradient side to reverse hydraulic gradients across the slurry wall and in underlying bedrock. Relatively few containment systems have been built with this degree of pumping and reinjection to ensure effective capture. The conceptual hydraulics of this type of system provides evidence that it would achieve complete or nearly complete capture.[180]

In other words, the Co-lead Agencies are not relying on evidence that this technology has worked at this level of capture before. The only evidence it has for its assumption of greater than 90 percent capture (and in some places, 100 percent capture) is "conceptual hydraulics."

However, the FEIS states in another place that

> The proposed containment system technology is not new nor unique; the slurry cutoff wall and collection trench approach has been used for many decades, beginning initially as a means to facilitate construction of deep foundations in locations of shallow groundwater and difficult soil conditions, and subsequently expanding to other uses such as the containment of contaminated groundwater emanating from unlined waste disposal facilities (e.g., landfills, stockpiles, etc.). There are many papers written about the use of groundwater containment systems and a number of contractors well-experienced and proficient in containment system construction.[181]

The comment that this text responds to specifically challenges the assumption that the capture efficiency will be greater than 90 percent.[182] Thus the response that the proposed technology "is not new or unique" and "there are many papers written" about it refers to a "unique" technology for which the agencies have no evidence other than conceptual hydraulics. Notably, no citations are provided for the papers.

Similarly, in response to comments that the chosen control technologies have never been proven in this type of mining, the agencies cite to a 1986 USACE manual in support of the statement: "Design

[180] FEIS Appendix A, A-193
[181] *Id.* A-198; *see also id.* at A-196 (same wording).
[182] *Id.* at A-197.

criteria for the Tailings Basin are based on well-established geotechnical design standards with significant precedent in Minnesota, in the greater United States, and worldwide."[183] In short, the agencies tout "significant precedent" for use of slurry wall technology when commenters point out the complete lack of information on the practical, as-built efficacy of the reverse hydraulic gradient system. And when commenters point out the ineffectiveness of slurry wall technology as shown by "significant precedent," the agencies tout the uniqueness of the hydraulic system. In neither situation is the comment actually responded to.

Despite this attempt to confuse the issue, it is clear that the Co-lead Agencies have no documented examples of situations in which this type of system has worked at the level of accuracy that the FEIS assumes. Given that these walls will be miles long and that the systems will need to continue operating for hundreds of years, assumptions that they will operate perfectly defy belief. Our expert reports provide many reasons to doubt these assumptions.

In light of the lack of precedent and the resulting uncertainty in the capture rate of these systems, one would think that the amount of leachate escaping from the Category I Stockpile and the Tailings Basin would be set as variable factors in the GoldSim modeling, allowing a picture of what might happen if the systems are less effective than assumed. Given the relative ease and simplicity of this means of assessing the outcome of a less-than-perfect performance of the containment system, there is simply is no excuse to ignore significant risks of water contamination, as the FEIS currently does.

### 7.6 Hydrometallurgical Residue Facility

The Hydrometallurgical Residue Facility (HRF) is the only disposal area proposed on the site with double liner. The materials contained within the HRF may be among the most dangerous on the site. The SDEIS was dismissive of the possibility that the HRF would leak;[184] the FEIS doesn't mention it at all.

Yet the underlying documents demonstrate that the materials in the HRF will undergo "an initial rapid flush of acidity and metals," and will remain acidic over time.[185] As noted by Dr. Chambers and Dr. Malusis in both comments submitted herewith and previous comments, substantial concerns remain regarding stability and potential impacts of the HRF. Even a small leak would have a significant impact that must be assessed.

### 7.7 Waste Water Treatment

As with other systems, the FEIS fails to discuss any potential difficulties and breakdowns that the Waste Water Treatment Plant and Facility might face, despite the assumption that they will have to operate for centuries. Rather than discussing the uncertainties of scaling up to large facilities from the pilot scale testing and the inherent uncertainties of adjustments needed to meet discharge limits for all constituents, the FEIS simply assumes that an answer will be found for any unexpected results. Rather than responding to questions about the uncertain efficacy of meeting the applicable standards at the necessary scale, the Response to Comments focuses on the ability to increase

[183] *Id.* A-438.
[184] The SDEIS stated that "it is assumed that the leakage from this facility into underlying groundwater or adjacent surface water would be negligible and this potential effect is not discussed further." SDEIS 5-157.
[185] PolyMet 2012e (NorthMet Project Residue Management Plan), p. 5.

capacity, and to continue treating and/or storing water during any breakdowns. But these responses do not address uncertainty relating to the systems' ability to meet the discharge limits in the first place. Although reverse osmosis (RO) may be "standard technology that has been operated around the world for decades,"[186] the FEIS and supporting documents provide no examples of it meeting the discharge limits that will apply here, at the scale it will need to operate. And please note that we are not saying that it cannot be done; we are saying that there is uncertainty involved and no resolution of the issue. The FEIS must reveal that uncertainty along with the range of impacts on water quality that might result if it does not work as well in reality as it did in a small pilot test.[187]

Regardless of the technology involved or the size of the plant, wastewater treatment facilities are not immune from accidents and failures, and most modes of failure involve human error.[188] For example, it may be the case that in RO systems "membrane failure tends to be gradual and provide advanced warning,"[189] but acting on that warning requires human reliability. The best way to estimate the potential for accidents, failures, and releases due to human error is not to examine the technology but to refer to history.

The greatest failure of the FEIS in regard to risk assessment of the water treatment systems is its failure to disclose what it will mean for water quality (and the humans and wildlife that depend on it) if waste water treatment ends prematurely due to a disruption in regulatory or financial institutions. As discussed above, given the timeframes involved this is not a "remote or highly speculative" possibility, and thus must be discussed in the FEIS.[190] The public deserves to know the quality of water that will be released if treatment ends prematurely, and decision makers need this information in order to take a "hard look" at what they are approving.

The EPA assessment of potential mining in Bristol Bay provides an example of disclosure of the impacts of a treatment plant failure.[191] The assessment provides the following description of difficulties with RO systems:

> Studies of wastewater treatment plant (WWTP) efficiency and design considerations show that reverse osmosis water treatment systems can be compromised by fouling and scaling from calcium, iron, barium, strontium, silica, microbial growth, and silt (Mortazavi 2008). The Bingham Canyon WWTP in Utah treats groundwater contaminated with sulfate and total dissolved solids from copper mining by reverse osmosis. Pilot tests and optimization studies have shown that the structural integrity of its reverse osmosis membranes can be damaged by abrasive materials (e.g., silt) or chlorine (ITRC 2010). Changes in water composition could increase the concentration of chlorine if the mine pit encounters a large flow of brine transmitted to the pit through deep fracture systems, or from localized areas of mineralized rock with anomalous water quality. An example of WWTP failure due to highly variable chemical composition of inflow wastewater has been documented at a copper mine in Chile: when silica concentrations exceeded the design range, the whole reverse

[186] FEIS App. A, Theme WR 143.
[187] Miller 2014.
[188] Great Britain Health and Safety Executive Hazardous Installations Directorate, Causes of Plant Failure (May 1, 2002) (attached as exhibit 7l).
[189] FEIS App. A, Theme WR 143.
[190] *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1029-34 (9th Cir. 2006).
[191] Ex.7h at 8-15 to 8-57. In particular, see Table 8-18 at 8-39.

> osmosis system could not be operated and was therefore shut down until feed water quality improved (Shao et al. 2009).[192]

Once again, although it may be true that these difficulties can be dealt with if maintenance, replacement, and repairs are performed as needed, it is exactly the failure of maintenance, replacement, and repairs that leads to accidents and unintended releases.

The EPA assessment concludes:

> Although it is highly likely that mine operations would adversely affect water quality at the mine site, several factors make it difficult to predict the level of effects and consequent risks to fish.
>
> One component of this uncertainty is associated with the likelihood of water collection and treatment failure. Water collection and treatment failures have been documented at 13 of 14 porphyry copper mines in the United States (Earthworks 2012). These 13 cases represent instances in which engineering uncertainties led to prediction failures, despite the fact that mine permits included mitigation measures intended to prevent such occurrences. These results indicate that failures are not uncommon at modern U.S. copper mines; however, they cannot be used to quantitatively predict the likelihood of water collection and treatment failures in this or future assessments.
>
> Even in the absence of failures, predicting the effects of mining on water quality is difficult and results are uncertain. Further, the effects of water quality changes on aquatic communities are uncertain. The following factors contribute to these uncertainties.
>
> - The range of potential failures is wide and the probability of occurrence for any of them cannot be estimated from available data. Therefore, we can only state that, based on the record of the mining industry, treatment failures of some sort are likely to occur.[193]

As stated by Dr. Miller, RO systems are notoriously difficult. This is an extremely complex system, and the likelihood that it will encounter problems is at least as likely at the 13 other locations studied in the Earthworks report.

### 7.8 East Pit Water Pumping, Treatment and Return

The plan to pump and treat water from the East Pit as it is filling is a mitigation measure designed to help meet groundwater standards. This strategy is unproven and receives only limited attention in the FEIS and its reference documents. The FEIS fails to respond substantively to SDEIS comments asking for further explanation and details. It also fails to provide any discussion of the uncertainty involved or the risk of unplanned difficulties.

The strategy is to "rinse" the rock in the backfilled East Pit, with the goal of flushing out constituents to improve water quality in the pit. The plan calls for pumping water out of the backfilled East Pit at a rate of 1750 gallons per minute (gpm), treating the water and returning it to

[192] *Id.* at 8-17.
[193] *Id.* at 8-54 to 8-55.

the pit. However, the record does not appear to include any evaluation of the uncertainties of pumping water at this high rate from the backfilled pit, or whether the rock in the pit is certain to remain saturated while pumping at that rate.[194]

The FEIS fails to assess the risk that pumping at the rates described could desaturate the contents of the East Pit, thereby exposing the most reactive rock (Category 2, 3 and 4) to oxygen that may result in the generation of pollution that subaqueous disposal is intended to limit. It appears that PolyMet proposes to add water back in at the same rate that it pumps water out, and therefore operates on the assumption that the rock will remain saturated. But water that is added back into a backfilled pit will follow preferential flowpaths, which may leave some areas unsaturated.[195]

The NorthMet Project Water Modeling Data Package notes that: "After Mine Year 31 the WWTF can accept more water from the East Pit due to decreasing flows from other sources, and the quantity extracted from the East Pit is allowed in the model to increase."[196] But the FEIS does not evaluate the uncertainty and the potential risks of increasing pumping beyond the already high 1,750 gpm rate.

Nor does the FEIS provide examples of mines where the rinsing of a pit was successfully achieved in the manner in which PolyMet proposes. The FEIS lacks the description and analysis of this proposed method necessary to assess its mitigation potential or to ensure the method itself does not cause significant environmental harm.

The Response to Comments on this issue provides only unsubstantiated assurance:

> FEIS Section 5.2.2.3.1 accurately describes how East Pit backfill would be flooded as it is emplaced during operations to maintain water within 5ft of the backfill surface using effluent from the WWTF and storm water runoff. The Co-lead Agencies' review of the model found that the footprints and depths of East/Central Pit are correctly incorporated into the three-dimensional model mesh, and that appropriate boundary conditions are used to simulate pit inflows. During reclamation (year 21 – 40), "water from the East Pit would also be pumped to the WWTF and treated...", after which treatment of water in the East Pit may continue into closure and long-term maintenance[197]

However, Section 5.2.2.3.1 provides only general statements of what is proposed and does not describe the "three-dimensional model mesh" or other details of the method, much less a response to concerns that discharge back into the pit would follow preferential flowpaths and leave areas of reactive rock unsaturated.

Rather than providing data, analysis, or examples to support the certainty that the plan will operate as intended, the FEIS Response to Comments simply restates the belief that all areas of the pit will remain saturated: "The Co-lead Agencies believe that the existing plans, as described in the FEIS, are sufficient to ensure that the East Pit backfill would remain saturated perpetually beyond

[194] *See* Myers Review 2015 at 28.
[195] *Id.*
[196] PolyMet 2015 at 173.
[197] FEIS Appendix A at A-658 (Section 2.1.1 of PolyMet 2015d, as cited in the FEIS).

closure."[198] This reliance on a mitigation measure, whose efficacy is not supported by the record, and the failure to discuss the risks and uncertainties of the method, violate NEPA requirements.[199]

## 8.0 The FEIS is based on a flawed water model that does not consider all potential impacts of the project.

The FEIS's MODFLOW and GoldSim models contain a series of flaws and unrealistically optimistic assumptions that ultimately result in a model that is not useful to predict conditions at the site, particularly the mine site.[200] Indeed, in many cases, the model has inputs that have biased it towards a particular outcome. For instance:

- The simulation estimated recharge that is far too low for the area because it improperly used the 30-day low flow as baseflow, thereby ignoring that baseflow occurs at higher rates even during storm events. Calibration with a very low recharge caused a very low conductivity estimate.
- The modeling set a vertical conductivity several orders of magnitude less than the horizontal. This limits the flow from the surface layer into the bedrock layer.
- The plant site model assumed that bedrock had such low conductivity that it was modeled as a no flow boundary but the cross-section model of seepage containment set the bedrock conductivity high so that groundwater flow through bedrock would curve upward and be captured by the drain.
- Storage parameters based on textbook values are too high. Specific yield for unconsolidated and bedrock units was set to 0.25 and 0.05, respectively. The specific storage is $3x10^{-6}$ $ft^{-1}$ for each formation which means that a very small amount of water removed from a confined aquifer will cause a foot of drawdown. This causes an underestimate of dewatering by an order of magnitude, meaning that a predicted dewatering rate of 500 gpm could actually be 5000 gpm.
- The mine site model simulates the Peter Mitchell Pit (PMP) as a constant head tens of feet higher than water levels at PolyMet when PMP water levels actually vary and in future will be as much as 300 feet below PolyMet and will be at least 75 feet lower in perpetuity. Adding the PMP to the Myers modeling shows that its long-term dewatering and pit lake development will substantially affect groundwater flow patterns at the proposed Polymet project. It will create pathways at depth from the Central and East Pits north to the PMP and contaminants could reach the PMP in less than 100 years.
- PolyMet's MODFLOW modeling ignored the backfill added to the pits and the pit lake in the West Pit in their simulation. The backfill properties would control the amount of water required to fill the pit, but the model did not adjust the properties from those of bedrock to emulate backfill during the pit refilling. As the water levels recover into a backfilled pit, the uppermost part of the backfill would be an unconfined aquifer and the backfill will would require five times as much water to saturate as would bedrock. The West Pit would be a

[198] FEIS Appendix A at A-662 to A-663.
[199] *See Wyoming Outdoor Council v. U.S. Army Corps of Eng'rs,* 351 F. Supp. 2d 1232, 1238 (D. Wyo. 2005).
[200] MCEA 3, 56-65, 70, 75; Friends 4 - 5, 10 - 16, 38 - 39; CBD 3 - 6, 40 - 41, 46 - 49; Supplemental letters.

> large open volume but the modeling did not change properties to reflect that fact. A lake would require twenty times the amount of water as compared to bedrock with specific yield equal to 0.05.

These errors or bad assumptions when applied to GoldSim cause many potential errors or biases in the model results.

The water model also ignores nitrate and ammonia concentrates, and underestimates sulfate concentrations. It predicted sulfate water quality that is chemically impossible because it is not "charge-balanced."[201]

The Conservation Organizations recognized the fundamental flaws with PolyMet's water modeling early in the process. Viewing it as insufficient merely to suggest changes to PolyMet's model, we commissioned Dr. Myers to generate his own water model to demonstrate what a more accurate model without PolyMet's flawed assumptions would look like. That model is described in Dr. Myers's comments on the SDEIS in 2014.

But the purpose of this modeling was not merely to generate a different, competing water model; it was to give the Co-Lead Agencies additional expertise on which to base their own model. As described in Myers 2015 at 5 - 6, hydrology models can benefit greatly from multiple conceptual models. It is not that one model is better than another, but that multiple models are optimal. But they are only optimal if the modelers choose to take advantage of them. In this case, the Co-Lead Agencies were dismissive rather than accepting of Dr. Myers's expertise.

In response to comments, the Co-Lead Agencies asked Barr Engineering to prepare, among other documents, a Memorandum on the four containment systems, and a sensitivity analysis of various inputs into the water model. The Memorandum on the containment systems begins as follows:

> The Co-Lead Agencies have requested a summary of the four containment systems that are planned for the NorthMet Project (Mine Site and Flotation Tailings Basin [FTB]) and the justification for how they are represented in the water quality (GoldSim) modeling. This memorandum represents the rationale for the modeling assumptions for each of the following containment systems:
>
> - FTB Seepage Containment System (north and west)
> - FTB Seepage Containment System (east)
> - FTB South Seepage Management System
> - Category 1 Waste Rock Stockpile Groundwater Containment System[202]

The Co-Lead Agencies requested a "justification" for how the containment systems are represented—not a response to substantive questions raised by public comment. Notice also that the Co-Lead Agencies did not request this "justification" from their own staff or consultants, but from the project proponents consultants. According to the project proponent's consultant,

[201] Maest 2015.
[202] Barr 2015e at 1.

capturing 100 percent of the surface water discharge and 90 percent of the groundwater discharge is a "conservative" assumption.[203]

In a second memo prepared by Barr entitled "Sensitivity Analysis of the NorthMet Water Quality Models," Barr stated that although it would describe its sensitivity analysis to see if various changes to the model would change the outputs:

> Because of the proposed engineering controls and the adaptive water management strategy, it is not expected that the modeled concentrations in the Partridge River would exhibit much sensitivity to most input variables for the Mine Site water quality modeling, except those inputs that control water quantity and quality from unimpacted portions of the watersheds. If this expectation is borne out in the sensitivity analysis, the results will be positive with respect to the potential for environmental impacts: this will indicate that as long as the engineering controls perform as planned and the adaptive water management strategy is able to achieve its objectives, there is little likelihood that a mischaracterized input variable would result in unforeseen environmental outcomes.

In other words, PolyMet's consultant would do the work, but the outcome was preordained by the assumptions in the model. This demonstrates that the Co-Lead Agencies have not taken a "hard look" at the water quality impacts of the PolyMet proposal.

## 9.0 Modeling must be re-done to reflect the actual hydrology of the mine site to provide an honest assessment of impacts.

Since the close of the comment period for the SDEIS, new information has come to light regarding the potential for groundwater to flow north out of the East and West pits after closure, toward and into Northshore Mining's PMP. The PMP will be dewatered for many years following the closure of the proposed NorthMet mine. Even after the PMP is closed and fills with water, that water will be maintained at a lower elevation than the water in the NorthMet West Pit lake and East Pit pore water, causing a northward migration of groundwater. This water will enter the PMP, from which all water will be discharged to the Rainy River watershed after mine closure, constituting a diversion of water from the Great Lakes basin to the Hudson Bay basin.

This issue was brought to the Co-Lead Agencies' attention by GLIFWC, whose position and modeling results are contained in a letter attached to these comments.[204] Dr. Tom Myers has done additional modeling that also indicates a northward flow from the mine pits after closure.[205]

Remarkably, the Co-lead Agencies defend their failure to establish the likely flow paths of groundwater from the mine pits by stating that the modeling done was not intended for this

[203] *Id.* at 4 - 5.

[204] Letter from John Coleman, Great Lakes Indian Fish and Wildlife Commission Environmental Section Leader, to Co-lead Agencies Re: Comments on PolyMet mine site contaminant northward flowpath and groundwater model calibration (Aug. 11, 2015) (attached, with supporting materials, as exhibit 9a).

[205] Tom Myers, Groundwater Flow and Transport Modeling NorthMet Mine and Plant Site, submitted with comments on SDEIS (Mar. 10, 2014).

purpose. The agencies as much as admit that they did not plan to require PolyMet to accurately characterize the hydrology of the site after closure, when to do so is required to obtain a water appropriation permit.[206] DNR will no doubt respond that this is a permitting rather than a MEPA requirement, but when exactly is it that the required hydrological investigation and modeling was going to be done? It legally must be completed before finalization of the FEIS.

PolyMet and the agencies' response to this issue is to promise to find some form of mitigation that will prevent water from flowing to the north.[207] At this point, the promises of mitigation have reached the point of absurdity. According to the FEIS, no matter what goes wrong at this mine, some ideal means will be found to address it. But it is abundantly clear from all evidence and all sources that this is not the way things work at similar mines. If it was, we would not have billions of dollars of contaminated mine sites spread across the country that are not being remediated because the ideal means and money to do so is not available. The FEIS provides four pages of mitigation ideas without one word about cost.

GLIFWC reviewed an early version of proposed mitigation measures and responded:

> Given the uncertainty that the co-leads feel there is in characterization of contaminant flowpath direction, the draft co-lead memo of June 22 proposes several mitigations that attempt to prevent northward flow of contaminants. The feasibility of any of those measures has not been evaluated. Even with the minimal information presented in the memo, several obstacles to successful mitigation of a northward flowpath are evident: 1) The thickness of the low conductivity surficial deposits between the PolyMet site and the P-M pits, approximately 50 feet thick according to Minnesota Geological Survey 2005 publication M158, makes the practicality of an infiltration trench questionable; 2) Lowering of water levels in the the PolyMet pits would expose reactive Virginia Formation rock to air and water, creating acid generation and dewatering surrounding wetlands; 3) Groundwater injection or extraction wells may be a feasible, but costly, mechanism to block northward flow but, as noted in the memo, would require perpetual operation, care and replacement.
>
> In addition to the proposed adaptive management appearing to be impractical, substituting "adaptive management" for understanding of the hydrologic system is contrary to the NEPA concept of site characterization and impact prediction. NEPA is a forward-looking process with the goal of anticipating and describing impacts so that measures can be taken to avoid or minimize those impacts. A northward flowpath for contaminants is indicated by both MODFLOW and MathCad. The character of the hydrology between the PolyMet and P-M projects needs to be described correctly so that impacts of that northward flowpath can be evaluated and the feasibility of mitigation measures can be determined.[208]

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[206] Minn. R. 6115.0720(1)(E) (water appropriations permits for mining require submission of "details of the hydrologic and hydraulic impacts and effects of the operation on the watershed(s) including changes in basins, watercourses, and groundwater systems.")
[207] FEIS 5-240 to 5-244.
[208] Ex. 9a Letter at 7-8.

In an Expert Report submitted with these comments, Dr. Tom Myers reviews the suggested mitigation possibilities, and points out:

> All of these measures would have to be maintained indefinitely because the northward flow gradient would last forever (Myers 2015). The FEIS has failed to prove that any of them could effectively work or that Polymet could afford to implement them. The FEIS should not rely on these mitigation strategies but rather should complete analysis to lower the uncertainty as to whether they will be needed by completing better upfront analyses of the potential for northward flow.[209]

The FEIS discussion states that proposed mitigation measures "if needed, would be maintained indefinitely or until acceptable bedrock groundwater flow conditions are obtained without those measures."[210] Acceptable bedrock groundwater flow conditions could not be guaranteed without a change in the law, which is what PolyMet seems to be banking on.

Our observation is that once a mine or a mineral processing plant is built in Minnesota, no branch of state government will require the company to do anything that it says it cannot afford. A case in point is Mesabi Nugget, which promised to build a water treatment system to address discharge problems within five years of startup. The plant was permitted and began operating, but when it came time to build the water treatment system, the company couldn't afford it, and ten years later continues to operate with a variance. Another is Reserve Mining, which promised on obtaining its permit to discharge tailings into Lake Superior that if the tailings did not settle on the lake bottom as expected, it would "take whatever action might be necessary to remedy those conditions."[211] The length and complexity of the legal proceedings to force it to do so are legendary.

The willingness of the Co-Lead Agencies to accept PolyMet's promises at face value, without assessing their practicality or the likelihood that they would be effective, abrogates the agencies' responsibilities to the public. Financial assurance is given as the answer to all questions. Moreover, Minnesota regulations require financial assurance only for planned remediation. We note that the mitigation measures proposed to address potential northward flow "would not be initially included in the financial assurance package, but, if required in the future, these measures would be added to the financial assurance package."[212] But even if the need for the measures was established before mining ended, neither we nor the Co-Lead Agencies have any reason to believe that PolyMet would be able to afford the financial assurance when the need is discovered. At that point, the mine will be operating, and even the Great Lakes Compact is unlikely to require mitigation when the company says it will close rather than pay for such measures. It is also possible, even likely, that any northward flow will not be discovered until after PolyMet has ceased operations. Once the mine is no longer producing ore in twenty years, obtaining any sort of financial assurance will be impossible because PolyMet will not have a source of revenue.

