

**Water Legacy Objections to USDA Forest Service
Federal Land Exchange for the PolyMet NorthMet Project**

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INTRODUCTION

WaterLegacy is a non-profit organization formed to protect Minnesota's water resources and the communities that rely on them. We have approximately 10,000 members and supporters across the state of Minnesota. Our members and supporters would be affected by the adverse impacts of the proposed PolyMet NorthMet sulfide mine due to their exposure to pollutants in air, drinking water, and food, their use of affected resources for fishing, gathering wild rice, hunting or recreation, and due to potential harm to their patients and communities of sulfide mining health impacts, financial and socioeconomic liabilities and loss of ecological services.

In the proposed PolyMet NorthMet land exchange, the USDA Forest Service (hereinafter "Forest Service") would exchange 6,650 acres of federal land in one contiguous parcel within the Superior National Forest for 6,690 acres in nine separate parcels. The responsible official for this transaction is Brenda Halter, the Forest Supervisor of the Superior National Forest, who signed the Forest Service Draft Record of Decision (hereinafter "DROD"). According to the Biological Assessment for the PolyMet NorthMet project prepared by the Forest Service and the U.S. Army Corps of Engineers (hereinafter "Army Corps"),¹ this land exchange would be the largest land exchange ever conducted by the Forest Service. (FEIS, App. D, Biological Assessment, p. 6-39).

The federal land exchange is proposed to allow the PolyMet Mining Company to dig an open-pit copper-nickel mine in sulfur-bearing rock. This is Minnesota's first proposed nonferrous mine. The PolyMet NorthMet sulfide mine is planned to operate for 20 years, over which time 533 million tons of waste rock and ore would be removed from the ground. The NorthMet sulfide mine would result in the excavation of three mine pits, with variable depths to 696 feet, three waste rock stockpiles, at the mining site - one of which would be a permanent unlined 526-acre waste rock pile, an unlined peat and overburden storage facility and a set of equalization basins for contaminated runoff and dewatering to produce sludge from reject concentrate at a processing plant nine miles away. The PolyMet NorthMet plant site would contain an active processing facility, a permanent unlined tailings waste storage facility and a

¹ U.S. Army Corps of Engineers, U.S.D.A. Forest Service, Biological Assessment for the Proposed NorthMet Project and Land Exchange, Apr. 2015, provided in FEIS Appendix D (hereinafter "Biological Assessment").

hydrometallurgical waste residue facility, in addition to a rail line and a pipeline connecting the NorthMet mine and processing plant sites. (FEIS ES-17, 3-44).

The NorthMet mine pits could be permanent sources of water pollution. (FEIS 5-144). Modeling shows that contaminated seepage from mine waste rock piles would require water quality treatment for at least 200 years, while seepage from tailings waste would require water quality treatment for at least 500 years in order to comply with water quality standards. (Tribal Comments and Co-Lead Agencies' Dispositions, Aug. 19, 2013, Exhibit 24).

The federal lands to be exchanged to allow the PolyMet sulfide mine development include the 100 Mile Swamp and the Upper Partridge River site, which are headwaters stream locations, classified as High Biological Diversity sites due to their high quality peatlands and rare plant species.

WaterLegacy submits these Objections to the Proposed PolyMet NorthMet Land Exchange (hereinafter "Objections") on the grounds that the proposed PolyMet NorthMet land exchange fails to comply with applicable federal law, federal policy and federal trust responsibilities of the U.S.D.A. Forest Service and does not serve the public interest. In addition, the PolyMet NorthMet Final Environmental Impact Statement (hereinafter "FEIS") is inadequate under federal law to support a record of decision proceeding with the land exchange. WaterLegacy concludes that the Forest Service should adopt the No Action alternative as the environmentally preferable alternative and the only alternative consistent with applicable law and the exercise of reasonable discretion.

WaterLegacy previously submitted timely and specific written comments regarding the PolyMet NorthMet proposed sulfide mine project and land exchange. 36 C.F.R. §§ 218.2, 218.5(a). Our November 29, 2010 scoping comments on the land exchange and our March 13, 2014 comments regarding the PolyMet NorthMet supplemental draft environmental impact statement (hereinafter "SDEIS comments") and proposed land exchange, along with expert reports and exhibits submitted with our comments, and other documents we reference in these Objections are provided in the WaterLegacy Appendix – SDEIS & Land Exchange References (hereinafter "WaterLegacy Appendix") and incorporated by reference.

As part of these Objections to Land Exchange, WaterLegacy has also submitted the following documents: Comments of WaterLegacy on PolyMet FEIS; Exhibits 1-43; and expert

reports of Brian Branfireun, Ph.D.; John Ipsen, M.D., Ph.D.; Bruce Johnson, Chemist/Biologist; Donald Lee, Ph.D., P.E.; Morgan Robertson, Ph.D.; and Margaret Saracino, M.D.

WaterLegacy's Objections rest on federal statutes, including the Federal Land Planning and Management Act (FLPMA), 43 U.S.C. §§ 1701-87 and the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-70. Under federal law, the Forest Service has no obligation to exchange Superior National Forest federal lands for private lands in order to facilitate the private pecuniary interest of a mining company. All land exchanges are discretionary. "The Secretary [of Agriculture] is not required to exchange any Federal lands. Land exchanges are discretionary, voluntary real estate transactions between the Federal and non-Federal parties." 36 C.F.R. §254.3(a). Proceedings to date regarding the PolyMet NorthMet project do not in any way require the Forest Service to proceed as new information and expert reports cast doubt on the Draft Record of Decision. "Unless and until the parties enter into a binding exchange agreement, any party may withdraw from and terminate an exchange proposal at any time during the exchange process." *Id.*

FLPMA precludes a federal land exchange unless it is based on equal value determined through an appraisal of the land. 43 U.S.C. §1716(b),(d). This federal appraisal is an underlying document, the release of which is required pursuant to NEPA regulations, 40 C.F.R. §1506.6(f), and the Freedom of Information Act (FOIA), 5 U.S.C. §552. The Forest Service's failure to make federal appraisals and instructions available despite repeated FOIA requests violates NEPA and the FOIA. The Forest Service cannot demonstrate that the proposed land exchange does not undervalue the federal land in violation of FLPMA and applicable regulations and policies.

FLPMA and NEPA require that the future use of the federal land must be considered to make a public interest determination and a comparison of alternatives. 43 U.S.C. §1716(a)(2); *Ctr. for Biological Diversity v. U.S. Dep't of the Interior*, 623 F. 3d 633(9th Cir. 2010); *Agdaagux Tribe of King Cove v. Jewell*, No. 3:14-cv-0110-HRH, 2015 U.S. Dist. LEXIS 118882 (D. Alaska, Sept. 8, 2015)(affirming final Record of Decision rejecting land exchange in favor of No Action alternative due to impacts of road construction on wildlife refuge). The beneficial and adverse effects of the mining use are critical to the determination of whether the public interest supports the proposed federal land exchange along with the proposed NorthMet mining alternative.

The DROD relies on the PolyMet NorthMet FEIS to disclose the effects of the land exchange and the mining project and inform the draft decision on the land exchange. (DROD 5). However, the Forest Service's claimed reliance on a final EIS does not insulate a proposed land exchange from scrutiny.

Where an FEIS failed to identify disadvantages of conveying lands into private ownership for mining and failed to make a meaningful comparison between the environmental effects of exchanging the land with the effects of not exchanging the land, the court held that "approval of the proposed land exchange was a violation of FLPMA and similarly arbitrary and capricious." *Ctr for Biol. Diversity v. U.S. Dep't of Interior, supra*, 623 F. 3d at 636. Without an accurate picture of the environmental consequences of the land exchange, the Bureau of Land Management (BLM) could not determine if the "public interest will be well served by making the exchange," and could not determine if the "values and the objectives" which the selected lands "may serve if retained in Federal ownership are not more than the values" of the offered lands. *Id.*, 623 F. 3d at 647.

A land exchange for Huckleberry Mountain was similarly rejected in *Muckleshoot Indian Tribe v. U. S. Forest Serv.*, 177 F. 3d 800 (9th Cir. 1999), despite the completion of an FEIS. The court found that the cumulative effects statements in the FEIS on which the Forest Service had relied to approve the land exchange "are far too general and one-sided to meet the NEPA requirements. The statements fall far short of a 'useful analysis.'" *Id.* at 811; citing *Neighbors of Cuddy Mountain v. U. S. Forest Serv.*, 137 F.3d 1372, 1379 (9th Cir. 1998); *City of Carmel-by-the-Sea v. U.S. Dep't. of Trans.*, 123 F.3d 1142, 1160 (9th Cir. 1997); *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1214-15 (9th Cir. 1998).

As detailed in WaterLegacy's FEIS Comments, the PolyMet NorthMet FEIS does not provide an appropriate foundation for approval of a federal land exchange. The Final Environmental Impact Statement for the PolyMet NorthMet open-pit copper-nickel mine project is a huge, cumbersome and repetitious document. It would be tempting to put it on a scale and deem it adequate by sheer weight alone. However, the PolyMet NorthMet FEIS fails to comply with the National Environmental Policy Act (NEPA), 42 U.S.C. §§4321 *et seq.*, and its implementing federal regulations.

An EIS must analyze the significant environmental impacts of a proposed action and provide a full and fair discussion of significant environmental impacts. 40 C.F.R. §1502.1.

The EIS must also disclose and respond to any responsible opposing view. 40 C.F.R. § 1502.9(b); *Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F. 3d 1157, 1167-1168 (9th Cir. 2003). An EIS must provide a thorough discussion of indirect as well as direct effects. 40 C.F.R. §1502.16(a), (b). In describing adverse effects, an EIS may not use a listing of mitigation measures and an unsupported assumption of their success to conclude that effects of a proposed action will be minimal. *Kentucky Riverkeeper v. Rowlette*, 714 F. 3d 402, 411-413 (6th Cir. 2013); *Ohio Valley Env'tl. Coalition v. Hurst*, 604 F. Supp. 2d 860, 868 (S. D. W. Va., 2009)(Under NEPS and CWA, reliance on the “success of a mitigation process to minimize cumulative impacts” without a rational explanation for reliance is arbitrary and capricious).

An EIS must meet basic standards for quality. “The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.” 40 C.F.R. §1500.1(b). An EIS may not manipulate models, rely on flawed mitigation analysis, work backwards to achieve a desired result, or otherwise use scientifically unsound analyses to draw conclusions as to the environmental impacts of a proposal. *See Environmental Defense v. U. S. Army Corps of Eng’rs*, 515 F. Supp. 2d 69, 74, 79-80 (D.D.C., 2007), *appeal dismissed*, 2008 U.S. App. LEXIS 28182 (D.C. Cir, Oct. 10, 2008). NEPA requires up-front disclosures of relevant shortcomings in the data or models. *See Lands Council v. Forester of Region One of the U.S. Forest Serv.*, 395 F. 3d 1019, 1032 (9th Cir. 2005); *Native Ecosystems Council v. U. S. Forest Serv.*, 418 F.3d 953, 964 (9th Cir. 2005).

An EIS must also meet basic standards of independence and integrity, what is often referred to as a “hard look” at the impacts of a decision. *See e.g. Mid States Coalition for Progress v. Surface Transportation Board*, 345 F.3d 520, 536 (8th Cir. 2003); “Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in the EIS” and “shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions.” 40 C.F.R. §1502.24.

One of the most significant roles the EIS must play is to facilitate the consideration of alternatives. An EIS must include information relevant to reasonably foreseeable significant adverse impacts and a choice among alternatives if the information can be obtained within the state of the art and costs of obtaining it are not exorbitant. 40 C.F.R. § 1502.22(b). An EIS must compare the potentially significant impacts of the proposal with those of other reasonable alternatives to the proposed project. 42 U.S.C. §4332(C)(iii) and (E); 40 C.F.R. §1502.1. Under

NEPA, the alternatives section of the EIS related to alternatives is “the heart of the environmental impact statement.” The EIS “Should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public.” 40 C.F.R. §1502.14.

An EIS must provide a thorough discussion of cumulative impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. 40 C.F.R. §1508.7.

Finally, an EIS may not be used to justify a decision already made. 40 C.F. R. §1502.2(g). An agency must exercise “independent judgment” and independently investigate a proponent’s claims that there are no practicable less damaging alternatives that would satisfy the project’s purpose. *Sierra Club v. Antwerp*, 709 F. Supp. 2d 1254, 1263, 1266 (S. D. Fla. 2009), *aff’d* 362 Fed. Appx. 100, 107 (11th Cir. 2010) (finding decision to grant limestone mining permits without examining non-wetland alternative locations arbitrary and capricious).

WaterLegacy’s comments on the PolyMet NorthMet FEIS demonstrate that the environmental review provided for Minnesota’s first proposed copper-nickel sulfide mine fails each of these tests for the quality, integrity, and content of an EIS. The PolyMet NorthMet FEIS is highly reliant on the project proponent’s modeling and on unsubstantiated assumptions from the project proponent for its conclusions. The FEIS not only fails to discuss opposing scientific views, it misrepresents peer-reviewed literature, the nature of tests conducted regarding the project, and even the documents contained in its own record. The FEIS discounts information as “unavailable,” where peer-reviewed literature and scientific best practices would have provided higher quality, if potentially inconvenient, analytic information.

The alternatives analysis is a scant few pages of the FEIS, and inadequate documentation is provided to support the rejection of substantive alternatives. Other than a smaller federal land exchange, no alternatives are considered. Although the FEIS mentions in various places that project effects would not occur under a No Action alternative, the FEIS fails to provide an accurate No Action baseline to compare impacts on water quality, thus biasing its results.

The FEIS repeatedly provides a list of possible mitigation options without evidence of their efficacy rather than analyzing relevant and significant potential impacts. The FEIS

manipulates models to avoid consideration of cumulative impacts on water quality and potential violations of the water quality standards. The FEIS fails to analyze issues of great significance and concern, including the synergistic effects of the PolyMet NorthMet project on mercury methylation, contamination of fish and resulting adverse impacts to human health, tribal resources and environmental justice.

As detailed in WaterLegacy's accompanying FEIS Comments, the PolyMet NorthMet FEIS is inadequate. It cannot serve as a basis for decisions following the letter and spirit of NEPA, our basic national charter for protection of the environment. 40 C.F.R. §1500.1. Even its statements about factual matters, such as the chemical composition of wastes, the collection rate of seepage and the direction in which water flows are suspect. The Forest Service may not rely on this FEIS to support the proposed land exchange. Closer and more objective review of the record demonstrates that the PolyMet NorthMet project does not meet basic legal requirements of federal law, would conflict with forest management, federal policies and trust responsibilities and would contravene the public interest.

- I. The proposed PolyMet NorthMet land exchange does not comply with NEPA, the FOIA, or with the Federal Land Planning and Management Act (FLPMA).**
- A. The Forest Service failed to release federal appraisals and instructions in violation of NEPA, the FOIA and its own policies.**

FLPMA and its implementing rules require a demonstration of equal value before a land exchange may take place. 43 U.S.C. §1716(b); 36 C.F.R. §§ 254.3(c), 254.12. The courts will enforce the requirements of FLPMA to ensure "appropriate federal guardianship" of public lands. Conservation groups have a right to "assure that no exchange takes place unless the governing federal statutes and regulations are followed, including the requirement that the land exchanged is properly valued by the agency." *Desert Citizens Against Pollution v. Bisson*, 231 F. 3d 1172, 1179 (9th Cir. 2000).

The Forest Service has valued the federal estate (6,650 acres) at a total market value of \$3,658,000 or an average of \$550 per acre and the non-federal land (6,690 acres) at a total of \$4,083,000 or an average of \$610 per acre.² The Forest Service plans to pay the PolyMet Mining Co. \$425,000 in taxpayer funds to "equalize" the difference in value. (DROD 8). The Forest

² The DROD states that the non-federal land is 6,690 acres. (DROD 8). The acreage reflected in DROD App. B is 6,680.38 acres, so average value for the non-federal land would be \$611 acre if App. B acreage were applied.

Service has provided no appraisal information or other underlying documents to support its land exchange valuation.

Since 2010, when WaterLegacy first reviewed the Forest Service Feasibility Analysis, we have been concerned that the Forest Service was undervaluing the federal estate by failing to appraise the Superior National Forest land which the PolyMet proposed to use for its open-pit copper nickel mine according to its highest and best use.³

WaterLegacy has sought to obtain the appraisal and appraisal instructions for the PolyMet NorthMet land exchange through Freedom of Information Act (FOIA) requests and appeals since 2012. The WaterLegacy FOIA Land Exchange Appraisal folder provided in the WaterLegacy Appendix contains a chronology of our efforts to obtain PolyMet NorthMet appraisal information, along with every FOIA request, FOIA appeal and Forest Service response to our requests. After reading the June 2015 preliminary version of the PolyMet NorthMet FEIS that explicitly relied on appraisal information to support the NorthMet land exchange, WaterLegacy requested “immediate release of the appraisal” for the proposed land exchange.⁴

WaterLegacy received few documents and these were highly redacted. The Forest Service’s September 9, 2015 response to WaterLegacy’s FOIA request stated that there were 1,775 pages “responsive” to our FOIA request, but that appraisal information in a land exchange was exempt from disclosure under exemption (b)(5) of the FIOA, permitting an agency to withhold “inter-agency or intra-agency” memoranda.⁵ Neither the appraiser not the Forest Service has asserted that any information in the requested documents was confidential or proprietary.⁶ Yet, The Forest Service withheld 1,701 out of these 1,775 pages, redacted substantive information regarding appraisals from 55 additional pages and provided only 19 pages in full, none of which contained substantive appraisal information. The Forest Service’s November 20, 2015 response to a follow-up FOIA request provided 42 pages of substantially redacted appraisal instruction documents.⁷

³ These concerns are reflected in WaterLegacy’s SDEIS Scoping Comment, Nov. 29, 2010 provided in the WaterLegacy Comments Land Exchange Scoping (2010) folder in the WaterLegacy Appendix.

⁴ WaterLegacy letter of July 30, 2015, Exhibit 12 in Land Exchange Appraisal folder.

⁵ Forest Service September 9, 2015 FOIA Response, Exhibit 13 in Land Exchange Appraisal folder.

⁶ *Id.*, and Forest Service Email FOIA Response of Sept. 22, 2014, Exhibit 8, provided in Land Exchange Appraisal folder.

⁷ Forest Service November 20, 2015 FOIA Response to WaterLegacy, Exhibit 19 in WaterLegacy FOIA Land Exchange Appraisal folder, *supra*.

WaterLegacy was entitled to receive the requested information under the FOIA, under NEPA and under Forest Service Manual policies. The requested information is objective data needed to determine whether the NorthMet land exchange complies with applicable law or whether the federal lands have been undervalued, serving the needs of the PolyMet Mining Company at the expense of the public.

The Forest Service's claims that a federal land appraisal is exempt from disclosure are unsupported. The federal appraisal is the underlying document that permits a federal land exchange under FLPMA. 43 U.S.C. §1716(d). Under NEPA, federal agencies are required to make "any underlying documents available to the public pursuant to the provisions of the Freedom of Information Act (5 U.S.C 552)." 40 C.F.R. §1506.6(f). The Forest Service Manual (F.S.M.)⁸ requires release of appraisal materials when a request is made pursuant to the FOIA. The Manual states that unless the responsible official documents a "sound legal basis for denial of access," the final approved appraisal reports for Federal and non-Federal lands in land exchange transactions shall be made available, upon written request, to all interested parties when an environmental assessment or draft environmental impact statement is released for public comment identifying a preferred alternative, and the appraisal report(s) have been reviewed and approved for agency use. F.S.M. §5412.11. Appraisal reports or appraisal information can only be withheld in accordance with provisions of the FOIA. F.S.M. §5412.2.

Case law under the FOIA does not provide the Forest Service with a sound legal basis for its claims for exemption from the FOIA. Exemption 5 only applies to "inter-agency or intra-agency memorandums or letters which would not be available by law to a party other than an agency in litigation with the agency." 5 U.S.C. §552(b)(5).

The land appraisals in this matter do not qualify as inter-agency or intra-agency memoranda, since each contract for appraisal of the federal and non-federal tracts is between the appraisal firm and the PolyMet Mining Co. as an "agent" of the U.S. Forest Service.⁹ No FOIA exemption 5 can apply either to appraisals conducted by private parties or to appraisal information reported to them. *Pagosans for Pub. Lands v. U. S. Forest Service*, No. 06-CV-00556-JLK-DLW, 2007 U.S. Dist. LEXIS 96814 (D. Col. Aug. 22, 2007)(Granting plaintiffs' motion for summary judgment and requiring disclosure of appraisal reports, including all

⁸ Forest Service Manual is available at http://www.fs.fed.us/im/directives/dughtml/fsh_1.html. Last visited dates are not provided in these footnotes, but all online sites have been visited since December 15, 2015

⁹ *Id.*, autop. 3, 8, 13, 17, 21, 25, 29, 33, 37.

valuation information); *recommendation affirmed*, 2008 U.S. Dist. LEXIS 28939 (D. Col. Mar. 31, 2008). Even had the appraisal been performed without PolyMet’s agency, an appraisal obtained pursuant to a federal requirement for a land exchange is discoverable in litigation. *U.S. v. 9.345 Acres of Land*, No. 11-803-JJB-SCR, 2012 U.S. Dist. LEXIS 128091, *16 (D.M.D. La. Sept. 10, 2012).

The underlying goal of FOIA was “to pierce the veil of administrative secrecy and to open agency action to the light of public scrutiny.” *Dep’t of the Air Force v. Rose*, 425 U.S. 352, 361 (U.S. 1976). “Congress intended FOIA to permit access to official action long shielded unnecessarily from public view,” and exemptions to an agency mandate for disclosure “must be narrowly construed.” *Milner v. Dep’t of the Navy*, 562 U.S. 562, 565 (2011) (citations omitted).

Failure of the Forest Service to release the PolyMet NorthMet land appraisals violated NEPA and the FOIA, conflicted with its own policies and deprived the public of any means of verifying that their interests in federal lands were not being sacrificed to serve the PolyMet Mining Company.

B. The Forest Service has not demonstrated that the federal lands were properly valued under FLPMA and applicable regulations, standards and policies.

Even the few documents released by the Forest Service lend support to WaterLegacy’s concerns that the federal estate for the PolyMet NorthMet land exchange has been significantly undervalued. PolyMet’s role as contractor for the appraisal creates an appearance of conflict of interest. Redacted pages in the Forest Service September 9, 2015 FOIA response state that the appraisal valued the federal estate based on the “highest and best use” of the land for “timber investment.”¹⁰ Absent an appraisal demonstrating contrary facts, failure to consider the highest and best use of federal lands for mining and mining-related purposes suggests that the federal lands have been undervalued - in violation of FLPMA regulations, the Uniform Standards of Appraisal for Federal Land Acquisition, the Forest Service Handbook and applicable case law.