PolyMet has to promise to keep its pit water from flowing toward the Rainy River, because according to the terms of the Great Lakes Compact, it could not otherwise be permitted.[213]

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[209] Meyers 2015.
[210] FEIS 5-243.
[211] *Reserve Mining Co. v. Herbst,* 256 N.W.2d 808, 814 (Minn. 1977).
[212] FEIS 5-239.
[213] Public Law 110-342, 122 Stat. 3739 (Oct. 3, 2008).

The Great Lakes Compact prohibits diversions of water out of the Great Lakes basin for anything other than public water supply.[214] There is no minimum volume on this prohibition; another section of the Compact indicates that volumes as low as 5.7 gallons are included.[215] The Co-Lead Agencies need to take a realistic look at the proposed mitigation measures, PolyMet's financial situation, and the very foreseeable risk that a diversion of Great Lakes water will result from permitting this mine.

## 10.0 The Geochemistry work relied upon by the FEIS uses unsupportable assumptions and inadequate data.

Similarly, the geochemistry work is insufficient to support realistic, defensible predictions of water quality impacts. The water quality predictions in the FEIS are based on insufficient data and unsupported assumptions. The combination of the uncertainty in regard to hydrology and geochemistry inputs to the model results in an overly-optimistic assessment of water quality impacts. As with hydrological impacts, the FEIS must include the full range of reasonably possible acid production and metals leaching potential of rock at the site, and the resulting range of reasonably possible impacts on water quality.[216] Specific issues include:

1. Nitrogen and ammonia are ignored in the proposed water treatment schemes. Both constituents are likely to be present at high volumes because of blasting agents; yet PolyMet has failed to address them in their water quality predictions and treatment strategy.[217]
2. An inadequate number of samples were used to characterize the chemical composition of waste rock, and almost no acid base accounting (ABA) analyses were done on the samples that were examined. As a result, the FEIS provides insufficient support for its conclusions regarding the potential for acid mine drainage and for virtually all of its water quality predictions.[218]
3. The use of concentration caps and averages, the disregard of actual results of HCT and field tests, and the failure to account for heterogeneity of the rock and seasonal variability result in a FEIS that almost certainly underestimates water quality problems.[219]
4. PolyMet assumes in its analysis that the stratigraphic units within the deposit are very similar, but does not have adequate support for this assumption.[220]
5. The modeling used a high adsorption factor that prevents contaminants from moving along flowpaths. Seasonal variability, including spring snowmelt, and other conditions may result in higher-than-predicted concentrations.[221]

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[214] *Id.* at §§ 4.8, 4.9.
[215] *See id.* at § 4.12(10) ("A Proposal to Withdraw Water and to remove it from the Basin in any container greater than 5.7 gallons shall be treated under this Compact in the same manner as a Proposal for a Diversion.")
[216] MCEA 5, 70-75; Friends 23-24, 38-39.
[217] Maest 2015.
[218] MCEA 71, 74; Friends 23-24.
[219] MCEA 71, 74-75; Friends 15; *see also* Maest 2015.
[220] MCEA 74.
[221] MCEA 75; Friends 15; *see also* Maest 2015 for additional concerns about adsorption.

6. There is potential for acidic conditions in the Category 2/3 and 4 wasterock stockpiles to develop more quickly than predicted.[222]

## 11.0 The FEIS must assess water quality impacts in the Partridge River at the closest point between the river and mine features.

The FEIS must assess water quality impacts from groundwater discharge to the Partridge River at any point where those impacts may be the greatest, including the point where the river comes closest to mine features. The FEIS cannot omit impacts on the river upstream of SW-004 unless it provides adequate data showing that those impacts will be less than the impacts at SW-004 and below. This issue was raised in our comments on the SDEIS at CBD 6 - 9, which is incorporated herein by reference. We asked Keith Gadway, principle of Quantum Environmental, Inc. in Ann Arbor, Michigan, to review the FEIS and our SDEIS comments in regards to this issue. His response is included as an expert report.

The methodology for assessing water quality impacts included assigning a number in the model to represent the distance between mine features and the river. This was apparently based on the average distance to the river within the flowpath.[223] As such, the accuracy of the location and width of the flowpaths becomes important. FEIS Figure 5.2.2-7 shows the flowpaths as estimated for the GoldSim modeling. Note that point SW-003 is the closest point to the Partridge River from the Category 2/3 stockpile. However, the East Pit/Category 2/3 Flowpath was deliberately drawn to begin just below this point, and no assessment was made of the impact of leachate from the stockpile on surface water quality in this location.

The flowpaths shown in Figure 5.2.2-7 and used in the GoldSim model do not accurately reflect the geography and hydrology at the site. As the Response to Comments admits, the flowpaths "do not exactly line up with the flow trajectories predicted by MODFLOW."[224] And even if they did, the MODFLOW modeling itself was not designed to accurately identify flow paths.[225] The FEIS makes several vague statements such as, "A secondary purpose of the MODFLOW model [including "groundwater flow directions" and "the distribution of groundwater baseflows along the Partridge River."] An evaluation of these parameters showed that the GoldSim setup/inputs were generally consistent with the MODFLOW results."[226] The FEIS needs to provide sufficient information about both the MODFLOW assumptions and the consistency between the two models to allow for some judgment as to the accuracy of the flowpaths. The Co-Lead Agencies seem to begin with the assumption that there will be no significant impacts along this stretch of the river, thus making the accuracy of groundwater discharge points unimportant.[227]

As Mr. Gadway states:

> Impacts to the river would presumably be greatest along the primary groundwater recharge zone closest to mine operations. Based on predicted pathways for

[222] MCEA 75; Friends 38-39.
[223] *See* FEIS 5-41, Table 5.2.2-8.
[224] FEIS App. A, Theme WR 089.
[225] *See, e.g.,* MDNR *et al.* 2015c at 2.
[226] FEIS 5-29.
[227] *See* FEIS App. A, Response to Comments Theme WR 177.

> discharges to the river from mine features, monitoring and evaluation points are more than three miles downstream from this point and are just below the discharge from a creek. Selection of these monitoring and evaluation points ensures that the discharges likely to be highest in pollutant concentrations are not caught by monitoring until well downstream, having been diluted by presumably clean groundwater and by surface water from an area less likely to be affected by mine operations.
>
> The failure to monitor surface water at the actual point of contact with groundwater and surface water closest to the mine is directly contrary to Great Lakes Initiative (GLI) requirements and standards that ensure that water quality will not be lowered for impaired waters. The FEIS methodology fails to evaluate the receiving water nearest the actual discharge to the Partridge River, and therefore is inadequate to address potential impairment.[228]

For reasons stated in our comments on the SDEIS, we believe that water from the Category 2/3 Stockpile and the East Pit will enter the Partridge River to the west of the mine as well as to the south. Supplemental modeling from Dr. Myers and scientists at GLIFWC indicates that water will likely move north as well. The mine site is located in a bend in the river, and the closest distances to the river for both the Category 2/3 stockpile and the East Pit are in locations that the FEIS omits from the evaluation. A new modeling effort is needed for this project for other reasons; in the course of that modeling, the effort should be made to identify what stretches of the actual river (as opposed to the modeled river) will receive polluted groundwater. The GoldSim model should then be adjusted to account for the reduced distance from mining features to the river.

**12.0 <u>The EIS must disclose the predicted quality of publicly-owned water within the property boundary, including groundwater.</u>**

The EIS must disclose the predicted quality of publicly-owned water within the property boundary, including groundwater. This issue was discussed in our comments on the SDEIS at CBD 12 - 15 (surface water) and 20 - 21 (groundwater), which are incorporated herein.

Allowing a landowner to pollute groundwater to the property boundary and failing to disclose the level of that pollution in environmental review are both unconscionable in this case. The property here covers close to thirty square miles,[229] or about half the size of the city of Minneapolis. A number of streams have their headwaters within the property. Both the streams and the groundwater below the property are public resources, as explained in our comments on the SDEIS.

In regard to groundwater, the Response to Comments asserts without basis that assessing impacts at the property boundary "is typically used in EISs for mining and industrial facilities."[230] We are not sure what is meant by this statement, but after scanning a number of recent mining EISs, we do not believe that it is true. We did not find a single EIS that provided quantified information on predicted water quality at the property boundary that did not also provide information for predicted water quality in pit lakes and backfilled pits. Most of the EISs we surveyed predicted no impacts on groundwater quality even within the mining area. The two EISs we found that did quantify impacts

[228] Keith Gadway, Quantum Environmental Inc., to MCEA (Dec. 9, 2015).
[229] *See* FEIS 3-9, Figure 3.2-1.
[230] FEIS App. A, Theme WR 064.

to groundwater included information on water quality within or under the mine workings following reclamation.[231]

If the Co-Lead Agencies are saying that assessment of groundwater quality impacts at the property line is standard practice for DNR and MPCA for projects in Minnesota, we do not believe that there has *ever* been another industrial or mining project permitted in the state of Minnesota with comparable predicted impacts to groundwater. Sulfide mining is unique, and new to Minnesota. The "typical" approach is entirely inadequate for this atypical project. And in any event, an approach does not necessarily meet regulatory requirements just because that is the way it has been done in the past. Whatever MPCA's practice is in permitting discharges to groundwater, that practice does not provide a limit on the impacts that must be discussed in an EIS. There is no valid reason for treating impacts to groundwater any differently than impacts to surface water (including wetlands), wildlife, and other public resources found within the boundaries of a proposed private industrial site.

**13.0 <u>The FEIS must contain a more complete disclosure of what is known about the length of time for which water treatment will be necessary.</u>**

The EIS states only that the need for water treatment is assumed to be "long-term." However, the water quality modeling results clearly indicate that treatment is likely to be needed for more than 500 years, which is as long as the model was run. An accurate statement would be "The length of time for which water treatment will be needed is unknown, but is predicted to be more than 500 years."[232]

**14.0 <u>The discussion of "passive" treatment in the FEIS is misleading and should be removed.</u>**

The "passive" or "non-mechanical" treatment is as yet undeveloped, and there is no evidence that it will ever prove technically capable of treating water at this site to the levels used for the WWTF effluent in the water quality modeling.

While the FEIS does state that the agencies are not relying on passive treatment for water quality predictions, and that the need for mechanical water treatment is assumed to be long-term, the placement of the material on passive treatment has the effect of insinuating that this assumption probably will not prove true. This insinuation in concert with the failure to define "long-term" does not provide the "hard look" at the need for perpetual treatment.[233]

The FEIS and supporting documents assume throughout that unproven passive treatment systems will be implemented. For instance, the FEIS contains a section describing the predicted transition from mechanical to non-mechanical treatment:

> As described in the Water Management section above, water modeling for the NorthMet Project Proposed Action and the environmental analysis in Chapter 5 assumes that mechanical water treatment would continue indefinitely. PolyMet would include funds in its contingency reclamation estimate and financial assurance

[231] Bureau of Land Mgmt., Final Environmental Impact Statement for Blackfoot Bridge Mine (Mar. 2011) at 4-55 to 4-57 (attached as Exhibit 12a); U.S. Army Corps of Eng'rs, Charleston District, Final Environmental Impact Statement for the Haile Gold Mine Project EIS Chapter 4, Section 4.3 at 4.3-32 to 4.3-39, (July 2014) (attached as Exhibit 12b).
[232] MCEA 69; Friends 1-5; CBD 35-39.
[233] Friends 5-8.

> package to operate mechanical water treatment for as long as necessary as a part of its Permit to Mine. However, the Permit to Mine would also require PolyMet to present a plan for eventual transition from mechanical water treatment to non-mechanical water treatment, and to adjust its financial assurance on an annual basis in accordance with *Minnesota Rules*, part 6132.1200 to conform to the transition. This section provides an overview of the transitional approach from mechanical water treatment to the use of non-mechanical treatment technologies.
>
> PolyMet would transition from mechanical to non-mechanical water treatment as soon as the company demonstrates that non-mechanical water treatment technologies would effectively treat water to meet water quality based effluent limits and as soon as formal approval is received from the agencies.
>
> Non-mechanical water treatment technologies need to be designed for site-specific conditions and actual site water quality. PolyMet accordingly would test non-mechanical water treatment technologies for several years during mine operations and reclamation, until an acceptable treatment performance could be achieved.
>
> Non-mechanical water treatment technologies can be evaluated in the following steps: 1) collection of additional local site information (i.e., hydrology and influent water quality), 2) laboratory testing, 3) pilot-scale testing, 4) design of a system for full-scale implementation, and 5) continued evaluation of effectiveness over time.
>
> The conceptual design for a non-mechanical treatment system is to treat each flow expected in the long term. The Adaptive Water Management Plan (PolyMet 2015d) outlines preliminary/conceptual information on non-mechanical treatment systems.
>
> PolyMet has initiated testing of non-mechanical water treatment technologies on site (in collaboration with Cliffs Erie) and will continue testing these systems and evaluating other non-mechanical water treatment technologies until they could be demonstrated to the satisfaction of the MDNR and MPCA to provide the required water treatment. Provisions would be included in the NorthMet Project financial assurance package to ensure this test work and implementation of the non-mechanical water treatment technologies could be completed.[234]

The Adaptive Water Management Plan, cited in the FEIS above, treats the transition to non-mechanical treatment as a certainty, with the only question being timing:

> The ultimate goal of long-term closure (Figure 2-4 and Figure 2-5) is to transition from the mechanical treatment provided by the WWTF to non-mechanical treatment. Because non-mechanical treatment designs are very site-specific and very dependent on the quality of the water to be treated, it is assumed that the WWTF will operate in the long-term and the transition to non-mechanical treatment will take place only after the performance of a non-mechanical system has been tested on site, proven effective, and approved by the agencies. The two non-mechanical treatment systems at the Mine Site are independent of each other. It is expected that the Category 1 Waste Rock Stockpile Non-Mechanical Treatment System will be deployed earlier than the West Pit Overflow Non-Mechanical Treatment System, as

[234] FEIS at 3-81.

> described in Sections 6.2 and 6.3. As noted previously, water from the Category 1 Waste Rock Stockpile will continue to be treated by the WWTF until non-mechanical treatment with gravity discharge to the West Pit has been proven to provide appropriate treatment. This may occur during reclamation or long-term closure… Operation of the WWTF will occur year-round with the discharge directed to a small watercourse that flows into the Partridge River until non-mechanical treatment has been proven effective at achieving water quality objectives.[235]

PolyMet has used these statements to sow confusion in the public about the length of time for which water treatment would be required at the site.

- "But because the study focused on the water that could escape rather than water contained at the site, other factors would have to be considered to give a true estimate of how long treatment would be needed, said Brad Moore, PolyMet's executive vice president of environmental and governmental affairs. He said company officials expect mechanical treatment, such as the reverse osmosis systems PolyMet is proposing for the mine and plant sites, would only be needed for decades. The effectiveness of passive treatment techniques such as wetlands is still being studied."[236]

- "Moore, a former commissioner of the Minnesota Pollution Control Agency, also disputed the need for long-term treatment at the mine site. The company estimates mechanical water treatment will only be needed for about 40 years after the mine is closed. When the mine opens, Moore said, PolyMet would begin testing passive wetland filtering systems designed specifically for the site's water chemistry. He said state and federal regulators chose the word 'indefinitely" in the document to be conservative, since the reverse osmosis technology is treatment that's already proven."[237]

- "One point of debate is the length of time water from the site would need to be treated after the mine closes. The environmental review includes the scenario in which water treatment could be needed for up to 200 years at the mine site and 500 years at the processing plant. But Moore said treatment won't be needed for that long. He said the conservative modeling used assumes that all elements of the rock will enter the ground water through the weathering process, although that doesn't happen."[238]

PolyMet also released its own "factsheet" about long-term water treatment in which it said that "PolyMet believes that within 30 years after closure, all water will be treated by passive treatment technologies."[239]

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[235] NorthMet Project Adaptive Water Management Plan, Version 9, p. 13, PolyMet 2015d in Reference Documents.
[236] Elizabeth Dunbar & Dan Kraker, *PolyMet Environmental Study Inconclusive on Water Treatment, Fueling Confusion*, MPRNews (January 27, 2014) (attached as exhibit 14a)
[237] Dan Kraker, *As DNR report on PolyMet Mine Emerges, Critics Question Safeguards*, MPRNews (June 26, 2015) (attached as exhibit 14b).
[238] Kirsti Marohn, *PolyMet Official in St. Cloud to Seek Support For Mine*, St. Cloud Times (Feb. 4, 2014) http://www.sctimes.com/story/news/2014/02/04/polymet-official-in-st-cloud-to-find-support-for-mine/5204153/ (attached as exhibit 14c).
[239] PolyMet Mining, Long-term Water Treatment Fact Sheet (2014) (attached as Exhibit 14d).

While the Conservation Organizations recognize that PolyMet's statements are not part of the FEIS, they are supported by statements in the FEIS that have no place in an agency document. An agency is obligated to assess the effectiveness of potential mitigation measures.[240] In this case, the Co-Lead Agencies have concluded that the potential mitigation measure is not effective at all because it relies upon non-existent technology, yet continue to discuss it at multiple points throughout the FEIS, including the Executive Summary:

> The NorthMet Project Proposed Action includes long-term mechanical treatment (RO or equivalently performing technology) at both the Mine Site and Plant Site with a goal of transitioning to a non-mechanical water treatment technology requiring less maintenance over the long term. Pilot studies for non-mechanical treatment would be conducted during operations (and post-closure as necessary) to demonstrate the ability to transition to non-mechanical water treatment. Both mechanical and non-mechanical treatment would require periodic maintenance and monitoring activities for as long as treatment is required.[241]

Also, in response to public comments that treatment would be essentially perpetual, the Co-Lead Agencies responded:

> *Minnesota Rules*, part 6132.3200, *Closure and Postclosure Maintenance*, identifies several goals for non-ferrous mining areas, including the goal that sites be closed so that they are maintenance-free. *A maintenance-free site is the goal of the Minnesota Department of Natural Resources (MDNR) for the NorthMet Project Proposed Action, as it is for every mining site. The NorthMet Project Proposed Action includes piloting a non-mechanical treatment system to achieve this goal.* PolyMet would include funds in its reclamation cost estimate and financial assurance package to fund mechanical water treatment for as long as necessary, but the Permit to Mine would require PolyMet to present a plan for eventual transition from mechanical water treatment to non-mechanical treatment. PolyMet cannot be released from its responsibilities, including financial assurance requirements, until there is no longer a need for closure/post-closure treatment/maintenance. Financial assurance is a component of any Permit to Mine, to ensure that necessary maintenance can be provided for as long as it necessary.[242]

Over the course of any project, technology changes and improves, and sometimes projects are implemented differently than predicted in an EIS where technology that is newer, better or less costly becomes available. Yet there is no doubt that the original 500-year predictions for water pollution in the SDEIS quickly became the most controversial aspect of this project.[243] The current FEIS still concedes that mechanical treatment is required for at least 200 years at the Mine Site and

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[240] 42 U.S.C. § 4332(c); 40 CFR §§ 1508.25(b), 1502.14(f), 1502.16(h) and 1505.2(c); *see also Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351-3 (1989).

[241] FEIS ES-24.

[242] FEIS A-456, Theme PER 04 (emphasis added).

[243] *See, e.g.,* Elizabeth Dunbar & Dan Kraker, *Water Treatment A Central Question in PolyMet's Environmental Study*, MPRNews (Dec. 5, 2013) (attached as Exhibit 14e); Josephine Marcotty, *Iron Range Mine Could Pollute Water for Up to 500 years*, Star Tribune (Oct. 7, 2013) (attached as Exhibit 14f); John Myers, *PolyMet study: Water from Mine Site Would Need 500 years of treatment*, Duluth News Tribune (Oct. 5, 2013) (attached as Exhibit 14g).

500 Years at the Plant Site.[244] Thus, it appears that FEIS continually repeats the goal of non-mechanical treatment solely for political reasons to address public concerns about committing to a mine that requires hundreds of years of water treatment, rather than any justifiable belief that this is a proven mitigation measure.

Furthermore, non-mechanical treatment will not meet the goal of maintenance-free closure. To repeat the Executive Summary: "Both mechanical and non-mechanical treatment would require periodic maintenance and monitoring activities for as long as treatment is required."[245] While less intensive or less frequent maintenance might be required for a non-mechanical system, in some respects this could add to the potential that failures and problems would go undetected. In any event, representing that non-mechanical treatment would meet the maintenance-free goal of the regulations is simply false.

In summary, the many statements about transition to non-mechanical treatment mislead the public and agency decision-makers into believing that non-mechanical treatments exist that will work at this site, and that they will eliminate concerns over the length of time that treatment will be needed. Neither of these things are true. These statements should be removed.

## 15.0 The FEIS does not address the need for pumping and treating water from areas adjacent to the pits during mining, or the potential for elevated concentrations of nitrate and ammonia from blasting agents.

The FEIS failed to take a "hard look" at the possibility that runoff from the area around the pits could have elevated concentrations of nitrate and ammonia from blasting agents, and that the area around the pits will need to be dewatered by pumping. The FEIS thus failed to consider the need for this additional pumping, which would add water to the total to be treated, including the need to treat process water for ammonium and nitrate.[246]

Mine water that has been in contact with blasting agents, including leachate from stockpile materials stored at the mine site and the pit walls, will have elevated concentrations of ammonia and nitrate from the use of high volumes of blasting agents such as emulsifiers, boosters, and ammonium nitrate – fuel oil (ANFO).[247] The treatment pilot tests, however, assumed that mine water would have near-background levels of nitrate and ammonia, and so the effectiveness of the selected methods for removal of these constituents under mining conditions has not been properly tested or considered.

The FEIS discloses that large amounts of explosives will be needed to create the open pits: 18,650 lb/yr for the booster, 4.65 million lb/yr for the emulsion, and 10.6 million lb/yr for ANFO.[248] As result, nitrate, ammonia, and oil & grease concentrations could be high in primary contaminant sources at mine sites and downstream. For instance, the significant exceedence of permit limits for nitrate in downgradient groundwater and surface water has been seen at the Buckhorm Mine.[249] However, while the FEIS lists that the "environmental concern" from these hazardous materials includes harm to water and aquatic life, the FEIS fails to actually consider and address the effects of

[244] FEIS at 5-8.
[245] FEIS ES-24.
[246] MCEA at 74; Friends at 6 - 8, 14.
[247] Maest 2015.
[248] FEIS at 5-621, Table 5.2.13-1.
[249] Maest 2015 at 2.

blasting on water quality. Indeed the objectives for wastewater treatment at the Mine Site do not even include mention of nitrate or ammonia removal.[250]

The agencies' response to comments on this issue is inadequate.[251] First, no response was provided for concerns about ammonia removal. And for treatment of nitrates, the response states that the WWTF will also be of modular construction, such that additional modules can be added for increased capacity if necessary. However, because nitrate, ammonia, and oil & grease concentrations will increase as soon as blasting begins (during mine development), treatment approaches cannot be addressed using adaptive management but must rather be in place before mining begins.[252] The response also states that nitrate will be addressed at the Plant Site if nitrate is included in the discharge permit.[253] However, much of the water at the Plant Site comes from the Mine Site, and the response ignores the potential for transport of mine water to downgradient groundwater and surface water at the Mine Site.

The FEIS also fails to address that neither chemical precipitation nor filtration, which are the planned treatment schemes at the mine site, will remove nitrate or ammonia.[254] The FEIS further fails to properly address nitrate and ammonia in environmental modeling. And, the FEIS fails to include mitigation measures or pollution prevention plans for minimizing the use of blasting chemicals.

## 16.0 The FEIS does not adequately address the potential impacts of mercury.

Our comments on the SDEIS raised a number of issues related to mercury in leachate from mine features, and its potential discharge to surface water through groundwater transport. We also commented on mercury in air deposition and wastewater discharges. These issues affect wetlands, the Partridge River, and the Embarrass River and its tributary streams.[255] In addition, we attach and incorporate comments on the SDEIS by Daniel Pauly, who is a board member of Friends of the Boundary Waters Wilderness.

Many of our points were ignored in the Response to Comments and the FEIS, in violation of CEQ NEPA regulations.[256] The following discussion addresses a few of the most important issues, but should not be taken to indicate that issues not repeated here are no longer of concern. All of the points regarding mercury raised in the above-referenced comments remain an issue.

We pointed out in our SDEIS comments that the air deposition analysis fails to quantify the amount of mercury that will be deposited in the Embarrass and Partridge Rivers from air emissions, despite the obvious availability of this information. This point is reiterated by Keith Gadway in his expert report submitted with the current comments. The FEIS reports on the change in mass loading of

[250] Barr, 2007d at viii.
[251] FEIS at A-764.
[252] Maest 2015 at 3.
[253] FEIS at A-764.
[254] Maest 2015 at 3.
[255] They are discussed at Friends 16-21 and CBD 21-33 and 54-55, which are attached and incorporated herein by reference.
[256] 40 C.F.R. § 1503.4(a) (agency must consider and respond to comments) and 40 C.F.R. § 1502.9(b) (agency must discuss in FEIS "any responsible opposing view," and "shall indicate the agency's response to the issues raised").

mercury in the Embarrass and Partridge Rivers, but does not include the load from air deposition, which misinforms readers.

The Response to Comments states "The increase [from air deposition] would not be expected to have any appreciable effect on the loading estimates from permitted discharges to the Embarrass River, Partridge River, or the lower St. Louis River."[257] As far as we can tell, this is simply untrue. According to the FEIS, the "loading estimates from permitted discharges" are an increase of 0.2 grams per year to the Embarrass River,[258] and a decrease of 1.2 grams per year to the Partridge River.[259] In contrast, the deposition analysis indicates that the increased load from air emissions from the NorthMet Project would be between 5.88 and 21.06 grams per year to the Embarrass River (upstream of Sabin Lake), and between 4.62 and 16.35 grams per year to the Partridge River (upstream of Colby Lake).[260] If the estimates for the watershed of these two lakes do not reflect the load to the upstream rivers, please explain why in the NEPA document.[261] If they do reflect the load to the upstream rivers, it is impossible to reconcile the numbers with the words "no appreciable effect."

The Response to Comments also misrepresents the air deposition analysis as having been done by MPCA.[262] The analysis was actually performed by Barr Engineering on behalf of PolyMet.

The FEIS also fails to quantify mercury discharging to surface water through groundwater. We pointed out in our comments on the SDEIS that methods are available to model mercury transport to surface water through groundwater. The EPA suggested one such method in its comment letter of March 13, 2015: "If GoldSim is not suitable to model this pollutant, elemental mercury can be modeled using a different water quality model, such as the Water Quality Analysis Simulation Program (WASP), which is commonly used by EPA to model elemental mercury." Keith Gadway suggests another: "Simplified mercury modeling for point concentrations are available in MINTEQ to evaluate chemical equilibrium and, when coupled with a transport model such as MODFLOW, can provide useful data."[263] In SDEIS comments, CBD submitted an example of groundwater mercury transport modeling that was done for a mine in Michigan. The FEIS and Response to Comments do not explain why none of these methods were used.

The FEIS takes the position that the mass balance studies are an adequate substitute for modeling. But the West Pit mass balance study does not account for the mercury that will escape from mine features through groundwater. The mass balance treats that mercury as being collected and settling out in the West Pit or tailings basin, which is erroneous. The Response to Comments ignores this point, and simply reiterates that the mass balance study was done to characterize mercury releases.

It is possible that the greatest source of mercury to the Partridge River from groundwater transport from mine features would be the Overburden Storage and Laydown Area (OSLA). A large volume

[257] FEIS A-407.
[258] FEIS 5-230.
[259] FEIS 5-227.
[260] PolyMet 2015e, Att. U, App. B.
[261] We made this argument in our comments on the SDEIS, including the numbers based on the Colby and Sabin Lake upstream watersheds, and if we are wrong in our assumptions we would expect the Response to Comments to explain why. However, the Response to Comments ignores this issue altogether.
[262] FEIS A-407.
[263] Gadway 2015.

of peat will be excavated and stored in this area; as pointed out in Keith Gadway's report, peat is known to sequester mercury and to release it when excavated and exposed to wetting and drying.[264] In addition, the OSLA will be unlined, and a larger volume of groundwater will enter the river from this source than from any other mine feature.[265] Furthermore, mercury from this source will enter the river prior to the time that the Waste Water Treatment Facility (WWTF) begins discharging treated water to the river (which is expected to dilute concentrations of pollutants that enter from the groundwater flowpaths). Discharge of mercury from this source will occur prior to the time of the predicted decrease of 1.2 grams per year in mercury load.

While several "Theme Statements" in the Response to Comments point this out, the responses never address it. The response to MERC 20 is typical. The discussion only mentions water that is routed to Pond PW-OSLA, which is routed from there to the Tailings Basin or mine pits. Release to groundwater from either the OSLA itself or from the pond is completely ignored.[266]

PolyMet and the Co-lead Agencies take the position that mercury will not discharge to surface water through groundwater or enter the treatment plant or facility at above 1.3 ng/L at any point in either watershed. This position is based on shake-flask tests that do not stand up to scientific scrutiny. These tests are wholly insufficient for the purpose they are used for, as explained in our SDEIS comments. The Response to Comments does not address any of our objections to the use of these tests as the basis for assumptions about mercury groundwater transport through tailings or from mine pits and waste rock.

Our SDEIS comments also objected to the selective use of data on mercury in seepage from the tailings basin to support estimates of mercury in leachate. Although the FEIS figures have changed based on additional data points, they still ignore data indicating that the mercury level is higher in groundwater seeps than it is in surface seeps or pond water. Again, this point is ignored in the Response to Comments and in the FEIS. And although the Response to Comments states that data was reviewed for inconsistencies,[267] it is unclear whether the problems identified by Daniel Pauly have been corrected.

All of these issues are of critical importance in regard to the mercury levels in influent to the WWTF and Waste Water Treatment Plant (WWTP). Pilot testing of the RO system did not include treatment for mercury, and the level at which the systems will remove mercury is simply unknown.[268] The FEIS assumption that the WWTF and WWTP will be able to achieve a 1.3 ng/L mercury concentration in effluent appears to based on projections that influent will be below at or below that level.[269] Although the FEIS states several times that RO technology is "known to remove mercury,"[270] the FEIS treats the level of removal as essentially irrelevant, because the analysis has already been manipulated to indicate that the influent will meet the water quality standard. Before this project is permitted, the agencies must correct errors and base mercury levels in influent on scientifically acceptable evidence, followed by a scientifically sound analysis of the mercury removal capabilities of the treatment systems.

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[264] Gadway 2015.
[265] FEIS 5-41.
[266] FEIS A-419.
[267] FEIS A-408
[268] *See* Pauly SDEIS comments at 36-43.
[269] FEIS 5-226 (WWTF) and 5-230 (WWTP).
[270] *e.g.,* 5-226.

We note that the mercury removal efficiencies in literature cited in the Pilot Testing Report will not necessarily transfer to the treatment of influent from the NorthMet project. Removal of mercury at very low levels to meet the 1.3 ng/L standard is notoriously difficult, far more difficult than (for instance) achieving 99.9 percent reduction for an influent of 6 ug/L mercury, which still leaves the effluent significantly above the 1.3 ng/L standard.

In its discussion of adaptive management, the FEIS states, "Adaptive management would be implemented as necessary based on monitoring for total mercury to determine whether the treated water could be discharged to surface waters, or whether some additional treatment is needed."[271] The text goes on to discuss possible treatments, but provides no information on how effective they have proven to be. This is not adaptive management, which would identify the trigger point at which adaptation would be required, along with measures that have been proven to give the necessary results and what they would cost.

Furthermore, adaptive management cannot be used as a means to avoid the necessity of providing a scientifically defensible analysis of mercury levels in the waste water treatment influent and effluent. Regulatory agencies cannot simply accept PolyMet's optimistic belief about influent mercury levels and wait until the WWTF and WWTP are built to test the effluent to find out if it needs additional treatment. At that point, several years of discharges at above the water quality standard are likely to have happened, discharges that would not have been permitted had they been properly assessed before the mine was built.

Finally, we note that while discharge of Colby Lake water without treatment for flow augmentation is no longer proposed, it is unclear whether Colby Lake water might at times be routed directly to the WWTP, for discharge to the environment below the tailings basin.[272] Colby Lake water averages approximately 6 ng/L mercury, and the FEIS provides no evidence that the WWTP will be able to treat it to the 1.3 ng/L standard. The responses to comments addressing this issue repeatedly refer the reader to the FEIS section on monitoring for more information. Promises of monitoring cannot take the place of providing adequate evidence that discharge will meet the 1.3 ng/L standard—not just on average, but on a regular basis.

As explained in our comments on the SDEIS, in the absence of site-specific data the wetlands at both the mine and plant sites must be considered to already violate the water quality standard for mercury. The FEIS includes a prediction that a certain number of acres of wetlands may suffer water quality impacts due to groundwater transport and air deposition. Mercury from the project will enter the wetlands from both sources, contributing to water quality standard exceedances in violation of the Clean Water Act. PolyMet's attempts to avoid the law by refusing to model or otherwise provide scientifically defensible estimates of releases of mercury (to both wetlands and streams) or other solutes (to wetlands) should not be countenanced by regulatory agencies. The Co-Lead Agencies' willingness to adopt PolyMet's position does not do justice to the people of Minnesota, who expect to see our environmental laws respected and enforced.

We recognize that the amount of mercury in this case is small compared to the mass of mercury circling the globe and coming down in precipitation, but we do not agree that this makes it insignificant. Mercury in the environment is a serious public health issue, especially in Northeastern

[271] FEIS 5-238.

[272] . *See, e.g.,* A-133. While this response to comments directs the reader to FEIS Section 5.2.2, that section is 250 pages long, and we were unable to find more specific information about the plans for Colby Lake water.

Minnesota. It is a cumulative problem; the mercury load to any particular water body comes from thousands of sources. When the Great Lakes Initiative (GLI) was adopted, it was with the recognition that drastic measures were needed to address this issue, and a complete prohibition was placed on new or increased discharges of mercury to any water body in the Lake Superior basin, including the Embarrass River. The mining industry might find it inconvenient, but the decision was made after a lengthy process with extensive public input, and that public now expects the law to be followed. This is Co-Lead Agencies' clear duty.

In Minnesota the prohibition on new or increased mercury discharges extends to wetlands through the application of water quality standard regulations. This is particularly appropriate in regards to mercury, because wetlands play such a significant role in producing methylmercury, which in turn makes fish unsafe to eat. The NorthMet project will also increase sulfate levels in wetlands, which may plan an even greater role in increased mercury methylation. We note that the FEIS added an analysis indicating a potential increase in sulfate levels in wetlands from air deposition alone at 1.7 mg/L, after dilution from precipitation. While the FEIS treats this as negligible, it is actually quite a substantial addition to wetland waters. We were unable to find any baseline information about water quality in the wetlands at the NorthMet site, and our understanding is that there is none.[273] The "background" sulfate level in surface water in Minnesota is often estimated at 3.0 mg/L or below; we assume this is an approximate level for wetlands at the mine site at least. If so, increases from air deposition alone would be as high as 50 percent. Although MPCA estimates that any waters with a current sulfate level above 40 mg/L are "high risk" waters for increased mercury methylation, this does not mean that sulfate does not significantly increase methylation of mercury at much lower levels. Increasing sulfates from 3.0 to 4.7 mg/L in wetlands would be expected to significantly increase mercury methylation.[274] Note that even with similarly low levels of sulfates in most northern Minnesota waters, we have a dire situation in regards to mercury in fish tissue.

Small increases in both mercury and sulfate in the water of extensive wetland areas are virtually certain to increase mercury methylation, and to lead to increased mercury levels in fish tissue and in fish-eating wildlife. Methylmercury is known to build to high levels in this situation, flushing out to area streams and lakes with snowmelt or floods.[275] This phenomenon is expected to increase in Minnesota with global warming.[276] The increases in mercury and sulfate that can be expected from the proposed project are likely to result in significant impacts, and thus must be properly assessed in the FEIS; monitoring cannot take the place of this assessment.

## 17.0 The FEIS fails to adequately disclose, analyze or discuss the effects of the project on area wetlands.

The FEIS still fails to adequately disclose, analyze, or discuss a number of questions regarding the environmental effects of the PolyMet mine and processing facility on area wetlands, addressing few of the questions and issues raised in the extensive comments on the SDEIS. Therefore, the Conservation Organizations restate and incorporate in their entirety, the comments and

[273] This begs the question of how PolyMet or the DNR and MPCA will know when wetlands have been impacted. What level would sulfate or methylmercury levels have to reach before they became a matter of concern? If this is never defined, monitoring is useless.
[274] FEIS Reference Branfireun *et al.* 1999 (increasing sulfate to 4.6 mg/L in sediment pore water increased methylmercury by a factor of 10).
[275] FEIS Reference Balough *et al.* 2006.
[276] *Id.*

accompanying expert reports of MCEA, Friends, and CBD on wetlands and related issues regarding hydrology, air deposition, and financial assurance.[277] The Conservation Organizations address below the change from the SDEIS to the FEIS identifying a number of wetlands as not likely to be indirectly affected to "low likelihood" of indirect effects, as well as a few of the relevant responses to comments (and their failure to adequately address issues raised). The Conservation Organizations will also highlight and emphasize some of the continuing wetland issues that are critical to permitting decisions moving forward.

**17.1 Wetland identification and classification is impermissibly skipped over in the FEIS.**

One of the primary issues raised in comments on the SDEIS concerned the failure to adequately classify and the potential misclassification of minerotrophic wetlands as opposed to ombrotrophic wetlands. While Eggers' January 2015 Memorandum appears to agree with Dr. Glaser regarding the references and guidance to be used in such identification, the FEIS is at best conflicted, and at worst simply wrong, in its approach to identifying project-affected wetlands as either ombrotrophic or minerotrophic and the resulting potential for negative effects and type of negative effect.[278] Instead of identifying wetlands that may be affected and their type, the FEIS now simply assigns a "low likelihood" of effect to area wetlands in an effort to avoid assessing wetland character as minerotrophic and to negate or minimize the importance of identifying specific wetlands as minerotrophic in the affected area. While it is correct that this is a slightly more conservative approach than the approach originally taken in the SDEIS, it is neither an accurate nor complete approach and tends to trivialize why it is important in environmental review to make the distinction.[279] Type of wetland will be relevant for more than assessing indirect effects as a result of hydrology and it is a required component of an EIS as well as for the analysis for the purposes of issuing a C.W.A. § 404 permit.

First, as discussed below, hydrology is not the only manner in which wetlands will be and are affected by the project, but it is a component among several. In order to fully understand effects, all ways in which wetlands might be affected should be addressed. Therefore, simply changing the NEPA document conclusion from no likelihood of effect to low likelihood does nothing to address the overall potential for effects to area wetlands, including the heightened potential for effects to minerotrophic wetlands and their unique characteristics.

Second, low likelihood as a blanket statement utterly fails to demonstrate the required level of analysis and disclosure for an EIS. There is no analysis in this blanket probability statement in the FEIS. A generic statement about all wetlands on and around the site tells the co-lead agencies, decision-makers, and the public absolutely nothing about what may occur as a result of the project and what is lost because of it. And the blanket "low likelihood" statement, absent assessment and analysis of wetlands that are actually in the area and their hydrologic character, is simply inaccurate. It is unlikely that all ombrotrophic and minerotrophic wetlands in the area are vulnerable to effects

[277] MCEA at § 13.0; Friends at VI; CBD at Part J. *See also* Comments on Section 404 Permit, dated March 13, 2014, submitted by Save Our Sky Blue Waters et al. (attached as Exhibit 17a).
[278] *See,* Report by Paul Glaser, Critique of PolyMet/NorthMet Final Environmental Impact Statement, dated (Dec. 17, 2015) [hereinafter "Glaser 2015"]. *See also* prior Glaser Report regarding the SDEIS (Mar. 2014), previously submitted [hereinafter "Glaser 2014"].
[279] *See,* Glaser 2015 at 1 - 3.

from the project in the exact same manner and degree. This is not analysis based upon evidence and science; this is just an effort to escape the requirements for environmental review.

Third, the blanket "low likelihood" coupled with the FEIS's simplistic use of distance from the pit in areas between the East Pit and the PMP as the only measure of whether a wetland might be affected by drawdown, fails to adequately assess potential wetland effects.[280]

Fourth, also discussed in more detail below, the type of wetland is important to identifying type and difficulty of mitigation needed and may affect whether the effect must, under applicable law, be completely avoided. As the FEIS acknowledges, both state and federal law require that full function of wetlands be mitigated if they cannot be avoided (avoidance is by far preferable and the required first step in analysis and decision-making for projects that will affect all types of wetlands)[281] Function includes the hydrology and the plants and wildlife that are dependent upon that hydrology and the characteristics of a particular wetland type, including whether that wetland is ombrotrophic or minerotrophic.[282] It also includes placement of the wetland in the landscape and relationship to the habitat and ecosystems within the area. Where a wetland is unique, rare, and/or difficult to restore or mitigate, avoidance is even more important and mitigation ratios must increase.

While it may be correct that an EIS does not always require original scientific research, it does require assessment and analysis of the site of the project itself sufficient to adequately characterize the environmental effects. Analysis of the actual site is not original research, it is in fact the very point of environmental review. There is no reason the project proponent and/or its consultants and/or the Co-Lead Agencies cannot access the site and survey potentially-affected wetlands to determine type through soil and plant analysis. The FEIS has been years in the making and this issue in particular was raised by the Conservation Organizations and their experts in comments over twenty months, and two entire growing seasons, prior to the issuance of the FEIS. In particular, MCEA's original comments on the SDEIS, at 87, criticized the lack of vegetation plots for assessment of wetland types and potential effects. Moreover, when the Conservation Organizations requested access to the site to conduct their own analysis during the 2015 growing season (something that the proponent and co-lead agencies should have done, but that *non-profits* were willing to do nonetheless), PolyMet denied access to public lands and the Forest Service allowed PolyMet to do so.[283] Finally, the Response to Comments[284] complains that a quantitative functional wetlands assessment has not been done because there is not a software program that can accomplish this task for a particular site. While that may be true, it does not then allow the project proponent and co-lead agencies to simply skip the task altogether. The combined effect rises to the level of purposeful, studied ignorance and avoidance of the plain legal requirements of NEPA, MEPA, and C.A.W. § 404.

The FEIS fails to adequately identify minerotrophic wetlands potentially affected by the project and has plainly made no attempt to do so. The Conservation Organizations strongly disagree with the premise in the FEIS that by changing the description of potential indirect effects to "low likelihood" as opposed to no likelihood allows the co-lead agencies to avoid analysis and disclosure of potential

[280] *See* Myers 2015 at 25-29.
[281] 33 C.F.R. § 320; 33 C.F.R. § 332.2.
[282] *See* Glaser 2015 and Glaser 2014.
[283] *See* letter from PolyMet to Dr. Paul Glaser dated August 26, 2015 (attached as Exhibit 17b).
[284] *e.g.* at A-485.

for negative effects to wetlands from the project. This shorthand and non-analytical approach is inadequate and misleading.

### 17.2 Avoidance and mitigation of wetland impacts is required by law but not sufficiently covered or assure in the FEIS.

The state and federal requirements for projects that affect wetlands have been set forth in earlier comments and in the FEIS itself and will not be repeated in detail here. Nonetheless, the Conservation Organizations emphasize two important components of wetland preservation and mitigation: the need to wholly avoid impacts to unique and rare natural resources and the need to fully mitigate all functions of any affected wetlands resource. The FEIS fails to provide adequate information and analysis of wetland impacts within those legal requirements and associated mitigation to address these requirements.

#### 17.2.1 State and federal law require that effects to rare natural communities must be avoided, but the FEIS does not consider avoidance.

The FEIS acknowledges that the Minnesota Wetland Conservation Act ("WCA") requires special consideration for wetlands that are rare natural communities.[285] Rare natural communities are native plant communities having conservation rank of S1, S2, or S3, or are communities within an area that has outstanding or high biodiversity significance rating.[286] The FEIS further acknowledges that the entire project area is one of high biodiversity significance and that most of the S2/S3 ecosystem is within the mine site itself or within the direct influence of the mine site activities and effects.[287] More than 50 percent of the Upper Partridge River area of high biodiversity significance will be obliterated by the mine and associated mine features, while a substantial portion of the remaining 50 percent of the high biodiversity significance will be "indirectly" negatively affected by the mine. The FEIS continues, however, to omit any analysis of what this actually means in terms of ecosystem impacts, implications for downstream and surrounding areas and the wildlife and vegetation that is present or depending on these high-quality areas, and fails to address the implications for mitigation. These very questions were originally raised in comments on the SDEIS by Friends[288] and MCEA[289] and remain unaddressed. Plainly, even if the FEIS does not expressly so state, the mine will permanently destroy the rare natural communities identified. The FEIS also fails to address the issue this raises regarding Minn. R. 8420.0515, supb. 3, which provides that mitigation plans must be denied for an activity that involves the modification of a rare natural community if the proposed activity will permanently adversely affect that natural communit

The foundation for this requirement is plain: rare natural wetlands communities such as those at the PolyMet site, comprised of a large, contiguous assemblage of northern peatland wetlands including coniferous bog (both ombrotrophic and minerotrophic) is impossible to restore or recreate elsewhere. Mitigation of the functions for this wetlands complex is an unworkable and unsupported

[285] Minn. R. 8420.0515, subp. 3.
[286] BWSR/DNR Wetland Conservation Act and Rare Natural Communities Technical Guidance, January 31, 2011 (attached as Exhibit 17c)
[287] FEIS at 4-201; Resp. to Comments at A-518 (also acknowledges Aquatic Resource of National Importance); Resp. to Comments at A-519 (notes mapping of large single wetland complex).
[288] Friends at 53.
[289] MCEA at 78-79.

concept. There is no scientific evidence that it can or has been successfully done. The research strongly cautions against allowing effects to peatland or bog environments because they cannot be rectified. The scientific literature is largely in agreement on this point. As noted by an article authored by EPA and provided on USGS's website, these types of wetlands "have developed over thousands of years and …have hydrologic conditions that are difficult, if not impossible, to duplicate," and that "experts agree" that bog and fen ecosystems are the least likely to be effectively replaced.[290] This is consistent with the report of the National Research Council in 2000[291] that pointedly stated wetland mitigation to date had been largely a failure, resulting in continuing net loss of wetlands and further emphasizing that bog wetlands in particular do not appear susceptible of restoration or mitigation once harmed.[292] The NRC Report, in surveying the literature, stated wetland types like fens and bogs "cannot be effectively restored with present knowledge", and recommended avoiding impacts to those resources.[293] In a follow-up article, scientists on the panel stated that the no net loss mitigation program had been in fact *fostering* a net loss of approximately eighty percent of wetlands.[294] For years, the Corps has followed the advice of the NRC Report that bog and fen-type ecosystems are difficult-to-replace and impacts to them should therefore be avoided. Research published as recently as 2012 continues to demonstrate these problems, finding that restored wetlands, despite real effort (as opposed to the often failed and incomplete efforts allowed by regulatory agencies) still suffer from structural and functional loss of ecosystem function.[295]

Despite the requirements for high value and difficult to replace wetlands and ecosystems such as those proposed to be destroyed by PolyMet, and despite the agreement in the science regarding the fallacy of thinking that the destroyed wetlands can be replaced or restored, the FEIS spends no time contemplating, analyzing or discussing these issues and concerns and blithely proposes mitigation business as usual.[296]

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[290] Kentula, Mary, 2002, USGS Water Supply Paper #2425, *Wetland Restoration and Creation* (attached as exhibit 17d)

[291] National Research Council, *Compensating for Wetlands Losses Under the Clean Water Act* (Natl. Acad. Press, 2001) (attached as Exhibit 17e).

[292] *Id.* at 2-10.

[293] *Id.* at 4.

[294] R. Eugene Turner, Ann M. Redmond & Joy B. Zedler, *Count it by Acre or Function: Mitigation Adds Up to Net Loss of Wetlands*, 23 - 6 Natl. Wetlands Newsltr. 5, at 15 (2001) (attached as Exhibit 17f).

[295] Moreno-Mateos, David et al., *Structural and Functional Loss in Restored Wetland Ecosystems*, PLOS Biology, January 2012 (attached as Exhibit 17g). This same study emphasizes that this is particularly the case in cold, humid environments, that is, northern peatlands. *Id.* at 1, 5, 6. This study also notes that large restorations fare better than small. *Id.* While the three sites proposed by PolyMet are fairly large in size, they are still dwarfed by the actual area directly affected by the PolyMet mine alone (much less the processing facility and indirect effects.) One of the key ecological functions of the PolyMet site is that fact that it is very large and intact, featuring a complex natural assemblage of plants, hydrology, wildlife habitat and wetland types. This function is completely lost in the wetland mitigation proposals set forth to date in the FEIS.