Federal rules require an appraiser, in estimating market value of Federal land, to determine the “highest and best use of the property to be appraised” and to “estimate the value of the lands and interests as if in private ownership and available for sale in the open market.” 36 C.F.R. § 254.9(b)(i) and (ii). In addition to including resource values and amenities in

¹⁰ Exhibit 13 in WaterLegacy FOIA Land Exchange Appraisal folder, *supra*.

determining value, federal rules explicitly require appraisal to “Consider the contributory value of any interest in land such as water rights, minerals, or timber, to the extent they are consistent with the highest and best use of the property.” 36 C.F.R. § 254.9(b)(iv).

Federal regulations require compliance with the Uniform Appraisal Standards for Federal Land Acquisitions. 36 C.F.R. §254.9. Uniform Appraisal Standards¹¹ would not support characterizing the highest and best use of the federal lands sought by PolyMet as “timber investment” for purposes of determining their market value. These Uniform Standards require that minerals in the property “are to be considered to the extent that they enhance the market value of the property as a whole.” (Uniform Appraisal Standards, p. 33). When a property is “adaptable to a use other than the existing use, its marketable potential for such use should be considered to the extent that potential affects market value.” (*Id.*, p. 34). If the land is “physically adaptable for such use” and “there is a need or demand for such use in the reasonably near future” the highest and best use must reflect “the more profitable operation allowed by law to be carried out on the premises.” (*Id.*, pp. 34-35). The Uniform Appraisal Standards do not permit valuation of land with extractable minerals at the modest prices for timber investment:

Many things must be considered in determining the highest and best use of property and each potential use must be analyzed in terms of its physical possibility, legal permissibility, financial feasibility, and its degree of profitability. That use which meets the first three tests and is the most profitable use (i.e., results in the highest value) is the property’s highest and best use. (*Id.*, p 36).

In the case of land that is underlaid with marketable minerals, . . . the existence of those minerals is a factor of value to be considered in determining the market value of the property. (*Id.*, p. 95)

The Forest Service Handbook (F.S.H.)¹² also reflects these rules in providing that value is based on the highest and best use of the property, F.S.H. 5409.12_10, §13.34. The market value take into account physical characteristics such as mineral development potential. F.S.H. 5409.12_10, §12.22. For any property from which minerals could be economically produced, the market value of the property should consider the “physical and economic possibility of such activity” that “would be reflected in the price agreed upon between a willing buyer and seller having knowledge of all such characteristics.” F.S.H. 5409.12_20, §23.

¹¹ *Uniform Appraisal Standards for Federal Land Acquisitions*, Appraisal Institute in cooperation with the U.S. Dep’t of Justice, 2000, available at <http://www.justice.gov/sites/default/files/enrd/legacy/2015/04/13/Uniform-Appraisal-Standards.pdf>.

¹² Forest Service Handbook available at http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?5409.12

Undervaluation of federal lands for proposed land exchanges has been a national scandal, resulting in in-depth federal investigations.¹³ The Government Accounting Office report concluded that many trades of public lands by the BLM and the Forest Service failed to protect the public interest:

Specifically, the agencies have given more than fair market value for nonfederal land they acquired, accepted less than fair market value for federal land they conveyed, and have not demonstrated that the public benefits of acquiring the nonfederal land matched or exceeded the public benefits of retaining the federal land — thereby raising doubts about whether these exchanges served the public interest. (GAO Land Exchange Report, p. 32)

Since this GAO investigation, courts have reversed and rejected land exchanges where the proposed future use of federal lands was not properly evaluated.

The leading case of *Desert Citizens Against Pollution v. Bisson*, 231 F.3d 1172 (9th Cir. 2000) blocked a Bureau of Land Management (BLM) land exchange due to failure to consider the highest and best use of the federal property. The *Bisson* case involved transfer of private land to the BLM in exchange for a parcel of federal land that was planned for use for the Mesquite Regional Landfill. The BLM's appraisal of the federal land did not consider the land's future use, so significantly undervalued its market value. The Court held that Uniform Appraisal Standards for Federal Land Acquisitions applied and found the appraisal defective due to its failure to consider the feasible and reasonable future use of the federal property in determining its market value. *Id.*, at 1181. The Court explained:

In general, if a proposed use is reasonable and not merely speculative or conjectural, an element of risk is an insufficient basis upon which to exclude that use from consideration. . . Here, the use of the land as a landfill was not only reasonable, it was the specific intent of the exchange that it be used for that purpose. There is no principled reason why the BLM, or any federal agency, should remain willfully blind to the value of federal lands by acting contrary to the most elementary principles of real estate transactions. *Id.*, at 1184.

In the *Bisson* case, the value of the federal lands for a landfill was more than 130 times the value of open land, \$46,000 as compared to \$350 per acre, so the difference in value for the 1,745 acres was nearly \$80 million dollars. The Court held, "The government must not wear

¹³ See GAO Report, *Land Exchanges Need to Reflect Appropriate Value and Serve the Public Interest* (2000), hereinafter "GAO Land Exchange Report," available at <http://www.gao.gov/archive/2000/rc00073.pdf>. See specific examples of improper valuation in federal land exchanges at pp. 17-25.

blindness when it participates in a real estate transaction, particularly if the result, as here, is the transfer of a flagrantly undervalued parcel of federal land to a private party.” *Id.*, at 1187.

The *Bisson* case was followed in *National Parks & Conservation Ass’n v. Bureau of Land Management*, 586 F. 3d 735 (9th Cir. 2009). A mining company sought to acquire 3,418 acres of federal land from the BLM to build a landfill on a former mining site near Joshua Tree National Park. The appraisal for the land exchange valued the land as a holding for investment, without considering its probable and most profitable highest and best use as a landfill. *Id.* at 739. Citing federal rules, Uniform Appraisal Standards and the *Bisson* case, the Court of Appeals granted summary judgment for the Conservation Association that the valuation was deficient and failed to comply with the Federal Land Planning and Management Act. *Id.* at 745.

If the surface estate sought by PolyMet were in private hands, there is no question that the private seller would require a premium price based on the highest and best use of the property for a copper-nickel mine. Areas of the land sought by PolyMet to make compliance with air and water pollution easier (DROD 24) or otherwise provide buffer for mining development would also have an enhanced market value due to their use for purposes related to mining. Even the most willing private seller would recognize that PolyMet’s position was contrary to the seller’s in terms of the amount that must be paid for the land, and would not consider allowing PolyMet to serve as its “agent” to appraise the value of the seller’s property.

The Forest Service’s proposal to value the property sought by PolyMet Mining Co. for an open-pit copper-nickel mine for no use other than timber investment demonstrates a willful blindness to the location of the federal estate, the underlying extractable minerals, and the specific intent of the federal exchange. This undervaluation of the federal estate proposed by the Forest Service would confer an untoward benefit to PolyMet, subsidizing its private mining venture at the expense of citizens and taxpayers. Despite requests under the FOIA, the Forest Service has released no appraisal documents that might support its decision. Neither federal statutes, regulations, the Forest Service Handbook, the Uniform Standards for Appraisal nor judicial precedent would support the proposed PolyMet NorthMet land exchange.

C. The non-federal lands proposed for the PolyMet NorthMet land exchange are unacceptable due to split estates, with no protection for the surface.

Federal regulations strongly disfavor accepting lands with reserved mineral rights in a land exchange. Applicable title standards state:

The United States shall not accept lands in which there are reserved or outstanding interests that would interfere with the use and management of the land by the United States or would otherwise be inconsistent with the authority under which, or the purpose for which, the lands are to be acquired. 36 C.F.R. §254.15(c)(ii).

For the proposed PolyMet NorthMet land exchange, all of the non-federal lands except Tract 4 have severed mineral and surface ownership. (FEIS 3-172, DROD 20). Thus, about 2.4% (160 acres) of the total non-federal lands (6,680.38) proposed for the exchange would have unified title and 97.6% would have split ownership and severed mineral rights. (DROD, App. B).

Reserved mineral interests on these non-federal tracts would foreseeably interfere with the use and management of the land by the Forest Service. For the Hay Lake Tract 1, based on known surficial aggregate mineral resources, the FEIS states that the risk of conflicts between Forest Service management and future mineral exploitation is “moderate.” (SDEIS, Table 5.3.1-3, p. 5-680). Tract 1 comprises 4,651.5 acres or 69.6 percent of the total acres to be exchanged for the federal estate. (DROD App. B). Tracts 2 and 3 also have privately held mineral exploitation rights.

Should the PolyMet NorthMet land exchange take place, the Forest Service would acquire rights only to the surface estate on the non-federal lands. No Weeks Act constraint would be applicable to limit the potential for open-pit mining destroying the surface estate of the newly-acquired federal lands.

II. The proposed PolyMet NorthMet land exchange is inconsistent with federal laws, regulations, policies and trust obligations and is not in the public interest.

The Forest Service may complete a land exchange “only after a determination is made that the public interest will be well served.” 43 U.S.C. §1716(a); 36 C.F.R. §254.3(b). When considering the public interest the Forest Service shall give full consideration to the needs of State and local people, including needs for food, fish and wildlife. 43 U.S.C. § 1716(a). Federal regulations set forth the full range of factors to be considered:

[T]he opportunity to achieve better management of Federal lands and resources, to meet the needs of State and local residents and their economies, and to secure important

objectives, including but not limited to: protection of fish and wildlife habitats, cultural resources, watersheds, and wilderness and aesthetic values; enhancement of recreation opportunities and public access; consolidation of lands and/or interests in lands, such as mineral and timber interests, for more logical and efficient management and development; consolidation of split estates; expansion of communities; accommodation of existing or planned land use authorizations (§254.4(c)(4)); promotion of multiple-use values; implementation of applicable Forest Land and Resource Management Plans; and fulfillment of public needs. § 254.3(b)(1).

In addition to considering various factors for the public interest determination, in order to proceed with a land exchange, the authorized officer *must* make specific factual findings:

To determine that an exchange well serves the public interest, the authorized officer must find that –

- (i) The resource values and the public objectives served by the non-Federal lands or interests to be acquired must equal or exceed the resource values and the public objectives served by the Federal lands to be conveyed, and
- (ii) The intended use of the conveyed Federal land will not substantially conflict with established management objectives on adjacent Federal lands, including Indian Trust lands. 36 C.F.R. §254.3(b)(2).

For the purpose of this section, “‘*resource values*’ means any of the various commodity values or non-commodity values, such as wildlife habitat and aesthetics, contained within land interests, surface and subsurface.” 36 C.F.R. § 254.2.

Federal regulations clarify that when a land exchange is proposed an authorized officer “shall consider only those exchange proposals that are consistent with land and resource management plans (36 CFR part 219).” 36 C.F.R. §254.3(f). Forest Service management plans must be formulated in light of trust responsibilities for federally recognized American Indian Tribes, and must result from government-to-government planning and consultation, including “the early identification of treaty rights, treaty-protected resources, and American Indian tribe resources.” 36 C.F.R. §219.15(a)-(c). The Forest Service lacks discretion to consider a land exchange proposal that is inconsistent with its own management plans based on the Part 219 planning and consultation process.

The Draft Record of Decision references sections of the Superior National Forest Land and Resource Management Plan (hereinafter “Forest Plan”)¹⁴ to support conveyance of the federal estate, but does not cite the many sections of the Forest Plan that are inconsistent with the

¹⁴ Superior National Forest Land and Resource Management Plan (2004) available at http://www.fs.usda.gov/detail/superior/landmanagement/planning/?cid=fsm91_049716.

proposed PolyMet NorthMet land exchange. The Forest Plan requires management of the Superior National Forest for multiple uses on a sustainable basis (Forest Plan, Ch. 1, pp. 1-5, 1-9). The Plan requires protection of surface and groundwater quality (*Id.*, Watershed Health, D-WS-4 and D-WS-5, p. 2-10; O-WS-1, p. 2-12) and prevention of impacts to wetlands and impairment of water quality within, upstream or downstream of a wetland (*Id.*, Watershed Health, O-WS-1, p. 2-12; G-WS-13 and G-WS-15, p. 2-15).

The Forest Plan provides for increase of old-growth and mature forest communities (*Id.*, Vegetation, O-VG-16 and O-VG-17, p. 2-24). The Plan not only seeks to avoid and minimize impacts to sensitive species and their habitats (*Id.*, Wildlife, O-WL-4, p. 2-29; G-WL-11, p. 2-31); it directs that the Forest Service “Contribute to the conservation and recovery of federally-listed, proposed, or candidate threatened and endangered species and the habitats upon which these species depend.” (*Id.*, Wildlife D-WL-3(c), p. 2-27).

Significant discrepancies between the Superior National Forest Plan and the proposed PolyMet NorthMet land exchange relate to Tribal Rights and Interests. The Forest Plan requires that lands must “help sustain American Indians’ way of life, cultural integrity, social cohesion, and economic well-being.” (*Id.*, Tribal Rights, D-TR-1, p. 2-37), that the Forest Service respect a government-to-government relationship with Tribes, especially in areas of treaty rights and ecosystem integrity (*Id.*, D-TR-2) and that the “Superior National Forest facilitates the exercise of the right to hunt, fish and gather as retained by Ojibwe whose homelands were subject to treaty.” (*Id.*, D-TR-3).

In addition to the Superior National Forest Plan, the proposed PolyMet NorthMet land exchange must be evaluated for consistency with the Fond du Lac Integrated Resource Management Plan (hereinafter “Fond du Lac IRMP”).¹⁵ 36 C.F.R. §§254.3(b)(2)(ii), 254.3(f). The Fond du Lac IRMP discusses the need to protect and improve wild rice harvest (p. 6), the importance of improving in-stream habitat for fishing (p. 29), the need to preserve traditional hunting, fishing and gathering rights in the 1854 and 1837 Ceded Territories (p. 53), the need to ensure that the quality and quantity of wildlife and wildlife habitat is not depleted in the Ceded Territories (p. 54, p. 57) and the importance of environmental protection such as enforcement of water quality standards affecting the Reservation. (p. 63).

¹⁵ Fond du Lac Resource Management, Integrated Resource Management Plan (2008), available at <http://www.fdlrez.com/RM/downloads/IRMP.pdf>.

In the following Sections of our Objections, WaterLegacy will demonstrate that the asserted basis for the Forest Service DROD is not a cognizable purpose under applicable law. The DROD relies on unsupportable claims and characterizations in the FEIS to deny the conflict between the PolyMet NorthMet land exchange and applicable statutes, regulations, policies and plans. When the full record and best evidence is considered, the PolyMet NorthMet land exchange and mining project is contrary to FLPMA, NEPA, the Endangered Species Act (ESA), and applicable regulations, Executive Orders, policies and fiduciary obligations of the Forest Service. The federal land exchange must be rejected in favor of the No Action alternative pursuant to law and in order to best serve the public interest.

A. The possibility of litigation does not provide grounds to reject the No Action Alternative for the PolyMet NorthMet land exchange.

The Forest Service Draft Record of Decision explains that the Superior National Forest land, which the PolyMet Mining Co. seeks to use for an open-pit sulfide mine, was purchased for National Forest purposes under the authority of the Weeks Act of March 1, 1911 (36 Stat. 961), as amended. The Forest Service believes that the mineral rights that were reserved when lands were conveyed to the United States in 1935 do not include the right to an open-pit mine as proposed by PolyMet. PolyMet disagrees with the Forest Service and argues that the mineral rights it seeks to utilize provide for access to minerals by any mining method, including open pit or surface mining. (DROD 1).

The Forest Service Draft Record of Decision then states that the threat of litigation by PolyMet provides grounds for the proposed PolyMet NorthMet land exchange, stating, “This conflict raises the possibility of litigation that has no certain outcome and could set a judicial precedent regarding other Weeks Act lands acquired in the same deed,” (DROD 1), and “could impact tens of thousands of acres of other National Forest System lands conveyed under the same deeds.” (DROD 2). The PolyMet NorthMet land exchange is proposed to eliminate the conflict between Forest Service surface management and PolyMet’s desire to mine through open pit rather than underground methods.¹⁶

¹⁶ It is interesting that analysis of case records from 1989-2008 demonstrates that, of the 226 cases where a plaintiff challenged a Forest Service management decision in order to obtain more intensive resource use, the Forest Service won 69.5% of the cases, losing only 12.8% and settling 17.7%. Amanda Miner, *et al.* “Twenty years of Forest Service land management litigation,” *J. Forestry*, 112(1):32-40, Jan. 2914, available at <http://www.ingentaconnect.com/content/saf/jof/2014/00000112/00000001>.

Neither the Federal Land Planning and Management Act, federal regulations pertaining to federal land exchange nor any other authority suggests that the desire to avoid litigation is a “public purpose” for a land exchange or a factor that should be considered in making a public interest determination for a land exchange. In fact, it would be contrary to the public interest for the Forest Service to relinquish Weeks Act lands where open-pit mining is prohibited in response to the threat of litigation.

In the Superior National Forest, the unwillingness to defend legal rights to protect the surface estate from open pit mining could affect tens of thousands of acres of National Forest System lands. As illustrated in maps prepared by the Minnesota Department of Natural Resources and the Minnesota Center for Environmental Advocacy, attached as Exhibit 37, there is extensive interest in nonferrous mining in Northeastern Minnesota and in the Superior National Forest in particular. Failure to assert legal rights to control the surface of Weeks Act lands could result in open-pit mining across significant expanses of the Superior National Forest.

The impact of the Forest Service’s decision not to defend Weeks Act protection of the Superior National Forest against PolyMet’s claims cannot be overstated. The Forest Service concluded, “For this project the No Action alternative would be the environmentally preferred alternative.” (DROD 21) The environmentally preferable alternative was explicitly rejected due to the fear that “the No Action Alternative increases the likelihood that PolyMet will initiate litigation against the United States.” (DROD 22). The Forest Service deciding officer concluded, “Finally, if I had selected the No Action alternative, the risk exists that litigation could result in a situation where the mining project is proposed and evaluated for approval without any non-federal land acquired in a land exchange (see Purpose and Need).” (DROD 27).

WaterLegacy recognizes the pressure being brought to bear on behalf of the PolyMet Mining Co. However, the public interest depends on the willingness of government agencies to defend legal protections of natural resources. Capitulation to an undesirable land exchange allows the threat of litigation to hold environmental values hostage.

B. In violation of NEPA, the proposed PolyMet NorthMet land exchange and mine project does not use all practicable means to avoid and/or minimize environmental harm.

The National Environmental Policy Act (NEPA) requires, at the time of any decision requiring an environmental impact statement, that the deciding agency identify all alternatives

considered by the agency in reaching its decision, specifying the alternative or alternatives which were considered to be environmentally preferable and state “whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not.” 40 C.F.F. §1505.2(b) and (c). The Forest Service determined that the No Action alternative was the environmentally preferable alternative, but did not select this alternative. (DROD 21).

The DROD briefly discussed several alternatives for the land exchange aspect of the project. Land Exchange Alternative B was ruled out to avoid leaving an isolated piece of land with limited access through private property. (DROD 23). The DROD stated that the alternative of a single contiguous non-federal parcel was eliminated because PolyMet was unable to identify any single large tracts of land for sale, and that exchanging other lands with “wetlands and habitat more similar to the federal lands than the proposed non-federal lands” was eliminated as “theoretical.” (DROD 23-24). There is no indication that the Forest Service considered requiring PolyMet to pursue either of these alternatives. The DROD further stated that a land exchange covering only the proposed mine site boundary was rejected because air quality impacts at the mine site boundary “would exceed regulatory requirements.” (DROD 24). There is no indication that the Forest Service required PolyMet to evaluate additional emissions control measures to provide compliance within a smaller boundary. Finally, the DROD concluded, relying on the PolyMet documents in FEIS Appendix B, that the underground mining alternative was eliminated “because it was found to be economically infeasible.” (DROD 24)

The Forest Service Draft Record of Decision does not discuss any other alternatives for the mine, waste facilities or processing plant to avoid or minimize environmental harm from the PolyMet NorthMet project. Without any such inquiry, the DROD concluded, “the future use on the conveyed land, the NorthMet Mining Project, meets the intent of Forest Plan Desired Condition D-MN-2.” (DROD 13). Desired Condition D-MN-2 states the Forest Service should “Ensure that exploring, developing, and producing mineral resources are conducted in an environmentally sound manner so that they may contribute to economic growth and national defense.” (Forest Plan, Minerals, D-MN-2, p. 2-9). The DROD characterized PolyMet’s proposed use as compliant with NEPA and the Forest Plan: “Based on the mining project design and mitigation as described throughout the FEIS, I believe that all practicable means to avoid and/or minimize environmental harm to remaining national forest lands that might occur from

implementing the mining project are incorporated into the design and mitigations as to be implemented in the permitting process.” (DROD 13). This belief is inconsistent with the record.

1. A land exchange alternative no larger than the proposed NorthMet mine site should have been evaluated.

WaterLegacy believes the Forest Service failed to set sufficient parameters for the contiguity and type of the non-federal land proposed for the land exchange. Although it may have been more costly or more difficult for PolyMet to secure a single contiguous parcel with wetlands, headwaters streams and habitat conditions more similar to the federal lands, it is not possible to determine whether an exchange with more comparable lands was feasible.

We are troubled by the revelation that an exchange tailored to be no larger than the mine site was rejected in order to allow PolyMet’s air emissions to exceed levels that would otherwise require control. From the perspective of environmental harm from sulfate air deposition to methylating wetlands as well as impacts to worker health, increasing the size of PolyMet’s property ownership allows more pollution. This decision, made without comprehensive analysis, contradicts NEPA’s requirement to avoid and minimize environmental harm.

In addition, a land exchange no larger than the proposed NorthMet mine site would have allowed the retention of most of the 100 Mile Swamp as federal forest land, where exceptional peatlands and biodiversity could be protected. (See FEIS Fig. 4.2.4-2, Fig. 5.2.2-28, for illustration of the mine site and the 100 Mile Swamp boundaries). The Forest Service would have been able to provide hydrologic, chemical and biological monitoring to make avoidance and minimization of environmental harm north of the proposed NorthMet mine more likely, reducing environmental threats from polluted seepage, mine dewatering, and air deposition on sensitive peatlands. Rejection of the smaller mine site footprint suited PolyMet’s interests, but conflicted with the Forest Plan Desired Condition to ensure that mineral development is conducted in an environmentally sound manner.

2. Underground mining would eliminate the need for a land exchange and minimize environmental harm, and it has not been shown to be infeasible.

Although the Forest Service DROD relied on the FEIS to conclude that underground mining is economically infeasible, closer review of the record demonstrated that no such

showing has been made. The Underground Mining Alternative should be re-evaluated examining the full extent of mineral grade resources, not just the ore body that PolyMet has chosen to mine with an open-pit method, and applying actual mitigation costs for the NorthMet project.