[296] All of the research cited in the Response to Comments section regarding the ability to actually restore or replace the functions of these difficult to replace ecosystems predates the comprehensive NRC Report and research following the Report cited above, therefore being of little value to the debate. Only (Sottocornola, 2007) post-dates the research above, but a review of the paper referenced shows that it has no relevance to these issues. There is effectively no research that

### 17.2.2 Indirect wetlands effects are not adequately disclosed and analyzed and are defined too narrowly in the FEIS.

Both federal and state law are clear that wetland effects that must be avoided and/or mitigated include all direct effects (e.g. where wetlands will be destroyed by the mine pit) and indirect effects—which includes changes in size, type, hydrology, or plant composition of a wetland as well as overall biodiversity and function of the wetland within the larger landscape. Both direct and indirect effects must be mitigated under state and federal law, and the mitigation must replace the full functions lost by virtue of either the direct or the indirect effects. Yet, the FEIS fails to adequately identify and analyze indirect effects and further defines and treats indirect effects very narrowly. The FEIS appears to constrain the definition of indirect effects on wetlands as including only changes in the hydrology of a wetland as a direct result of mine or processing facility activities or by virtue of "fragmentation," further appearing to narrowly define fragmentation as a diminishment in physical size (i.e. acreage) of a specific individual wetland.[297] Even fragmentation is largely regarded through a hydrological lens. These constraints fail to address and disclose all potential impacts to wetlands from the PolyMet project and in turn fail to address the full mitigation obligation primarily by fragmenting the analysis itself on a 'wetland by wetland' basis instead of looking at the entire, complex wetland and ecosystem assemblage that is the mine site.

First, the FEIS fails to adequately disclose and analyze potential indirect effects even within the narrow definitional constraints used. The FEIS simply states there will be a "low likelihood" of indirect effects and leaves the analysis for another day, likely after the mine has already started operation and it is far too late to avoid effects; the damage will occur by the time it is identified as even a possibility.[298] This is unacceptable. While the Conservation Organizations acknowledge that the Co-Lead Agencies may be currently unable to identify and analyze all indirect effects to wetlands, they can certainly identify some and begin to assess which are more likely than others. For example, DNR acknowledges the validity of the modeling and criticisms from GLIFWC regarding groundwater drawdown and flows in the area between the PolyMet pit and the Northshore mine.[299] The information in the FEIS and supplied by GLIFWC demonstrates groundwater flow in and out of the north side of the PolyMet east pit. The FEIS also acknowledges that the Cat 1 stockpile will have an effect on water flows—even if the operation is as PolyMet intends, indirect effects are likely

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supports the FEIS's theory that the resources that will be damaged or destroyed in the PolyMet project can be replaced or restored, especially not as proposed by PolyMet in its bare mitigation plans.

[297] The FEIS does also appear to consider dust deposition an indirect effect and that issue is dealt with below.

[298] MCEA earlier raised this very issue in comments on the SDEIS, at 89 - 91, noting no detail regarding effects monitoring, not details regarding whether actual representative conditions or plant communities will be monitored, when an "effect" would be considered to have occurred, or what would be required should an effect become evident. The Response to Comments fails to respond to these issues noting only that the monitoring of hydrology should observe indirect effects sooner than other methods that might be used (e.g. plant assemblage or subsidence.) This does not address the issues raised in MCEA's previous comments.

[299] Myers 2015 at 24-29 echoes this critique.

to occur.[300] This is adequate information for the FEIS to provide that some indirect effects are in fact likely to occur and make an estimate of where and what they are. This is particularly important for mitigation as mitigation is required to occur BEFORE the effects do. The co-lead agencies should make every effort to identify potential effects now and protect against them with conservative mitigation measures and ratios, not wait for the damage to occur and then scramble for a solution.

Second, the narrow approach to defining indirect effects fails to conform to the legal requirements for avoiding and/or mitigating all effects to wetlands. Hydrologic changes are of course an important component of indirect effects to wetlands. With respect to hydrologic changes, the FEIS provides that only those hydrologic changes that result in a 20 percent change in watershed area (converting a function—wetland hydrology—to an areal or geographic measure) will be considered an indirect effect.[301] It cites solely to a paper by Richter for support of this standard. Upon review, the paper cited does not apply. The Richter paper concerns flow in rivers (and barriers or alterations affecting flow, like dams), an entirely different ecosystem than peatland wetlands. Nothing in the paper suggests it is transferable to any other ecosystem analysis much less peatlands or other wetlands. And it isn't even addressing "watershed area" the metric with which the FEIS purports to be concerned. Rather the paper is referencing 20 percent reductions in river flow, an entirely different metric. It is specious for the FEIS to cite to this as support for a number that otherwise appears entirely arbitrary for assessing indirect hydrologic effects to wetlands. The co-lead agencies admit that the paper is really only about river flows, but state, with absolutely no explanation, discussion, or support, that they "believe" it provides a foundation for using the 20 percent number here.[302] The co-lead agencies' "belief" finds no support in the science or the law. The law provides that indirect effects must be avoided and if they cannot be avoided mitigated. It does not set a threshold of 20 percent before the requirements take hold. The co-lead agencies are wrong and arbitrary.

Third, the narrow definition tied almost exclusively to hydrologic measures also does not take into account the obvious effects on the overall complex of wetlands and the diminishment of the function of the area known as the Hundred Mile Swamp. As noted previously and as is plain from maps and the Co-Lead Agencies' own documents and statements, the area of the PolyMet mine site is a very large intact northern wetland complex, including many high-quality natural communities. This area, as a whole, is the headwaters for the Partridge River. This area functions as a whole, not as a group of smaller, isolated wetland and/or upland ecosystems. Therefore, the FEIS treatment of this area as a group of small isolated wetlands each of which can be destroyed or negatively affected

[300] The FEIS is also woefully inadequate on what happens should the northward flow occur stating only, in the Response to comments at A-520, that "mitigation would be implemented to prevent this from occurring." The document fails to specify precisely what that might be, which is of particular interest given the stated need in the FEIS to keep the east pit full and under water in order to manage contamination from the waste rock and pit itself. It occurs to the Conservation Organizations that in fact PolyMet and co-lead agencies currently have no idea how to mitigate should the northward flow occur as predicted by GLIFWC's more-accurate modeling.

[301] It is less than clear precisely how the FEIS is considering using this 20 percent but it appears to mean that a 50 acre wetland would have to shrink by 10 acres in watershed size before it is considered indirectly affected. This appears to be the measure because 20 percent flow doesn't really have any meaning in the wetland context.

[302] Resp. to Comments at A-498.

without regard to others is scientifically unsupported and unsupported by the agencies' own previous assessment of the area. The system of assigning a value of 0 to 6 to "assess" risk to each small increment in the system is simply the appearance of an iterative process, but it is in fact a purposefully artificial constraint on assessing the potential risk to this integrated wetlands complex and ecosystem and the need to avoid or mitigate effects to it. The Co-Lead Agencies make the classic error of slicing and dicing an integrated ecosystem in order to minimize negative effects and to effectively deny their consequences. This is an illegal segmentation of NEPA analysis.

The law demands that the function of the entire affected system be taken into consideration in the avoidance and mitigation analysis and requirements. In particular, the FEIS fails to address the effect of taking the larger intact northern peatland and forest assemblage and reducing it to a narrow strip of property, likely with changed hydrology and dust deposition, between two huge mines—PolyMet and Northshore. The entirety of the area, particularly the entirety of the area between these two mines, must be considered indirectly affected with respect to a functions analysis and addressed in the avoidance and mitigation components of the FEIS regardless of hydrological effects determined by after-the-fact spot checking in isolated locations.[303] The FEIS fails to analyze and discuss the functions of the large intact assemblage (the interaction and value of a complex mix of forest and wetland, within a headwaters; the role of the plant and wildlife mix and connectedness of the system) and fails to analyze and discuss the effect of eliminating the large intact assemblage, leaving in its place a very small and likely altered remnant. Instead, the FEIS treats each small individual wetland as an isolated ecosystem, an approach wholly unsupported by science or the facts. Finally, the FEIS fails to propose mitigation for these obvious effects. The entirety of the hundred mile swamp complex should be considered indirectly affected due to its large reduction in overall size and should be mitigated (if the project is allowed to proceed as proposed) as its function will plainly be lost.

### 17.2.3 The FEIS inadequately addresses climate change implications for wetland impact avoidance and mitigation.

Climate change and its effect on northern wetlands is also inadequately addressed in the FEIS. The FEIS is lacking in this regard in two ways.

First, the FEIS fails to adequately identify and analyze the effect that climate change will have on the northern peatlands landscape and how that should shape the avoidance component of wetlands regulation and/or the mitigation requirement. Nowhere in the wetlands section is climate change mentioned. Only in the Response to Comments on wetlands does the document claim a "qualitative assessment of the potential impacts of climate change on wetlands is included in FEIS Section 5.2.7.2.4."[304] Section 5.2.7.2.4 follows on the air quality section, not an obvious placement for wetland impacts. More to the point, Section 5.2.7.2.4 contains little to no assessment of climate impacts on wetlands, much less a "qualitative assessment" stating only that climate change may affect some wetlands in some ways. It then references Barr 2012l. Barr 2012l can be summarized as stating climate change may make some wetlands wetter, some drier, some hotter, some shadier and that increased temperatures may release more methane.[305] The total amount of text devoted to the topic is no more than a page and can hardly be described as a qualitative assessment of what is

[303] *See* Glaser 2015; FEIS at 4-5; (Saunders et al. 1991 and Lehtinen, 1999).
[304] Resp. to Comments at A-495.
[305] Barr 2012l at 50 and 53.

actually going to occur with wetlands on the site and more importantly contains no discussion of what the may mean regarding impacts from the project and need for and location of mitigation. A quick search of even a single piece of local research would have produced more detailed information.

Recent research suggests that Minnesota boreal peatlands may suffer most from the effects of climate change.[306] Most vulnerable will be the southern extent of those lands---the very areas where PolyMet proposes two of the three mitigation sites. Coupled with the science on how questionable mitigation for peatlands is, it is plain that the agencies must consider avoidance of effects to the PolyMet wetlands as an important hedge against the effects of climate change. Maintaining intact ecosystems is plainly identified as the preferable path in the face of climate threats.[307] In light of the science, the FEIS must discuss how eliminating a vast area of high-quality and intact wetland will affect overall system resiliency in the face of climate change. At a minimum, the FEIS must analyze and discuss how climate change may affect the success of the proposed mitigation and whether or to what extent the mitigation proposal may have to adjust in light of climate effects, whether in terms of location, overall size, watershed, and/or ratios.

Second, the FEIS at best is confused on the issue of carbon sequestration and at worst is misleading. The science is undisputed that the best carbon sinks on the planet are peatlands. Globally, peatlands represent just 3 percent of all soils but contain more than one-third of all soil organic Carbon.[308] A preliminary inventory of peatlands in Minnesota estimates that the 5.73 million acres of peatland in the state contain 4,250 megatonnes (million metric tons) of C, or approximately 745 metric tons of stored C per acre.[309] Moreover, drying of peatlands from water drawdown increases emissions of both carbon and methane, creating a feedback loop and increasing fire risk—another source of carbon emissions.[310]

The Response to Comments, while acknowledging the loss of carbon sequestration, claims that restoration elsewhere will compensate.[311] This statement comes with no support. There is no independent science to support the claim that the carbon sequestration benefits of the mixed, old

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[306] Susan Galatowitsch, Lee Frelich, Laura Phillips-Mao, *Regional Climate Change Adaptation Strategies for biodiversity Conservation in a Midcontinental Region of North America*, Biological Conservation 142 (2009) (attached as Exhibit 17h). This study has also been cited to the Minnesota Dep't of Natural Resources previously in the 2009 Report from the Moose Advisory Committee.

[307] *See* Ex. 17g (Galatowitsch et al. 2009) at 4.2 ("Ecosystems in relatively intact landscapes currently may have sufficient resilience but land and water use policies should be conservatively implemented in these regions as well, to avert resilience loss.")

[308] FEIS Reference Bridgeham *et al.* 2001.

[309] Estimates based on data from the Minnesota DNR peatland inventory, the USDA-NRCS STATSGO and NASIS database, and the 1990 LMIC land cover data. Information from The Potential for Terrestrial Carbon Sequestration in Minnesota, Report to Minnesota DNR, February 2008 (attached as Exhibit 17i).

[310] *Id., See also*, BWSR Carbon Sequestration in Wetlands: Summary of Research, December 2008 (attached as Exhibit 17j)("Overall, research studies agree that carbon storage is enhanced in wet systems. Also, evidence suggests more carbon is sequestered by a richer mix of native species. Species-rich ecosystems are more stable over time and may provide a faster, stronger response to future changes in atmospheric carbon dioxide concentration.")

[311] Resp. to Comments at A-492.

peatlands at the PolyMet site will be mitigated with wetlands at any of the three mitigation sites (especially since two of them are south of the project site and don't propose to replace coniferous bog habitat.). Also, even if some mitigation occurs, there is no mitigation for the very big one-time release of the destruction event itself, much less the over-time release that is bound to happen from some indirect effects over time. There is no discussion in the FEIS of the loss of sequestration, or the effects of that loss on the environment. The published research makes clear that avoiding impacts to peatlands is the only way to ensure that they continue their function as a carbon sink and serve as a refuge from future climate change impacts.

### 17.2.4 The FEIS fails to explain how the proposed mitigation complies with the law.

As stated above, state and federal law requires mitigation for lost or degraded wetland functions when those effects cannot first be avoided. PolyMet currently proposes to mitigate only direct impacts to site wetlands and proposes to mitigate the majority of those negative effects outside of the Lake Superior watershed. The only explanation for why the Co-Lead Agencies believe this is acceptable is because mitigation sites were "difficult to find" within the watershed. This runs counter to the Friends' and MCEA's own expert analysis[312] and the FEIS fails to provide adequate detail for the public to understand and judge whether rejection of certain sites was proper. Further, even if it is true that there are no acceptable mitigation sites within the watershed, there is nothing in the law that then excuses PolyMet from application of the avoid and mitigate requirements. If the impacts cannot be avoided, they must be mitigated. If they cannot be mitigated they cannot be allowed. The Co-Lead Agencies' position in the FEIS appears to be that the law is only a strong suggestion or guidance, to be complied with if to do so is relatively easy. This approach would render the law meaningless and that is outside the Co-Lead Agencies' authority.

The apparent lack of mitigation opportunities within the watershed further raises questions with respect to PolyMet and the Co-Lead Agencies' failure to address expected indirect impacts (discussed above) now, before the impact occurs. Again, that is not compliant with the temporal requirements for mitigation in the law and the FEIS provides no explanation for how the Co-Lead Agencies think it might be. Further, it highlights the fact that mitigating for likely future indirect impacts will be difficult within the bounds of the law. If the Co-Lead Agencies properly require mitigation for the entirety of indirect effects to the Hundred Mile Swamp functions and for expected indirect effects given what is already known about flow between PolyMet's east pit and Northshore, thousands more acres of wetland must be mitigated. If the Co-Lead Agencies already know that mitigation sites are severely limited, moving forward and allowing impacts nonetheless is irresponsible and not compliant with the law. As MCEA states in the SDEIS comments, thousands of acres of wetlands may be affected with no potential mitigation option identified much less provided before the effects occur.[313]

In addition to the out-of-watershed and temporal violations inherent in the current approach, the FEIS pays lip service to mitigating functions lost, but it provides no real discussion of how PolyMet will in fact "mitigate" or "restore" coniferous bog wetlands, and in particular how PolyMet will recreate a groundwater-fed fen. The suggestion of as much borders on ridiculous. The scientific literature is replete with statements about how it is nearly impossible to mitigate bogs, how it has rarely (if ever, depending on how success is defined) been done successfully, and that therefore,

[312] *See* Glaser reports regarding Alborn fen site.
[313] MCEA at 83.

damage to these wetland types should always be avoided. The Conservation Organizations are unaware of any example of a fen being mitigated. And the FEIS appears to recognize this when it continues to talk about "targets" for mitigation[314] admitting that if the coniferous bog and swamp restoration is unsuccessful then targets will simply be readjusted to be whatever PolyMet actually comes up with in the mitigation effort. The so-called targets concept does not comply with the law's requirement to fully replace lost functions and is in fact more of a "moving target" for mitigation.

Finally, given the out-of-watershed proposal and obvious difficulty with actually mitigating the functions that will be destroyed within a timeframe wherein those functions will actually be replaced, the FEIS provides a somewhat incoherent discussion of mitigation ratios. At some level the FEIS provides for 2:1 but then engages in lengthy speculation regarding reducing those ratios to 1:1. The charts showing mitigation acres actually show that coniferous bog will not be mitigation on a 1:1 basis; it appears that PolyMet will rely on coniferous swamp at their Aitkin site for some of those acres, a failure to meet the mitigation requirements of replacing full function. The Co-Lead Agencies must require 2:1 as the minimum replacement ratio for all wetland effects from the PolyMet project. There is no scientific, legal, or factual support for anything less.

**17.3 The FEIS fails to address increased potential for mercury methylation in area wetlands.**

As the FEIS recognizes, the mine and ore transport facilities will result in airborne particulates and deposition of those particulates in area wetlands.[315] While the FEIS provides some information regarding inhibited photosynthesis and the response to comments provides some discussion of sulfate and some other metals running off (largely discounting any potential effect) the response to comments in the FEIS wholly fail to answer the comments that raised potential for increased mercury methylation from the deposition of sulfates and mercury in ore and rock dust.[316] The FEIS acknowledges the research, much of it from Minnesota, that demonstrates sulfates and mercury deposition in peat environments is a synergistic combination. Sulfates hastens the methylation of mercury in the peat environment making the mercury bioavailable. While comments on the SDEIS raised this issue and asked for analysis of how deposition from the PolyMet project will affect mercury methylation in area wetlands, the FEIS failed to include this analysis and the response to comments wholly dodges the question.[317] The only response claims that mercury that will be deposited from dust and spillage is within the variability of background.[318] This doesn't address the direct question of what effect increased mercury and sulfate, acting synergistically, may have on methylation of mercury in the subject wetlands.

[314] MCEA at 81.
[315] In the Response to comments, at A-505, there is a statement that dust and spillage are not regulated under CWA § 404. This is incorrect if it is being suggested that discharges from rolling stock are not regulated under the Clean Water Act.
[316] Resp. to Comments at A-506 to 509.
[317] *Id.*
[318] *Id.* at A-508.

### 17.4 The FEIS's discussion of financial assurance for wetland mitigation obligations is wholly inadequate and largely absent.

In the response to comments, the FEIS wetland section refers to the financial assurance responses at FIN 11 for the discussion of financial assurance related to wetland effects.[319] FIN 11 includes no information on financial assurance other than a statement that it will be required. This is wholly inadequate and not compliant with NEPA and MEPA requirements. While the precise form and amount of financial assurance may not yet be finalized, there is a significant amount of information that can and should be provided to the public about what amounts are likely needed to ensure the monitoring and mitigation necessary for the project to comply with the law. PolyMet and the Co-Lead Agencies also know the various forms of instruments available for financial assurance and the FEIS should include a discussion and analysis of the risks and benefits of each type in order to provide the public an understanding of what instruments are preferable and why.

#### 17.4.1 Assurance for monitoring for indirect effects.

The FEIS defers the issue of indirect effects and claims that indirect wetland effects will not be mitigated prior to commencement of the mining project. Rather, the FEIS provides that wetlands that have the most probability of impacts (a questionable concept in itself, see discussion above) will be monitored and if indirect effects occur, they will be identified and mitigated. Putting aside the issue of whether this is an acceptable approach to indirect effects as a whole, there remains a serious issue regarding financial assurance to ensure the monitoring will occur at a frequency and adequate number of locations, and for a sufficient period of time after mine closure. The project proponents and the Co-Lead Agencies should disclose the cost of the proposed monitoring given that they know where they intend to place monitors (with their purported ratings approach) and they know how much monitors cost. The costs of monitoring should be extended for the period of time after mining ceases that effects are expected—at least for a length of time after the East Pit fills given the modeling showing movement of water between the East Pit and Northshore and the possibility of flows northward. This is an knowable cost estimate that should be provided to the public.

#### 17.4.2 Assurance for mitigation.

The FEIS also must disclose the cost estimates for wetland mitigation. The project proponent and Co-Lead Agencies already know the sites where they propose to mitigate for direct wetland effects. Information regarding the costs associated with acquisition of those sites, either directly or through leasing or purchase of easements, is known. Also known are the bulk of activities necessary to restore those sites as demonstrated by the discussions of hydrology restoration, planting, and monitoring set forth in the FEIS. For example, PolyMet and/or the Co-Lead Agencies are fully capable of estimating labor costs, time, equipment necessary to the job and costs of seedlings to arrive at an estimate. Again, those are known quantities with known and knowable costs whereby an estimate can readily be provided. The mitigation sites will also require their own monitoring, another cost estimate that must be provided and that can be readily known with information available now.

This information would also allow an estimate for the public for future mitigation needs for indirect wetland effects. It is critical that PolyMet be required to set aside funds should indirect effects need to be mitigated at some point in the future. With the information available regarding mitigation for

[319] *Id.* at A-366.

direct effects, at least some general estimate can be given for financial assurance needs for future indirect effects.

### 17.4.3 Financial assurance instruments.

The FEIS includes no information regarding available financial assurance options and the risks and benefits of each, information that is important to Co-Lead Agencies' ultimate decision and certainly important to the public's understanding and assessment of the project and its effect on Minnesota's environment and Minnesota taxpayers. Financial assurance can take the form of cash held in reserve by the state, letters of credit, surety bonds, or insurance.[320] Some of these instruments are more secure than others. In particular, only letters of credit to the benefit of the state, payable on demand upon the occurrence of a clearly-defined triggering event, are free of bankruptcy constraints and readily available should they be needed to protect the public. This analysis and these disclosures should be made now for the public to have a full understanding of the risks and benefits of various financial assurance instruments. The FEIS includes no discussion of this kind.

### 17.4.4 Project proponent financial status

The FEIS includes no information or analysis of PolyMet's (or PolyMet's parent's) financial status or credit-worthiness other than to disclose that PolyMet in fact has no assets and is entirely dependent upon its parent company. The FEIS, in connection with information regarding the amount and type of financial assurance that may be available and required for the PolyMet project, should disclose the assets and liability of PolyMet and its parent company, both current and projected through at least the beginning of the mine operation. The disclosures should be comparable to the disclosure that would be provided a bank for financing as that is essentially what is being asked of the State of Minnesota; to trust PolyMet to comply with its obligations to the state's and the nation's natural resource assets.

## 18.0 <u>The FEIS must include the off-site "indirect" impacts of this project.</u>

CEQ Regulations state that an EIS must include a consideration of "any adverse environmental effects," including both direct and indirect effects.[321] Indirect effects are those which are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable."[322] A "reasonably foreseeable" effect is defined as one which "is sufficiently likely to occur that a person of ordinary prudence would take it into account."[323]

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[320] While "self-bonding" is a concept allowed in some states for some situations, the Conservation Organizations believe that self-bonding should not be available here as it has proven ineffective and disastrous for protecting the public from failed cleanup, closure, reclamation, monitoring and/or mitigation at other mines. It is antithetical to common sense that a business will continue to spend money and reserve assets AFTER the business no longer brings in income. Self-bonding is not and should not be considered a viable option for financial assurance.

[321] 40 C.F.R. § 1508.8.

[322] *Id; see also* 40 C.F.R. § 1508.7.

[323] *Sierra Club v. Marsh*, 976 F.2d 763, 767 (1st Cir. 1992).

Federal courts have held that this includes "downstream" impacts such as the impacts of burning coal after it has been shipped on a new rail line. The Eighth Circuit applied these definitions to a proposal to construct new rail lines to the Powder River Coal Basin in Wyoming.[324] Since those rail lines would increase availability of the coal and decrease its price, the Court held that increased coal consumption was a reasonably foreseeable effect of the proposal, such that its environmental impact must be included in the EIS.[325]

The FEIS does not assess the indirect impacts of burning coal due to its energy demand from Minnesota Power facilities. According to Minnesota Power's most recent Integrated Resource Plan, at present, Minnesota Power's resource mix includes 75 percent coal-burning power plants. The utility owns two coal-fired power plants, Boswell Energy Center (4 units, 926 MW total) and Taconite Harbor Energy Center (2 units, 150 MW total). Minnesota Power also has a long-term power purchase from the Square Butte Cooperative's coal-fired Milton Young Plant in North Dakota (currently, 100 MW, which purchase MP plans to phase out by 2026).

These coal-fired power plants emit over 8 million tons of carbon dioxide per year. The plants emit about 325 lbs of per year of mercury, 7,500 tons per year of nitrogen oxides (NOx), and 7,500 tons per year of sulfur dioxide ($SO_2$). PolyMet will cause an incremental increase in the emissions of these pollutants.[326]

Although Minnesota Power expects coal to drop to 33 percent of its resource mix, the timing for this estimate is uncertain. In addition,they will be adding natural gas to the mix, their resources will be less carbon intensive, but certainly not carbon-free.

Importantly, large industrial customers heavily influence Minnesota Power's resource planning:

> In 2014, 54 percent of Minnesota Power's kilowatt-hour ("kwh") sales served large power customers, primarily in the taconite mining, iron concentrate, paper, pulp, refining and pipeline industries...Two additional large power customers expected to be operating soon will also be receiving energy from Minnesota Power: PolyMet, a nonferrous mining operation awaiting final permitting, and Essar Steel Minnesota, a major taconite mine and processing plant now under construction.

PolyMet is a sufficiently significant customer that it is mentioned by name in the most recent Integrated Resource Plan. The prospect of PolyMet's future energy consumption is already driving decisions at Minnesota Power, and the FEIS should analyze those effects.

The FEIS fails to address, as did the SDEIS, the safe transport and disposal of materials generated from the wastewater treatment process. A filtered "sludge" material will be generated from treating contaminated water at the WWTF. In addition, the pore water from the HRF must be disposed of. The FEIS calls for disposing of these waste streams at either an "offsite" location or at the Hydrometallurgical Residue Facility. Important information is missing in the FEIS about what the contents of these wastes are expected to be, as well as

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[324] *Mid States Coalition for Progress v. Surface Transportation Board*, 345 F.3d 520 (8th Cir. 2003).
[325] *Id.* at 549-550.
[326] Report by Victoria Stamper, Review of Air Quality Impacts Analysis Presented in the November 2015 NorthMet Mining Project Final Environmental Impact Statement (Dec. 15, 2015) [hereinafter "Stamper 2015"] at 24-25.

how to ensure the safe transport and containment of them. Whether or not the waste streams meet the legal definition of "hazardous," it is likely that they will be voluminous and toxic. The FEIS fails to provide information to properly assess the dangers these pose to the environment or human health.

### 18.1 The FEIS fails to take a "hard look" at the environmental effects of transporting ore to smelters, smelting or further processing of the copper ore.[327]

The increased copper smelting caused by the removal of copper ore at the PolyMet mine is a reasonably foreseeable impact that should be addressed in the SDEIS. The chain of causation between the extraction of ore at the proposed site and the smelting of the resulting product is much less attenuated than the connection between the construction of new rail lines and coal consumption analyzed by the Eighth Circuit. Copper smelting is clearly certain to occur; for without it the copper precipitate is worthless as an industrial commodity.

The FEIS states that the "NorthMet Project Proposed Action would utilize a beneficiation and hydrometallurgical processing technology rather than smelting. Copper smelting at a specific location is not a reasonably foreseeable effect of the NorthMet Project Proposed Action."[328] It also states that "The off-site transport and use of the metal concentrates is outside the scope of the FEIS."[329]

This response does not meet the requirements of NEPA, as described above. The Hydrometallurgical Facility *may* replace smelting if it is effective, but it will not become operational for 2-4 years after the beneficiation plant is operational.[330] In the meantime, the copper concentrate produced from the beneficiation process must be smelted. Moreover,the FEIS states that the hydrometallurgical processing technology "would process nickel concentrates." [331] Based on the FEIS, the Hydrometallurgical Facility is designed to process nickel concentrate, not copper concentrate. A plain reading of Figure 3.2-26 shows that only nickel concentrate enters the autoclave, and copper concentrate must leave the site for further processing, even after the hydrometallurgical facility is built, contradicting the statement cited above from Appendix A that the hydrometallurgical facility replaces copper smelting.

As detailed in MCEA comments in 2014, simply because the Co-Lead Agencies do not know the precise location of the copper smelting does not excuse them from analyzing the impacts under NEPA. An indeterminate *location* of environmental impacts does not affect their inclusion or exclusion in an EIS. In *Mid States Coaltion for Progress*, for example, the court rejected defendant's argument that increased coal consumption was speculative because specific coal plants that would be built to burn the new coal had not been identified. For NEPA purposes, the court held, it is the *nature* of the impact that is important.[332] It is certain that some entity will smelt the copper, even if

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[327] (MCEA 7, 98-104).
[328] FEIS at A-451.
[329] FEIS at A-453.
[330] FEIS at 3-109.
[331] *Id.*; *See also* FEIS Figure 3.2-26 on p. 3-111, showing nickel concentrate entering the autoclave, while copper concentrate enters a copper concentrate filter in a different stream, and copper product exits from the copper concentrate storage, while nickel/cobalt concentrate exits several steps after the autoclave.
[332] *Mid States Coalition for Progress*, 345 F.3d. at 549

the exact geographic location is still undetermined. CEQ regulations specifically address indirect impacts where there is incomplete or unavailable information.[333] The agency should evaluate those impacts to the extent possible, and include a statement of incompleteness.[334]

Even if the environmental impacts of the copper smelting are primarily borne by Canada, those extraterritorial effects do not bar their consideration under NEPA. The federal courts note that "NEPA requires agencies to consider reasonably foreseeable transboundary effects resulting from a major federal action taken within the United States."[335] This would include any transboundary effects from copper smelting taking place outside U.S. jurisdiction.

Moreover, the fact that the location of the smelting is unknown may be the result of willful ignorance, rather than a lack of available information. According to Polymet's NI 43-101, in the first phase of the NorthMet operation (prior to the construction of the on-site hydrometallurgical facility) the copper and nickel concentrates will be sold to Glencore International "under a long-term marketing agreement."[336] After the second phase processing facility is built, Polymet will also sell the nickel-cobalt hydroxide and precious metals precipitate produced by that facility to Glencore. [337] In fact, the 2008 long-term marketing agreement specifies that Glencore will purchase "all of Polymet's products (metals, concentrates or intermediate products) on independent commercial terms at the time of the sale. Glencore will take possession of the products at site and be responsible for transportation and ultimate sale."[338] After publication of the NI 43-101, Glencore International merged with Xstrata PLC to become Glencore Xstrata PLC.[339]

Glencore Xstrata owns a copper smelting operation in Sudbury, Ontario called Sudbury Integrated Nickel Operations, with the capacity to smelt 95,000 tons of nickel and copper concentrates,[340] and the Horne Smelter in Quebec, Canada, which produced 194,000 tons of copper anodes in 2012.[341] Therefore, the best approach is for the Co-Lead Agencies to simply ask Glencore where it intends to process the materials. If there is a sound and supported reason why Glencore cannot specify the location of smelting, then it does not excuse the Co-Lead Agencies from analyzing the impacts, but it does allow them to analyze the impacts of smelting at a more general level, along with a statement as to what information is incomplete or unavailable consistent with Minn. R. 4410.2500 and If Glencore can specify the likely location where some or all of the ore would be smelted, than the EIS must analyze those location-specific impacts. MCEA's SDEIS comments describe some of those

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[333] 40 C.F.R. § 1502.22.
[334] *Id.*
[335] *Government of the Province of Manitoba v. Salazar*, 691 F. Supp. 2d 37, 51 (D.D.C. 2010) (requiring agency to analyze environmental effects in Canada of a project carried out in the U.S.); *Swinomish Tribal Community v. Federal Energy Regulatory Commission*, 627 F.2d 499, 511 (D.C. Cir. 1980) (finding it "entirely appropriate" that an EIS for a proposal to heighten a dam in Washington State specifically addressed the Canadian effects of the proposal).
[336] Polymet Mining, *Updated NI 43-101 Technical Report on the NorthMet Deposit* at § 1.5 (p. 1-8), Jan. 14, 2013, attached as Exhibit 2b to MCEA's SDEIS comments.
[337] *Id.*
[338] *Id.* at 19.3 (p. 19-1).
[339] *See* Diana Kinch, Glencore-Xstrata Merger Complete, The Wall Street Journal, May 2, 2013 (attached as Exhibit 15b to MCEA's SDEIS comments).
[340] Sudbury Integrated Nickel Operations (attached as Exhibit 15c to MCEA's SDEIS comments).
[341] Xstrata, 2012 Annual Report at 20 (attached as Exhibit 15d to MCEA's SDEIS comments).

impacts on pages 100-105, providing a helpful description of the type of impacts from smelting that must be considered.

In addition, the FEIS should analyze the potential impacts of additional transportation of the copper and nickel concentrates to smelters.[342] The FEIS discusses transportation of hazardous materials – primarily diesel fuel and PAX – but does not discuss transportation of the final product. The FEIS should address potential transportation modes (rail, truck, freighter) as well as potential routes over land and water.

The transportation of ore may generate air pollution, among other risks. The impacts associated with the transport of ore are "prime examples of indirect effects that NEPA requires be considered."[343]

While the Conservation Organizations acknowledge that there is some uncertainty as to the final destination of the processed material, the final products will be the property of Glencore by contract, and an inquiry of Glencore as to the likely destination should be part of the analysis. Moreover, Glencore owns other mining assets in North America, as well as smelting facilities. Glencore also owns warehousing and port facilities in North America.[344] Glencore advertises that "we have a sizeable custom smelting and refining capacity."[345] Glencore's vertical integration of shipping and processing narrows down the potential routes and destinations considerably.

At a minimum, where information about a potential environmental impact is incomplete and cannot be obtained, the RGU must include, by law, the following information in the EIS:

A. A statement that the information is incomplete or unavailable and a brief explanation of why it is lacking;

B. An explanation of the relevance of the lacking information to evaluation of potentially significant environmental impacts and their mitigation and to a reasoned choice among alternatives;

C. A brief summary of existing credible scientific evidence that is relevant to evaluating the potential significant environmental impacts; and

D. The RGU's evaluation of such impacts from the project and its alternatives based upon theoretical approaches or research methods generally accepted in the scientific community.[346]

Copper ore contains, obviously, copper, which is toxic to aquatic life, but also [arsenic, cadmium, selenium and other toxic heavy metals discussed in Section 15.2.6, above. Thus, a spill or accident involving metal precipitates could be harmful to human health and aquatic life.

[342] *Mid States Coalition for Progress v. Surface Transportation Board*, 345 F.3d 520 (8th Cir. 2003).
[343] *South Fork Band Council of Western Shoshone of Nevada v. U.S. Dept. of Interior*, 588 F.3d 718, 725 (9th Cir. 2009).
[344] *See* Glencore, Xstrata Operations map (attached as exhibit 18b).
[345] http://www.glencore.com/who-we-are/what-we-do/metals-and-minerals/ (attached as Ex. 18c)
[346] Minn. R. 4410.2500.

## 19.0 The EIS fails to adequately analyze and disclose impacts to federally listed species, and fails to demonstrate compliance with the Endangered Species Act for these species.

As acknowledged in the FEIS, the NorthMet mine would impact three federally listed species: the Canada lynx, gray wolf, and northern long-eared bat.[347] The mine would result in the long-term destruction of two square miles (1454 acres) of designated critical habitat for the Canada lynx and gray wolf.[348] The project may also kill lynx and wolves as result of the significant vehicle traffic within the Mine Site, and the significant vehicle and railroad traffic between the Mine and Plants Sites.[349] The project would also impact two of the thirteen remaining wildlife corridors that allow wildlife migration (including for lynx and wolves) from northwest to southeast of the Mesabi Iron Range.[350] Moreover, the project would destroy habitat that may be used by the northern long-eared bat at the Mine Site, and would also disrupt the bat's use of the Plant Site.[351] Due to the significance of impacts to these three threatened species that would result from the proposed mine, the FEIS is inadequate in assessing and disclosing the direct, indirect, and cumulative impacts, and fails to demonstrate compliance with the Endangered Species Act (ESA).[352]

The ESA represents "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation."[353] Congress enacted this statute "to halt and reverse the trend towards species extinction, whatever the cost."[354] In enacting the ESA, Congress spoke "in the plainest of words, making it abundantly clear that the balance has been struck in affording endangered species the highest of priorities, thereby adopting a policy which it described as 'institutionalized caution.'"[355]

As the court in *Tennessee Valley Authority* observed:

> One would be hard pressed to find a statutory provision whose terms were any plainer than those in [Section] 7 of the Endangered Species Act. Its very words affirmatively command all federal agencies 'to *insure* that actions *authorized, funded,* or *carried out* by them do not *jeopardize* the continued existence' of an endangered species or '*result* in the destruction or modification of habitat of such species...' This language admits of no exception.[356]

Section 7 of the ESA mandates that "federal agencies take no action that will result in the 'destruction or adverse modification' of designated critical habitat."[357] "Destruction or adverse modification" of critical habitat is defined as "a direct or indirect alteration that appreciably

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[347] FEIS at 5-433.
[348] FEIS at 5-434, 5-437.
[349] *Id.* at 5-436, 5-437.
[350] *Id.* at 6-77.
[351] *Id.* at 5-438.
[352] MCEA 109-112; Friends 59-60; CBD 66.
[353] *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 180 (1978).
[354] *Id.* at 184.
[355] *Id.* at 194.
[356] *Id.* at 173 (quoting 16 U.S.C. § 1536) (emphasis in original).
[357] *National Wildlife Federation v. National Marine Fisheries Service*, 524 F.3d 917, 933 (9th Cir. 2007), *quoting* 16 U.S.C. § 1536(a)(2).

diminishes the value of the critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical."[358]

The courts have found that this regulatory definition reads the "recovery" goal out of the statutory adverse modification inquiry, "and that agencies must in fact consider impacts that appreciably diminish the value of critical habitat for *either* survival or recovery."[359] Thus, the agencies' assessment of the impacts of a proposed action on a listed species' critical habitat must address the project's potential impact on the species' habitat in terms of the species' recovery as well as its survival. In addition, agencies are not allowed to characterize as "insignificant" the potential impacts on a species' critical habitat by considering only the broad scale or long-term impacts.[360]

The NorthMet Mine Site is within designated critical habitat for the Canada lynx and gray wolf, and signs of lynx and wolves have been observed near and at the Mine Site.[361] The proposed mine would reduce suitable habitat for lynx and wolves, and fragment their remaining habitat.[362] Significantly, the proposed mine would destroy two square miles (1454 acres) of critical habitat for lynx and wolves for at least 40 years.[363] Moreover, the mine would further affect lynx and wolf critical habitat through impacts to two of the remaining wildlife corridors in this region.[364] Because the proposed mine would result in the destruction and adverse modification of critical habitat for both the Canada lynx and gray wolf, the project violates Section 7 of the ESA and cannot proceed.[365]

In addition to the direct impacts on lynx and wolf habitat at the Mine Site, an average of 2066 miles per day of vehicular traffic is expected within the site, with an additional 1734 miles of traffic each day between the Mine Site and Plant Site.[366] This does not include additional highway traffic from workers driving to and from work, or truck traffic delivering supplies. The agencies acknowledge that increased vehicle and train traffic could further affect lynx and wolves, including through vehicle collisions.[367]

The consideration and disclosure of cumulative impacts to lynx and wolves in the FEIS is also inadequate, including the cumulative impacts to the few remaining travel corridors in the region. There have been two studies of the few remaining wildlife corridors through the Mesabi Iron Range and Arrowhead Region. In 2006, Emmons and Olivier Resources prepared for the DNR, "*Cumulative Effects Analysis on Wildlife Habitat Loss/Fragmentation and Wildlife Travel Corridor Obstruction/Landscape Barriers in the Mesabi Iron Range and Arrowhead Regions of Minnesota.*"[368] As stated by Emmons & Olivier, wildlife travel through this region is restricted "because of the extensive change to the landscape, including large mine pits, stockpiles, mining infrastructure, regional development

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[358] 50 C.F.R. § 402.02.
[359] *National Wildlife Federation*, 524 F.3d at 934; *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, 378 F.3d 1059, 1069-71 (9th Cir. 2004).
[360] *National Wildlife Federation*, 524 F.3d at 935; *Gifford Pinchot*, 378 F.3d at 1069.
[361] FEIS at 4-234 - 4-237.
[362] *Id.*
[363] *Id.* at 5-434, 5-437.
[364] *Id.* at 6-77.
[365] 16 U.S.C. 1536 (a)(2); *Tennessee Valley Authority v. Hill*, 437 U.S. 153.
[366] FEIS at 5-436.
[367] *Id.* at 5-436, 5-437.
[368] FEIS Reference Emmons & Olivier 2006.

associated with the Mesabi Iron Range, and highways."[369] Emmons & Olivier identified only thirteen remaining wildlife corridors across the 100 mile Mesabi Iron Range.[370] Moreover, Emmons & Olivier found that any future losses of these relatively small remaining corridors may be considered significant.[371] Additionally, due to cumulative effects of past habitat losses in this region for "mammalian species of greatest conservation need," Emmons & Olivier determined that "any future losses to the habitat requirements for these species could be considered significant."[372]

The second study is entitled, "*Cumulative Effects Analysis of Wildlife Habitat and Threatened and Endangered Wildlife Species, Keetac Expansion Project*," prepared by Barr Engineering in 2009.[373] The Barr Report states that mining features already cover 118,314 acres along the Iron Range, including 36,962 acres of open pit mines, 78,620 acres of stockpiles and tailings basins, and 212 acres of facilities and infrastructure.[374] The cumulative impacts of 125 years of mining in this region has fragmented habitat and resulted in a loss of wildlife travel corridors.[375] "It is feasible that in the future, mining in the Iron Range could potentially culminate in a 100-mile long landscape barrier that severs wildlife travel corridors, which may have impacts on dispersal, migration, and/or seasonal movements of many species."[376]

The Barr Report identified eighteen remaining wildlife corridors.[377] Of the eighteen, the Barr Report predicts that "four will likely become completely impassable within the next 25-30 years as a result of planned mining activities," and an additional four corridors "will retain some functionality, but will be significantly degraded by future mining plans."[378] In addition, "[a]s wildlife are increasingly exposed to mining activity, roads, and urban centers due to the degradation of available corridors, the incidence of wildlife mortality within the corridors is likely to increase."[379] Due to insufficient data, however, the Barr Report was unable to determine whether wide-ranging mammals such as lynx and wolves would be "sensitive" to these cumulative effects.[380]

As briefly summarized in the FEIS, there are thirteen wildlife travel corridors that remain along the Mesabi Iron Range, ranging from less than 0.1 mile to over 3.2 miles wide.[381] "Of the 13 large mammal wildlife crossing corridors . . . two are in the vicinity of the Mine Site or Plant Site."[382] The first is located just a mile from the Plant Site, and the second is located just a half mile from the proposed Mine Site.[383] "Operations at the Mine Site would indirectly affect the corridor by reducing its size and acting as a source of noise and activity near the large habitat block southeast of the

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[369] *Id.* at 2.
[370] *Id.* at 51.
[371] *Id.*
[372] *Id.* at 52.
[373] FEIS Reference Barr 2009a.
[374] *Id.* at 4.
[375] *Id.*
[376] *Id.*
[377] *Id.* at 51.
[378] *Id.* at 56.
[379] *Id.*
[380] *Id.*
[381] FEIS at 6-74.
[382] *Id.* at 6-77.
[383] *Id.*

corridor."[384] Additionally, the proposed mine's transportation and utility corridor between the Mine Site and Plant Site runs parallel to wildlife corridors and would further affect wildlife use.[385]

Moreover, other reasonably foreseeable projects are anticipated to adversely affect the remaining wildlife travel corridors in the region, including the complete loss of some of the corridors.[386] "These effects may include blocking or encroachment into the mapped wildlife corridors, which affects adjacent habitat that may make the corridor less valuable to wildlife, and increasing traffic along new or existing roads through the corridor.[387] "*The effects on these corridors include complete loss* (depending upon final extent of activities), habitat isolation, fragmentation, and/or minimal effect."[388]

The proposed mine's direct and long-term destruction of two square miles of designated lynx and wolf critical habitat, along with the mine's adverse and cumulative impacts to the few remaining travel corridors for lynx and wolves, would result in the "destruction or adverse modification" of critical habitat, which is prohibited by the ESA.[389] The conversion of the critical habitat at the Mine Site to an open-pit mine would destroy and adversely modify all of the primary constituent elements for Canada lynx and gray wolves identified by the U.S. Fish and Wildlife Service, including for lynx the destruction of boreal forest landscapes that support a mosaic of forest stages, sites for denning, and matrix habitat allowing for travel and habitat connectivity.[390]

Additionally, despite the acknowledged significant impacts to lynx and wolves, and their designated critical habitat, including impacts to the few remaining wildlife travel corridors in the region, the FEIS fails to consider or address the impacts of the proposed mine and land exchange on lynx and wolf recovery. By adding to the widespread cumulative impacts of mining projects and other development across this region, including contributing to the continuing decrease in available travel corridors, the proposed mine project is likely to appreciably contribute to the diminishment of the chances for the lynx and wolf populations in this region to recover, and to be eventually taken off the list of threatened species. The FEIS's failure to consider this fundamentally important factor concerning lynx and wolves violates NEPA and the ESA.

Section 9 of the ESA prohibits any person from "taking" a threatened or endangered species.[391] "Take" is defined broadly to include "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[392] The proposed mine would likely result in the "take" of Canada lynx and wolves, through the destruction of their critical habitat, vehicle and train collisions, and the continued loss and fragmentation of the few remaining wildlife corridors in the area.

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[384] *Id.*
[385] *Id.*
[386] FEIS at 6-77, Table 6.2.5-1.
[387] *Id.* at 6-77.
[388] *Id.* (emphasis added); *see Id.* at Table 6.2.5-1 (describing impacts to each of the corridors, including the overall loss of one corridor due to Essar Steel, the complete loss of a corridor due to U.S. Steel Keetac, the direct loss of a corridor due to U.S. Steel Minntac, and considerable habitat loss, fragmentation and isolation to other corridors caused by traffic and development).
[389] 16 U.S.C. § 1536(a)(2).
[390] *See* 74 Fed. Reg. 8616, 8638 (Feb. 25, 2009) (Final Rule designating Canada lynx critical habitat).
[391] 16 U.S.C. § 1538(a)(1)(B); 50 C.F.R. § 17.31(a); *Animal Protection Institute v. Holsten*, 541 F.Supp. 2d 1073, 1076 (D. Minn. 2008).
[392] *Animal Protection Institute*, 541 F.Supp. 2d at 1076, *quoting* 16 U.S.C. § 1532 (19).

## 20.0 The EIS must disclose the ongoing, acute decline in the moose population, the position of the mine site on the edge of what is now considered moose territory, and the impact of this loss of habitat.

The EIS fails to provide the "hard look" at impacts on moose that is required by NEPA. This issue was raised on our comments on the SDEIS.[393] Our SDEIS comments are attached to this objection letter, and the referenced pages along with all cited materials are incorporated herein.

This issue was not addressed in the FEIS Response to Comments. Although the FEIS has added a small amount of information on moose, it neither includes the factors that we raised in our comments nor explains why they are not included, in violation of 40 C.F.R. § 1503.4(a) (agency must consider and respond to comments) and 40 C.F.R. § 1502.9(b) (agency must discuss in FEIS "any responsible opposing view," and "shall indicate the agency's response to the issues raised"). For instance, the FEIS fails to assess the project's impact on moose due to vehicle and train collisions and the increase in noise and human activity, which were raised in our comments on the SDEIS and supported by scientific literature.

The FEIS discloses that 2,785.9 acres of moose habitat would be directly affected by the project, but fails to discuss either indirect impacts on habitat or the actual effects on moose.[394] This includes significant impacts to high quality wetlands, which habitat is particularly important to moose due to ongoing and future climate change. In fact, the 2009 Report to the DNR by the Minnesota Moose Advisory Committee recommended the enhancement of the availability of "wetlands and other habitats where moose are most secure from heat stress."[395] The impacts of the proposed mine on heat stress and thermal refugia for moose, however, are not considered or disclosed. More generally, the FEIS fails to assess the impacts to moose and other species dependent on wetland habitat in the context of the current and anticipated impacts of climate change, which will cause the disappearance of wetlands, higher temperatures, increased evapotranspiration, and longer droughts over the same time period of the proposed mine and its impacts.[396]

As recognized by the CEQ, "[c]limate change is a fundamental environmental issue, and the relation of Federal actions to it falls squarely within NEPA's focus."[397] Agencies must consider not only a proposed action's effects on climate change, but also "the implications of climate change for the environmental effects of a proposed action."[398] "Federal agencies, to remain consistent with NEPA,

[393] Friends 62, CBD 69-71.
[394] FEIS 5-439.
[395] Rolf Peterson *et al.,* Report to the Minnesota Department of Natural Resources (DNR) by the Moose Advisory Committee, Aug. 18, 2009 (attached as Exhibit 20a) at ii; *see also id.* at 6 ("Moose habitat management should accommodate the need for aquatic feeding areas and thermal refugia").
[396] *Id.* at 4 (Figure 3).
[397] 79 Fed. Reg. 77802, 77823 (Dec. 24, 2014). While the CEQ guidance is still in draft form, it does not create any new regulatory requirements but rather seeks to "facilitate compliance with existing legal requirements under NEPA." *Id.* at 77816, 77823.
[398] *Id.* at 77824.

should . . . take into account the ways in which a changing climate over the life of the proposed project may alter the overall environmental implications of such actions."[399]

The impacts of climate change are already occurring, are predicted to intensify, and are directly related to the environmental consequences of the proposed NorthMet mine on the state's sensitive and declining moose population. As recognized by the Moose Advisory Committee, climate change is a long-term threat to the persistence of moose in Minnesota.[400] Moreover, "large bodied mammals, such as moose [a]re more likely to rapidly respond to climate change, which indicates a higher extinction risk."[401] As a result of climate change, "[m]oose will lose crucial habitat, experience heat stress and malnutrition, and come into contact with more pathogens and winter ticks as a result of warmer, wetter winters and springs, a reduction in show depth, and hotter summers."[402] Moreover, boreal species on which moose rely are expected to decline, "and forested wetlands – an incredibly valuable type of habitat for moose – will likely disappear."[403] The adverse impacts of losing over 2,700 acres of important moose habitat as result of the proposed mine simply cannot be considered in isolation of the significant, recognized threats to moose and its habitat in the region resulting from current and predicted climate change.