The PolyMet NorthMet Scoping Decision required evaluation of underground mining, specifying that if underground mining merely provided a lower economic return a detailed assessment must be prepared. (PolyMet NorthMet DEIS Appx. B, Final Scoping Decision Document, p. 5 of 45).¹⁷

It is undisputed that the Underground Mining Alternative is technically feasible. (FEIS App. B, Co-Lead Agencies, Underground Mining Alternative Assessment for the NorthMet Mining Project and Land Exchange Environmental Impact Statement, Sept. 27, 2013, hereinafter “Underground Mining Assessment,” p. 4, FEIS autop. 2881 et seq.). It is also undisputed that the Underground Mining Alternative would offer significant environmental benefits over the proposed open-pit mine:

Compared to the proposed open pit mine, the underground mining alternative would offer some significant environmental benefits, including:

- fewer direct effects on surface resources, including wetlands;
- less mine dewatering and, therefore, less water to be managed;
- less waste rock, which would result in:
 - a smaller surface footprint; and
 - reduced effects on surface water and groundwater.
- less ore mined at a slower rate, which would result in:
 - less tailings and hydrometallurgical residue to be managed;
 - fewer effects on surface water and groundwater; and
 - reduced air emissions from mining, transporting, and processing the ore, and constructing the Tailings Basin and Hydrometallurgical Residue Facility.

(*Id.*, p. 3, FEIS autop. 2887)

The FEIS also acknowledged that the Underground Mine Alternative would result in a “smaller surface footprint, thus offering environmental benefits over the NorthMet Project Proposed Action through reduced effects on wetlands, vegetation, and wildlife habitat.”

Underground mining would have lower production rates compared to the proposed open pit, resulting in less fugitive air emissions, and less waste rock and processing waste (tailings and hydrometallurgical residue), thus “reducing the scale and duration of potential water quality effects.” (FEIS, 3-160). Perhaps most significant for the Forest Service, underground mining would not require a federal land exchange.

¹⁷ The PolyMet NorthMet SDEIS reference, MDNR and USACE 2009, does not include the appendices to the DEIS. They can be found at http://www.dnr.state.mn.us/input/environmentalreview/polymet/eis_toc.html.

The FEIS, like the SDEIS before it, stated that underground mining was eliminated as an alternative to the Proposed Action “because it was found to be economically infeasible” in an analysis provided by PolyMet’s consultants, Foth Infrastructure & Environment, LLC.¹⁸ in Appendix B to the FEIS. (FEIS, 3-184). On first blush, this statement would seem to suggest that underground mining is impracticable. However, closer scrutiny demonstrates that analysis of economic feasibility was based on an unreasonably narrow definition of the potential project and failure to assess actual project costs under the Proposed Action, including long-term treatment requirements. The analysis is sufficiently unreliable that it cannot support elimination of the Underground Mining Alternative, which would obviate the need for a federal land exchange while meeting Forest Plan objectives to develop mineral resources in an environmentally sound manner. (Forest Plan, Minerals, D-MN-2, p. 2-9).

The Foth Report constrained its analysis of “NorthMet deposit” to include only the measured and indicated resources within the open pit identified by PolyMet. (Foth Report, p. 3, FEIS App. B., autop. 2905), even while acknowledging that this constraint excludes much of the mineralized rock that could be available for underground mining:

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. . . The majority of inferred resource defined by Poly Met (2007) is below the open-pit. (*Id.*).

The extent of mineralized rock that occurs below the open-pit is illustrated in slides presented by PolyMet to investors in May 2012 and May 5, 2015.¹⁹ The majority of above average ore grade mineralization in the Unit 1 Main Ore Body is plainly evident outside the open-pit boundary line.

Restriction of alternatives analysis to the mineral resources within the open pit specified by PolyMet (FEIS, 3-159) served the project proponent’s interests, while excluding the reasonable alternative of underground mining. This constraint is inconsistent with NEPA. “An agency may not define the objectives of its action in terms so unreasonably narrow that only one

¹⁸ Foth Infrastructure & Environment, LLC, *Economic Assessment of Conceptual Underground Mining Option for the NorthMet Project*, prepared for PolyMet, Oct. 2012, FEIS App. B, autop. 2897 *et seq.* (“Foth Report”).

¹⁹ See PolyMet, Presentation to InvestMNT Conference, Minneapolis, May 14, 2012, Excerpts, NorthMet Ore Body slide, p. 2 of Exhibit 48 to WaterLegacy SDEIS Exhibits in WaterLegacy Appendix and PolyMet, Copper, Nickel & Precious Metals in the U.S., May 2105, slide, p. 2, attached herein as Exhibit 33.

alternative from among the environmentally benign ones in the agency's power would accomplish the goals of the agency's action, and the EIS would become a foreordained formality.” *Nat'l Parks & Conservation Ass'n v. BLM*, 606 F. 3d 1058, 1070 (9th Cir. 2010). The court found against the BLM on the grounds that the agency had adopted the proponent’s “interests as its own” and “As a result of this unreasonably narrow purpose and need statement, the BLM necessarily considered an unreasonably narrow range of alternatives.” (*Id.* at 1072). *See also Simmons v. United States Army Corps of Eng'rs*, 120 F.3d 664, 666 (7th Cir. 1997)(“If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role.”)

In addition, the cost assessment provided by PolyMet’s consultant and adopted in the Co-Leads’ Underground Mining Assessment is insufficient to conclude that underground mining is economically infeasible, since it failed to compare underground mining costs to actual costs of the NorthMet proposed action. On May 15, 2012, the EPA cautioned that mine capital and operating cost numbers previously used to determine feasibility were out-of-date and did not consider PolyMet’s mitigation and treatment costs. The EPA also noted that the Co-Leads’ position paper did not factor into its analysis the potential that the applicant would in the future “mine higher-grade minerals that are located deeper than the proposed mine pit.”²⁰ EPA’s letter sent two weeks later stated that this Co-Leads’ position paper should be revised so that “updated environmental and economic data that compares costs of both pit mining and underground mining options” could inform the selection of a preferred project alternative.²¹

Despite these concerns, PolyMet’s consultant did not include any actual operating or pre-production capital costs from the PolyMet NorthMet mine project in the analysis; all are published cost models. (Underground Mine Assessment, p. 6, FEIS autop. 2890). While some adjustments were made from the cost models to account for obvious differences with a possible NorthMet setting, “there is no assurance these adjustments are adequate.” (Foth Report, p. 6, FEIS autop. 2908).

Without a comparison of underground mining of all suitable ore to the actual costs of NorthMet open-pit mining, mitigation and long-term treatment, there is no way for decision-makers or the public to determine if the Underground Mining Alternative is merely less

²⁰ M. Sedlacek, EPA Letter to Co-Lead Agencies re underground mining, May. 15, 2012, p. 2, Exhibit 46 to WaterLegacy SDEIS comments contained in WaterLegacy Appendix.

²¹ K. Westlake, EPA Letter to Co-Lead Agencies re underground mining, May. 31, 2012, p. 2, Exhibit 47 to WaterLegacy SDEIS comments contained in WaterLegacy Appendix.

profitable than the Proposed Action or, on the other hand, if the appearance of feasibility for the open-pit mine is based on excluding and failing to account for long-term treatment and mitigation costs. No PolyMet NorthMet federal land exchange should proceed until a complete and unbiased evaluation is performed for the Underground Mining Alternative.

3. Practicable mitigation alternatives to avoid and/or minimize environmental harm from the PolyMet NorthMet should have been evaluated and adopted.

The PolyMet NorthMet process has reflected an inadequate separation between the roles of the project proponent and those of the Co-Lead Agencies charged by law with making decisions in the public interest. In these Objections, WaterLegacy has already expressed our concern about the degree of leverage exercised by PolyMet as a result of threatening litigation and the appearance of impropriety in PolyMet's role as the "agent" of the Forest Service in appraising the federal land. We believe that the role of the Co-Lead Agencies in developing a proposal on behalf of PolyMet and becoming advocates for that proposal has foreclosed consideration of alternatives even before the public had an opportunity to comment on the supplemental draft environmental impact statement (SDEIS) in 2013. The Forest Service explains this role:

After issuing the DEIS, the Co-lead Agencies. . . developed an alternative proposal in consultation with PolyMet that sought to resolve several major environmental concerns and permitting barriers raised during the DEIS process. This alternative was subsequently adopted by PolyMet and became the current NorthMet Mining Project Proposed Action. (DROD 4).

We need not demonstrate that there has been a subjective lack of impartiality in the environmental review process. The objective record and the SDEIS and FEIS reflect inadequate analysis of environmental impacts and failure to analyze less environmentally damaging alternatives once the Co-Lead Agencies' "alternative proposal" had been adopted by PolyMet. The analysis of impacts and alternatives under NEPA may not be used to justify decisions already made. 40 C.F.R. §1502.2 (g). *Nat'l Audubon Soc'y v. Dep't of the Navy*, 422 F. 3d 174, 199 (4th Cir. 2005); *Davis v. Mineta*, 302 F. 3d 1104, 1120 (10th Cir. 2002). Neither can the facts in the underlying record be disregarded in order to deny environmental impacts of an extraction project for which a land exchange is sought. *National Audubon Soc'y v. Clark*, 606 F. Supp. 825, 842-844 (D. Alaska 1984).

The FEIS for the PolyMet NorthMet project is aberrant in that it fails to assess any alternatives, including mitigation alternatives, not already included the Proposed Action before the SDEIS was prepared. WaterLegacy's comments on the SDEIS as well as the FEIS, comments by other citizens and groups, and materials provided by Tribal Cooperating Agencies have proposed less environmentally damaging alternatives. The FEIS has not evaluated these alternatives or demonstrated either that they are impracticable or that they would have other significant adverse environmental consequences.

a. Dry stack tailings disposal is a practicable alternative that would avoid or minimize environmental impacts from contaminated seepage.

Dry stack tailings disposal on a lined facility at an alternative brownfield site would avoid or minimize environmental harm from contaminated NorthMet tailings seepage to surface water and groundwater. Dry stack tailings disposal is also the best available technology to avoid the potential for catastrophic dam failure with potentially disastrous environmental consequences. In addition, dry stack tailings disposal on a lined facility at an alternative brownfield site would avoid or minimize environmental impacts from destruction of wetlands and from hydrologic changes and releases to tailings site wetlands that increase mercury methylation. The FEIS neither evaluates the dry stack tailings alternative, nor justifies its exclusion from consideration.

The PolyMet NorthMet tailings storage proposal creates a substantial risk of environmental harm from uncaptured seepage. As further explained in WaterLegacy's FEIS Comments, NorthMet tailings would be deposited in a wet slurry, without a liner, on top of the existing unlined LTVSMC taconite tailings and slimes. (FEIS, 3-104, 3-158, 4-427, 5-5, 5-185, Figure 5.2.14-6). The NorthMet project would produce 110,736 tons of wet tailings slurry per day, of which liquids would be 68.5 percent by weight or 86 percent by volume. (FEIS ref. PolyMet 2015q, autop. 621). The wet slurry tailings waste is predicted to produce 3,880 gallons per minute (gpm) of contaminated seepage (FEIS, 5-179, 5-181), equivalent to 2,041,000,000 gallons of contaminated seepage per year.²²

NorthMet tailings seepage would be collected from the toe of the tailings heaps and would contain sulfates and heavy metals from copper-nickel processing slurry, effluent from the mine site treatment plant, as well as seepage from existing LTVSMC tailings. (FEIS ref.

²² Conversion site is at http://www.convert-me.com/en/convert/flow_rate_volume/gallon_day.html.

PolyMet 2015j, FEIS Figure 3.2-12). Solutes in the seepage, including arsenic, mercury, manganese, and lead are known to impair human health; sulfate is known to be toxic to wild rice and to enhance mercury methylation; and metals and other chemicals including copper, nickel, cobalt, lead, mercury, and specific conductance are known to adversely impact aquatic life.

PolyMet has predicted solute concentrations in tailings toe seepage (PolyMet 2015i, Large table 2) far exceeding water quality standards. For example, at the North Toe, P90 levels of nickel in year 20 are predicted at 893 µg/L -- more than 17 times the water quality standard of 52 µg/L in hardness of 100 mg/L. Lead, a particularly dangerous neurotoxin with no safe level (Saracino, 2015), would reach levels of 58 µg/L -- more than 18 times the water quality standard of 3.2 µg/L in hardness of 100 mg/L.

PolyMet's modeling of seepage at the tailings toe is also likely to understate actual tailings chemistry. Leachate from copper-nickel *tailings* from MinnAMAX bulk sampling was not considered in modeling of NorthMet tailings seepage. MinnAMAX tailings leachate contained levels of cobalt more than 30 times the tailings seepage concentration predicted for the NorthMet project, levels of nickel more than 21 times the predicted NorthMet concentrations, and sulfate concentrations more than 11 times higher than predicted NorthMet concentrations. (Opinion of Bruce Johnson, Chemist/Biologist, hereinafter "Johnson 2015").²³

Dry stack tailings disposal reduces seepage rates, as compared with slurry tailings. The Senior Director of Geotechnical Engineering and Hydrogeology for Newmont Mining Corporation has estimated the seepage rate from slurry tailings at 6.4 gallons per minute (gpm) per acre, the seepage rate from paste or thickened tailings at 0.06 gpm per acre and the seepage from dry filtered tailings at 0.007 gpm per acre.²⁴ As compared to dry filtered tailings, this estimate indicates that slurry tailings produce approximately 914 times as much seepage. The FEIS is insufficient to demonstrate that the significant reduction in tailings seepage that would result from dry stack tailings would not produce a significant environmental benefit. Claims made by the project proponent and adopted in the FEIS of nearly perfect seepage collection fail to consider tailings site hydrogeology, rely on unsubstantiated modeling assumptions and unverified promises of the project proponent, and contradict field experience and its application

²³ WaterLegacy expert reports with the 2015 date are attached in the WaterLegacy Expert Reports (FEIS_Section 404_Land Exchange) folder.

²⁴ See John Lupo, Ph.D., P.E., Dry Stack Tailings Overview, slide presentation is available at <http://www.slideshare.net/Rosemont-Copper/dry-stack-tailings-overview>.

to the NorthMet tailings site.

Based on the information provided by PolyMet in its Water Modeling Data Package (FEIS ref. PolyMet 2015j) the FEIS claims that, during mine operations, 3,860 gallons per minute of the total 3,880 gpm modeled would be collected. (FEIS, 5-181, Table 5.2.2-37). This would be a nearly perfect collection rate of 99.5%.

To reach this conclusion, the FEIS first assumes that all but 200 gpm (0.05%) of total NorthMet tailings seepage will be “surface seepage,” since that is the volume currently estimated to seep out of groundwater at the toe of the existing LTVSMC basin. (FEIS, 5-179, PolyMet 2015j). Increased seepage and hydraulic head created in the tailings piles during NorthMet operations could result in more water being retained deeper into groundwater. In addition, lack of data on bedrock groundwater precludes calculation of how much groundwater is actually flowing in bedrock at the site. (Tailings Opinion of Donald Lee, Ph.D., P.E. hereinafter “Lee, tailings opinion, 2015,” p. 4).

Next, based on PolyMet’s underlying analysis (PolyMet 2015j), the FEIS assumes that 100 percent of tailings surface seepage and groundwater seepage would be captured on both the east side and the south side of the tailings piles (FEIS, 5-8, 5-102) and that 100 percent of the “surface seepage” and 90 percent of seepage retained in groundwater would be captured at the north, northwest and west toes of the tailings storage facility. (FEIS, 5-186).

These assumptions are not based on assessment of hydrogeology and run counter to expert opinions from geologists. The FEIS cross-section of the tailings basin groundwater containment system characterizes the bedrock as an “assumed no flow boundary.” (FEIS, Figure 3.2-28). The FEIS also uses mine site Duluth Complex bedrock as an analogy to assume very low hydraulic conductivity at bedrock depths beneath the tailings piles. (FEIS, 4-44). Although the FEIS estimates water flow through the top 20 feet of bedrock at 0.14 feet per day (FEIS, 4-113), neither the FEIS nor the PolyMet reports on which it is based dig any deeper. Beneath the top 20 feet, neither the FEIS nor underlying documents provide *any* information of any kind on the hydraulic conductivity of tailings site bedrock. (See FEIS ref. Barr 2014b, pp. 21-22, Large Figures 1-2). The FEIS also provides *no* investigation of fractures beneath the tailings waste site.

Geologist J.D. Lehr criticized the “simplistic and cursory treatment of the role that bedrock fractures may play in the transmission of groundwater” at the tailings site contained in the PolyMet NorthMet SDEIS. (Opinion of J.D. Lehr, Geologist, included in WaterLegacy

SDEIS Appendix, hereinafter “Lehr 2014,” p. 3). Lehr objected to the assumption of a “no-flow boundary” beneath the tailings piles and the resulting implication that groundwater flow through bedrock at the tailings site “is so insignificant that it can be ignored.” (*Id.*). He commented that the failure to identify fractures or assess groundwater flow through fractured bedrock “was a major omission, resulting in unsupported assumptions and inadequate information regarding groundwater flow” at the tailings waste site (*Id.*, p. 4). He raised concerns that neither the project proponent nor the Co-Lead Agencies have required any study of bedrock fractures or their hydrogeologic properties. (*Id.*, p. 15).

Mr. Lehr also criticized the PolyMet NorthMet SDEIS for failing to include any hydraulic testing of bedrock in the tailings site area. (*Id.*, p. 12, p. 15). He explained that analogies between Duluth Complex at the mine site and Giants Range Granite at the tailings site cannot be used to assume hydraulic conductivity of bedrock at the tailings site. (*Id.*, p. 15). Mr. Lehr emphasized that, to assess hydraulic conductivity, “What the SDEIS requires is data.” (*Id.*, pp. 15-16) “Unless a solid scientific basis is provided, the SDEIS’ claims – both explicit and implicit – that groundwater flow through bedrock is minimal, cannot be sustained.” (*Id.*, p. 16). Based on the scientific literature and his professional knowledge of the region’s geology, J.D. Lehr concluded, “bedrock fractures will play a significant role in groundwater and contaminant transport” at the tailings site. (*Id.*, p. 17). No additional hydraulic testing of bedrock at the tailings site has been done by PolyMet since the SDEIS was issued and these comments made.

Anthony Runkel, the Chief Geologist for the Minnesota Geological Survey, echoed these concerns, in an opinion on the PolyMet NorthMet SDEIS attached as Exhibit 14. Mr. Runkel stated that the investigations done for the NorthMet mine and tailings site are not sufficient to support the modeling used for the project. He stated that investigations used in similar hydrogeologic settings support conceptual models that differ substantially from those used for the NorthMet project,

Of particular significance for solute transport, the conceptual models commonly include key fractures or fracture zones of relatively high hydraulic conductivity, and multiple flow systems within the bedrock at individual sites. These flow systems are variably connected to the surface water system, have variable residence times, can have upward and downward vertical gradients within a local area, and horizontal flow directions that differ from one another. (Runkel, 2014, p.1, Exhibit 14)

Mr. Runkel agreed with J.D. Lehr that use of a Duluth Complex analogy to assume

conditions in tailings site bedrock “is not valid.” (*Id.*, p. 2). He noted that faults are known to be common across much of mapped extent of the Giants Range Batholith, including in the plant site/tailings basin area. Mr. Runkel explained that nearby fractures in the same bedrock have had significant environmental effects, reporting, “Hydraulically significant fractures in the Giants Range Batholith are documented to have transported contaminants at the Northwoods Closed Landfill (MPCA reports) several miles north of the Plant Site/Tailings Basin area.” (*Id.*, p. 3).

In addition to failing to provide appropriate data, the FEIS relied heavily on the project proponent’s assumptions to reach its conclusions about tailings seepage capture. The capture efficiencies claimed for the NorthMet tailings site were “provided by PolyMet” (FEIS, A-583) and “justified,” “supported,” and “assumed” based on the proponent’s modeling. (FEIS, A-578, A-612, 5-77). On the south side of the tailings facility, claims of 100 percent seepage capture were based on a vague promise that unspecified future upgrades by PolyMet will achieve perfect collection: “PolyMet has committed to future upgrades to achieve 100 percent capture by this system if the NorthMet Project Proposed Action is approved.” (FEIS, 3-120, A-84, A-195, A-197, A-616, 3-120).

The factual record undermines PolyMet’s optimistic promises. Since 2011, the current tailings site owner, Cliffs Erie, LLC has installed a seepage collection system on the south side of the existing LTVSMC tailings waste facility at surface discharge location SD026. This system includes a cutoff berm and trench, seep collection sump, pump and pipe system. (PolyMet 2015i). Although neither the FEIS nor PolyMet documents specify what percentage of south tailings seepage is currently collected by Cliffs Erie, water is bypassing the cutoff dam, and improvements in collection would be required to comply with the Cliffs consent decree.²⁵ “It is acknowledged that there is currently incomplete capture of impacted water at SD026.” (FEIS, A-625). The FEIS provides no evidence that any of its possible engineering alternatives would be effective in capturing *all* seepage that comes to the surface on the south side of the tailings piles (FEIS, 3-120, 5-102), and proposes no mechanism of any kind to collect groundwater seepage on the south side of the tailings site. Even though no bedrock hydrogeology investigation has been done at the tailings waste site, the FEIS assumes, “groundwater migration is not expected to the east or south.” (FEIS, 5-77).

²⁵ Barr, Water Balance Evaluation of SD026 Seepage Collection System and Cell 1E Pond Water Levels (May 1, 2013), p. 1; MPCA (John Thomas) letter to Cliffs Natural Resources (Craig Hartmann), April 4, 2013, p. 1, both of which are attached as Exhibit 38.

Hydrologist and engineer Donald Lee determined after reading the FEIS and supporting documents on tailings basin performance, “The analytical support for these conclusions is based on assumptions of performance that are not justified or supported by data.” (Lee, tailings opinion, 2015, p. 1).

The tailings performance claimed in the FEIS is not consistent with field experience or site-specific application. The completed NorthMet tailings piles would be 1,735 feet above sea level, the highest elevation on the landscape (FEIS, 3-104; Figure 4.2.2-17), thus creating hydraulic pressure for seepage. The design basis for the containment system is “to reverse the pre-existing hydraulic gradient (and flow direction) across the facility.” (FEIS, p. A-547). Responses to comments state, “few capture systems have been built with this degree of pumping to cause a reversal of the pre-existing hydraulic gradients” (FEIS, p. A-548). Research has disclosed no similar systems operating long-term to reverse hydraulic gradient.