Furthermore, NEPA does not allow the agencies to not address in the FEIS the combined impacts of climate change and the proposed mine on moose just because the exact rate and extent of climate change remains uncertain. NEPA instead requires agencies to engage in reasonable forecasting when preparing EISs, as speculation is implicit in NEPA.[404] As stated by the Eighth Circuit, "when the *nature* of the effect is reasonably foreseeable but its *extent* is not, . . . the agency may not simply ignore the effect.[405] Moreover, as recognized by CEQ, agencies should describe the region that would be affected by a proposal "based on available climate change information, including observations, interpretative assessments, predictive modeling, scenarios, and other empirical evidence."[406] And despite remaining uncertainties, CEQ emphasized that a NEPA analysis "should present a reasonably thorough discussion of probable environmental consequences."[407]

The agencies' failure to consider the implications and impacts of climate change along with the proposed NorthMet mine project on the declining moose population is especially egregious due to

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[399] *Id.* at 77825. *See also id.* at 77813 ("Agencies should consider the specific effects of the proposed action" and "the nexus of those effects with projected climate change effects on the same aspects of our environment").
[400] Exhibit 20a at ii.
[401] Center for Biological Diversity and Honor the Earth, Petition to List the U.S. Population of Northwestern Moose Under the Endangered Species Act, July 9, 2015 (attached as Exhibit 20b) at 25.
[402] *Id.*
[403] *Id.* at 26.
[404] *N. Plains Res. Council v. Surface Transp. Bd.*, 668 F.3d 1067, 1079 (9th Cir. 2011). *See also Foundation on Economic Trends v. Heckler*, 756 F.2d 143, 160 (D.C. Cir. 1985) (recognizing that the "complexity and uncertainty of the issues" do not diminish an agency's responsibilities under NEPA).
[405] *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003) (emphasis in original).
[406] 79 Fed. Reg. at 77828.
[407] *Id.* at 77803; *see also id.* at 77817 (noting that agencies should use "current scientific information" in assessing climate change effects).

the very long-term duration of the proposed mine, and its severe impacts on wetlands and other habitat needs of moose. As highlighted by CEQ, "climate change effects should be considered in the analysis of projects that are designed for long-term utility and involve resources considered vulnerable to specific effects of climate change within the timeframe of the proposed project's anticipated useful life."[408] Overall, the agencies failure to consider and disclose in the FEIS the combined impacts of climate change and the proposed mine on moose habitat and the remaining declining population violates NEPA.[409]

The FEIS also fails to inform the reader of the actual situation regarding moose in Minnesota and the potential impact of this and other projects on moose recovery in the Midwestern United States. Much of this information is provided in a petition to the U.S. Fish and Wildlife Service for federal Endangered Species Act listing of *alces alces andersoni*, the subspecies of moose found in the Midwest.[410] In addition, we are including the report from the MDNR's 2015 aerial moose survey.[411] These documents are in addition to the material submitted with comments to the SDEIS, which are again included with this submission.

Moose, which have been observed in the project area,[412] are listed by the state as a species of special concern.[413] The DNR and Forest Service have been well aware for years that the moose population in the state and on the Superior National Forest is in precipitous decline, a fact that cannot be discerned from the NorthMet FEIS. The FEIS discussion of this issue is a classic example of providing only data that tends to discount the problem in the eye of the reader. What the FEIS tells us is:

> The overall moose population declined approximately 35 percent from 2012 to 2013. The 2014 winter aerial moose survey estimated the population at 4,350 animals, up from the 2013 estimate of 2,760. However, this is likely due to variability in the survey conditions from year to year and uncertainty inherent in the survey itself. [414]

The reader is left with the idea that perhaps the 35 percent change from 2012 to 2013 was an anomaly due to counting methods, and with no understanding as to the actual situation.

According to the MDNR, the population estimate for moose in the state was 8,840 in 2006, and in 2015 is estimated at 3,450.[415] While the count did go up in 2014, the trend over a ten-year period is a decline of more than 60 percent. The FEIS also fails to recognize the critical importance of northeastern Minnesota for the remaining moose population in the state. Moose also used to be common in northwestern Minnesota, but that population has disappeared over the last twenty years. From a population of 4,000, fewer than 100 remain, with any rebound seen as very unlikely. This

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[408] 79 Fed. Reg. at 77813.
[409] *Native Village of Point Hope v. Jewell*, 740 F.3d 489, 493-95 (9th Cir. 2014) (NEPA requires agencies to consider "every significant aspect" of a proposal, and a decision is arbitrary if it "failed to consider an important aspect of the problem").
[410] Exhibit 20b
[411] Glenn D. DelGiudice, 2015 Aerial Moose Survey (attached as Exhibit 20c).
[412] FEIS at 4-237
[413] A species of special concern is defined as a species that is "extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status." Minn. Stat. § 84.0895, Subd. 3.
[414] FEIS at 4-237.
[415] Exhibit 20c at 2.

leaves northeastern Minnesota, including the Proposed Project area, as the only remaining refuge for the state's declining moose population.

To summarize, the Minnesota moose population is undergoing a rapid decline and may be extirpated from the state of Minnesota within another decade; habitat loss and fragmentation is acknowledged to be a factor in that decline; it is acknowledged that this project will result in a loss of habitat; and with no further information, the FEIS concludes that the project would likely not affect moose at the population level. NEPA prohibits agencies from making such sweeping general statements without providing supporting data or analysis.[416]

As noted below, the FEIS analysis of the potential impacts to moose is even more deficient and problematic in the cumulative impacts analysis, where moose are not even mentioned. Overall, the FEIS has failed to meaningfully consider and disclose the impacts of the proposed mine on the state's dramatically declining moose population. The omission of any meaningful consideration of such an important issue "precludes the type of informed decision making mandated by NEPA."[417]

## 21.0 The Cumulative Effects Analysis in the FEIS is Inadequate.

NEPA and MEPA both require an analysis of the potential cumulative impacts of a proposed action.[418] The NEPA regulations provide the following definition for cumulative impacts:

> Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.[419]

In order to properly consider cumulative effects in an EIS, NEPA requires quantified and detailed information.[420] "Without such information, neither the courts nor the public, in reviewing the [agency's] decisions, can be assured that the [agency] provided the hard look that it is required to provide."[421] "General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided."[422] "Nor is it appropriate to defer consideration of cumulative impacts to a future date,"[423] as NEPA requires consideration of the potential impact of an action *before* the action takes place.[424]

As explained throughout these comments, the FEIS cumulative impacts analysis for a number of resources – including but not limited to water quality, wetlands, and wildlife - is

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[416] *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1150 (9th Cir. 1998); 40 C.F.R. § 1502.24.
[417] *Foundation for North Am. Wild Sheep v. U.S. Dept. of Agriculture*, 681 F.2d 1172, 1178 (9th Cir. 1982).
[418] *See e.g.*, 40 C.F.R. § 1508.25(c); Minn. R. § 4410.1700, subp. 7(B).
[419] 40 C.F.R. § 1508.7.
[420] *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1379 (9th Cir. 1998).
[421] *Id.*
[422] *Id.* at 1380.
[423] *Id.*
[424] 40 C.F.R. § 1500.1(b).

inadequate and fails to comply with NEPA or MEPA. The FEIS provides only general, mostly non-quantified analysis, which falls far short of the detail required. In *Great Basin Mine Watch v. Hankins*, 456 F.3d 955, 971-974 (9th Cir. 2006), the court struck down an agency's reliance on generalized descriptions of mining impacts in a region, and instead required the agency to include "mine-specific … cumulative data."[425] The court highlighted the need for a "quantified assessment of [other projects'] combined environmental impacts" and an "objective quantification of the impacts."[426] The FEIS for the proposed PolyMet mine fails to provide this necessary analysis.

In addition to providing primarily general, non-quantified analysis, the FEIS makes a number of fundamental mistakes in its cumulative impacts analysis. The FEIS, for instance, in its assessment of past, present, and reasonably foreseeable actions, the agencies failed to include the hundreds of exploratory drilling projects taking place in the same region on federal, state, and private lands.[427] The fact that these exploratory drilling projects will collectively contribute towards significant cumulative impacts on a number of resources is acknowledged by the Forest Service in the forest-wide EIS that it prepared for only a subset of these past, present, and reasonably foreseeable projects.

The FEIS also limited its consideration of reasonably foreseeable future actions to only those that are included in approved planning documents and have approved funding, are permitted, or have a currently active federal or state permit or site plan application under review. [428] This definition of reasonably foreseeable actions is unreasonably narrow and violates NEPA. The United States Court of Appeals for the Eighth Circuit has more broadly held that an environmental effect is reasonably foreseeable under NEPA if it sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision.[429] Moreover, "when the *nature* of the effect is reasonably foreseeable but its *extent* is not, . . . the agency may not simply ignore the effect."[430]

The lead agencies claim that they relied on 1997 CEQ and 1999 EPA guidance in preparing the cumulative impacts analysis.[431] The CEQ guidance, however, demonstrates that the approach taken by the agencies in the FEIS is impermissibly narrow and violates NEPA. As explained by CEQ:

> Commonly, analysts only include those plans for actions which are funded or for which other NEPA analysis is being prepared. This approach does not meet the

[425] *Id.* at 973.
[426] *Id.* at 972.
[427] *See e.g.*, FEIS at 6-20, 6-21 (confirming that Rio Tinto, Teck, and Encampment Minerals mineral exploration projects were not considered in the cumulative impacts analysis).
[428] FEIS at 6-2; FEIS at A-354.
[429] *Mid States Coalition for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir 2003).
[430] *Id.* (emphasis in original); see also 40 C.F.R. § 1502.22; *Northern Plains Res. Council v. Surface Transp. Bd.*, 668 F.3d 1067, 1078-79 (9th Cir. 2011) ("projects need not be finalized before they are reasonably foreseeable," as "NEPA requires that an EIS engage in reasonable forecasting," and "speculation is implicit in NEPA").
[431] FEIS at 6-1.

> letter or intent of CEQ's regulations. It underestimates the number of future projects, because many viable actions may be in the early planning stage. [432]

Agency must instead "use the best available information to develop scenarios that predict which future actions might reasonably be expected as a result of the proposal."[433] Similarly, "[i]f the analyst is uncertain whether to include future actions, it may be appropriate to bound the problem by developing several scenarios with different assumptions about future actions."[434] Future actions can only be excluded from the cumulative impacts analysis if the action is outside the established geographic boundaries or time frame, the action would not affect any resources, or the agency can show that including the action would be arbitrary.[435] Importantly, CEQ makes clear that "reasonable forecasting is implicit in NEPA," and therefore "it is the responsibility of federal agencies to predict the environmental effects of proposed actions before they are fully known."[436]

EPA's 1999 guidance further demonstrates that the agencies definition of reasonably foreseeable actions in the NorthMet FEIS is too restrictive and violates NEPA. As explained by EPA, "reasonably foreseeable future actions need to be considered even if they are not specific proposals."[437] As with CEQ, EPA directs agencies to utilize the best available information "to develop scenarios that predict which future actions might reasonably be expected as a result of the proposal."[438]

The NEPA requirement, as explained by CEQ, EPA, and the courts, to use reasonable forecasting and to develop scenarios that predict and disclose the environmental consequences of future actions, along with the NorthMet proposal and other past and present actions, is particularly important for the NorthMet proposal due to its extremely long time-frame. The lead agencies recognize in the FEIS that the necessary maintenance, mitigation, and monitoring for the NorthMet mine will be required indefinitely, likely for hundreds of years. In light of the lead agencies current understanding of the copper, nickel and other mineral deposits within the "Duluth Complex," along with the expressed interest of mining companies from across the globe to access and mine these minerals, it is at least "reasonably foreseeable" to anticipate additional mining proposals during this time frame. In fact, it is arbitrary and unreasonable for the agencies to assume that no additional copper nickel mines will be proposed and considered during the hundreds of years of mining activities that the agencies are considering authorizing for PolyMet's NorthMet mine. The lead agencies must therefore consider a range of development scenarios that meaningfully assess and disclose what the cumulative impacts would be to the various resources of the region under each of these scenarios. Because the FEIS fails to do so, a Supplemental EIS must be prepared.

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[432] CEQ's 1997 Guidance, entitled "Considering Cumulative Effects Under the National Environmental Policy Act," p. 19.
[433] *Id.*
[434] *Id.*
[435] *Id.*
[436] *Id.*
[437] EPA's 1999 Guidance, entitled "Consideration of Cumulative Impacts in EPA Review of NEPA Documents," Part 4.3.
[438] *Id.*

The agencies unlawfully narrow definition of reasonably foreseeable future actions led the agencies to exclude the proposed Twin Metals copper-nickel mine from the FEIS' cumulative impacts analysis.[439] From its 8,800 square-foot headquarters in Ely that was constructed in 2011, to its past, ongoing, and proposed exploration throughout the region, and its proposed hydro-geologic study, along with the ongoing consideration of the environmental impacts of its proposed lease renewals by the BLM, the Twin Metals proposal and its environmental impacts are far beyond "speculative," and are instead ongoing or at least reasonably foreseeable.

Significantly, in 2014 Twin Metals completed a voluminous "Technical Report on Pre-feasibility Study" (PFS), which was prepared by a large team of engineers and describes in detail where the company plans to mine, the characteristics of the mine site, the mineral reserve estimates, the proposed mine plan, the mining methods, the recovery methods, the project infrastructure, and, environmental protection strategies, and environmental concerns and issues.[440] The Twin Metals proposal includes a 30-year mine plan focused on the development of the Maturi and Maturi SW mineral deposits, located about 9 miles southeast of Ely and 11 miles northeast of Babbitt. The PFS estimates an average production rate of 50,000 tons of mineralized ore per day. The mine plan consists of four major facilities: an underground mine site, a concentrator site, a tailings basin facility, and utility corridors.

The Twin Metals PFS demonstrates that there will undoubtedly be significant cumulative impacts to numerous resources that would also be affected by the NorthMet project, as Twin Metals proposes to place its massive tailings facility in the same St. Louis River watershed, adjacent to the Peter Mitchell Mine. The agencies have entirely failed to consider or disclose in the NorthMet FEIS the major impacts and issues concerning geology, hydrology, groundwater, surface water, and pollution that would result from the interactions and cumulative impacts of the NorthMet mine site, Peter Mitchell mine pit, and Twin Metals tailings basin in the same general location. Without such an analysis, that also takes into account the existing changes and predicted impacts to the Laurentian Divide, the agencies are wholly unable to predict or disclose the extent of pollution that would flow to the St. Louis River and Boundary Waters watersheds.

According to Twin Metals, the details from the PFS will "form a Mine Plan of Operations (MPO) that will be submitted to state and federal regulatory agencies for environmental review."[441] Twin Metals further states that it has been conducting environmental studies and assessments of its mine proposal for "more than five years," which will continue during the development of its Mine Plan of Operations, and "will feed into the formal, Draft Environmental Impact Study (DEIS) that will be conducted by state and federal agencies. Key environmental issues include: surface water quality and hydrology, threatened and endangered species, air quality, plant life, wetlands and socioeconomic factors."[442] And "[m]ore than $250 million has been invested in exploration and project

[439] MCEA 115-126; Friends 31-32, 71; CBD 76-80.
[440] Twin Metals Minnesota Project, NI 43-101, Technical Report on Pre-feasibility Study (attached as exhibit 21a).
[441] Twin Metals Project Facts available at http://www.twin-metals.com/about-the-project/project-facts/ (attached as exhibit 21b).
[442] *Id.*

development to date."[443] In sum, there is no question that the Twin Metals proposed mine is not "speculative," but rather "reasonably foreseeable," and was required by NEPA and MEPA to be included in the cumulative impacts assessment for NorthMet FEIS.

In fact, in March of 2013, the "Minnesota Minerals Coordinating Committee," which includes the DNR, issued a document entitled "Explore Minnesota: Copper, Nickel PGEs."[444] The document stated that PolyMet, Twin Metals, and Teck American were all "active" copper-nickel projects at that time. Moreover, the document referred to the Twin Metals PFS, which was then underway, acknowledged that the PFS will be comprehensive and evaluate all project details, and then stated: "Once completed, the PFS will provide multiple state and federal agencies the information needed to conduct a rigorous and thorough environmental review of the proposed plan." Now that the PFS is complete, and provides the agencies with hundreds of pages concerning the proposed mine's specific details and impacts, the lead agencies still refuse to include Twin Metals in the cumulative impacts analysis for the NorthMet proposal, in plain violation of MEPA and NEPA.

Considering additional future proposals, including Twin Metals, is further supported by the definition of "cumulative potential effects," within Minnesota's regulations:

> "Cumulative potential effects" means the effect on the environment that results from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects. . . . In determining if a basis of expectation has been laid for a project, an RGU must determine whether a project is reasonably likely to occur and, if so, whether sufficiently detailed information is available about the project to contribute to the understanding of cumulative potential effects. In making these determinations, the RGU must consider: whether any applications for permits have been filed with any units of government; whether detailed plans and specifications have been prepared for the project; whether future development is indicated by adopted comprehensive plans or zoning or other ordinances; whether future development is indicated by historic or forecasted trends; and any other factors determined to be relevant by the RGU.[445]

The lead agencies violated MEPA because they failed to address whether there is a "basis of expectation" that Twin Metals will proceed.[446] Moreover, the agencies violated this regulation by further failing to consider the "detailed plans and specifications" already been prepared for Twin Metals, including its 500+ page Technical Report on Pre-feasibility Study.[447] The agencies failed to consider whether "historic or forecasted trends" indicate that Twin Metals is reasonably likely to be

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[443] *Id.*
[444] Minnesota Minerals Coordinating Committee. *Explore Minnesota: Copper, Nickel PGEs.* (March 2013) (attached as exhibit 21c).
[445] Minn. R. § 4410.0200, subpart 11a.
[446] *Id.*
[447] *Id.*

approved.[448] It does not take a serious study of the history of the Iron Range to know that virtually all proposed mining projects and mining expansions have been approved in the past, which the agencies did not consider before concluding that Twin Metals remains "speculative."

The agencies also refused to consider Teck and its leases, exploration and drilling on the Mesaba deposit, adjacent to the NorthMet site. As explained in the FEIS comments provided by Andrew Comfort, the FEIS is wrong that the Teck and PolyMet projects are 3 miles apart.[449] They are instead immediately adjacent to one another, and the agencies have failed to consider the continuous band of ore that connects PolyMet's proposal to Teck and the Mesabi deposit.[450]

Relatedly, the agencies' cumulative impacts analysis in the FEIS also fails to address PolyMet's plans for future expansion and/or for the Plant Site to be utilized for future copper-nickel mining projects in this region. Because the plant capacity is three times as large as is needed for the proposed NorthMet project, its use for other projects is likely.[451] As explained in an Edison Investment Research Limited report, "there is a good chance PolyMet will be able to expand the size of its resource by 50-100% based on what we learned on a site visit."[452] Additionally, "[t]here are roughly 11 mineral properties within shipping distance of PolyMet's mill," and "[w]e believe there is a good chance PolyMet will decide to toll process third-party ore from some relationships with one or more local projects."[453] Of course the additional use of this Plant Site for expansions and other mining proposals would significantly increase the amount of waste that would be deposited into the tailings basin. This would also greatly increase the amount of vehicle and rail traffic and other disturbances in the immediate project area and affecting numerous resources. The agencies, however, failed to consider the "forecasted trend" for PolyMet and the NorthMet mine site, as analyzed and disclosed by Edison and brought to the agencies' attention during the NorthMet public comment period, in violation of NEPA and MEPA.

The FEIS also fails to set forth the proper geographic scope for the cumulative impacts analysis, especially concerning the potential impacts to water, wetlands, and aquatics, where the agencies refuse to extend the scope of analysis to the entire St. Louis River watershed. There can be no dispute that past and ongoing mining and related activities have resulted in major, significant impacts to the St. Louis River watershed, all the way downstream to the estuary which is formally

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[448] *Id.*

[449] FEIS at 6-21.

[450] *See* Ex. 21c (stating that Teck is an "active" copper nickel project, with "leases on the largest known deposit in the belt, the Mesaba (or Babbitt) deposit, which lies between the NorthMet and Birch Lake deposits").

[451] *See e.g.*, Barr 2012r, p. 5-6 (stating that PolyMet's purchase of the LTV taconite plant includes the existing crushing plant, which has a capacity of 100,000 tons per day, and that even though the design of PolyMet's operation reflects an average throughput of 32,000 tons per day, PolyMet intends to permit all of the existing crushing plant equipment "to allow for operational flexibility").

[452] Ex. 21d at 5 (Edison Investment Research Ltd, *PolyMet Mining Corp.: Low-cost polymetallic development project* (Nov. 21, 2013)).

[453] *Id.* at 10.

designated as an "Area of Concern."[454] From thousands of acres of permanent wetlands destruction, to sulfate pollution that has wiped out miles of historic wild rice, to mercury related health warnings, the agencies cannot simply ignore a century of impacts from mining and other industrial activities on this watershed.[455]

As further explained by Tribal Cooperating Agencies, nearly half of the St. Louis River watershed "has experienced hydrologic alteration from extensive ditching."[456]

> It is reasonably foreseeable that an additional 3000 acres of wetlands within the watershed will be directly impacted by proposed new mining projects and expansions that are in active permitting and/or environmental review: the PolyMet NorthMet project, Mesabi Nugget Phase II, US Steel Minntac expansion, US Steel Keetac expansion, United Taconite Tails Basin 3 construction. To date, virtually all required wetland mitigation for mining impacts has been implemented out of the basin, representing a permanent loss of high quality ecological resources and functions.[457]

Similarly, in looking forward, the agencies cannot simply proclaim that no specific mine, by itself, will have any significant impacts on the entire watershed. First, the agencies are wrong that large-scale open-pit mining, including the proposed PolyMet mine, will not have significant impacts on numerous resources, including water and wetlands. Second, both NEPA and MEPA recognize that cumulatively significant impacts may occur as the result of a number of individually insignificant impacts taking place over time within the same watershed.[458]

This is an error that the FEIS makes again and again, for virtually every type of impact. From the air deposition of mercury in area lakes, to ambient air pollution and regional haze, to the loss of critical habitat, to impacts on state-listed endangered plants, the FEIS compares the level of impact from this project to the overall impact and deems the impacts from this project insignificant and thus not of concern, even in regards to the cumulative problem. The FEIS must reveal the level of cumulative impact that all sources together have on impacted resources, and acknowledge that the proposed NorthMet project would be one of many sources that together cause the impacts.

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[454] *See e.g.*, Supplemental DEIS, Appendix C (Tribal Cooperating Agencies Cumulative Effects Analysis, stating "that current, historic, and 'reasonably foreseeable' mining activities have profoundly and, in many cases permanently, degraded vast areas of forests, wetlands, air and water resources, wildlife habitat, cultural sites and other critical treaty-protected resources within the 1854 Ceded Territory").

[455] *Id.* (Tribal Cooperating Agencies, stating that the "relevant spatial scale for water quality and hydrologic cumulative effects analysis is the entire St. Louis River watershed," which "has experienced substantial historic, current and proposed expanded mining activities, as well as other industrial, agricultural and urban development").

[456] *Id.*

[457] *Id.*

[458] 40 C.F.R. § 1508.7; Minn. R. § 4410.0200, subp. 11; *see Citizens Advocating Responsible Dev't v. Kandiyohi Cty. Bd. of Comm's*, 713 N.W.2d 817, 836 (Minn. 2006) (recognizing that "an individually insignificant project may have a significant environmental effect when considered in conjunction with other projects").