Field experience and local geological conditions do not support claims made in the FEIS that a bentonite slurry trench will serve as an impermeable “cut-off wall” (FEIS, p. 5-197) or that it could be “keyed into” the tailings site bedrock. (FEIS, p. 5-185). J.D. Lehr explained that the type of bedrock at the tailings site would not be favorable to allow a keyed in trench, and large boulders and cobbles known to exist at the site would also impede construction of an effective slurry trench. (Lehr, 2014, pp. 17-18). Dr. Lee noted that the proposed slurry wall at a depth exceeding 40 feet in some locations was a significant undertaking, and that claims that a slurry wall would be nearly impermeable for the indefinite future were not justified. (Lee, tailings opinion, 2015, p. 3). These concerns are similar to those raised by Barr Engineering in a 2007 evaluation report of Tailings Basin Modifications to Eliminate Water Release via Seepage. (FEIS ref. Barr 2007f, p. 21).

The only reference in the record discussing containment system field experience, (FEIS ref. PolyMet 2015h, Barr Memo in Attach. D), doesn’t substantiate PolyMet’s claims for tailings seepage capture efficiency. For most of Barr’s cited examples, no information was available to assess capture success. However, follow-up information was available for one of the two examples highlighted in detail by Barr. Barr had offered the Fort McMurray tailings pond seepage containment system in Alberta Canada as an example of the successful use of slurry walls to isolate mine tailings seepage from downgradient water:

Another example is the installation of a soil-bentonite cutoff wall around the perimeter of a mine tailings pond located in the province of Alberta, Canada. The cutoff wall is approximately 100-feet deep and 3 feet wide, and has a hydraulic conductivity of less than 1×10^{-7} cm/sec. The cutoff wall was used to isolate the tailings pond from downgradient surface water features including wetlands and the Athabasca River. (*Id.*, pp. 1-2)

However, information available since 2012 demonstrates that Fort McMurray tar sands tailings seepage containment has been a serious failure. Canadian federal research used chemical profiling to confirm the contaminant source in the Athabasca River and concluded that toxic chemicals from McMurray Formation oil sand tailings ponds are leaching into groundwater and seeping into the Athabasca River, despite ditches, cutoff walls, groundwater interception wells and a system where captured water is pumped back into tailings ponds.²⁶ One dam has been reported to seep wastewater at a rate of 75 liters per second (625,200,000 U.S. gallons per year) into groundwater feeding the Athabasca River.²⁷ Industry is working to address the tailings seepage issue, budgeting more than \$1 billion in tailings-reduction technology.²⁸

WaterLegacy is unaware of any other data on capture of unlined tailings waste seepage that would support PolyMet's unrealistic modeling assumptions. In Minnesota, MPCA concluded in 2008 that the maximum estimated percentage of seepage to the Sandy River that could be collected from the unlined U.S. Steel Minntac tailings waste facility was approximately 55 to 60 percent.²⁹ In 2013, U.S. Steel confirmed that the dike and pump back system on the east side of the Minntac facility was collecting roughly 50 percent of the total seepage volume.³⁰ After extensive research, the highest rate of seepage capture identified for any unlined facility using slurry walls appears to have been at the Hill Air Force Base in northern Utah, where a combination of the slurry walls, landfill covers, groundwater interception and extraction wells,

²⁶ Frank et al., *Profiling Oil Sands Mixtures from Industrial Developments and Natural Groundwaters for Source Identification*, Env. Sci & Tech. accepted Jan. 21, 2014. Available at <http://www.theyee.ca/Documents/2014/02/21/Profiling-Oil-Sands-Mixtures.pdf>. Bob Weber, *Federal study says oil sands toxins are leaching into groundwater, Athabasca River*, Edmonton Globe and Mail, Feb. 20, 2014. Available at <http://www.theglobeandmail.com/news/national/federal-study-says-oil-sands-toxins-are-leaching-into-groundwater-athabasca-river/article17016054/>

²⁷ Andrew Nikiforuk, *Large dams of mining waste leaking into Athabasca River study*, Feb. 21, 2014, <http://theyee.ca/Blogs/TheHook/2014/02/21/Tailings-Waste-Athabasca/>

²⁸ Weber, *supra* note 4.

²⁹ MPCA (John Thomas) letter to Tom Moe (U.S. Steel Corporation) of Jan. 10, 2008, available at http://waterlegacy.org/sites/default/files/PolyMet_SuppEIS/WL_Ex19_MPCA_MinntacSeepLtr_2008.pdf.

³⁰ U.S. Steel (Chrissy Bartovich) letter to U.S. Army Corps of Engineers, July 9, 2013, excerpted at http://waterlegacy.org/sites/default/files/PolyMet_SuppEIS/WL_Ex20_U.S.Steel_MinntacLtr_2013.pdf.

and treatment succeeded in reducing metals concentrations from a Superfund site by 80 percent.³¹

In the EPA's recent Pebble Mine assessment, the Agency recently concluded, "Water collection and treatment failures are a common feature of mines."³² EPA stated that the probability of potential *failure* of water collection and treatment during operations is 93 percent, and results include "exceedance of standards potentially including death of fish and invertebrates." Post-closure probability of failure of water collection and treatment was "somewhat higher than operation," and "failures are likely to result in release of untreated or incompletely treated leachates for days or months." If the site were to be abandoned, EPA noted that failure of water collection and treatment was "certain."³³

The FEIS identifies several likely failures of the proposed tailings seepage collection system: new surface seepage locations may emerge as the tailings basin is developed; tailings pond water quality may be worse than expected; and groundwater or surface water downgradient of the tailings basin may fail to comply with water quality standards. (FEIS, 5-239 to 5-240). Such failures may or may not be revealed by monitoring, may be revealed only after irreparable harm has been caused to fish, wild rice or human beings or may only come to light after mining has ceased and the mining company declares bankruptcy to avoid responsibility.

The FEIS' predictions of tailings seepage rates are unsubstantiated and indefensible. Uncertainties are magnified by unknown hydrogeology, fractures beneath the unlined tailings piles, predictable failures of engineered systems, and field experience with seepage leakage and low rates of capture from unlined tailings piles. An alternative of dry stack tailings on a lined and stable foundation should have been evaluated to avoid and minimize environmental harm from seepage of contaminants to surface and groundwater.

b. Dry stack tailings disposal is a practicable alternative that would avoid or minimize the risk of catastrophic tailings dam failure.

Proposed NorthMet tailings storage also creates a reasonably foreseeable risk of catastrophic dam failure that could be avoided if the best available technology of dry stack

³¹ EPA, *Engineering Bulletin Slurry Walls* (October 1992), p. 5, available at <http://nepis.epa.gov/Exe/ZyPDF.cgi/10002DPY.PDF?Dockey=10002DPY.PDF>.

³² EPA, *An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska*, Volume 1 – Main Report (EPA 910-R-14-001A (January 2014), p. 8-19, available at

http://www2.epa.gov/sites/production/files/2015-05/documents/bristol_bay_assessment_final_2014_vol1.pdf.

³³ *Id.*, Table ES-4 and Table 14-1.

tailings in a lined facility were used. International headlines, research reports and expert opinions over the past year and a half underscore the fact that catastrophic failure of mine tailings dams is a significant and foreseeable risk.

On Monday, August 4, 2014, on a sunny summer day, the tailings dam at the Mount Polley copper-mine in British Columbia, Canada collapsed. The breach released an estimated 24.4 million cubic meters (6.3 billion gallons) of tailings and wastewater into Polley Lake, which rose by 1.5 meters. Hazeltine Creek, which flows out of Lake Polley, was transformed from a 2-metre-wide stream to a 50-metre-across "wasteland" and Cariboo Creek was also affected. By August 8, the spill had reached Quesnel Lake, considered until then one of the cleanest deep-water lakes in the world.³⁴

One year later, water quality in 70-kilometer once-pristine Quesnel Lake had changed. After the dam collapse, Imperial Metals supplied drinking water and acknowledged that tailings contained arsenic and lead. The Interior Health Authority issued a bulletin warning people not to eat the fish in Quesnel Lake due to mercury.³⁵

On November 6, 2015, an iron ore tailings dam collapsed at the Samarco mine in Brazil. The dam collapse started a mudslide that flattened a village and killed 17 people. An estimated 60 million cubic meters (nearly 16 billion gallons) of mine waste were released, requiring 600 people to be evacuated.³⁶ On November 30, 2015, Brazil announced that they would file a \$5.2 billion lawsuit against the BHP mine company. A large number of fish had died.³⁷ Laboratory testing in downstream samples of water from the impacted Rio (River) Doce detected mercury,

³⁴ Gordon Hoekstra, Mount Polley mine tailings spill nearly 70 percent bigger than first estimated, Vancouver Sun, Sept. 3, 2014, http://www.vancouversun.com/Mount+Polley+mine+tailings+spill+nearly+cent+bigger+than+first+estimated/10172302/story.html?__lsa=3d36-42fe#ixzz3VcdRA2uw.

³⁵ Rod Marining, The Mount Polley Disaster One year later, *Wilderness Committee*, August 1, 2015, http://commonground.ca/OLD/iss/289/eg289_MtPolley.shtml; Monica Lamb-Yorski, Mine still supplying drinking water to Quesnel Lake residents, *Williams Lake Tribune*, Jan. 15, 2015, <http://www.wltribune.com/news/288759341.html>.

³⁶ Brazil dam burst: 17 dead, dozens missing as mudslides flatten a village and engulf homes at BHP co-owned site, ABC News, <http://www.abc.net.au/news/2015-11-07/brazil-dam-desperate-search-for-survivors/6921062>; Kathryn Diss, Samarco mine tragedy: BHP 'deeply sorry' for Brazil dam disaster, pledges review of operations, ABC News, Nov. 19, 2015, <http://www.abc.net.au/news/2015-11-19/deeply-sorry-bhp-announces-mines-review-after-dam-disaster/6955084>.

³⁷ Esmarie Swanepoel, BHP says Brazil plans \$5bn legal suit over Samarco disaster. Nov. 30, 2015, <http://www.miningweekly.com/article/bhp-says-brazil-plans-5bn-legal-suit-over-samarco-disaster-2015-11-30>.

aluminum, iron, lead, boron, barium, copper, arsenic and other chemicals. Arsenic in the sampling was 2,639.4 micrograms per liter ($\mu\text{g/L}$) -- more than 200 times Brazil's standard.³⁸

These may be particularly gripping examples, but they are not uncommon. A July 21, 2015 report by Lindsay Bowker and David Chambers, *The Risk, Public Liability & Economics of Tailings Storage Facility Failures* (hereinafter "TSF Failures," attached as Exhibit 19) analyzed recorded tailings storage facility failures from 1940 to 2010 using statistical tools. They found an emerging and pronounced trend since 1960 toward a higher incidence of Serious failures, i.e. large enough to cause significant impacts or loss of life and Very Serious failures, i.e. catastrophic dam failures that released more than 1 million cubic meters of tailings and in some instances resulted in multiple loss of life. In fact, 63% of all incidents and failures since 1990 were Serious or Very Serious. The total cost for just 7 of these 16 large failures was \$3.8 billion, at an average cost of \$543 million per failure. (*TSF Failures*, pp. 1-2, Exhibit 19).

The *TSF Failures* report identified factors contributing to the increase in catastrophic dam failures: mining lower grades and falling real prices of metals, pushing older tailings storage facilities to unplanned heights, or stretching the limits of tailings storage facilities that were not built or managed to best practices in the first place. (*Id.*, pp.1, 2,16). These risk factors would all apply to the PolyMet NorthMet tailings facility.

Although the *TSF Failures* analysis did not cover the past few years, the World Information Service on Energy (WISE) has prepared a chronology of major dam failures through mid-November 2015, attached as Exhibit 20. Since 2010, WISE has identified 12 major tailings dam failures, including failures in Canada, the United States, and Europe.

David Chambers, an engineer with decades of experience in mining, provided "Comments on the Geotechnical Stability of the Proposed NorthMet Tailings Basin and Hydrometallurgical Residue Facility in light of the Failure of the Mt Polley Tailings Storage Facility" in April 2015. (Chambers 2015, attached as Exhibit 21). Dr. Chambers noted that tailings dams fail at a rate that is approximately 10 times higher than that of water supply reservoir dams. (*Id.*, p.2). He stated that upstream-type dam construction used for the existing LTVSMC tailings and proposed for NorthMet tailings poses the highest risk for both seismic and static failure of tailings dams. (*Id.*, pp. 2-3). Dr. Chambers highlighted the presence of a clay

³⁸ Paula Stange, Analysis indicates the presence of mercury, arsenic, iron and lead in the water do Rio Doce, *GazetaOnline*, Nov. 12, 2015, http://gazeta.redegazeta.com.br/_conteudo/2015/11/noticias/cidades/3914468-analise-aponta-presenca-de-mercurio-arsenio-ferro-e-chumbo-na-agua-do-rio-doce.html

layer beneath a portion of the Mount Polley dam as a significant cause of its failure, explaining that the LTVSMC tailings slimes on which PolyMet's tailings dams would be built have a consistency and behavior similar to clays. (*Id.*, p. 3).

The FEIS confirms that the LTVSMC dam was built with upstream construction and that PolyMet would use upstream construction for its tailings storage on top of these old dams. (FEIS, 4-439, 5-646). The FEIS also notes that there were times during the operation of the underlying LTVSMC tailings facility where "significant amounts of fine tailings and slimes" settled near the perimeter dams and dams were then built with coarse tailings on top of them. (FEIS, 4-427). This inclusion of "relatively large zones" of fine tailings and slimes in the dam's outer shell "reduces the drainage ability of the shell, increasing the phreatic surface, and reduces the localized shear strength" of the dam. (*Id.*).

The FEIS identified the northern dam in the proposed PolyMet NorthMet Cell 2E as an area of potential weakness since it is "underlain by a layer of fibrous peat up to approximately 20 ft thick that extends north beyond the toe of the dam into a nearby wetland and due to the presence of interbedded layers of contractive fine tailings and slimes." A deposit of glacial till lies beneath the peat, and the crest of the dam in this area is about 90 feet above the surrounding ground surface and "consists mostly of coarse tailings with some weaker layers of interbedded fine tailings and slimes close to the base of the dam." (FEIS, 4-437). Fully liquefied, this cross-section of the dam (Section F) has a margin of safety at barely the 1.1 minimum required. (FEIS, 5-658, Table 5.2.14-1).

Although the FEIS does not include any dam break analysis (FEIS, 5-628), PolyMet's Flotation Tailings Management Plan (PolyMet 2015n) states that there are 34 homes that could be affected by a tailings dam break, and that the time to first arrival of flood flows at the nearest residence would be about an hour. (*Id.*, p. 20, see Exhibit 22 for map).

After the Mount Polley dam failure, an independent panel of experts studied the breach and released a report, *The Independent Expert Engineering Investigation and Review Panel Report on Mount Polley Tailings Storage Facility Breach* (hereinafter "Independent Report") attached as Exhibit 25. The *Independent Report* analyzed the cause of the Mount Polley tailings impoundment failure and concluded, "the dominant contribution to the failure resides in the design." The *Report* made the following key recommendation:

[T]he future requires not only an improved adoption of best applicable practices (BAP), but also a migration to best available technology (BAT). Examples of BAT are filtered, unsaturated, compacted tailings and reduction in the use of water covers in a closure setting. (*Id.*, at iv)

The *Independent Report* explained, “There are no overriding technical impediments to more widespread adoption of filtered tailings technology.” (*Id.*, at 122). Its Expert Panel challenged the practice of maintaining a water cover over tailings to reduce reactivity, stating that so-called water cover runs counter to best available technology principles and that “No method for achieving chemical stability can succeed without first ensuring physical stability.” (*Id.*, at 124). The *Independent Report* explained the “intrinsic hazards associated with dual-purpose impoundments storing both water and tailings” and identified as the goal of best available technology for tailings management “to assure physical stability of the tailings deposit. This is achieved by preventing release of impoundment contents, independent of the integrity of any containment structures.” (*Id.*, at 121). To accomplish this objective, the Report continued, “BAT has three components that derive from first principles of soil mechanics: 1. Eliminate surface water from the impoundment. 2. Promote unsaturated conditions in the tailings with drainage provisions. 3. Achieve dilatant conditions throughout the tailings deposit by compaction.” (*Id.*).

The *Report*’s expert panel recognized that the chief reason why there isn’t wider industry adoption of filtered tailings is that comparisons of capital and operating costs alone favor conventional tailings dams. The *Independent Report* recommended that cost estimates include “risk costs, either direct or indirect, associated with failure potential,” emphasizing, “Full consideration of life cycle costs including closure, environmental liabilities, and other externalities will provide a more complete economic picture. While economic factors cannot be neglected, neither can they continue to pre-empt best technology.” (*Id.*, at 123). The *Report* concluded that “BAT should be actively encouraged for new tailings facilities at existing and proposed mines” and “cost should not be the determining factor.” (*Id.*, at 125).

The alternative of dry stack tailings was not evaluated at any point in environmental review. The Draft EIS screening process found thickened (not dry stack) tailings would address tailings basin mitigation issues, but “the operational cost of this measure would be high.” (MDNR and USACE, 2009, 3-56, Table 3.2-2). Although Co-Lead Agency responses to comments state that after the DEIS a dry tailings alternative was reconsidered and determined

not to offer significant environmental benefits (FEIS, A-315), there is no such analysis in the SDEIS, the FEIS, or any reference cited in either document.

The FEIS states that the *Independent Report* on Mount Polley was reviewed after the SDEIS comment period ended³⁹ and Co-Lead Agency technical analysis confirmed, “use of dry stacking technology would increase tailings basin stability.” Further evaluation of this alternative was rejected, however, on the grounds that use of dry stacking requires a basin liner, which is not feasible on top of the existing LTVSMC tailings basin. Use of a different location and a lined dry stack facility was then rejected on the grounds that “A separate dry stack tailings basin would increase footprint effects of the project” and that “A separate dry stack tailings basin would not address LTVSMC tailings basin legacy issues.” (FEIS, A-315).

A separate dry stack tailings basin might increase the “footprint” of the project, but need not have any adverse environmental effects. During the scoping process for the NorthMet project, several brownfield sites in close proximity to the LTVSMC plant were identified as alternative tailings locations. This map of these Alternative Sites is attached as Exhibit 27. Addressing LTVSMC legacy issues is not relevant to any decision regarding PolyMet NorthMet alternatives, particularly since Cliffs Erie is already required under applicable law and a consent decree to address legacy issues irrespective of the NorthMet proposal.

In addition to environmental damage due to uncaptured seepage and the reasonably foreseeable environmental damage from catastrophic dam failure, the proposed use of the LTVSMC site for NorthMet tailings disposal would have substantial direct and indirect impacts on wetlands. The Proposed Action would result in direct destruction of 148.4 acres of wetlands (FEIS, 5-322, Table 5.2.3-8) and potentially impact thousands of additional acres of wetlands as the result of dewatering resulting from seepage collection, sulfate deposition and seepage impacts on water quality. (See FEIS, 5-333, Table 5.2.3-10; 5-345, Table 5.2.3-12).

Tailings site wetlands, though degraded as the result of the existing LTVSMC tailings impoundment, are historical wetlands. (Exhibit 13 maps). They are also highly methylating environments, particularly sensitive to changes in hydrology resulting in drying and wetting cycles, as explained in the opinion of Brian Branfireun, an international expert on mercury, methylmercury and wetlands. (Opinion of Brian Branfireun attached with WaterLegacy Expert Reports, hereinafter “Branfireun 2015”).

³⁹ Such review was requested by WaterLegacy in a March 18, 2015 letter to Co-Lead Agencies, attached as Exhibit 26.

There are many alternative sites in the vicinity of the LTVSMC processing plant that could be used for PolyMet NorthMet tailings, some of which have been identified on Exhibit 27. Tailings disposal does not require siting on wetlands to fulfill its basic purpose. In fact, siting within wetlands is arguably inimical to the purpose of containing these wastes. The Co-Lead Agencies' arguments for rejecting the alternative of dry stack tailings disposal on a lined facility without any evaluation are spurious and fail to ensure that the proposed NorthMet mining project would be conducted in an environmentally sound manner.

c. West Pit Backfill is a practicable alternative that would avoid or minimize environmental impacts from water pollution.

The FEIS erroneously minimizes the significance of West Pit Backfill in mitigating environmental damage resulting from the NorthMet mine and stockpiling of Category 1 waste rock. Contaminated seepage from this site would impact federal lands in the Upper Partridge River and Partridge River Peatlands sites as well as the 100 Mile Swamp.

First, the FEIS errs in minimizing the significance of reclamation of the waste rock pile's 526-acre surface and the restoration of wetland areas and functions on the grounds that compensatory wetlands mitigation would have been required regardless of future backfilling or not. (FEIS, 3-161 to 3-162). This is a striking distortion of the concept of environmental benefit. Although a project proponent may see no value in future wetlands restoration if it receives no mitigation credit, environmental impacts are not the same as mining company interests. There is an environmental benefit to the watershed of reclamation even if it comes after the predicted 20-year mine life cycle, particularly when such a large site can be restored to the natural ecosystem.

The FEIS identifies additional benefits from improvement of visual aesthetics and a measurable environmental benefit from not having to treat seepage from the Category 1 Stockpile. (FEIS, 3-161).

The FEIS fails to consider an important environmental benefit of the West Pit Backfill alternative. It would reduce contaminated seepage that would otherwise result from leaving the 526-acre Category 1 copper-nickel waste rock pile permanently in a 280-foot-tall unlined pile at the mine site where seepage could impact the 100 Mile Swamp and the Upper Partridge River. (FEIS, 5-119, Table 5.2.2-21). The hydrogeologic conditions beneath the unlined Category 1 waste rock piles are not discussed in the FEIS. But comparing the Mine Site Plan (FEIS, Figure

4.2.14-1) with figures in the Barr Hydrogeology of Fractured Bedrock report (FEIS ref. Barr 2014b, Figures 1 and 2, Exhibit 3) shows that the majority of the Category 1 waste rock pile would be located on Virginia Formation rock, rather than less hydraulically conductive Duluth Complex rock. There are three faults transecting the proposed site for the Category 1 waste rock pile. (*Id.*)

The FEIS predicted, based on PolyMet's modeling and assumptions (PolyMet 2015h), that more than 98 percent of affected groundwater seepage from the Category 1 stockpile would be captured by the containment system or would migrate as groundwater into the West Pit and East Pit. (FEIS, 5-7). PolyMet's modeling (PolyMet 2015h), also adopted in the FEIS, predicted that only negligible volumes of uncaptured seepage would flow north. (FEIS, 5-65).

Technical documents undermine these claims for seepage collection. Although the FEIS refers to the containment to be installed to collect seepage as a "low-permeability cut-off wall keyed into bedrock" (FEIS, 5-7), the actual design provides for the use of "compacted soil" as a barrier around the waste rock pile. (FEIS ref. PolyMet 2015h, p. 10). Specifications for the hydraulic conductivity are 1×10^{-5} centimeters per second (*Id.*, p. 13), which is generally classified as "semi-permeable" soil.