Due to the major deficiencies in the cumulative effects analysis for the NorthMet proposal, the Tribal Cooperating Agencies prepared their own.[459] As explained by the Tribes, the lead agencies failed to consider their repeated requests to utilize a tool developed by the EPA in 2011 in cooperation with tribes entitled, "Applying Cumulative Impact Analysis Tools to Tribes and Tribal Lands." This is despite the Mine Site and Plant Site, and resulting impacts, being located within the 1854 Ceded Territory, and upstream from the Fond du Lac Reservation. The Tribes thus undertook "a resource-specific GIS-based approach as defined in the 2011 guidance to generate an alternative [cumulative effects analysis] that more accurately accounts for cumulative impacts to resources of tribal significance."[460] The Co-Lead Agencies, however, failed to utilize or consider this contradictory and more detailed cumulative impacts analysis in the FEIS, in violation of NEPA.[461]

Additional major flaws with the FEIS' cumulative effects analysis are set forth in the November 13, 2015 request by the Fond du Lac Band of Lake Superior Chippewa for predecisional referral of the North Met proposal to CEQ.[462] As explained by Fond du Lac, bedrock and surficial groundwater pollution is already documented at the same site PolyMet intends to use for the NorthMet project (the LTV site), and the Dunka Pit. As the Band has requested, the agencies must consider and disclose the cumulative impacts of the NorthMet proposal, LTV site, Dunka Pit, as well as the groundwater pollution from nearby iron ore mines, including the Peter Mitchell Pit, Laskin Energy, Arcelor-Mittal, United Taconite, and US Steel Minntac. Moreover, the Band reiterated the need for a geographically broader and watershed-based cumulative impacts analysis that takes into account other major proposals such as United Taconite's proposal for 1,200 acres of wetland destruction to build a new tailings basin, and the existing pollution that is already causing water quality standard violations in the St. Louis River watershed.

## 22.0 The Co-Lead Agencies Fail to Assess Direct and Cumulative Impacts on Wildlife.

The FEIS fails to assess the cumulative impacts on sensitive wildlife species, which the FEIS defines to include federal and state-listed species, species of special concern, and Forest Service sensitive species.[463] This issue was raised in our comments on the SDEIS at MCEA 118 and CBD 73-75, which are attached and incorporated herein. We also submitted a supplementary letter to Forest Supervisor Brenda Halter on October 8, 2015, which we incorporate herein. The FEIS neither mentions this issue in its Response to Comments, nor includes material in the text of the FEIS that responds to the issue, in violation of 40 C.F.R. § 1503.4(a) (agency must consider and respond to comments) and 40 C.F.R. § 1502.9(b) (agency must discuss in FEIS "any responsible opposing view," and "shall indicate the agency's response to the issues raised").

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[459] *See* Supplemental DEIS, Appendix C (Tribal Cooperating Agencies Cumulative Effects Analysis).
[460] *Id.*
[461] *See e.g.*, 40 C.F.R. § 1502.24 (agencies must "insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements"); § 1502.9(b) (agencies must discuss in FEIS "any responsible opposing view").
[462] Nov. 13, 2015 Fond du Lac Request for Predecisional Referral to CEQ.
[463] FEIS at 6-71.

The FEIS claims that the cumulative effects analysis for wildlife "focuses on potential losses to sensitive wildlife species."[464] In fact, however, the FEIS provides only a few pages of very general information, with the vast majority of sensitive species not even mentioned. There is therefore no scientific support for the agencies' conclusion that the proposed NorthMet mine, along with all other past, present, and reasonably foreseeable actions, "would not further threaten special status wildlife species."[465]

Although Chapters 4 and 5 of the FEIS list many species of concern that either are found at the project site or for which the project site provides habitat, and Chapter 5 at least purports to assess the impacts that the NorthMet project alone would have on these species, Chapter 6 provides no comparable analysis for cumulative impacts. And yet almost all of the species of concern are on the list of Regional Forester Sensitive Species (RFSS) due to current or expected cumulative losses of habitat across their range within the region.[466] Without an analysis or explanation of the ultimate impact on these species from cumulative losses and how the NorthMet project would contribute to those losses, the FEIS does not provide the "hard look" at impacts required by NEPA.

NEPA requires the Forest Service to consider the potential cumulative effects of proposed actions.[467] "To 'consider' cumulative effects, some quantified or detailed information is required."[468] "Without such information, neither the courts nor the public, in reviewing the [agency's] decisions, can be assured that the [agency] provided the hard look that it is required to provide."[469] "General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided."[470]

In its cumulative impacts analysis for wildlife, the FEIS provides only very general statements concerning risks and impacts, which falls far short of the detailed and quantified analysis required by NEPA. The sum of the assessment is found in three statements. First:

> Cumulative effects on wildlife may include the loss and/or fragmentation of habitat and encroachments into critical wildlife travel corridors…[471]

Second:

> In addition to habitat fragmentation and loss and effects on wildlife crossing corridors, wildlife species of concern in the Nashwauk Uplands and Laurentian Uplands ecological subsections are subject to other stressors that could result in

[464] FEIS at 6-71.
[465] Id.
[466] The RFSS list includes species that face either "significant current or predicted downward trends in population numbers or density," or "significant current or predicted downward trends in habitat capability that would reduce a species existing distribution." BE ii, FEIS App. D. The main text of the FEIS refers to RFSS species but provides no explanation of what that means, once again failing to provide context that would allow a judgment regarding the significance of impacts.
[467] 40 C.F.R. § 1508.25(c).
[468] *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1379 (9th Cir. 1998).
[469] *Id.*
[470] *Id.* at 1380.
[471] FEIS 6-71.

> cumulative effects. Traffic and activity related to mining projects, urban development, forestry, tourism, and road expansions all increase the risk for special status wildlife species and, as such, could result in cumulative effects.[472]

And finally, in regards to wildlife travel corridors:

> Wildlife could be affected by the NorthMet Project Proposed Action and other actions through a cumulative disruption of their travel corridors. These actions could pose additional barriers to wildlife movement by increasing the number of isolated patches of suitable habitat, increasing mortality during transit, and physically blocking travel. This may lead to increased population and genetic isolation and decreased meta-population dynamics, which in turn could lead to decreases in overall population stability and persistence.[473]

The FEIS provides additional cursory information about the approach it used to reach this "assessment," including the spatial boundaries; the timeframe; the list of past, present, and foreseeable future actions considered; the causes of habitat changes; the vegetation types of affected habitats; and the list of wildlife corridors and projects affecting them. But aside from a couple of brief paragraphs on federally-listed species (which are addressed below), the three statements quoted above are all the cumulative assessment says about the actual impacts on wildlife. The FEIS provides no information on the status of or impacts to any specific species.

As an example of what is missing, the FEIS tells us that loss of wildlife habitat in the Laurentian Uplands will be due primarily to timber harvest and mining, while losses in the Nashwauk Uplands will be due primarily due to mining and urban development.[474] But it completely fails to tell us what those losses are expected to be, or how they will impact specific species. Without explaining why more detailed and quantified information cannot be provided, these very general statements are insufficient and fail to comply with NEPA.[475]

The U.S. Court of Appeals for the Ninth Circuit rejected a similar cumulative effects analysis for a proposed mining project. In *Great Basin Mine Watch v. Hankins*, the court struck down the agency's reliance on the same sort of brief, generalized descriptions of mining impacts in the region.[476] The court required the agency to include "mine-specific … cumulative data."[477] Relying on prior cases, the court highlighted the need for a "quantified assessment of [other projects] combined environmental impacts" and "objective quantification of the impacts."[478] The FEIS for the proposed PolyMet mine similarly fails to provide the required detailed analysis of cumulative impacts.

Moreover, the cumulative effects analysis entirely fails to even mention moose, despite the documented presence of moose in the area, its rapidly declining population and designation as a

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[472] FEIS 6-79.
[473] FEIS 6-74.
[474] FEIS 6-73.
[475] *Neighbors of Cuddy Mountain*, 137 F.3d at 1379-80.
[476] 456 F.3d 955, 971-974 (9th Cir. 2006)
[477] *Id.* at 973.
[478] *Id.* at 972.

species of special concern, its iconic status to the citizens of Minnesota, and its cultural significance to the Tribes. The agencies' failure to address such a fundamentally important issue violates NEPA.[479]

Chapter 5 of the FEIS acknowledges that the proposed mine by itself "would likely affect moose individuals in the vicinity through habitat loss and fragmentation";[480] cumulative impacts to moose and moose habitat should be obvious. As noted by the Tribal cooperating agencies in their comments on the initial DEIS for this project, the Minnesota advisory committee studying the decline of the moose population in northeastern Minnesota recommended preserving wetlands as sanctuaries for moose from heat stress.[481] Yet PolyMet is proposing the largest wetland fill ever permitted in this region, and additional losses will follow with other mining activity. Wetland mitigation for the PolyMet project will be located outside of the area that still supports a moose population, as will the largest tract of the replacement lands that the Forest Service will receive in the land exchange. This loss will undoubtedly be joined by other losses of wetlands throughout Minnesota's remaining moose territory, but the FEIS provides no information on what the extent of those losses is likely to be.

The lack of information on the projected cumulative impacts from this and other foreseeable actions is exacerbated by the lack of information on the current status of other sensitive species. This lack of information makes it impossible to guess at the significance of additional loss or fragmentation of habitat as well. For example, the FEIS tells us that "Two northern goshawk territories have been identified at or near the Mine Site."[482] But there is no information anywhere in the FEIS by which to determine whether the loss of these territories is significant in relation to the number of other territories in the state and in the national forest and the threats they may be facing.

Because the FEIS fails to provide this information, we turned to AECOM 2011a, which states, "Today, there are 23 known goshawk nest sites in Superior National Forest and 87 in the state of Minnesota." This cannot be taken as the number of goshawk territories, however, because alternative sites are common:

> While goshawks do not always use the same nest for more than a year, they typically have two and up to nine alternate nest sites that are usually within a mile of the present nest. It is important to also protect these alternate nest sites that may be used in subsequent years.[483]

Thus 87 nest sites in the state could represent as few as 10 territories, which puts the loss of one or two territories into a perspective that the FEIS utterly fails to provide.

The lack of information on northern goshawks stands in contrast to what is found in other recent EISs prepared by the Forest Service. For example, the Glacier Project Biological Evaluation states,

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[479] *See Foundation for North Am. Wild Sheep v. U.S Dept. of Agric.*, 681 F.2d 1172, 1178 (9th Cir. 1982).
[480] FEIS 5-439.
[481] *See* Exhibit 20a.
[482] FEIS 4-239.
[483] BE 5-58, FEIS App. D.

> Surveys for nesting goshawks have been conducted in several project areas within the Kawishiwi Ranger District over the past 6 years. Three occupied goshawk nesting territories have been found. One of them is within the Glacier project area. Eight survey routes consisting of approximately 60 calling points were conducted in the Glacier area in 2006 and 2007(survey records in project file). The best potential goshawk habitat is within the large mature upland patches in the Fernberg corridor and south of the Kawishiwi River and southwest of Birch Lake (goshawk map, project record). 2005 Forest-wide survey efforts showed an increase of known breeding pairs over those known in 2003 (Annual Monitoring Report 2006). Based on the 2007 Statewide Goshawk monitoring effort there are 26 known territories on the Superior National Forest. Nine were known to be occupied in 2007.[484]

Contrary to recent practice and NEPA and MEPA requirements, the FEIS provides no context on goshawk territories or population.

In addition to its gaps in crucial information, the NorthMet BE minimizes the amount of impacted acres from the project to "158 acres of mature upland forest habitat" that "would be directed affected" and compares it to "625,000 acres of upland forest within the CESA that could now, or in the reasonably foreseeable future, provide habitat for northern goshawk," concluding that "habitat loss from the Project would have a negligible cumulative effect on northern goshawks in the CESA."[485] But further investigation reveals that the 625,000 acre figure does not take account of any factors that make large portions of that forest unsuitable for goshawks, including fragmentation, age, size of patches, and noises and other disturbances. It is patently false that in the reasonably foreseeable future, this forest will become less fragmented, older, and subject to less noise and disturbance.

The Glacier Project BE reveals that *forest-wide*, the predicted suitable habitat for northern goshawks (large patches of upland mature forest) is about 300,000 acres.[486] It is unclear from the FEIS or the BE how many acres of suitable habitat will be directly and indirectly affected by the NorthMet project. This would include acreage that, while not directly impacted, is lost to goshawks because it

[484] Susan Catton *et al.*, Glacier Project Draft Environmental Impact Statement Appendix F at F-18 (2007) (attached as exhibit 22a).
[485] BE 5-61, FEIS App. D (citing Emmons and Olivier, Inc. 2006:30, 38).
[486] Ex. 22a at F-22.

is no longer contained within a large enough patch of mature upland forest.[487] It would also include acreage affected by noise, traffic, and human presence. For the cumulative effects analysis, added to that would be habitat similarly affected by other past, present, and foreseeable future projects.

The Glacier Project BE also reveals that "Foraging areas for nesting goshawk can range from 21,000 to 27,200 acres surrounding the nest site," which again puts the total of 300,000 available acres in perspective. It would appear from these numbers that there is only sufficient habitat for about 15 breeding pairs of northern goshawks within the Superior National Forest, although the Forest Plan provides a goal of 20 to 30 breeding pairs. The loss of even one breeding pair appears significant in this context, and would be even more significant if additional breeding pairs are threatened by other foreseeable projects and activities. But the FEIS gives us none of this information. In sum, due to the failure of the FEIS to provide meaningful and detailed information and analysis, neither the public nor agency decision-makers have any idea what this project means for northern goshawks in Minnesota or the Superior National Forest. The FEIS has not done its job.

The FEIS provides even less information on great gray owls, which also use the site.[488] The best information we were able to obtain--again, *outside* of the FEIS--was the last annual wildlife survey report released by the Superior National Forest in 2009. This report indicates that surveys of the "Laurentian Forest Province of Minnesota" observed one great gray owl in 2008 and two in 2009.[489] Nesting information from the same report states,

> MOU records show one nesting record in Lake County. The Biotics database listed two nests in 2004 and four nests as of 2009: the latest two were found and protected, and are annually monitored by FS biologists. NRRI observed one individual during forest breeding bird surveys between 1991 and 2002. There are approximately 36 great gray owl nesting platforms on the SNF since 2007. Platforms have been monitored every year with no detections as of yet.[490]

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[487] For more information on northern goshawk status and habitat needs, see Ex. 22b (D. Coleman Crocker-Bedford, "Goshawk Reproduction and Forest Management," *Wildl. Soc. Bul. 18:262-69* (1990)); Ex. 22c (K.S. Marvel, "Northern Goshawk Nest Activity as an Indicator of Habitat Quality on Three National Forests in Southern Utah," *All Student Publications* (2007)); Ex. 22d (Richard T. Reynolds et al., "Management Recommendations for the Northern Goshawk in the Southwestern United States," *USDA Forest Service Technical Report RM-217* (1992)); Ex. 22e (John R. Squires and Patricia L. Kennedy, "Northern Goshawk Ecology: An assessment of current knowledge and information needs for conservation and management," in Michael L. Morrison, ed., *The Northern Goshawk: A Technical Assessment of its Status, Ecology, and Management 8-62* (2006)); Ex. 22f (A. Kari Stuart-Smith et al., "A Scientific Basis for Managing Northern Goshawk Breeding Areas in the Interior of British Columbia" (2012)); Ex. 22g (D. Noah Greenwald, "A review of northern goshawk habitat selection in the home range and implications for forest management in the Western United States," *Wildl. Soc. Bull. 33(1):120-129* (2005)).

[488] FEIS 4-244.

[489] Ex. 22h (Superior National Forest, Fiscal Year 2009 Monitoring and Evaluation Report Chapter III, Section 9b, "Regional Forester Terrestrial Sensitive Species," at 9b.14 (July 2011)).

[490] *Id.* at 9b.15.

This report indicates that the fact that great gray owls have been seen nesting and hunting at the PolyMet site is far more significant than one might suppose from reading the FEIS. The agencies' failure to analyze and disclose this directly relevant information in the FEIS violates NEPA.

While northern goshawks, great gray owls, and moose are three species that are known to make use of the mine site and the federal lands, the site also provides habitat for a number of other sensitive species, which are listed in the BE and FEIS.[491] The FEIS must also provide substantially more information on these species of concern, their habitat, and threats to their habitat throughout the Superior National Forest and the state of Minnesota in order to provide a rational and scientifically supported basis for the agencies' judgment as to the significance of the loss of habitat from this project in conjunction with other past, present and reasonably foreseeable actions

The agencies' consideration and disclosure of the cumulative impacts to federally-listed lynx, wolves, and the northern long-eared bat in the FEIS is also insufficient. Each of these imperiled species has been identified as present in the affected region, and would admittedly be adversely affected by the proposed mine.[492] But the FEIS provides only general and already obvious information that does not satisfy the hard look required by NEPA.[493] The FEIS, for instance, discloses that cumulative impacts would result in "additional" habitat fragmentation, "may increase pressures" for lynx and wolves, "would likely result" in additional traffic and potential collisions, and "could affect" northern long-eared bats through habitat destruction and fragmentation.[494] Yet the FEIS fails to take the next required step to quantify or estimate the extent and magnitude of these anticipated cumulative impacts in any way, or otherwise explain what these cumulative impacts could mean for these already imperiled populations in the region. This information is critical to allow the public and decision maker to actually weigh the significance of the likely cumulative impacts to these listed species.

We also object to geographical limitations on the projects and activities considered in the cumulative impacts assessment for wildlife.[495] According to the text,

> The spatial CEAA [Cumulative Effects Assessment Area] for wildlife includes the portions of the Mesabi Iron Range located within the Nashwauk Uplands and Laurentian Uplands ecological subsections (see Figure 6.1.1-1). The area has been limited to the Mesabi Iron Range, as it is a definable physiographic region encompassing the region's mining, which represents an influential land use in regards to wildlife and wildlife habitat.[496]

Figure 6.1.1-1 shows the "Mesabi Iron Range" within the "Nashwauk Uplands" and the "Laurentian Uplands" to be a very narrow band of territory with no relationship to the range of any of the wildlife species of concern.

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[491] BE 1-14 to 1-16, FEIS 4-239 to 4-245.
[492] FEIS 6-79.
[493] *Neighbors of Cuddy Mountain*, 137 F.3d at 1379-80.
[494] FEIS 6-79.
[495] FEIS 6-72.
[496] FEIS 6-71.

Despite the above language, the assessment is not limited to the Iron Range for anything except mining projects. For example, the scant information provided on changes to habitat in the area are given for the entire Nashwauk Uplands and Laurentian Uplands areas.[497] And in regards to non-mining projects, the impacts of both "community growth and development" and "forestry practices" are given at the "regional" level, which is undefined. Regarding impacts from mining, however, the FEIS inexplicably omits activity outside the narrow band of the Iron Range.

In May 2012, the Forest Service completed an EIS for 29 federal hardrock mineral prospecting permits that acknowledged impacts to wildlife including up to 163 miles of new roads, increased traffic volume, and the increased noise from drilling.[498] Although the mineral prospecting EIS was limited to an identified number of projects where the federal government owns the mineral rights, there are many additional mineral exploration projects within and near the Superior National Forest where the mineral rights are owned by private interests or the State, along with numerous other projects that were not included in the NorthMet FEIS.[499] Additionally, the BLM is currently considering potential lease renewals for Twin Metals, which would result in additional exploration and other mining activities.[500] And the Forest Service recently released an Environmental Assessment for the Twin Metals hydrogeological study; the Biological Evaluation from that project is included here.[501] All of these projects will have impacts on wildlife, each of which may not be significant standing alone, but are very likely to be significant in the aggregate. None of these projects, however, are considered in the FEIS cumulative impacts analysis for the NorthMet project.

Defining an area for the assessment of cumulative impacts must begin by looking at the resource that is potentially affected. If viability of a species within the Superior National Forest is being assessed, the appropriate area for assessing past, present and foreseeable future activities that could cumulatively impact the species is the Superior National Forest. If viability within the state is being assessed, the appropriate area is that area of the state that provides habitat for the species. Without providing information on foreseeable threats to a species in other portions of its territory, it is impossible to know the import of threats within whatever narrow area the agencies arbitrarily choose to assess.

**22.1 Cumulative impacts on rare plants**

The FEIS contains a similar problem in regard to rare plants. This issue was raised in our comments on the SDEIS at Friends 63-64 and CBD 76, as well as in our letter of October 8, 2015 to Forest Supervisor Brenda Halter. The comments and letter are attached, and the referenced pages

[497] FEIS 6-73.
[498] Superior National Forest, Final Environmental Impact Statement, Federal Hardrock Mineral Prospecting Permits 167-183 (May 2012) (attached as exhibit 22i).
[499] *See Id.* App. C; Superior National Forest, Twin Metals Minnesota Hydrogeologic Study Special Use Permit Environmental Assessment App. B (Oct. 8, 2015) (attached as exhibit 22j).
[500] Bureau of Land Management, NEPA Log FY 2013 (website accessed Nov. 23, 2015) (attached as exhibit 22k).
[501] Superior National Forest, Twin Metals Minnesota Hydrogeological Study Special Use Permit App. G – Biological Evaluation of Regional Forester Sensitive Species (June 2015) (attached as exhibit 22l).

incorporated herein. This issue was not addressed in either the Response to Comments or the text of the FEIS, in violation of 40 C.F.R. § 1503.4(a).

The cumulative effects analysis for rare plants provides the same delineation of the "cumulative effects assessment area" (CEAA) as is discussed above for wildlife, i.e, the portion of the Iron Range within the Nashwauk and Laurentian Uplands.[502] It then discusses the number of populations of rare plants for which Takings Permits have been issued within the CEAA.[503] But rather than comparing the number of affected populations in the CEAA with the total number of populations in the CEAA, it instead provides a comparison with the number of populations statewide. The FEIS simply assumes that all populations outside the CEAA are secure, an assumption that has no basis in the record.

Furthermore, limitation of the analysis to impacts for which Takings Permits have been issued very likely understates the impacts. According to the assessment for three plant species, none are expected to be indirectly affected. We question whether Takings Permits are an appropriate means to assess indirect effects; we doubt that mining companies have applied for Takings Permits for such effects, which are usually somewhat uncertain until after they occur.

At any rate, the fact that as much as 8 percent of the *statewide* population of one species (ternate grapefern) is expected to be directly affected by currently planned "takings" on the Iron Range alone gives one reason for pause. Without some information about threats to this species throughout its range in Minnesota, the conclusion that "the cumulative effects of the NorthMet Project Proposed Action and other reasonably foreseeable activities are not expected to jeopardize the presence of B. rugulosum in Minnesota" is unfounded. The same is true for all of the other species of concern that will be impacted by this project, including the floating marsh marigold.

## 23.0 The EIS includes information provided by PolyMet contractors that has not been independently verified by the agencies.

The Council on Environmental Quality's NEPA regulation on "Agency Responsibility" clearly establishes agency duties to choose unconflicted contractors, confirm that lack of bias in writing, and supervise contractor work on EIS documents in order to maintain agency control.[504] Since Co-Lead Agencies required Polymet "to submit environmental information for possible use by the agency in preparing an environmental impact statement, . . . The agency *shall independently evaluate the information submitted and shall be responsible for its accuracy*."[505]

Moreover,

> any environmental impact statement prepared pursuant to the requirements of NEPA shall be prepared directly by or by a contractor selected by the lead agency . . . . It is the intent of these regulations that the contractor be chosen solely by the lead agency . . . to avoid any conflict of interest. Contractors shall execute a disclosure statement prepared

[502] FEIS 6-63.
[503] FEIS 6-67 to 6-68.
[504] *See* 40 C.F.R. § 1506.5.
[505] 40 C.F.R. § 1506.5(a) (emphasis added).

> by the lead agency . . . specifying that they have no financial or other interest in the outcome of the project.[506]

Numerous circuits have read these requirements to obligate agencies to properly engage with unconflicted contractors and see to it that the proper disclosures are complete.[507] Furthermore, numerous federal courts have required agencies to perform rigorous independent review of contractor and applicant information in order to prove compliance with 40 C.F.R. § 1506.5(a).[508]

In general, the Final EIS relies far too much on work from PolyMet and Barr Engineering. In some cases, the SDEIS simply adopts statements from PolyMet without any independent verification, such as the estimates of tax revenues for the state[509] or financial assurance estimates, as discussed further in Section 2. This is also the case for many of the inputs into the water model, including recharge and vertical conductivity, as discussed further above.