The Category 1 waste rock pile drainage system would consist of pipes and ditches and rely only on gravity for collection. (*Id.*, p. 14). PolyMet admits that along the west, north, and east sides of the stockpile, there may be localized areas where the drain pipe cannot be installed at an elevation low enough to ensure that groundwater will not flow beneath the cutoff wall. After reviewing PolyMet's seepage collection plan, Dr. Lee has summarized, "the proposed drainage system is unlikely to work as anticipated." (Opinion of Donald Lee, Ph.D., P.E. on Category 1 stockpile, hereinafter "Lee, Category 1 opinion, 2015", p. 2).

Failures of engineering controls for seepage are not modeled by PolyMet. It is suggested that pollution may be discovered after the fact: "PolyMet assumed that water collection performance monitoring points will be defined in SDS permitting to confirm (via monitoring differential hydraulic head) whether or not post-construction seepage loss is occurring beneath the cutoff wall. If monitoring confirms that seepage losses are occurring to an extent potentially detrimental to water quality, then groundwater recovery wells can be installed to supplement the containment system. (PolyMet 2015h, p. 14).

The FEIS' predictions of minimal Category 1 seepage flow were also based on an

assumption that the cover placed on the rock pile would reduce infiltration by more than 99 percent (from 360 gpm to 2.8 gpm). (FEIS, 5-145). PolyMet's document from which this conclusion is drawn admits that geomembranes have not been used for many waste rock stockpile covers and that use is generally limited to projects with an average size of less than 30 acres. (PolyMet 2015d, p. 45). Yet, PolyMet (2015d) and the FEIS calculate infiltration solely on the basis of liner defects per acre, without considering the topography of massive waste rock piles. PolyMet identifies three mine sites where geomembranes have been used as a cover, but does not describe seepage results. One of these featured sites is the Dunka Mine (*Id.*, p. 46). Unsurprisingly, the FEIS does not cite the Dunka Mine for its predictions that infiltration and seepage will be prevented. Despite its geomembrane, Dunka Mine waste rock seepage has resulted and continues to result in ongoing violations of Minnesota water quality standards for copper, nickel, hardness and specific conductivity. (See Dunka Mine DMR summaries, provided in Exhibit 34).

Recent water modeling has challenged the FEIS' assumption that little seepage would flow north from the Category 1 waste rock pile. As described in WaterLegacy's FEIS Comments, preliminary MODFLOW modeling by the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) suggests that contaminants in the NorthMet mine surficial aquifer could flow northward as a result of the increase in pit depth and future closure of the Peter Mitchell Pit, given the proximity of the Category 1 stockpile (0.8 miles) to the Peter Mitchell Pit and the experience with other taconite pits where a cone of depression affecting surficial water can extend 1.4 to 1.5 miles from the pits. (GLIFWC Northward Flowpath Letter, Exhibit 8, p. 5).

Placing Category 1 in the Duluth Complex rock West Pit, after grouting any fractures revealed by mining, may reduce adverse effects from uncaptured release of contaminated seepage to surface and groundwater. Maintaining saturated conditions to reduce oxidation may also be more effective within the West Pit than trying to do so with a cover on a tiered pile. These potential environmental benefits from the West Pit Backfill alternative should have been analyzed to determine the alternative for Category 1 waste rock storage that would best avoid and minimize environmental impacts.

The FEIS explains that environmental benefits from the West Pit Backfill alternative do not require its consideration, let alone implementation, due to PolyMet's interests:

[T]he potential environmental benefit is moot or outweighed because encumbrance is not

allowed in PolyMet’s private mineral leases and because the 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 (MDNR et al. 2013b). As such, the option to backfill the West Pit was eliminated from further consideration in the SDEIS and remains so in this FEIS. (FEIS, 3-162)

The MDNR memorandum cited above relied on the conclusion reached by PolyMet’s consultants that the West Pit Backfill alternative “would significantly decrease net return on the project.” (FEIS ref. MDNR et al., 2013b, p. 3). PolyMet’s consultants also emphasized, “There are known extensions of mineralization outside the mine plan both to the south (down dip) and to the west (along strike). A key consideration in the development of an overall mine plan for the Project, including the ability to backfill open pits, is preserving potential future development of these extensions of mineralization.”⁴⁰

PolyMet’s interests in a better financial return or avoiding renegotiation of leases do not render the West Pit Backfill alternative impracticable. In addition, the “key consideration” relevant to PolyMet in opposing this alternative - preserving future development of extensions of mineralization outside the pit boundary – if it is considered as part of the project purpose for rejecting the West Pit Backfill Alternative, must also serve to define the project purpose for evaluating the Underground Mining Alternative.

d. Mine Site Reverse Osmosis in Year 1 is a practicable alternative that would minimize pollution and adverse wetlands impacts.

Both WaterLegacy and Tribal Cooperating Agencies requested consideration of an alternative to mitigate impacts on wetlands and water quality from mine dewatering and seepage by treating groundwater pumped from mine pits during operations with reverse osmosis to levels that comply with water quality standards and returning that treated water to support wetlands and dilute any seepage released to the Partridge River watershed. Yet, the FEIS doesn’t even mention this alternative. Although the request to consider this alternative was noted in two responses to comments, neither substantively responded to the Mine Site Reverse Osmosis in Year 1 alternative. (FEIS, A-134 to A-135, A-313).

⁴⁰ Foth, *Evaluation of Backfilling the NorthMet West Pit*, prepared for PolyMet Mining, Dec. 2012. p. 8, provided with WaterLegacy SDEIS Comments in the WaterLegacy Appendix as Exhibit 49.

The NorthMet Proposed Action currently calls for construction of reverse osmosis (RO) water quality treatment in approximately year 52 (FEIS, 5-142). That RO facility would be scaled to treat overflow discharge from the West Pit. Prior to the predicted filling of the West Pit, at least 52 years away (more if mining is continued for more than 20 years), all water from the Upper Partridge River would be sent to the processing plant nine miles away and removed from the watershed.

The treatment targets for the mine site wastewater treatment plant from year 1 to at least year 52 would not permit discharge of treated water to surface water. Based on current baseline hardness in the proposed West Pit Outlet Creek of less than 50 milligrams per liter (mg/L) (FEIS, 4-91, Table 4.2.2-15), the mine site wastewater treatment facility (WWTF) target for lead (10 µg/L) would be more than seven times the chronic water quality standard (1.3 µg/L);⁴¹ the WWTF target for nickel (113 µg/L) would be nearly four times the water quality standard (29 µg/L);⁴² and the WWTF target for sulfate would be 250 mg/L, 25 times the 10 mg/L standard applicable in wild rice waters. (See FEIS, 5-148, Table 5.2.2-2 for WWTF targets). The predicted mercury concentration in WWTF effluent would be 5.8 nanograms per liter (ng/L),⁴³ nearly 5 times the Great Lakes Initiative water quality standard of 1.3 ng/L. This low-quality effluent could not be used to augment the mine site aquifer to protect wetlands from water drawdown or to mitigate mine site seepage impacts.

Where wetlands near the tailings site in the Embarrass River watershed are concerned, the FEIS has already proposed that stream augmentation would mitigate effects on wetlands due to the maintenance of surface flows within 20 percent of existing conditions. (FEIS, 5-183). Yet, although wetlands at the plant site are degraded by the existing impoundment (FEIS, 4-186) and wetlands at the mine site are high quality wetlands (FEIS, 5-26) including Superior National Forest wetlands, the proposed action makes no plan to treat and return water to the mine site watershed.

Indirect impacts on mine site wetlands as a result of mine dewatering are likely to be quite severe. As explained in WaterLegacy's FEIS Comments and in a later section of these Objections, mine dewatering could adversely affect 5,720 acres of proximate wetlands. (FEIS,

⁴¹ Minn. R. 7050.0222, Subp. 4

⁴² Minn. R. 7052.0100, Subp. 6.

⁴³ Information on the WWTF mercury target is not provided in the SDEIS, FEIS or their cited references, but is available in PolyMet RS66, Mercury Mass Balance Attach. A, obtained through the Data Practices Act. This report is Exhibit 4 to WaterLegacy SDEIS Comments in the WaterLegacy Appendix.

App. C, autop. 2994). PolyMet has recently re-evaluated the hydraulic conductivity of both wetlands and rock formations at the mine site. The conductivity of both wetlands deposits (horizontal conductivity) and Virginia Formation bedrock (both horizontal and vertical conductivity) was calculated at 400 percent of the conductivity previously modeled for the 2013 SDEIS. (Comparison is based on SDEIS, 5-27, Table 5.2.2-7 and FEIS, 5-29 Table 5.2.2-7). As a result, peak inflows and dewatering of the Partridge River watershed could be as much as 760 gallons per minute (FEIS, 5-111, Table 5.5.2-19) or 399,700,000 gallons per year removed from mine site groundwater.

Mine Site Reverse Osmosis in Year 1 could return treated, clean water to mine site streams and surficial aquifers, mitigating indirect impacts of wetlands drawdown. Reduction in the degree to which mine site wetlands are impacted by hydrologic change would have the potential to mitigate the degree to which mine site wetting and drying cycles enhance mercury methylation in the Partridge River watershed. In addition, if PolyMet's modeling of polluted seepage at the mine site has underestimated impacts to water quality, the Reverse Osmosis in Year 1 alternative would allow discharge of clean water to mitigate impacts while additional engineering solutions to prevent seepage are put into place.

Since construction of a reverse osmosis plant at the mine site is already planned post-closure, at a time when PolyMet would have fewer economic resources than during operations, it should be presumed that earlier construction and operation of the plant would be practicable. As with other alternatives that clearly reduce adverse effects on the ecosystem, the project proponent bears the burden of proof to demonstrate that Mine Site Reverse Osmosis in Year 1 is not a practicable alternative to minimize and mitigate impacts to wetlands and water quality of the proposed NorthMet project.

e. Hydrometallurgical waste disposal on an alternative site is a practicable alternative that would avoid or minimize environmental impacts.

The NorthMet hydrometallurgical residue facility (HRF) would be a relatively small facility, when compared to the NorthMet tailings waste storage facility. However, the NorthMet hydrometallurgical residue facility (HRF) would contain some of the most concentrated and toxic chemicals resulting from the project. It is proposed to be located on 36.1 acres of wetlands,

requiring the destruction of 7.5 acres of marsh wetlands subject to state and federal regulatory jurisdiction. (FEIS, 5-321, Figure 5.2.3-19).

The HRF would receive 313,000 tons per year of hydrometallurgical residue produced by autoclave processing of metals at the Hydrometallurgical Plant and up to a total of 6,170,000 tons of this waste. (FEIS, 1-5, 3-117). During operations, the HRF would also receive filtered sludge produced by chemical precipitation of process water in the West and East equalization ponds. This process water would include the reject concentrate stream from the plant site wastewater treatment plant (WWTP). (FEIS, 5-101, Figure 5.2.2-20). The FEIS also proposes disposal in the HRF of WWTP treatment plant solids, which are primarily gypsum, and of coal ash wastes from the existing LTVSMC site Coal Ash Landfill. (FEIS, 5-178, PolyMet 2014c). These additional potentially toxic and reactive wastes may represent up to 10 percent of the HRF facility solids volume. (FEIS, 4-445).

The FEIS concludes that HRF waste will not exceed federal RCRA hazardous waste thresholds, without disclosing the mass or concentration of *any* of the constituent wastes that would be disposed of in this facility. Rather than assessing the contaminant levels actually proposed for the HRF under the current project plan, the FEIS states that, if the project is approved, the residue should be tested to verify that it is not hazardous. (FEIS, 5-609).

No supporting documents fully disclose the chemical constituents of the hydrometallurgical residue facility. However, the little information available confirms that the constituents of the HRF would pose serious risks to the aquatic ecosystem and to human health if they were ever to leak or spill. Co-Lead Agency responses to comments state that 164 pounds of mercury would be deposited in the hydrometallurgical facility each year. (FEIS, A-414). Over a 20-year mine life, up to *3,280 pounds of mercury* could thus be deposited in the HRF.

The February 2007 PolyMet RS33/RS65 Hydrometallurgical Residue Characterization (provided as Exhibit 27 to WaterLegacy SDEIS Comments) indicated that tested hydrometallurgical leachate residue would have sulfate levels of 7,347 mg/L. Although we have found no document in the EIS record that provides contaminant levels for filtered sludge, before WWTP reject concentrate is dewatered to become sludge it would contain levels of arsenic and metals as much three orders of magnitude above applicable limits. At the P90 level, reject concentrate would contain as much as 1,150 µg/L of arsenic (2 µg/L criterion for drinking water); 16,600 µg/L of manganese (100 µg/L HRL for drinking water); 847 of cobalt (5 µg/L

surface water limit); 11,600 µg/L of copper (9.3 µg/L limit in water with 100 mg/L hardness); 1,290 µg/L of lead (3.2 µg/L limit in water with 100 mg/L hardness); 8,230 mg/L of sulfate (10 mg/L limit in wild rice waters). (reject concentrate levels provided in FEIS ref. PolyMet 2015m, autop. 452).

The FEIS assumes that leakage from the HRF into underlying groundwater or adjacent surface water “would be negligible” due to the double liner proposed, and does not evaluate potential environmental impacts from HRF waste facility seepage. (FEIS, 5-179). This assumption is based on a referenced PolyMet document that states, “The double liner system designed for the HRF is impermeable enough so that its effect on the environment can be ignored.” (PolyMet 2015j, p. 117). PolyMet assumes a leakage rate of 2 defects per acre in the upper liner of the HRF, that defects are circular with a diameter of 1 centimeter, and that no defects at all will occur in the lower clay liner. (*Id.*). However data in PolyMet’s own Residue Management Plan suggests that 40% of installed liners have a defect density from 4 to 10 per acre and 10% have a defect density from 10 to 20 per acre. (FEIS ref. PolyMet 2014r, p. 11). Although the hydraulic head between the upper and lower HRF liner may be low, leakage could still occur.

Neither the FEIS nor its underlying PolyMet documents address the difference between the HRF proposal and modern landfill siting and performance. Modern landfills, on which the optimistic expectations of HRF leakage performance are based, cannot be sited on locations like the one proposed in the FEIS. As summarized on the EPA website, municipal solid waste landfills must comply with the federal regulations in 40 C.F.R. § 258 (Subtitle D of RCRA), or equivalent state regulations. Federal standards for solid waste landfills include: “Location restrictions—ensure that landfills are built in suitable geological areas away from faults, wetlands, flood plains, or other restricted areas.”⁴⁴ Minnesota law similarly precludes the siting of either a hazardous or a solid waste facility in a wetland or in a location where the topography, geology, hydrology or soil is unsuitable for the protection of the ground water and the surface water. Minn. R. 7045.0460, Subp. 2, Minn. R. 7035.1600.

The FEIS and supporting documents demonstrate that the proposed hydrometallurgical residue facility would be sited in an unsuitable location for either a hazardous or an industrial waste landfill. The HRF would be located on approximately 36.1 acres of wetlands, affecting the

⁴⁴ EPA, Landfills, available at <http://www3.epa.gov/epawaste/nonhaz/municipal/landfill.htm>. See also 40 C.F.R. §257.9 for restrictions on location of new or expanding non-municipal, non-hazardous waste facilities on wetlands.

foundation of the disposal facility as well as implicating Clean Water Act regulations. In addition to the wetlands, the HRF would be located on top of as much as 50 feet of fine tailings and slimes in the existing LTVSMC Emergency Basin. (FEIS, 5-664, Figure 5.2.14-9). Although the FEIS proposes that a preload could be placed on these materials to compress them in order to reduce stress deformation and strain on the liner system, it is expected that the material would rebound to some degree after the preload is removed. (FEIS, 5-667). Differential settlement of foundation materials is known to create longitudinal strain for liner materials. (FEIS, 5-661).

The FEIS and Minnesota Geological Survey maps show the existence of a fault directly beneath the proposed HRF location. (FEIS, 4-435, Barr 2014b Large Figures 1 and 2, Exhibit 3). The FEIS has identified yet another risk to liner deformation and integrity. Seeps along the southern edge of the existing LTVSMC tailings basin Cell 2W have been observed with the potential to create phreatic build-up below the HRF liners. The HRF would require a collection drain beneath the proposed embankment and liner systems to transmit the collected seep to the exterior of the HRF facility and reduce this risk. (FEIS, 5-662 to 5-663).

Although the degree to which leakage and seepage of concentrated and toxic chemicals would adversely affect groundwater and surface water quality is difficult to quantify given the lack of information in the FEIS, there is a clear environmental benefit to locating the hydrometallurgical residue facility on a site with a level, stable and dry foundation, where predictions of infrequent leakage are much more likely to be true. More effectively containing mercury, arsenic, manganese, cobalt, copper, lead and sulfate so that they are not released to surface water and groundwater would reduce impacts to aquatic life and to human health.

The FEIS contemplates that “liquefaction of the hydrometallurgical residue” may occur, but states that the embankment dam is “sufficiently designed so that containment would not be lost.” (FEIS, 5-664). The liquefaction and failure of containment at the hydrometallurgical residue facility may or may not be a likely occurrence. But it would be a catastrophic occurrence that can be readily avoided by siting the HRF on an appropriate site that is not located on top of slimes and wetlands.

There are many sites that do not involve wetlands in the vicinity of the proposed NorthMet processing plant (see for example, brownfield sites identified in Exhibit 27) that could accommodate the small footprint of the proposed NorthMet HRF facility. The Co-Lead Agencies

should have required evaluation of an alternative location for hydrometallurgical and other concentrated and reactive waste disposal.

C. The proposed PolyMet NorthMet land exchange and mine project would have significant adverse impacts on water quality, watersheds, fish, and human health, contrary to FLPMA and the public interest.

The Federal Land Planning and Management Act under which the proposed land exchange would be authorized requires that the Forest Service give full consideration to the needs of State and local people, including needs for food, fish and wildlife. 43 U.S.C. § 1716(a). Federal regulations also require that protection of fish and watersheds, be given full consideration in determining whether a land exchange serves the public interest. 36 C.F.R. §254.3(b)(1). The Forest Service DROD acknowledges the need to consider the effects of the mining project as well as the land exchange in making its public interest determination. (DROD 14-15).

Federal regulations also require a finding that a proposed land exchange complies with established management objectives on adjacent federal lands. 36 C.F.R. §254.3(b)(2)(ii). However, the DROD failed to consider *any* Superior National Forest Plan objectives related to watershed health. The Forest Plan includes many such provisions, including the following:

“Management activities do not reduce existing quality of surface or groundwater or impair designated uses of surface and ground water.” (Forest Plan, Watershed Health, D-WS-4, p. 2-10)

“Water quality, altered stream flow, and channel stability do not limit aquatic biota or associated recreational uses. Water in lakes, streams, and wetlands meets or exceeds State water quality requirements.” (*Id.*, Watershed Health, D-WS-5, p. 2-10)

“Improve and protect watershed conditions to provide the water quality, water quantity, and soil productivity necessary to support ecological functions and intended beneficial water uses.” (*Id.*, Watershed Health, O-WS-1, p. 2-12)

The Forest Service uncritically relied on the FEIS: “The analysis in the FEIS indicates that the mining project will result in no significant effects to water quality.” (DROD 18). The DROD admitted there was a possibility that pollution or other impacts from the mine would affect adjacent national forest lands, but again stated “the FEIS analysis indicates” that with project mitigation measures and the permitting process “regulatory requirements for the protection of the environment and human health will be met.” (DROD 18). This circular

reasoning fails to meet the Forest Service's obligations under NEPA to take an independent "hard look" at the impacts of the PolyMet NorthMet mining project on water quality and human health.

The full record - including underlying documents, comments and expert opinion as well as the FEIS - demonstrates that the PolyMet NorthMet land exchange and mining project would increase mercury and methylmercury in downstream waters and fish; would cause and contribute to degradation of water quality and violation of water quality standards; and would impair watersheds, fish, human health and the use of natural resources for food by local people. Under applicable statutes, regulations and the management objectives of the Forest Plan, the federal land exchange that would result in the PolyMet NorthMet sulfide mine project must be rejected.

1. The PolyMet NorthMet project would significantly increase mercury and methylmercury in the Partridge and Embarrass watersheds and the St. Louis River.

The Forest Service DROD reflects the significance to the PolyMet NorthMet land exchange decision of determining whether there will be a change in fish mercury concentrations and changes in human health risks related to fish consumption. (DROD 27). The "best available science" must also be used to decide the nature of impacts on water quality. (DROD 30).

After working with some of the world's leading mercury scientists for several years, WaterLegacy believes that the PolyMet NorthMet project would create a "perfect storm" for increased mercury contamination of fish as a result of discharge of sulfate and mercury, air deposition of sulfur compounds and mercury and hydrologic changes to wetlands due to mining and tailings seepage capture. The increased mercury in the water column and increased mercury contamination of fish would cause or contribute to violations of water quality standards of the State of Minnesota and the downstream Fond du Lac Band and would increase human health risks, particularly to fetuses, infants, children and people who rely on local fish for subsistence.

International mercury, methylmercury and wetlands expert Brian Branfireun has provided the only scientific analysis in this record of the potential for increased methylmercury production and transport as a result of the PolyMet NorthMet project. Dr. Branfireun concluded, in an opinion attached with WaterLegacy's comments:

Based on the relatively high concentrations of methylmercury, and more importantly the high percentage of total mercury that is methylmercury in mine tributary streams and in

the Partridge and Embarrass Rivers as well as the scientifically accepted mechanisms of methylmercury production and transport, it is clear that the watersheds impacted by the proposed development contain significant sites of methylmercury production, and therefore are sensitive to changes presented above that would result in enhanced methylmercury production. . . It is my opinion that the NorthMet development could create a substantial risk of ecologically significant increases in water column and fish methylmercury concentrations in downstream waters, including the St. Louis River. (Branfireun 2015, pp. 26-27).

In his detailed opinion, Dr. Branfireun explained the site-specific data and peer-reviewed literature on which his assessment of methylmercury risks is based. First, he explained, the methylmercury data collected by PolyMet since the SDEIS demonstrates that the ratio of methylmercury to mercury in the Partridge and Embarrass Rivers surface water sampling sites and mine site creeks are all indicative of a highly methylating environment. This data shows the fraction of methylmercury in the Partridge River as 2.2% at SW-001, increasing to 14.6% at SW-004a and remaining at about 10% at the next two stations. For the two surface water sampling sites on the Embarrass River, mean percentages of methylmercury are 10.4% and 8.8%. Although Wyman Creek, which is impacted by mining has the highest percentage of methylmercury (12.5% at PM-5), the relatively unimpacted mine site creeks also have high methylmercury ratios of 6.0% at Longnose Creek, 5.5% at proposed West Pit Outlet Creek and 9.6% at Wetlegs Creek. (*Id.*, pp. 3-4).

This finding is significant, Dr. Branfireun explained, because it highlights the role of ombrotrophic bogs in the production of methylmercury and the fact that, “Even relatively small changes in water table position and wetting and drying frequency in the ombrotrophic wetlands at the NorthMet mine site have the potential to impact sulfate and methylmercury concentrations of receiving waters.” (*Id.*, p. 19) He stated that the indirect effects of changes in hydrology on vegetation community which the FEIS proposes to monitor is “perhaps the least significant consideration in terms of water quality impacts and cumulative effects on aquatic and human health in receiving waters of small tributaries, the Partridge and Embarrass Rivers, and the St. Louis River.” (*Id.*). Of greater importance, “considering the potential for mercury methylation, bog wetlands around the proposed mine site must be considered to have a *very high likelihood of indirect impacts* from the proposed NorthMet development.” (*Id.*, emphasis added).

Dr. Branfireun also emphasized, “The high percentage of methylmercury in these surface waters speaks to sensitivity of their watersheds to both a) hydrological impact from a change in

either surface or subsurface hydrology, and b) deposition of any additional sulfate either from surface water flows, or wet/dry atmospheric deposition.” (*Id.*, p. 4) The data also shows that “surface waters in the small tributaries at the proposed mine site, the Partridge, and the Embarrass Rivers are all strongly influenced by the presence of wetlands in their watersheds.” In fact, Dr. Branfireun stated that he is not professionally aware of any other surface waters where the fractions of methylmercury as a percentage of total mercury are as high as the waters reported in the FEIS. (*Id.*, pp. 15-16).

Thus, the data confirms that both the proposed NorthMet mine site and tailings site are highly methylating environments and that the methylation that takes place in wetlands in these watersheds is exported to surface waters. Mine site ombrotrophic bogs are not wetlands with a “low likelihood” of impacts from mine dewatering where the critical function of water quality is concerned. They must be considered wetlands with a “very high likelihood” of indirect effects on mercury methylation, whether or not there is a detectable change in plant communities. Finally, based on the sensitivity of the surrounding aquatic ecosystem to impacts of sulfate and hydrologic impacts, the NorthMet mine site and tailings site locations seem particularly ill-suited for a copper-nickel sulfide mine and tailings storage facility.

Dr. Branfireun reviewed recent peer-reviewed literature that found in wetlands exposed to sulfate loading, “prolonged water table drawdowns lead to greater sulfate release in all treatments.” As a result of a natural drought in experimental wetlands, wetlands drawdown increased methylmercury desorption and flux from peatlands, drove sulfate-reducing-bacteria activity that increased mercury methylation, and made sulfate “available for export to downstream aquatic systems (e.g. lakes and other wetlands) that could be equally susceptible to *in situ* net methylations.” (*Id.*, p. 20, quoting Coleman-Wasik *et al.* 2015).⁴⁵

Based on his field experience and this recent peer-reviewed study, Dr. Branfireun concluded for the NorthMet site that “a significant proportion of bog wetlands that are within the zone of drawdown from the proposed mine proposed development will also exhibit sulfate regeneration and increased export of methylmercury, under natural rewetting cycles as well as storm events.” (*Id.*, p. 20). Hydrologic changes at both the mine site and tailings site would increase mercury and methylmercury and release sulfate to downstream waters:

⁴⁵ References cited by Dr. Branfireun are attached with these Comments in the Branfireun Referred Materials folder.

[D]evelopment-induced change in hydrology, such as those proposed at both the NorthMet mine site and tailings basin, could amplify those drought-rewetting cycles (in terms of magnitude, frequency, or both). These implications should not be understated. Independent of any additional releases of uncaptured sulfate or mercury from the proposed NorthMet development, dewatering of wetlands surrounding the tailings basin through seepage collection and even modest impacts on water table position by underdrainage of mine site peatlands through open pit dewatering could increase total mercury, methylmercury and sulfate in the Partridge, Embarrass, and ultimately the St. Louis River. (*Id.*, pp. 21-22).

In addition to mine site and tailings site dewatering, Dr. Branfireun raised concerns about the proposed storage of peat overburden in the NorthMet unlined laydown area for 11 years. He stated that this storage would “result in repeated flushes of methylmercury as well as inorganic mercury.” (*Id.*, p. 22). Based on the Coleman-Wasik (2015) research, Dr. Branfireun cautioned, “The continuous process of drying and rewetting of overburden peat stockpiled in laydown areas may not only continue to release inorganic mercury, but may also continuously regenerate sulfate, and in anaerobic locations, promote methylmercury formation.” (Branfireun 2015, p. 21).

Dr. Branfireun also explained that there is clear evidence, most of which comes from Minnesota peatland experiments, that the addition of sulfate either from seepage or from direct atmospheric deposition to bogs increases mercury methylation in wetlands. He referenced the assumptions in the FEIS regarding nearly perfect seepage collection and found the FEIS “insufficient to discount the potential for seepage of sulfates and associated impacts to wetlands in the vicinity of both the project mine site and tailings basin.” (*Id.*, p. 24). Dr. Branfireun also noted that, “Such seepage would enhance methylmercury production in the project area and could also contribute directly to water quality impairments in sulfate-poor sediments downstream of the project site.” (*Id.*).

Dr. Branfireun also explained that even if sulfate concentrations in discharge did not exceed the 10 milligrams per liter (mg/L) level that protects wild rice, increased sulfate would increase mercury methylation when added to sulfate-poor waters. He noted, “the small tributaries that are more proximal to the proposed NorthMet mine site location clearly demonstrate sulfate-limited conditions. The mean sulfate concentrations in Longnose Creek, West Pit Outlet Creek and Wetlegs Creek are 0.91, 2.6 and 3.9 mg/L respectively.” (*Id.*, p. 11). Increases in sulfate above these low background levels would promote mercury methylation in creek sediments.

Although Dr. Branfireun did not have sufficiently reliable data to quantify NorthMet effects on mercury methylation from sulfate in seepage, he performed a quantitative analysis based on the atmospheric loading of sulfate as a result of dry deposition of dust at the mine site. (*Id.*, pp. 22-23). He explained that the Barr documents underlying the FEIS use an invalid assumption that bog wetlands will contain a foot of standing water, and that sulfate deposition should be calculated as a true load to the surface. Using PolyMet's numbers for sulfate background deposition (after validating them with a comparison to peer-reviewed literature) and expressing both the background and NorthMet sulfate deposition numbers in the same units, Dr. Branfireun calculated that the sulfate load from dust deposition from the proposed mine site would be 12.6 kilograms per hectare per acre (kg/ha/yr) as compared to the background rate of 4.58 kg/ha/yr. Sulfate load would, thus be 3.76 times or 376% of the background deposition rate.

Comparing this additional loading with several peer-reviewed studies measuring methylmercury export after adding sulfate to experimental wetlands, and using the conservative assumption in the FEIS that all sulfur in dust is converted to sulfate, Dr. Branfireun calculated that methylmercury export from sensitive mine-site peatlands may be *increased up to 1.88 times as a result of sulfate air deposition alone*. Given the magnitude of this potential impact, he explained, even if less than the total sulfate deposited is liberated to the environment, "there will still be a substantial stimulatory effect on peatland methylmercury production." (*Id.*, p. 23).

Dr. Branfireun explained how increased production and export of methylmercury would affect water quality:

The potential near-doubling of methylmercury export from methylating peatlands receiving an additional sulfate load from the proposed PolyMet development would be reflected in methylmercury concentrations in the upper tributaries, and the Embarrass and Partridge Rivers, given the role these wetlands play in supplying water to these streams and rivers. Increased methylmercury would also be expected to impact the upper St Louis River, given the direct hydrological connection and known methods of methylmercury transport. (*Id.*, p. 23).

Based on the finding in the Coleman-Wasik *et al.* study that portions of the experimental wetland recovering from high sulfate loading had methylmercury levels intermediate between those of unimpacted and current experimental treatments, Dr. Branfireun opined that sulfate loading impacts would continue even after deposition stops. "It can be expected that effects of elevated sulfate deposition on peatlands will persist to some degree even after additional sulfate loading has ceased." (*Id.*).

Explicitly challenging the assumption that impacts of the NorthMet project on mercury and methylmercury would not affect the St. Louis River, Dr. Branfireun detailed the process by which methylmercury is exported to surface waters and transported downstream. (*Id.*, pp. 26-27). Methylmercury from wetlands near the NorthMet site would be exported to tributaries of the Partridge and Embarrass Rivers by baseflow in a continuous supply to streams and by flow during snowmelt and rainstorms. Much of the methylmercury derived from wetlands would be bound to dissolved organic matter derived from the decomposition of wetland soils, so the methylmercury would remain stable, even under oxygenated stream conditions and would have lower demethylation rates from light. (*Id.*)

Methylmercury would be transported in the Partridge and Embarrass Rivers dissolved in water, sorbed to particles, bound to plant matter and algae, and bioaccumulated into aquatic organisms including fish. Methylmercury dissolved in water and in suspended inorganic and organic particles, as well as biological media, would flow into the St. Louis River as well as continuing to cycle through sorption and the aquatic food chain. Although there are numerous lakes, reservoirs and other sources and sinks for methylmercury in the 12-15 miles from NorthMet site features to the St. Louis River, Dr. Branfireun explained that there is no physical or chemical basis to discount contributions of methylmercury from tributaries of the Partridge and Embarrass Rivers to the St. Louis River. In addition, there are no barriers to fish movement, so entry of methylmercury into higher organisms and fish could occur upstream in the Partridge and Embarrass Rivers and the fish could migrate downstream to the St. Louis River. (*Id.*)

In closing, as quoted at the beginning of this section, Dr. Branfireun not only concluded that the NorthMet development could create a substantial risk of ecologically significant increases in water column and fish tissue methylmercury concentrations, but that this impact could not be addressed by adaptive management:

Finally, even if appropriate monitoring for biogeochemical changes in wetlands and sediments near the development were to be designed and implemented (a difficult and complex undertaking requiring collection of baseline data not supplied in the FEIS), it is highly likely that lag times for expression of methylmercury increases, multiple mechanisms of transport, and the likelihood of legacy regeneration of sulfate stored in the watershed would preclude effective adaptive management prior to irreversible impairment of downstream waters. (Branfireun 2015, p. 27).

2. The PolyMet NorthMet FEIS' denial of mercury and methylmercury impacts is scientifically unsupportable and relies on poor quality information.

The FEIS uses several constructs to deny the adverse effects of mercury and methylmercury on downstream waters. First, the FEIS adopts a mechanistic model that it characterizes as a “mass balance” model to claim that any increases of mercury in the Embarrass River from mercury loading would be offset by corresponding decreases in mercury loading in the Partridge River. Next, the FEIS misrepresents the well-accepted peer-reviewed science in an effort to deny the potential for increased methylmercury production and transport. Finally, the FEIS omits, distorts and in some cases misrepresents information needed to evaluate the effects of the PolyMet NorthMet proposed action.

a. The FEIS analysis of mercury and methylmercury lacks scientific justification.

Dr. Branfireun reviewed new data on background mercury and methylmercury used for the FEIS (Barr 2014d) and found numerous errors and internal inconsistencies in the data demonstrating a lack of quality assurance, arbitrary changes in non-detect levels in the process of making calculations, and a practice he criticized of substituting values for non-detect findings. He concluded that the manner in which mercury summary data is calculated, interpreted and subsequently presented remained incorrect. (Branfireun 2015, pp. 2-6, 8-9).

Dr. Branfireun then focused on the explanatory power in the data set and the EPA's request that an uncertainty range be established for estimated concentrations of solutes. No uncertainty analysis at all was done for the data on mercury and methylmercury, despite EPA requests. (*Id.*, p. 7, citing Barr 2012p). On reviewing underlying Barr documents, Dr. Branfireun found that for many elements reported in the FEIS, even those with total sample numbers in excess of 150, the standard deviations (variations) were greater than the means, and in some cases much more variable than plus or minus 100% of the mean reported. This reflects a huge margin of error, even for elements which are likely to be less variable than reactive elements such as mercury and methylmercury. The FEIS reported mean concentrations without bracketing the margin of error even for solutes of ecological concern, such as arsenic, chromium, copper, nickel and cobalt. (*Id.*, pp. 7-8).

Dr. Branfireun emphasized that an estimate of potential environmental effects that “fails to identify statistical uncertainty and the margin of error in the data” would not be considered

“acceptable when assessing the potential for downstream water quality impairments that could impact aquatic life and human activities.” (*Id.*, p. 9). “If an analysis of the margin of error in projections of sulfate and mercury releases had been performed,” he emphasized, “it is my opinion that that the FEIS statements of certainty based on grams of sulfate or mercury released could not be supported.” The “uncertainty that would bracket the model output” alone would preclude conclusions from this asserted mass balance that the proposed development will not have appreciable impacts on water quality. (*Id.*, p.14).

Dr. Branfireun concluded that the FEIS contained “cumulative errors embedded within the estimates that cast serious doubt on the extremely small gains or losses used in the FEIS to claim that the NorthMet impact would have no net impact on downstream loading of inorganic mercury.” The underlying mercury concentration data is “fraught with errors, fails to apply an uncertainty analysis to mercury or methylmercury, and fails to report chemical data in a consistent and scientifically standard way.” He criticized the FEIS for continuing to rely on a mass balance model that “even if its underlying discharge assumptions were reasonable (which they do not seem to be) in the absence of a modeled cumulative error, presents us with mass loadings of sulfate, mercury and methylmercury to the Partridge and Embarrass Rivers that are unusable.” (*Id.*, p. 24).

The EPA, in comments on the SDEIS, recommended that the FEIS model mercury using either GoldSim or a more suitable model, such as the Water Quality Analysis Simulation Program (WASP)³, which is commonly used by EPA to model elemental mercury. (EPA Comments on PolyMet NorthMet SDEIS, pp. 10-11, attached as Exhibit 1). In his review of the SDEIS, Dr. Branfireun also rejected the use of a mechanistic mass balance model and recommended use of a more appropriate model. (Branfireun 2014, p. 11). Despite these opinions, mercury was not included in the GoldSim modeling for the NorthMet mine site or the plant site (FEIS, 5-223, 5-228) and no other model was applied.

Dr. Branfireun emphasized that “a mass balance model *cannot* by definition incorporate mechanistically the input and removal processes for mercury, and *cannot* address the biogeochemical aspects of mercury methylation across the landscape which are at the root of the potential impacts associated with the PolyMet proposal.” He criticized the FEIS’ continuing reliance on this “cheaper and easier” method that “can be presented as definitive to a non-expert”

when much more defensible approaches exist, including models for stream-watershed mercury dynamics. (Branfireun 2015, p. 13).

Dr. Branfireun also challenged, one by one, the statements used in the FEIS to deny the relationship between the PolyMet NorthMet project and increased methylation and bioaccumulation of mercury in downstream aquatic systems. He disagreed with the implication in the FEIS (FEIS, 5-231 to 5-232) that there is no established relationship between methylmercury and sulfate, explaining that the lack of direct correlation is the result of sulfate consumption in the reduction reaction that produces methylmercury. (Branfireun 2015, p. 10). He criticized the inconsistency between the FEIS' argument "that there is insufficient scientific knowledge to develop a mechanistic model to evaluate the risk to surface waters from enhanced methylation in the impacted watersheds," and the FEIS' comfort in "speculating about the future geochemical environment in a flooded pit 55 years from now in order to dismiss the potential for enhanced methylation." (*Id.*, p.12). On the latter point, Dr. Branfireun also referenced peer-reviewed literature finding that stratification in a flooded pit was likely to support methylmercury production in anaerobic bottom sediments. (*Id.*).

Dr. Branfireun rejected the FEIS' assumption of proportionality between atmospheric deposition of mercury and mercury in fish tissue as "an archaic approach to this problem" that "does not reflect current scientific thought or the best available tools." He cited research from Minnesota's Voyageur's National Park published in 2014 demonstrating that fish tissue mercury will vary under the same atmospheric deposition, based on hydrology and other characteristics of that specific water body. (*Id.* pp. 14-15). He criticized the FEIS' misrepresentation of the potential for ombrotrophic bogs to be adversely effected by under-drainage from mine dewatering and noted that the monitoring proposed in the FEIS would both avoid bogs and be ineffectual to detect or evaluate methylation effects on wetlands. (*Id.*, pp. 16-19). Dr. Branfireun underscored the inadequacy of the FEIS to support a finding of a lack of water quality impairment resulting from mercury and methylmercury.

There are no modifications to the FEIS from the SDEIS that change my opinion that the likelihood of downstream water quality impairments from mercury and methylmercury as a result of the proposed NorthMet development is not scientifically or rigorously evaluated in the EIS . . . In conclusion, I reject as unsupported and without scientific justification, any statement or implication in the FEIS that the proposed NorthMet development would not increase risks of methylmercury production and transport in the

Partridge and Embarrass River watersheds, particularly in ombrotrophic wetlands near the mine site and wetlands affected by tailings site seepage collection, changes to hydrology or atmospheric deposition. (Branfireun 2015, pp. 25, 27)

b. The FEIS provided inadequate and misleading information regarding mercury loading to the Partridge and Embarrass River watersheds.

WaterLegacy's comments on the FEIS identify numerous omissions, inconsistencies and misrepresentations that preclude reliance on the FEIS to dismiss the threat posed by the PolyMet NorthMet project of ecologically significant increases in mercury and methylmercury. Our concerns are summarized in the next subsections.

First, although the FEIS asserts that it is performing a mercury mass loading analysis, it fails to disclose mass balance information needed to verify the accuracy of its model, omits salient information that would contradict its calculations, and misrepresents important information about mercury seepage, sequestration and treatment.

The FEIS asserts with incomprehensible precision that mercury loading in the Partridge River would decrease from 24.2 to 23 grams per year as a result of the PolyMet NorthMet mine project, more offsetting the mere 0.2 gram increase (from 22.3 to 22.5 grams per year) in mercury loading to the Embarrass River. (FEIS, ES-36, 5-462).

However, the FEIS fails to provide basic data regarding mercury loading. The FEIS does not disclose its assumptions as to the mass or concentration of mercury in potential project sources of contamination, including peat, overburden, ore, waste rock, process water, tailings, reject concentrate, filtered sludge, hydrometallurgical residue or coal ash, or any other potential sources of mercury release from the project. Responses to comments state that estimates for major mercury sources was based on studies done for PolyMet in 2004 and 2005 (FEIS, A-414), but these studies are not included in the FEIS reference documents and neither their methodologies nor numeric values are disclosed. Thus, the FEIS does not permit any verification that mercury projections prepared by PolyMet and assumed by the FEIS (FEIS, 5-226, Table 5.2.2-49, PolyMet 2015m) are consistent with good scientific practice and local geology.

Despite the minute scale of differences in mercury loading claimed in the FEIS, the FEIS failed to analyze mercury air deposition, much of which would be locally deposited, as a potential source of mass loading to either the Partridge or Embarrass River. The FEIS states, "Mercury air emissions and subsequent mercury deposition were not assessed for the Mine Site

because potential emissions are less than 1.0 lb./yr.” (FEIS, p. 5-462). Although 1.0 pound per year may not be significant for Minnesota’s statewide mercury Total Maximum Daily Load (TMDL), it is equivalent to 453.6 grams of mercury per year. This is an astronomical number when compared to the FEIS’ mercury loading calculations. If far less than one percent of NorthMet mine site mercury deposition found its way into the Partridge River, the net effect of the NorthMet project, with no other revisions or corrections, would increase mercury loading to the St. Louis River.

Similarly, the FEIS failed to quantify mass loading to the Embarrass River from the 4.6 pounds of mercury that will be emitted each year from the plant site. The underlying PolyMet reference for the FEIS analysis states that under the more conservative assumption that only 25% of mercury from the plant is elemental, up to 3.68 pounds or 1,669.2 grams of NorthMet plant site mercury emissions may be deposited locally each year, most within a 10-kilometer radius of the plant site. (PolyMet 2015e, Appendix C to Attachment U, p. 2, autop. 1091). Yet, as with the mine site mercury deposition, even as it claims mercury in the Embarrass River would only increase 0.2 grams per year, the FEIS does not evaluate the effects if even a small portion of the potentially *1,669.2 grams of locally deposited mercury – several times the order of magnitude of the claimed difference* - were included in the mercury loading calculation.

The FEIS also mischaracterized applicable data to claim that mercury in tailings would be adsorbed. (FEIS, 5-229). The FEIS omits key data from the 2006 NTS bench study in reporting that this study reduced mercury concentrations by 73 percent (from 3.3 ng/L to 0.9 ng/L) after 480 minutes. The FEIS fails to disclose either that the plain water in a *control* flask reduced mercury concentrations by 22 percent in that timeframe or that the trend in the experiment, when it was discontinued after eight hours, was that the mercury was *desorbing* from the tailings and may have doubled since the fourth hour of the experiment when mercury was beneath the detection limit of 0.5 ng/L. (FEIS ref. Barr 2007d, autop. 157, 160).

The assertion that adsorption of mercury by the existing LTVSMC tailings has been demonstrated (FEIS, 5-229) is also inconsistent with the data and explanations in Chapter 4 of the FEIS itself. The FEIS explains that comparison of the existing Cell 2E pond water quality with water quality at the toe of the Tailings Basin reveals the effect that passage through the existing LTVSMC tailings has on seepage water quality. Some parameters decrease in passage

through the tailings and others increase as they seep from the tailings pond to the toe of the Tailings Basin. (FEIS, 4-127).

The FEIS narrative does not state how seepage through LTVSMC tailings affects mercury concentrations, but one can read the data. Mercury in the existing Cell 2E pond has a mean concentration of 1.4 ng/L. Mercury in the toe of the existing tailings facility has a mean concentration of 4.9 ng/L. (FEIS, 4-126, Table 4.2.2-23). Using simple arithmetic, the FEIS has shown that in passing through the existing LTVSMC tailings mean mercury *more than triples*.

If bench study data and field experience at the LTVSMC tailings facility were presented in a fair and rigorous way, assertions in the FEIS that mercury concentrations in untreated tailings basin seepage will be only 1.1 ng/L (FEIS, 5-230, Table 5.2.2-51) could not be supported. Given that more than two billion gallons a year of tailings seepage are predicted for the NorthMet project,⁴⁶ plant site mercury impacts on water quality could significantly affect mercury loading.