**24.0 <u>The FEIS fails to assess the potential impacts of mineral fibers on public health.</u>**

The FEIS discussion of fibers misstates the current state of knowledge and scientific methodology for virtually every element that is needed for an assessment of the potential impacts of mineral fibers on public health. The FEIS must disclose and base its conclusions on the best evidence and methods available, rather than continuing to repeat the outdated position that nothing is known or can be known about the toxicity of fibers or the level at which a new facility will emit them. This issue was raised in our comments on the SDEIS at CBD 87-99 and Friends 74-75, which along with reference material cited in those comments is attached and incorporated herein.

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[506] 40 C.F.R. § 1506.5(c).

[507] *See*, *e.g.*, *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190 (D.C. Cir. 1991) (remanding to a federal agency when a contractor was chosen by a local agency and had not completed a required disclosure regarding conflict); *Sierra Club v. Van Antwerp*, 526 F.3d 1353, 1368 (11th Cir. 2008) (while remanding approval of EIS to the district court, "A conclusory decision to place decisive reliance on contested data submitted by an interested party is not reasoned, and therefore deserves no deference." (Kravitch, J., concurring in part and dissenting in part)); *Sierra Club v. Van Antwerp*, 709 F.Supp.2d 1254 (S.D. Florida 2009) (finding on remand that the Corps's reliance on conflicted applicant reports was arbitrary and capricious), *affirmed, Sierra Club v. Van Antwerp*, 362 Fed.Appx. 100 (11th Cir. 2010); *Center for Biological Diversity v. Federal Highway Admin.*, 290 F.Supp.2d 1175, 1186 (9th Cir. 2003) (contractor with clear, disclosed, conflict who prepared part of an FEIS did not compromise NEPA process because contribution was carefully reviewed by agency and contractor writing FEIS).

[508] *See Valley Community Preservation Com'n v. Mineta*, 231 F.Supp.2d 23 (D.D.C. 2002) (following *Associations Working for Aurora's Residential Environment v. Colorado Dep't of Transportation*, 153 F.3d 1122, 1129 (10th Cir.1998)). In the Eighth Circuit this oversight is sufficient when an agency hires a truly independent contractor to verify conflicted contractor work, and then performs another independent review of the contractors' work at the agency level. *See Mid States Coalition for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 547–48 (8th Cir. 2003).

[509] FEIS 5-858, relying on a "personal communication" from PolyMet from March 29, 2012, despite the fact that the state should have *more* expertise on the question of potential tax revenue.

The FEIS assessment of mineral fibers appears to be based on information from before 2009. Scientists have done a great deal of work in the past six years developing the ability to assess the toxicity of fibers of all kinds. As the FEIS puts it, "[E]xisting credible scientific evidence, with additional research, may one day provide guidance for future development of a human health based standard for amphibole mineral fiber. There is an ongoing effort in the environmental health community to develop the scientific tools and expertise to arrive at such a standard in the future."[510] These tools and expertise have advanced significantly in the past few years.

On October 6 and 7, 2015, the conference on Asbestos-like Mineral Fibers in the Upper Midwest: Implications for Mining and Health was held at the U.S. EPA Mid-Continent Ecology Division in Duluth (hereinafter "Duluth Conference"). The work of EPA research scientist Phil Cook on the toxicity of fibers was presented along with other research and information indicating that it is now possible to estimate the potential health impacts from mineral fibers such as those from Northshore Mining's Peter Mitchell Pit and surrounding mines. The Co-lead Agencies should investigate the current potential for estimating toxicity rather than simply deeming the likely toxicity of fibers from the Duluth Complex as unknown and unknowable.

It is also untrue that estimates of emissions of fibers cannot be made. While it may be true that the emissions level cannot be pinpointed with certainty, the same is true of both emissions and discharges of all the other substances that will be released at this mine. The agencies must perform the appropriate studies and calculations of mineral fibers emissions and toxicity at the level of accuracy allowed by existing science, and provide that assessment in the FEIS.

As in so much of the FEIS, the discussion on amphibole mineral fibers begins by minimizing the issue. The first sentence states that the Duluth Complex "may" contain amphibole mineral fibers, as though the very presence of amphibole fibers is still unknown.[511] This is contradicted by the text in the FEIS itself.[512] The introduction goes on to state that taconite ore from the Northshore Mine "has received public attention with regard to potential releases of amphibole mineral fibers."[513] There is nothing "potential" about these releases; the Minnesota Department of Health and Pollution Control Agency have reams of data stretching over forty years indicating high levels of amphibole mineral fibers emitted from the Peter Mitchell Pit and the Northshore Mining processing plant.

The debate over the toxicity of mineral fibers released by mining in Northeastern Minnesota has long rested on the premise that because these fibers are not "asbestos," nothing is known about their toxicity; the NorthMet FEIS follows in this vein. Rather than designing studies to look at the toxicity of *these* fibers, industry has tried to keep attention on the toxicity of "asbestos" fibers and the alleged impossibility of correlating the information.

In the meantime, Phil Cook and a number of researchers studying the fibers that have cost so many lives in Libby, Montana, have set aside the argument over what is and is not "asbestos" or "asbestiform" and have instead looked at toxicity studies of a range of fibers with variable factors

[510] FEIS 5-515.
[511] FEIS 5-513.
[512] FEIS 5-517.
[513] FEIS 5-513.

such as particle dimensions, mass, shape, surface area, and material type. As some of these researchers point out in a 2011 journal article, "For regulatory and health assessment purposes, it is microscopical morphology that counts: there is no evidence that potentially affected cells can distinguish between 'asbestiform' and 'nonasbestiform' fibres having the equivalent dimensions."[514]

The EPA put together a database of 70 mineral fiber samples used in biological studies and characterized by transmission electron microscopy (TEM).[515] The database includes fibers from the Peter Mitchell Pit, several types of UICC asbestos fibers, and other mineral fibers not classified as asbestos.[516] This work was done in response to the understanding that although non-asbestos fibers (including "cleavage fragments") may not be as toxic as asbestos, that does not mean that they are benign.

As Dr. Roberts pointed out in his report to MDH,

> The current approach for evaluating risk from airborne asbestos dates back to 1986 and is based upon measurement of fibers of a specified size and aspect ratio (i.e., length-width ratio) using phase contrast microscopy (PCM). There are a number of problems with this approach related to the technology for fiber detection and measurement [PCM], the way in which mineral fibers of interest are defined, and the assumption that a single toxic potency value is adequate to characterize risk from all relevant mineral fiber types.
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> . . . . .
>
> Further, there is also concern mineral fibers that pose cancer risk by inhalation may be defined too narrowly, and that a single potency value for asbestos is too simplistic to adequately cover the variety of fiber sources and exposures that exists.[517]

Dr. Roberts was tasked with assessing whether the EPA database provided sufficient information to allow estimates of toxicity of a range of mineral fibers, wholly aside from their categorization as "asbestos." Specifically, Dr. Roberts was asked to answer three questions:

1. Can the available data be used to provide fiber potency estimates?
2. Are available data adequate for dose-response modeling?
3. Is physiologically-based pharmacokinetic (PB-PK) modeling feasible?

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[514] Ann E. Aust, et al., "Morphological and Chemical Mechanisms of Elongated Mineral particle Toxicities," Journal of Toxicology and Environmental Health, Part B, 14:40-75 (2011) at 53 (*quoting* B. Case, "On talc, tremolite, and tergiversation," Br. J. Ind. Med. 48:357–360 (1991) (attached as exhibit 24a).

[515] Stephen M. Roberts, Report to the Minnesota Dept. of Health: Validation of the U.S. EPA Database for Fiber Sample Doses Used in Biological Studies at 3 (Sept. 2010) (attached as exhibit 24b).

[516] *Id.* Table 1.

[517] *Id.* at 3, 5.

The answer to all three questions was "yes."[518] At the time the report was written (2010), Dr. Roberts noted that although PB-PK modeling was feasible, it did not yet exist, but that it was being developed through the Libby Action Plan and would likely be available in the near future.[519] That work has now been done, and was reported on at the Duluth Conference. Thus if the statement in the NorthMet FEIS that "[t]he Co-lead Agencies believe that there is currently incomplete and unavailable scientific information to characterize the health risk to the public from exposure to mineral fibers and that the means to obtain such information are not known" is true, it is only because the agencies have failed to investigate and inform themselves of the current state of the science.

At the Duluth Conference, Acting Division Director Dale Hoff presented the late Phil Cook's work on calculating fiber potency estimates. The framework was to set the toxicity of UICC amosite asbestos at a potency of 1.0, and to estimate the relative potencies of other fibers as indicated by modeling based on the data in the EPA database. To our knowledge this material has not yet been published, but the methodology and database are available.[520]

The EPA estimates that 0.0004 UICC amosite asbestos fibers per cubic centimeter in ambient air will result in one additional cancer per 10,000 people.[521] While the discussion below relates to cancer risks, non-malignant health risks can be of even greater concern.[522]

We recognize that the sum of the various types of fibers that are emitted by the mining industry in Northeastern Minnesota is likely less toxic than amosite asbestos. However, any assessment of the impact on public health has to include a discussion of the level of fibers in the ambient air, both before and during operation of the proposed mine. Information on existing fiber levels is available from MPCA and MDH. This information should have been included in the FEIS, along with a comparison to levels in a non-impacted area.

We are submitting two exhibits containing monitoring data for ambient air in Silver Bay, Beaver Bay, and Babbitt. The most recent data we have for Silver Bay (F1) and Beaver Bay (F7) is contained on an Excel spreadsheet prepared by MPCA staff and provided to Le Lind on January 24, 2007.[523] The average amphibole fiber count in the ambient air in Silver Bay (F1) in 2006 was 4,998 fibers per

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[518] *Id.* at 11.
[519] *Id.*
[520] Dr. Hoff may be reached at hoff.dale@epa.gov or 218-529-5010.
[521] U.S. EPA, Integrated Risk Information System Chemical Assessment Summary for Asbestos (Sept. 26, 1988) (attached as exhibit 24c). The Minnesota Department of Health (MDH) uses a benchmark of 1 additional cancer per 100,000 people to arrive at "Health Risk Values." Minn. R. 4717.8050(3). Although 0.01 fibers per cubic centimeter is sometimes cited as the Minnesota standard for asbestos, that standard is used as an indicator of hazard, rather than a chronic health standard. *See* Minn. R. 4620.3592(5)(F) (if concentration exceeds 0.01 fibers per cc, "the asbestos work area must be evacuated.")
[522] Aubrey Miller, National Institute of Environmental Health Sciences, "Geology and Health 101," Presentation at Duluth Conference (Oct. 6, 2015).
[523] MPCA Ambient Air Monitoring Spreadsheet provided to Le Lind on January 24, 2007 (attached as exhibit 24d).

cubic meter.[524] The average amphibole fiber count in the ambient air in Beaver Bay (F7) in 2006 was 5,823 fibers per cubic meter. This translates to 0.0050 fibers per cc in Silver Bay and 0.0058 fibers per cc in Beaver Bay. If these fibers were as toxic as amosite asbestos, this would translate to an increased cancer risk of 12.5 and 14.5 in 10,000. We are also submitting three sampling data sheets for monitoring in Babbitt in 2008.[525] One had a result of zero; the average of the other two samples is 8,806 amphibole fibers per cubic meter, or 0.0088 fibers per cc. This would amount to an estimated increased cancer risk of 22 in 10,000 for amosite asbestos.

Thus even if the sum of toxicity of fibers from Minnesota mines is only one-tenth the toxicity of amosite asbestos, the ambient air in Minnesota mining communities is already above the EPA benchmark, which is regarded as an indicator of an acceptable level of risk.[526]

The Minnesota Air Toxics Study published in 2005 reported on monitored levels of listed air toxics between 1996 and 2001. Although the study found that a few substances were present in ambient air at above the benchmark for an additional 1 in 100,000 increased cancer risk, *no* substance was present above the benchmark for an additional 1 in 10,000 increased cancer risk at *any* location. This indicates that even if the sum of toxicity of fibers from Minnesota mines is *one-hundredth* the toxicity of amosite asbestos, it is still one of the most serious air toxics health issues in Minnesota.

This situation is allowed to continue in part because the State focuses attention on epidemiological studies in regard to mineral fibers from mining, while for every other toxic substance (and for mineral fibers from any other industry), allowable levels in the ambient air are based on toxicological studies. Limitations based on toxicological studies protect the public at a level that is not measurable in the local population by epidemiological studies. Given the size of the local population, it would be impossible to detect an increase of one additional cancer in 10,000 people on the Iron Range, much less assign a cause. And yet discussions of the toxicity of fibers in the ambient air on the Iron Range and North Shore invariably center on epidemiological studies such as the Minnesota Taconite Workers Study. The NorthMet FEIS repeats this pattern.[527] Minnesota agencies apparently will not require that amphibole fibers in the ambient air in Northeastern Minnesota remain below a certain level until the increase in cancer in the general population is measurable, despite the fact that MDH consistently rejects such an approach as insufficiently protective of public health. Standard agency practice for protecting the public from airborne toxins is nowhere to be found in the public discourse.

Turning to the proposed NorthMet project, any additional health risks from fiber emissions would add to an ongoing problem. The current situation does not allow for permitting a new facility and then monitoring to find out if the fiber level in ambient air in local communities increases. We are already past that point.

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[524] A few samples had results of zero fibers of any variety. We judged these results to be most likely due to equipment malfunction, and thus omitted them from the calculations.
[525] Minnesota Department of Health – Environmental Laboratory Final Report for MPCA Air Quality, (Sept. 30, 2008) (attached as exhibit 24e).
[526] *See, e.g.,* MDH, Health Consultation: Residual Soil and Indoor Asbestos Assessment, Western Mineral Products Site (Feb. 21, 2012) at 8-10 (attached as exhibit 24f).
[527] FEIS 5-515 to 5-516 (citing a toxicological study that "found non-asbestiform particles to be cytotoxic," and then countering that with several epidemiological studies).

As the NorthMet FEIS acknowledges, amphibole fibers are present in the NorthMet ore. The discussion of the levels of fibers in the ore attempts to minimize concern without telling us anything about what the level actually is. The text states that "amphibole mineral fibers were found to represent a relatively small percent of the mineral fibers associated with the processing of NorthMet Deposit ore; approximately 9 percent of the fibers identified from all collected samples of ore, tailings, and process water."[528] But the text does not tell us the total number of fibers identified or the volume of ore, tailings, and process water that they were identified in, so 9 percent means absolutely nothing.

The text goes on to say that "It is not possible to accurately quantify the amount of fibers that might be emitted from the facility." This is a curious statement in light of the quantification of emissions of virtually every other possible pollutant.[529] The FEIS provides no explanation or reference for this judgment.

This statement appears to set up a hurdle for the assessment of fiber emissions that is counter to both NEPA and the other analyses in the FEIS. While we agree that assessments should provide the greatest degree of accuracy possible, NEPA does not allow agencies to forego an assessment because it will not meet some undefined level of accuracy. Instead, the agency must use the best methods and data available, with explanations of the uncertainty involved. Taking an example from the FEIS itself, the water quality modeling provides variable inputs of water quality that may differ by orders of magnitude to consider a range of scenarios. For some of these estimates, there is no correlation between the modeled "continuation of existing conditions" and actual existing conditions at the site. Given the sophistication of air modeling in use today, we find it hard to believe that a similar level of accuracy is not possible for fiber emissions.

Quantifying emissions involves two steps: measuring fiber levels in rock or process and waste streams; and applying emission factors and modeling to estimate levels in the ambient air. We found nothing in the record that indicates either of these cannot be done, and the FEIS does not say which of these steps makes the analysis impossible. Throughout the FEIS, analogs of other mine pits, waste rock, river systems, etc. are used where there is a lack of site-specific information. In addition, values from the Regional Copper Nickel Study are often included in analyses, and were in fact included in the discussion of fibers. Rough estimates of fiber levels in the ore and of the resulting impacts on ambient air can be drawn from these sources.

In regards to measuring fibers in the ore, the study presented in Barr 2007l was done for precisely this purpose. We did not find an explanation of why this information could not be used as a basis for an estimate of the average level of fibers in the ore; if it is because the data set was not large enough, there is no explanation as to why a larger study could not be done.

If PolyMet wants to perpetuate a lack of site-specific data, a report done for the Copper Nickel Study (and referenced in the FEIS) provides a comparison between the Duluth Complex and fiber levels in the Biwabik Formation, which hosts the Peter Mitchell Pit: "The Duluth Complex data

[528] FEIS 5-517.
[529] *See* PolyMet 2015e.

show approximately 1/3 the amphibole content of the Biwabik formation. Based on this comparison, the Duluth gabbro will produce, on an average, concentrations of amphibole comparable to or less than those of Reserve Mining Company."[530]

The authors of the Copper Nickel Study obviously believed that enough was or could be known about the level of fibers in ore and the fate of those fibers in processing to support modeling of fiber levels in ambient air.[531] While the modeling for the Copper Nickel Study cannot be used directly for the NorthMet FEIS because the scenario modeled included a smelter and a larger volume of ore being processed, a similar site-specific modeling effort cannot be impossible for the NorthMet project. Indeed, the Copper Nickel Study explicitly expected that such an effort would be undertaken before permitting a particular project: "[T]hese estimates simply serve to highlight areas requiring further investigation. The site- specific considerations for a smelter (and tailing basin) must clearly address this question in the light of more detailed data." [532]

Furthermore, the Stevenson report combined with analog information from the communities affected by Northshore Mining provides another avenue for a NEPA-level assessment of potential impacts from the proposed NorthMet mine. We assume that ambient air fiber levels in Babbitt in 2008 stem from the Peter Mitchell Pit; LTV had ceased operating by then, and Mesabi Nuggets had not yet started. Also, the processing plant in Silver Bay is the only local source of fibers in Silver Bay and Beaver Bay, so ambient levels in those locations can also provide an analog.

We assume that the NorthMet mine would process about 80% the amount of ore that Northshore Mining did in 2006,[533] and we acknowledge that the best information available is that the NorthMet ore likely contains about one-third the amount of fibers as the Peter Mitchell Pit. However, at the NorthMet mine, the mine pit and the processing plant are close enough to each other that they would emit fibers to the same ambient air, which would approximately double the amount of fibers from one of the sources alone. This results in an emissions level of about half that affecting any of the mining communities in 2006 or 2008 (.8 x .33 x 2). Given the current level of fibers in the ambient air, increasing them by 50% without any attempt to assess the public health implications is unconscionable. And the planned Mesabi Nugget's expansion would no doubt further add to the problem, depending on their source for taconite.

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[530] Ex. 24g at 20. Stevenson also noted the similarity of the fibers in the two formations: "Some comparison should be made between the Duluth Complex fiber generation potential and that of the Peter Mitchell Pit. Figure 42 is a comparison of a sample collected by Bonnichsen (1968) from the Peter Mitchell Pit and a sample from the AMAX test shaft. The samples were collected from sites within 10 miles of each other. Notice that the alteration of the olivine (01) to cummingtonite (c) produces the same acicular crystals."

[531] Ingrid Ritchie and Peter J. Kreisman, Regional Copper Nickel Study Vol. III, Chapter 3: Air Resources at 228 (1979) (attached as exhibit 24g).

[532] *Id.* at 229.

[533] Northshore's production in 2006 was approximately 5 million tons of pellets. Ex. 24d. Using the standard 2 to 1 ratio for waste to taconite pellets, this indicates that Northshore processed about 15 million tons of ore in 2006, compared to NorthMet's proposed 11.68 million tons per year.

Rather than disclose this information in the FEIS to inform permitting and other agency decisions, the Co-lead Agencies propose controls for $PM_{2.5}$, along with future monitoring. The levels of fibers present in the air from current mining operations reveal the fallacy of this approach. We have seen almost forty years of "regulation" of fibers at Northshore Mining, which has focused on installing supposed state-of-the-art particulate matter control technology. And while the fiber levels in ambient air are certainly lower than they would be without that technology, they still present a significant risk to public health. Are fugitive dust control measures planned for the NorthMet Mine that are not being used at Northshore Mining? If so, why isn't Northshore Mining using them?

If PolyMet will in fact use the best possible $PM_{2.5}$ control technology and practices, we fail to see how monitoring ambient air after the mine is built could help. If the agencies find that fiber levels have risen above a particular level, what action will be taken? What action will even be possible, if the best possible controls are already being used? It is clear that the State of Minnesota will not shut down an existing mining operation until epidemiological studies show that people are dying at levels that cannot be ignored. If state-of-the-art controls are already being used, the decision to permit this mine is in practicality a decision to accept the fiber emissions that will result and the subsequent fiber levels in ambient air. And yet the Co-lead Agencies have not even attempted to find out what those emissions and fiber levels will be.

## 25.0 The FEIS Adopts An Overly-Narrow Purpose and Need Statement for the Co-Lead Agencies That Improperly Eliminates Reasonable Alternatives.

The Purpose and Need Statements in the FEIS are improperly narrow, resulting in premature elimination of reasonable alternatives. The Co-Lead Agencies are expected to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action."[534] While the agency is free to take the needs of the project proposer into account, but those private interests should not define the scope of the purpose and need. Instead,

> Agencies must look hard at the factors relevant to the definition of purpose… Perhaps more importantly [than the need to take private interests into account], an agency should always consider the views of Congress, expressed, to the extent that the agency can determine them, in the agency's statutory authorization to act, as well as in other congressional directives.[535]

As the Seventh Circuit has explained, "One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing 'reasonable alternatives' out of consideration (and even out of existence)."[536]An overly-narrow purpose that focuses on the needs of

[534] 40 C.F.R. § 1502.13.
[535] *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C.C. 1991), *cert. denied* 502 U.S. 994; quoted by *National Parks & Conservation Ass'n v. Bureau of Land Mgmt.*, 606 F.3d 1058, 1070 (9th Cir. 2009).
[536] *Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664, 666 (7th Cir. 1997).

the applicant to mine a particular resource has the potential to narrow the range of alternatives "to those that would allow the miners to mine" the proposed property.[537]

The Purpose and Need Statements in the FEIS are categorized by entity, starting with PolyMet. While it is fine for the Co-Lead Agencies to include PolyMet's purpose, it is not appropriate to use that statement as a basis for defining reasonable alternatives. Nor is it appropriate for the Co-Lead Agencies to defer to the applicant's purpose and need, as noted above.

Then follows the NorthMet Project and Land Exchange Purpose and Need Statement, which presumably applies to all Co-Lead Agencies.[538] The first bullet point is:

- For PolyMet to utilize its leased mineral rights and recover commercial quantities and quality of semi-refined metal concentrates, hydroxides, and precipitates from the NorthMet ore body in northern Minnesota, and to process the recovered ore by reutilizing the former LTVSMC processing plant.

This is an improper adoption of PolyMet's purpose and need statement, as described above. This is PolyMet's purpose and need, not the co-lead agencies.

The third bullet point is:

- To extract and process metals in a technically and economically feasible manner, such that there would be sufficient income to cover: operating cost (which includes but is not limited to the cost of mining, processing, transportation, and waste management), capital cost (needed to build and sustain facilities), an adequate return to investors, reclamation, and closure costs and taxes.

This is also an improper purpose and need statement for the Co-Lead Agencies. Putting an emphasis on whether PolyMet's venture is profitable emphasizes PolyMet's investors over environmental concerns. It is clearly designed to eliminate reasonable alternatives such as underground mining and the West Pit backfill from consideration, rather than to allow neutral assessment of those alternatives.

By referencing the company's plan, the company's profitability, and the company's processing plant, the agencies do not allow themselves any alternatives. They certainly do not allow for ore to come from any seam but the one identified by Polymet.
DNR's Purpose and Need statement is essentially a shortened version of PolyMet's:

> The Purpose and Need of the Proposed Action is to produce base and precious metals precipitates and flotation concentrates from ore mined at the NorthMet Deposit by uninterrupted operation of the former LTVSMC processing plant. The processed resources would help meet domestic and global demand by sale of these products to domestic and world markets.

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[537] *Sierra Club v. Antwerp*, 709 F.Supp.2d 1254, 1269 (S.D. Florida 2009)(*aff'd* 362 F.Appx. 100 (11th Cir. 2010).
[538] FEIS 1-11.

This is the same Purpose and Need statement in the SDEIS. Thus, The Conservation Organizations repeat the same comments, including those in Section 19.2 of MCEA's SDEIS comments.

## CONCLUSION

The Conservation Organizations submit that the FEIS is inadequate in a variety of ways, and the Co-Lead Agencies cannot determine that it is adequate based on the existing record. In addition, the Conservation Organizations request a Supplemental EIS on the topics described above, including the alternative of dry stacking the tailings based on new information from the Mt. Polley Independent Report, as well as the potential for northward flow from the mine based on new information regarding the Peter Mitchell Pit.