The FEIS also understates potential impacts from mercury in the West Pit in assuming a 92 percent “burial” rate for the total mercury load in the West Pit. (FEIS, 5-226, Table 5.2.2-49). The cited literature estimates actual mercury sedimentation rates at 80 to 90%. (FEIS ref. PolyMet 2015m, p. 325). More important, sedimentation does not render mercury permanently unavailable. The FEIS fails to discuss the well-established processes by which mercury concentrated in lake sediments can cycle in and out of suspension, can become methylated and can bioaccumulate, affecting fish and wildlife.⁴⁷

c. The FEIS provided inadequate and misleading information regarding sulfate loading to the Partridge and Embarrass River watersheds.

As discussed in more detail in WaterLegacy’s Comments on the FEIS and in the preceding discussion of mitigation alternatives, the FEIS’ claims regarding sulfate loading to proximate wetlands and streams are based on unsubstantiated assumptions regarding collection of seepage at the tailings waste storage facility and at the Category 1 waste rock pile as well as uncertain and unreliable hydrologic modeling at the mine site. In addition, the FEIS’ claims that the NorthMet project will reduce sulfate loading to the Embarrass River are based on an

⁴⁶ Conversion of 3,880 gallons per minute of tailings seepage (FEIS, p. 5-179) to 2,041,000,000 gallons per year using a standard conversion chart.

⁴⁷ See e.g. U.S. Geological Survey Fact Sheet FS-216-95, *Mercury Contamination of Aquatic Ecosystems*, available at <http://pubs.usgs.gov/fs/1995/fs216-95/pdf/fs21695.pdf>.

inappropriate “continuation of existing conditions” baseline that neither includes natural attenuation of contaminants nor legally-required improvements resulting from the Cliffs Erie Consent decree and compliance with Minnesota water quality standards. (FEIS, ES-49, 5-94).

The FEIS provided no data regarding sulfate loading to wetlands from mine site leakage or seepage, since PolyMet’s model assumed that all leakage/seepage released directly to the Partridge River. (FEIS, 5-320, citing PolyMet 2015m). Sulfate seepage impacts on methylation at NorthMet mine site wetlands could be significant. At the mine site, even as compared to continuation of existing conditions scenario, P90 sulfate is predicted to more than triple along the overburden storage and laydown flowpath and along the West Pit flowpath. (FEIS, 5-129, Table 5.2.2-23). There are 516 acres of wetlands within mine site surficial aquifer flowpaths. (FEIS, 5-320; Table 5.2.3-7).

Although the FEIS discussed various forms of sulfur-containing air emissions, these were disaggregated. (FEIS, pp. 5-509 to 5-511). Even with Dr. Branfireun’s re-analysis of underlying data, it is not possible to construct a loading analysis cumulating *all* forms of sulfur air deposition from the NorthMet project that would result in sulfate loading.

The FEIS discussion of sulfur deposition as a result of spillage and dust assumed a 97% reduction from its prior calculation of 6.14 tons per year potential spillage from each car. (FEIS, 5-164, citing PolyMet 2014a). As with other marked reductions in potential sulfate loading, the FEIS relies on PolyMet’s unsubstantiated assumptions, and requires no proof of the efficacy of the proposed rail car refurbishment. The FEIS states that surface water quality in the mine site Upper Partridge tributary streams (sulfate-limited Wetlegs Creek, Longnose Creek, proposed West Pit Outlet Creek) “would be affected by ore spillage from the rail cars,” but fails to analyze this effect or impacts of ore spillage on wetlands and mercury methylation. (FEIS, 5-164) Approximately 543 acres of wetlands along the railroad corridor could be affected by releases of solutes resulting from rainfall contacting spilled ore and fines. (FEIS, 5-314).

d. The NorthMet project has no plan for wastewater treatment to reduce mercury concentrations.

Dr. Branfireun’s opinion states that reading the comments of environmental consultant Daniel Pauly⁴⁸ led him to question the assumption in the FEIS that reverse osmosis at the tailings

⁴⁸ SDEIS Comments of Daniel Pauly are included in Dr. Branfireun’s Referred Materials folder.

basin and, eventually, at the mine site would remove mercury and methylmercury from the waste stream. After reviewing the underlying pilot test referenced in the FEIS (FEIS ref. Barr 2013f), Dr. Branfireun concluded, “When combined with the uncertainty of other FEIS estimates concerning mercury inputs to treatment plant influent, I have no confidence that these proposed strategies will succeed in meeting water quality guidelines.” (Branfireun, 2015, p. 24).

On closer review, the FEIS’ reference to a pilot test for NorthMet wastewater treatment is somewhat of a misnomer. The single pilot test cited in the FEIS was conducted on water from a seep and a shallow well at the existing LTVSMC taconite tailings facility, not on leachate similar to that for the NorthMet project. (Barr 2013f, p. 11). Mercury was below detectable levels in the *influent* for the test. (*Id.*, autop. 64-69, Table 1, Table 2). The only conclusions regarding mercury in Barr’s report were based on literature and inquiries to the membrane supplier. Barr reported, “Mercury removal by RO membranes is highly dependent on the type of membrane used. Mercury rejections [the percentage removed by treatment] ranging from 22 to 99.9% have been reported.” (*Id.*, p. 39). The report continued, “Mercury removal by RO is highly variable and dependent upon its speciation and the membrane selection. For these reasons, its removal is difficult to quantify.” (*Id.*, p. 41).

Should mercury in NorthMet tailings seepage exceed 1.3 ng/L, the FEIS does not provide any basis to conclude that water quality treatment will result in compliance with the federal Great Lakes Initiative and Minnesota water quality standard for mercury. Instead, the FEIS assumes that there will be no need for mercury treatment, since combined *inflows* to the wastewater treatment plant (WWTP) are predicted to be precisely 1.3 ng/L. (FEIS, 5-230, Table 5.2.2-51). The FEIS’ assumption is problematic given the data on mercury in existing LTVSMC tailings seepage and the limits of adsorption discussed above. This assumption also fails to consider the input of high-mercury Colby Lake water to the tailings facility and WWTP.

Colby Lake water mercury concentrations substantially exceed the Great Lakes Initiative and Minnesota water quality standard of 1.3 ng/L. FEIS data indicates mercury concentrations in Colby Lake are between 4.6 and 8.7 ng/L, averaging 6.0 ng/L. (FEIS, 4-37 to 4-38). During operations, maximum plant site water appropriation of water from Colby Lake would be 15.1 million gallons per day (MGD) or 1,300 million gallons per year (MGY). (FEIS, 5-201, Table 5.2.2-40). This maximum (2,472 gpm) is higher than the 2,425 gpm total combined stream flow to the WWTP predicted in the FEIS. (FEIS, 5-230, Table 5.2.2-51). Yet, despite the substantial

volume and concentration of mercury in Colby Lake waters, the FEIS neither changes its claim⁴⁹ that the concentration of mercury in inputs to the WWTP will be 1.3 ng/L nor justifies this assumption.

As demonstrated in the past several sections of text, the FEIS' mechanistic construct for mercury loading is scientifically indefensible and conflicts with data regarding NorthMet project mercury loading from air deposition and seepage. The FEIS relies on unsubstantiated assumptions of seepage collection to minimize likely adverse effects of sulfate releases and uses a model that explicitly denies the potential discharge to wetlands, the sites where most methylation of mercury is likely to occur. The FEIS disaggregates and minimizes sulfate loading through air deposition and spillage. Although the FEIS asserts that reverse osmosis will result in compliance with water quality standards, treatment plant inflow assumptions are contrived to require no treatment and there is neither a pilot test nor a plan for mercury removal from wastewater. Finally, despite the clear significance of methylmercury production and transport to downstream water quality, aquatic life and human health, the FEIS has avoided any analysis of the impacts of mercury discharge, sulfate loading or hydrologic changes from the NorthMet project on increased production and transport of methylmercury.

The FEIS is inadequate under NEPA, and cannot support a determination by the Forest Service that the PolyMet NorthMet project would not impair water quality, fish and the use of fish by local people for food as a result of mercury and methylmercury increases.

3. Increases in mercury and methylmercury from the PolyMet NorthMet project would cause or contribute to violation of water quality standards.

Both Minnesota water quality standards adopted pursuant to the Clean Water Act and downstream water quality standards of the Fond du Lac Band, adopted pursuant to Section 518 of the Clean Water Act, 33 U.S.C. §1377(e), contain numeric limits on mercury in the water column. Minnesota's water column mercury limit in Lake Superior Basin waters, pursuant to the federal Great Lakes Initiative, is 1.3 nanograms per liter (ng/L). Minn. R.7052.0100, subp. 2. The Fond du Lac Band has set a mercury water column standard of 0.77 ng/L to protect Tribe members who have a higher daily human consumption of fish than that assumed in the Great Lakes Initiative methods used to develop water quality standards. Fond du Lac Water Quality

⁴⁹ SDEIS at 5-206, Table 5.2.2-52, when Colby Lake water was not proposed to be treated prior to augmentation.

Standards, Ord. #12/98 as amended, Sect. 301e.1; Appx. 1, Standards Specific to Designated Use.⁵⁰

Both Minnesota water quality standards and the downstream Fond du Lac Band standards also include narrative standards to prevent degradation of water quality as a result of new sources of pollution. Minnesota nondegradation standards apply to new or expanded point and non-point sources of bioaccumulative chemicals of concern in the Lake Superior Basin. Minn. R. 7052.0300, 7050.0185. Mercury is both a bioaccumulative chemical of concern and a bioaccumulative substance of immediate concern. Minn. R. 7052.0010, Subp. 4, Subp. 5. All NorthMet Project area waters are designated Outstanding International Resource Waters, which prohibits any new or expanded point source discharges of mercury unless a nondegradation demonstration is completed and approved by the MPCA. Minn. R. 7050.0460, 7052.0300.

Fond du Lac water quality standards require that “Reservation waters shall be free from substances entering the waters as a result of human activity in concentrations that are toxic.” Fond du Lac water quality standards also prohibit “further water quality degradation which would interfere with or become injurious to existing or designated uses.” Fond du Lac Water Quality Standards, Ord. #12/98 as amended, Sect. 105a.1; Sect 301e.

Methylmercury is the form of mercury that bioaccumulates in the food chain, including edible fish tissue. Minnesota has a standard for mercury that bioaccumulates in edible fish tissue, applicable across the range of waters used for fishing and drinking water, of 0.2 milligrams per kilogram (mg/kg). Minn. R. 7050.0220, subp. 3a, 4a, 5a. This standard is based on the EPA’s methylmercury criterion for fish tissue to protect human health and the particular pattern of fish consumption in Minnesota. Because of the higher fish consumption rate in the state, Minnesota has a lower fish tissue mercury criterion than the EPA’s rate of 0.3 mg/kg.⁵¹ Findings that Minnesota water bodies are impaired due to mercury in fish tissue are based on application of the 0.2 mg/kg health-based standard.

The Embarrass River chain of lakes downstream of the proposed NorthMet tailings site - Sabin, Wynne, and Embarrass Lakes -- are impaired due to excessive mercury in fish tissue. Colby Lake, into which the Partridge River flows downstream of the proposed mine site, is also

⁵⁰ Fond du Lac Water Quality Standards, approved by the U.S. Environmental Protection Agency on December 21, 2001, are available at <http://www.epa.gov/wqs-tech/water-quality-standards-regulations-fond-du-lac-band-minnesota-chippewa-tribe> as well as at <http://www.fdlrez.com/government/ords/12-98ord.pdf>.

⁵¹ MPCA, Minnesota Statewide Mercury Total Maximum Daily Load (TMDL), approved by U.S. EPA March 27 2007, p. 5, available at <http://www.pca.state.mn.us/index.php/view-document.html?gid=8507>

impaired due to excessive mercury in fish tissue. (FEIS, 4-29, Table 4.2.2-2). Based on the sampling done for the NorthMet project, the Partridge River and Embarrass River may also be impaired for aquatic consumption due to excessive mercury. Mean concentrations of mercury at surface water sites in the Partridge River (2.3 to 5.4 ng/L) and mean concentrations in the Embarrass River (4.3 to 5.1 ng/L) are two to four times higher than Minnesota's water column standard of 1.3 ng/L. (FEIS, 4-41, Table 4.2.2-4).

Most of the St. Louis River downstream of the proposed NorthMet sulfide mine project is impaired for the designated use for aquatic consumption as a result of excessive mercury in fish tissue. (FEIS, 4-285). Exhibit 28 to WaterLegacy's comments identifies segments of the St. Louis River that are on Minnesota's Section 303(d) impaired waters list due to excessive mercury in the water column or mercury in fish tissue.

The Clean Water Act and implementing regulations preclude increased new discharge of mercury to impaired waters when there is no TMDL plan or compliance schedule in place that will bring the impaired water into compliance with applicable water quality standards. 33 U.S.C. §1251(a); 40 C.F.R. §122.4(i); *Friends of Pinto Creek v. U.S. EPA*, 504 F. 3d 1007 (9th Cir. 2007). None of the mercury-impaired waters downstream of the proposed PolyMet NorthMet project have a plan in place to achieve compliance with mercury standards.

Discharge and seepage of mercury from the NorthMet project would cause or contribute to violation of mercury water column standards. Methylmercury increases resulting from the NorthMet project would also cause or contribute to violation of fish tissue standards, in waters including the Embarrass River chain of lakes, Colby Lake and the St. Louis River, that are already impaired due to excessive methylmercury in fish tissue. Rejection of the NorthMet land exchange is required to prevent degradation of impaired waters and violation of water quality standards resulting from mercury and methylmercury increases.

4. Metals, sulfate and ionic pollution from the PolyMet NorthMet project would degrade water quality and violate water quality standards.

The Forest Service Draft Record of Decision unquestioningly accepts the FEIS' prediction of "no significant adverse effects to water quality" and assumes that the PolyMet NorthMet project would comply with the Clean Water Act and applicable federal and state regulations to protect water resources. (DROD 37). With respect to mercury and methylmercury,

the preceding sections demonstrate that this reliance is misplaced. Despite PolyMet's efforts to avoid disclosing or modeling mercury and deny peer-reviewed research, factual and expert evidence shows that the NorthMet project will increase mercury and methylmercury, causing and contributing to degradation of water quality and exceedance of standards in mercury-impaired waters.

The FEIS fudges the question of whether NorthMet discharge would violate other water quality standards and degrade water quality by comparing predictions to an unrealistic "Continuation of Existing Conditions" scenario, by allowing an "acceptable range" for the frequency and magnitude of exceedances, and by using "evaluation criteria" at selected locations rather than applying surface water quality standards at the closest point where contaminated seepage would "daylight" to surface waters. (FEIS 5-9). As explained in more detail with reference to sulfate and drinking water contaminants, the Continuation of Existing Conditions is an unrealistic baseline that makes predicted NorthMet pollution look less serious and may fail to protect human health.

Despite the limitations of the data, a close look at the FEIS suggests that the NorthMet project would adversely affect surface water quality as a result of mining metals pollution, sulfate pollution and ionic pollution. In the next paragraphs, WaterLegacy first evaluates available data applying surface water quality standards and then discusses some of our concerns about the distortions in underlying PolyMet documents that have been adopted in the FEIS to characterize water quality impacts. In making its determination whether the NorthMet land exchange and mining project serve the public interest, the Forest Service cannot rely on the FEIS to conclude that waters in the Partridge and Embarrass River watersheds, on Tribal trust lands, or downstream in the St. Louis River and on the Fond du Lac Reservation will not be polluted.

a. NorthMet metals pollution would violate water quality standards and degrade water quality.

At the proposed NorthMet mine site, there are no predictions for the closest point at which contaminated seepage to the surficial aquifer will "daylight" to surface water. Even data showing solute levels at the point where mine site flowpaths reach the Partridge River have been

stripped from the FEIS.⁵² However, data at the mine site property boundary (FEIS, 5-129, Table 5.2.2-23) shows a level of contamination from mine site seepage sufficient to result in water quality violations.

For the East Pit Category 2/3 Flowpath, under the NorthMet Proposed Action aluminum is predicted at 339 µg/L, an increase to 576% of the modeled continuation of existing conditions (CEC) scenario and nearly three times the 125 µg/L water quality standard. Cobalt is predicted at 10.5 µg/L, an increase to 1,117% of the modeled CEC scenario and more than twice the 5 µg/L water quality standard. For the Overburden Storage and Laydown Area at the old property boundary, aluminum is predicted at 139 µg/L, an increase to 236% of the CEC level, also above the 125 µg/L water quality standard. For the West Pit Flowpath at the property boundary, a cobalt concentration of 33.1 µg/L is predicted for the Proposed Action, which would be an increase to 3,521% of the modeled CEC scenario and more than six times the 5 µg/L water quality standard. Lead concentrations in the West Pit Flowpath are predicted at 5.2 µg/L – an increase to 800% of the modeled CEC scenario and four times the applicable 1.3 µg/L water quality standard for lead.⁵³

If the concentrations of solutes modeled for the CEC in the flowpaths when they reach the Partridge River are the same as CEC levels modeled for the same flowpaths at the property line,⁵⁴ applying the ratios of relative differences provided in the FEIS (FEIS, 5-130, Table 5.2.2-24), *cobalt, aluminum, and lead would still violate applicable water quality standards at the point where they reach the Partridge River.* Cobalt reaching the Partridge River from the West Pit Flowpath is predicted at 24.3 times the CEC level, thus estimated at 22.8 µg/L -- four times the 5 µg/L water quality standard. Aluminum from the East Pit Category 2/3 Flowpath is predicted to be 2.9 times the CEC level, thus estimated at 171 µg/L -- considerably above the 125 µg/L water quality standard. Lead from the West Pit Flowpath is predicted at 5.8 times the CEC level, thus estimated at 3.8 µg/L -- nearly three times the 1.3 µg/L chronic water quality standard for the Partridge River. Mine site seepage to the Partridge River within the federal estate would also reflect substantial increases in flowpath concentrations of chloride, sulfate, beryllium, cadmium, selenium, and zinc. (FEIS, 5-130, Table 5.2.2-24).

⁵² The SDEIS disclosed solute levels where East Pit Category 2/3 Surficial Flowpath reaches the Partridge River at 5-109, Table 5.2.2-22.

⁵³ Existing baseline levels of hardness in the Partridge River near the mine site are 37 mg/L (FEIS, 4-87, Table 4.2.2-13), so the chronic water quality standard for lead is 1.3 µg/L. Minn. R. 7050.0222, subp. 4.

⁵⁴ The CEC flowpath levels are estimated based on FEIS 5-129, Table 5.2.2-23.

Mine site data in the FEIS also shows a likelihood of significant degradation of water as a result of the conversion of the mine site segment of the Partridge River headwaters to a system dominated by mine site wastewater, rather than a natural system. (FEIS 6-83). At Partridge River surface water site SW-004a, the first site on adjacent federal lands where the impacts of mine site discharge are projected, levels of several signature mining chemicals that affect aquatic life and wildlife are predicted to markedly increase as compared both to existing levels and to the modeled continuation of existing conditions (CEC).⁵⁵ Waters that now have low concentrations of metals would have levels approaching the maximums prohibited by water quality standards.

Copper concentrations at surface water site SW-004a are predicted to reach 5.79 µg/L for the NorthMet project. *Under baseline hardness conditions, this level of copper would violate the chronic water quality standard of 5.2 µg/L.*⁵⁶ This copper concentration would be an increase to 386% of existing mean water quality (1.5 µg/L) and 166% of predicted CEC levels.

Nickel concentrations are predicted at 26.7 µg/L for the NorthMet project, a level of nickel (slightly below water quality standard of 29 µg/L) that is 2,225 % of the existing mean nickel concentration of 1.2 µg/L, and 612% of CEC levels. Cadmium is predicted at 0.93 µg/L (water quality standard of 1.4 µg/L), which would be an increase to 1,033% of existing mean cadmium concentrations of 0.09 µg/L and an increase of 547% compared to CEC levels. Zinc is predicted at 48.7 µg/L (water quality standard of 67 µg/L), which would be an increase to 1059% of existing mean zinc concentrations of 4.6 µg/L and 192% of CEC levels. Cobalt is predicted at 3.11 µg/L (water quality standard of 5 µg/L), which would be an increase to 740% of existing 0.42 µg/L mean cobalt concentrations and 241% of modeled CEC levels.

Based on FEIS data alone, without addressing any of PolyMet's assumptions challenged in these Objections or in WaterLegacy's Comments on the FEIS, changing Partridge River headwaters to a stream dominated by wastewater effluent would significantly degrade water quality in the Superior National Forest.

At the proposed NorthMet plant site, FEIS data also reflects reduction in water quality at tailings site tributaries and in the Embarrass River due to the fact that *treated* wastewater from the NorthMet wastewater treatment plant (WWTP) would have higher concentrations of solutes than existing tributary water containing *untreated* LTVSMC tailings basin seepage. Treated

⁵⁵ For this section, mean existing concentrations of solutes at SW-004a are obtained from FEIS 4-88 to 4-89, Table 4.2.2-14. Proposed action and CEC scenario information is from FEIS 5-151, Table 5.2.2-31.

⁵⁶ Minn. R. 7052.0100, subp. 6 provides chronic water quality standards for baseline hardness of 50 mg/L.

NorthMet wastewater would result in higher concentrations of various metals, including antimony, cobalt, lead, nickel, selenium and zinc in tributary streams and in the Embarrass River. (FEIS, 5-205, Table 5.2.2-42).

At Trimble Creek-1, a tailings site tributary surface sampling site, zinc concentrations for the NorthMet project are predicted at 100 µg/L (water quality standard of 120 µg/L in 100 mg/L hardness), which is an increase to 1,124% of the existing maximum detected of 8.9 µg/L and 2,222% of the existing mean of 4.5 µg/L,⁵⁷ as well as an increase to 719% of the modeled CEC conditions. Cobalt would be elevated to 5.0 µg/L (equal to the water quality standard of 5.0 µg/L), which is 357% of the existing maximum concentration of 1.4 µg/L and 806% of the existing mean of 0.62 µg/L, as well as an increase to 175% of CEC conditions.

For each of the other four solutes we reviewed, data for existing conditions was reported incorrectly in the FEIS. (FEIS 4-155, Table 4.2.2-37). For nickel, the existing mean concentration was reported above the highest range detected. For antimony, selenium, and lead, current levels fell below detection limits. Though the FEIS said it had adopted the Barr practice (criticized by Dr. Branfireun) of reporting non-detects at half the detection limit, each of these important metals were reported *at the detection limit* although no metals had been detected, thus creating a false impression of the level of the metal in existing waters.⁵⁸

Under the NorthMet proposed action at P90, antimony at Trimble Creek-1 would increase to 20.3 µg/L (water quality standard of 31 µg/L). If antimony non-detect sampling were reported as half the detection limit (0.13 µg/L), NorthMet antimony would increase to 15,615% of the existing antimony level and an increase to 4,060% of CEC conditions. Nickel is predicted to reach 50 µg/L (water quality standard of 52 µg/L in 100 mg/L hardness) under the proposed action. If the existing nickel concentration were at the top of the range described (0.25 µg/L), predicted P90 nickel at Trimble Creek TC-1 would be 20,000% of the existing maximum detected concentration as well as 849% of modeled CEC conditions.

Lead concentrations are predicted at 3.0 µg/L (water quality standard of 3.2 in 100 mg/L hardness) under the Proposed Action. If lead non-detect sampling were reported as half the detection limit (0.13 µg/L), predicted lead levels would be at least 2,308% of the existing

⁵⁷ Data on existing concentrations of solutes at Trimble Creek are obtained from FEIS 4-155, Table 4.2.2-37. Data for the proposed action and CEC scenario are obtained from FEIS, 5-205, Table 5.2.2-42.

⁵⁸ The FEIS does not explain how CEC conditions at many times the non-detect level could have been predicted when current sampling showed that solute levels were below the detection limit.

maximum and an increase to 265% of CEC modeled conditions. Selenium is predicted reach 5.0 µg/L, which is also equal to the water quality standard of 5.0 µg/L. Existing sampling found no detection of selenium despite four samples with a detection level of 0.50 µg/L. If selenium levels were reported at half its detection limit (0.25 µg/L), predicted NorthMet concentrations would increase to 2,000% of existing levels and 633% of CEC conditions.

Similar increases in predicted solute concentrations and ratios are predicted at PM-19 (Trimble Creek) and PM-11 (Unnamed Creek) tributary sites. Elevations persist, with some dilution, in the Embarrass River at PM-13, further downstream of NorthMet wastewater treatment discharge. (FEIS, 5-207, Table 5.2.2-43).

Even if the appropriate water quality based effluent limits were set for solutes in an NPDES permit and PolyMet complied with these limits (contingencies which the current state of Minnesota permits may not allow one to assume, as discussed in the final section of these Objections) predicted changes to NorthMet tailings site receiving waters would significantly degrade waters that were previously substantially less impacted by mining metals. The differences between water quality in the existing Trimble Creek and conditions after the Creek is inundated with sulfide mining wastewater are significant and may harm aquatic life.

b. The FEIS underestimates risks of NorthMet sulfate pollution.

The FEIS minimizes sulfate pollution risks by maintaining that neither NorthMet Category 1 waste rock nor tailing seepage will be high-sulfur or acid-generating. Although similar predictions have been made by other sulfide mines, these predictions have rarely been realized in practice.⁵⁹ As Bruce Johnson, the Minnesota chemist responsible for constructing the MinnAMAX tailings leachate piles explained, evidence from the same Duluth Complex ore body as the NorthMet tailings, suggests that sulfate levels at the NorthMet tailings site may be more than 11 times higher than what PolyMet has predicted. (Johnson 2015, p. 3). Mine site sulfate seepage is also likely to be higher than PolyMet projections. (Johnson 2014, pp. 2-6).

⁵⁹ See James Kuipers et al., *Comparison of Predicted and Actual Water Quality at Hardrock Mines: The reliability of predictions in Environmental Impact Statements* (2006), ES-8, ES-10, available at https://www.earthworksaction.org/library/detail/comparison_of_predicted_and_actual_water_quality_at_hardrock_mines/#.VnyCgpMrKAY. 58% of case study mines had increased sulfate. Of the nine case study mines developing acid mine drainage, 89% 8/9 underestimated or ignored the potential for acid mine drainage in their EISs.

FEIS predictions based on PolyMet's assumptions of seepage collection affect sulfate along with other pollutants. However, the comparison of proposed action impacts with a Continuation of Existing Conditions (CEC) scenario rather than a No Action baseline creates a particular distortion for sulfate, which is already elevated at the mine and plant site due to existing mining discharge from the Northshore Mine, abandoned mine pits, and the existing LTVSMC taconite tailings basin, all currently owned by Cliffs Erie.

The FEIS acknowledges that the CEC scenario, with which the proposed action is compared in every table and narrative analysis of pollution, "is not synonymous with the No Action Alternative because it does not account for other foreseeable changes within the NorthMet Project area." (FEIS, 5-254). Under a No Action alternative, the existing LTVSMC brownfield site "would be reclaimed in accordance with the Cliffs Erie reclamation/closure plan." (FEIS, ES-49). In addition, under a No Action scenario, if the PolyMet NorthMet project were not built, "the water quality of seepage from the existing LTVSMC Tailings Basin would improve over time as a result of natural attenuation and/or possible additional mitigation measures pursuant to the Consent Decree between the MPCA and Cliffs Erie." (FEIS, 5-470).

Under NEPA, the FEIS should have compared the water quality impacts of the NorthMet proposal with an appropriate No Action baseline, so that the degree to which the NorthMet project would increase sulfate could be evaluated. *Ctr. for Biological Diversity v. U. S. Dept. of Interior*, 623 F.3d 633, 642 (9th Cir. 2010). (Finding BLM's approval of an EIS arbitrary and capricious due to flawed assumption regarding the result of a no action alternative). *See also Ctr. for Biological Diversity v. U.S. BLM*, 746 F. Supp. 2d 1055, 1090 (N.D. Cal. 2009) (The "no action" alternative is "the standard by which the reader may compare the other alternatives' beneficial and adverse impacts related to the applicant doing nothing.") Courts "not infrequently find NEPA violations when an agency miscalculates the 'no build' baseline or when the baseline assumes the existence of a proposed project." *N. C. Wildlife Fed'n v. N.C. DOT*, 677 F.3d 596, 603 (4th Cir. 2012) (Finding EIS inadequate due to assumptions made in the "no build" data); *Friends of Yosemite Valley v. Kempthorne*, 520 F.3d 1024, 1037-38 (9th Cir. 2008).

The baseline for comparing the adverse effects of a project cannot rely on a false assumption that old pollution would remain unabated if a project were not approved. *Preserve Our Island v. United States Army Corps of Eng'rs*, No: C08-1353RSM, 2009 U.S. Dist. LEXIS, 70 ERC (BNA) 1622, *46-47 (W. D. Wash. Aug. 13, 2009). The no action baseline comparison

in an EIS also cannot properly include elements that would not comply with law. *Friends of Yosemite Valley v. Kempthorne*, *supra*, 520 F.3d at 1038; *Ctr. for Biological Diversity v. U. S. Dept. of Interior*, *supra*, 623 F.3d at 642; *Conservation Northwest v. Rey*, 674 F. Supp. 2d 1232, 1245-1246 (D.C. W.D. Wash., 2009). Where an agency has ignored its duty, the result cannot be presented as a *fait accompli* in the baseline for an EIS. *League to Save Lake Tahoe v. Tahoe Reg'l Planning Agency*, 739 F. Supp. 2d 1260, 1276 (E.D. Cal. 2010).

The existing permit for Northshore Mine discharge to the Partridge River contains a “monitor only” requirement for sulfate, but no limit on sulfate pollution (WaterLegacy Comment on Northshore Mine Certification, Nov. 4, 2015 and NPDES permit, attached Exhibit 31). Sulfate is elevated above 10 milligrams per liter (mg/L) at sampling sites on the Partridge River upstream of the mine site. (FEIS 4-88, Table 4.2.2-14).

The LTVSMC taconite tailings plant has been closed since 2000 when the LTV Steel Mining Company declared bankruptcy. In addition to taconite tailings, high sulfate hornfels from the Dunka Mine was deposited in the existing tailings waste facility. (FEIS ref. NTS 2009, autop. 52). Sulfate discharge from the existing LTVSMC tailings remains markedly elevated at the south surface discharge site SD026, with a mean of 178 mg/L. (FEIS 4-105, Table 4.2.2-20).

Cliffs Erie, which became legally responsible for permit compliance in 2001 when it acquired the LTVSMC property, is legally required to remediate tailings waste facility pollution under a 2010 consent decree (see WaterLegacy Appendix, SDEIS comments Exhibit 8). Cliffs Erie’s failure to comply with law and control sulfate seepage may not be used as a No Action baseline under NEPA, particularly in light of the consent decree. Minnesota Pollution Control Agency (MPCA) delay in requiring compliance also cannot be incorporated as a *fait accompli* in the No Action baseline for an EIS.⁶⁰ In addition, under its 2006 purchase agreement with Cliffs Erie, PolyMet is required to indemnify Cliffs Erie for remediation obligations at the tailings site and is “working closely” with Cliffs to fulfill Cliffs’ legal obligations. (PolyMet 2015 SEC Form 20-F, Exhibit 23, pp. 18-19). By this time, nine years later, PolyMet may even share some responsibility for the continuing high sulfate levels at the LTVSMC tailings facility that distort a No Action baseline.

Until appropriate modeling is done comparing PolyMet NorthMet pollution to a No Action baseline that includes both natural attenuation and compliance of Cliffs Erie with its legal

⁶⁰ See WaterLegacy Petition for NPDES Program Withdrawal in Minnesota, available at <http://www2.epa.gov/mn/npdes-petition-program-withdrawal-minnesota>

obligations to remediate sulfate pollution, FEIS predictions that the NorthMet mine project will not impair wild rice as a result of sulfate pollution are unreliable and cannot support a determination that the land exchange and NorthMet project serve the public interest.

c. The FEIS fails to analyze specific conductance ionic pollution.

The Forest Service is required by law to assess the impacts of the proposed land exchange on fish as part of its public interest decision. 43 U.S.C. §1716(a); 36 C.F.R. 254.3(b)(1). The PolyMet NorthMet FEIS doesn't support this analysis. The FEIS completely failed to assess a pollutant that is characteristic of mining and is of particular concern for benthic macroinvertebrates and fish -- the combination of ions and salts that is tested as specific conductivity.⁶¹ WaterLegacy's prior Comments on the SDEIS referenced EPA's research, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*,⁶² which set a benchmark conductivity level for Appalachian streams at 300 microSiemens per centimeter ($\mu\text{S}/\text{cm}$).

This year, chemist Bruce Johnson and biologist Maureen Johnson, both former regulators for Minnesota and federal government agencies, prepared a report, *An Evaluation of a Field-Based Aquatic Life Benchmark for Specific Conductance* (hereinafter "Conductivity Evaluation"), attached as Exhibit 16. This *Conductivity Evaluation* applied protocols from the *EPA Conductivity Benchmark Study* to Northeastern Minnesota ecoregions, including the ecoregion where the NorthMet project is proposed. The *Conductivity Evaluation* examined data on water chemistry and macroinvertebrate populations from Minnesota's Regional Copper-Nickel study and the files of state and federal agencies as well as several studies evaluating conductivity and stressors for aquatic life.

The *Evaluation* found that the median specific conductivity level in Minnesota waters is lower than the background level in EPA studies and that existing data demonstrates impacts on benthic invertebrates from elevated specific conductance in mining-impacted waters, including the St. Louis River watershed. (*Id.*, pp. 31-32, 39-42) The *Conductivity Evaluation* concluded that, in the Minnesota ecoregion where the NorthMet project is proposed to be located, discharge

⁶¹ These comments use the terms "specific conductivity" and "specific conductance" interchangeably.

⁶² U.S. Environmental Protection Agency, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*, Office of Research and Development, National Center for Environmental Assessment, Washington, DC, 2011 EPA/600/R-10/023F. (hereinafter "EPA Conductivity Benchmark Study") available for download at <http://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=233809>.

of specific conductance above the 300 $\mu\text{S}/\text{cm}$ level established as EPA guidance for Appalachian streams is highly likely to result in extirpation of 5% or more of invertebrate genera and thus should be prohibited under Minnesota narrative standards preventing degradation and toxic pollution. Additional investigation was recommended to determine whether a more stringent limit would be required in Northeastern Minnesota to protect aquatic life. (*Id.*, p. 42).

In addition to the *Conductivity Evaluation*, the Minnesota Pollution Control Agency's (MPCA) Draft St. Louis Stressor Identification Report explicitly attributed impairments in the vicinity of the PolyMet NorthMet project to specific conductance discharge from mining facilities:

Fish results from the upper Embarrass River (the portion upstream of the town of Embarrass) show extremely low fish counts and limited taxa richness. . . Two of the impaired streams in this watershed zone, Spring Mine Creek and the Embarrass River, receive water originating from mine pits. Sampling results from these streams show elevated specific conductance and sulfate concentrations. (MPCA, Draft St. Louis River Stressor Identification Report, October 2013, p. 16, provided as Attachment B to the Conductivity Evaluation, Exhibit 16).⁶³

The Tribal Cooperating Agencies' Cumulative Effects Analysis concluded that elevated specific conductance is a water chemistry "signature" for mining discharges that should be analyzed in the PolyMet NorthMet EIS. (FEIS, App. C. Tribal CEA, autop. 3001-3003).

The FEIS provides little data on existing concentrations of specific conductivity in NorthMet receiving waters: no data is provided for mine site tributary creeks or waters at the plant or tailings site. Moreover, none of the FEIS narratives, tables or figures model or predict specific conductivity levels that would result from NorthMet mine or plant site facilities. The FEIS notes that "portions of the Embarrass River, from the headwaters to Embarrass Lake, are listed on the 303(d) list as impaired for 'Fishes Bioassessment'" (FEIS, 4-285), but fails to disclose that the MPCA has identified mine discharge with elevated sulfate and specific conductance as a stressor for this impairment.

The FEIS also provides inadequate baseline information on macroinvertebrates. No aquatic biota studies were conducted in Longnose Creek, Wetlegs Creek, or Second Creek, and no fish or macroinvertebrate community or habitat characteristics were evaluated for these creeks although they all are first-order streams proximate to the NorthMet site. (FEIS, 4-260). For the

⁶³ FEIS references include an earlier version of the Draft St. Louis River Stressor Identification Report (MPCA 2013c) from March 2013; it does not include this analysis.

Partridge River, invertebrate data is either provided for a single year or with a single sample; and no data is provided at the genera level, so no assessment can be made whether invertebrates sensitive to conductivity are present. (FEIS, 4-267, Table 4.2.6-6). For the Embarrass River, sampling numbers are not provided; data is not provided at consistent locations over time; and, again, no data is provided at the genera level, so prevalence of pollution-tolerant and intolerant invertebrates cannot be determined. (FEIS, 4-284, Table 4.2.6-14).

Since there is no water chemistry data for the Embarrass River, none for tailings or mine site creeks, and little benthic invertebrate data in the FEIS, with no sampling for genera, no uniform protocols over time and no invertebrate data in mine site tributaries, even if monitoring were proposed to evaluate effects of the PolyMet NorthMet project on conductivity, that monitoring would be meaningless. The FEIS is inadequate to assess or protect fish and aquatic life from specific conductivity pollution.

d. The PolyMet NorthMet FEIS does not demonstrate that the project would comply with the Clean Water Act or health-based standards.

WaterLegacy has concluded that the PolyMet NorthMet project would not comply with the Clean Water Act and that no Section 404 permit should be issued to PolyMet.⁶⁴ We believe that inadequacies in the FEIS belie its assertion that discharge to surface water and groundwater will comply with water quality standards and limits that protect fish, aquatic life, wild rice and human health.

Although the tables in Chapter 5 of the FEIS can create the impression that compliance with water quality standards has been addressed, neither PolyMet nor the FEIS have predicted contaminant levels at the point when seepage through mine site aquifers would first reach the nearest surface waters (wetlands or streams). At the most basic level, the FEIS reflects a decision not to model the point where the Clean Water Act requires compliance with water quality standards. The FEIS reports that a decision was made in the modeling that would preclude evaluation of the locations where mine site or tailings seepage first surfaced to wetlands: “Several decisions were made while setting up the GoldSim models. An approach was taken not to represent in those models the interactions between bedrock groundwater and surficial deposits

⁶⁴ A courtesy copy of WaterLegacy’s Comments on PolyMet Mining Inc. (PolyMet) Application for Clean Water Act Section 404 Permit for PolyMet NorthMet Mining Permit is provided in the WaterLegacy Appendix.

groundwater, or between groundwater and wetlands.” (FEIS, 5-53).

The GoldSim model used in the FEIS also excluded northward surficial aquifer flow (FEIS, 5-55). This deficit is significant since Yelp Creek is closer to East Pit and Category 1 waste rock contaminant sites than the Partridge River (see FEIS, Figure 5.2.2-23), and the FEIS has admitted that Yelp Creek, along with the Partridge River “act as hydrologic sinks for surficial groundwater and surface water originating at the Mine Site. Surface runoff or surficial groundwater seepage leaving the Mine Site would flow into Yelp Creek or the Partridge River.” (FEIS, 5-5). Recent GLIFWC analysis based on Northshore Mine hydraulic gradient predicts northward flow through the surficial aquifer to surface waters. (GLIFWC Northward Flowpath Letter, Exhibit 8, p. 5).

While FEIS maps label the locations where mine site surficial flowpaths discharge to the Partridge River as locations of “groundwater discharge to *surface water*” (FEIS, Figure 5.2.2-4), and although PolyMet clearly modeled surficial flowpath concentrations at these locations (see ratios in FEIS, 5-205, Table 5.2.2-24), the FEIS did not disclose the concentrations of solutes at the Partridge River locations where seepage would indisputably report to surface water. This information should have been provided in the FEIS.⁶⁵ Estimating from available data, WaterLegacy’s best analysis shows several areas of non-compliance with water quality standards at the point when seepage will reach the Partridge River. Under the most charitable interpretation, the FEIS has not supported a determination that NorthMet activities at the mine site will comply with water quality standards.

In a comment on the PolyMet NorthMet SDEIS, the Commissioner of the Minnesota Department of Health requested that the FEIS compare projections of chemical concentrations under the proposed action to Minnesota Health Risk Limits (HRL) or Risk Assessment Advice (RAA) to evaluate releases of manganese, beryllium and thallium to groundwater, rather than using “evaluation criteria” based on the projection from existing concentrations. (Ehlinger SDEIS Comment, Mar. 13, 2014, p. 3, Exhibit 17). The FEIS has not made this change.

The FEIS fails to discuss hydrogeology at the tailings site that may reduce seepage capture efficiency and impact residential supply wells, despite Dr. Ehlinger’s recommendation. (*Id.*, pp. 1-2). In addition, preparation of the FEIS resulted in no additional sampling of residential wells potentially impacted by contaminated seepage. As a result, 23 out of 38 wells

⁶⁵ Part of this data, showing concentrations where the East Pit Category 2/3 Flowpath reported to the Partridge River was contained in the SDEIS, Table 5.2.2-22 on page 5-109.

downgradient from the LTVSMC tailings storage facility remain unsampled. (FEIS, 4-120).

Commissioner Ehlinger also raised concerns about Hoyt Lakes' drinking water, stating that modeling of seepage of contaminants from the mine site, including arsenic, antimony, nickel and copper, seemed inconsistent with field leaching tests and hydrogeological conditions. (Ehlinger SDEIS Comment, Exhibit 17, pp. 2, 4). These concerns were not addressed in the FEIS.

The method by which the FEIS changed its predictions about arsenic increases in drinking water remains opaque to WaterLegacy, despite our review of the FEIS. The level of arsenic in Colby Lake is predicted to exceed safe levels in drinking water (2 µg/L) under the proposed NorthMet project. (FEIS 5-170). However, where the SDEIS had concluded that NorthMet project would be responsible for an increase of 38.5% in Colby Lake arsenic as compared to continuation of existing conditions (SDEIS, Table 5.2.2-34), the FEIS reassures the reader that the increase resulting from the project would be less than 1 percent (FEIS, 5-165 Table 5.2.2-34). The FEIS does not explain this discrepancy.

The NorthMet mine would generate high levels of arsenic, including P90 arsenic concentrations of 100 µg/L in the East Pit long after mine closure (FEIS ref. 2015m, autop. 447). Without discussing fractures, the FEIS assumes that adsorption in soil will prevent any arsenic from seeping from the mine site for thousands of years. (FEIS 5-65). The FEIS also appears to alter modeling for arsenic removal based on its small-scale pilot test. (FEIS 5-170, Barr 2103f). WaterLegacy is concerned that FEIS modeling may understate impacts of the NorthMet project on arsenic contamination of drinking water and surface water.

Mine site seepage to the Partridge River would reflect substantial increases in flowpath concentrations of chloride, sulfate, beryllium, cadmium, selenium, and zinc, as well as additional loading of cobalt, aluminum and lead described previously. (FEIS, 5-130, Table 5.2.2-24). Whether or not these increases would further violate water quality standards and significantly degrade water quality depends on assumptions regarding seepage concentrations, seepage flow and seepage collection, all of which have been challenged in detail in WaterLegacy's Comments on the FEIS and in these Objections.

Similarly, at the tailings site, solute concentrations in tailings toe seepage (PolyMet 2015i, Large table 2, autop. 57) are predicted to far exceed water quality standards. For example, at the North Toe, P90 levels of nickel in year 20 are predicted at 893 µg/L -- more than 17 times the water quality standard of 52 µg/L in hardness of 100 mg/L. Lead, a particularly dangerous

neurotoxin with no safe level (Saracino 2015), would reach levels of 58 µg/L -- more than 18 times the water quality standard of 3.2 µg/L in hardness of 100 mg/L. Comparing PolyMet's predictions to MinnAMAX copper-nickel mine tailings seepage, even these predictions may be underestimates of contamination by as much as an order of magnitude. (Johnson 2015).

The FEIS assumes that no tailings seepage will be released to surface waters from any part of the tailings waste facility. (FEIS, 5-7 to 5-8). WaterLegacy comments on the FEIS, the analysis of tailings mitigation alternatives in these Objections, expert opinions, and field experience with collection of seepage from other unlined tailings storage facilities indicates that PolyMet's assumptions of nearly perfect collection are likely to be erroneous. Given the highly concentrated toxic metals in tailings toe seepage, it would not take much uncaptured release to violate water quality standards and degrade water quality in the wetlands and creeks adjacent to the tailings site. As detailed earlier in these pages, the FEIS failed to analyze impacts of the PolyMet NorthMet project on methylmercury, a highly significant adverse effect of the proposed action on water quality.

Multiple inadequacies, gaps and distortions in PolyMet underlying documents carried forward in the FEIS preclude a determination that the PolyMet NorthMet would comply with water quality standards or well serve the public interest. They include:

- Unsubstantiated and unreasonable assumptions regarding mine site seepage collection;
- Unsubstantiated and unreasonable assumptions regarding tailings site seepage collection;
- Unsubstantiated assumptions of no leakage from the hydrometallurgical residue facility;
- Failure to model a range of probabilities for the efficacy of performance of engineered systems to control mine site and tailings site seepage;
- Understatement of seepage volumes and solute concentrations from Category I waste rock;
- Understatement of seepage volumes and solute concentrations from tailings;
- Failure to disclose concentrations of solutes in the hydrometallurgical residue facility;
- Failure to consider mine site and tailings site fractures in evaluating seepage transport;
- Failure to consider interactions between bedrock and surficial deposits in evaluating seepage transport;
- Inadequate hydrogeological testing at both the mine site and tailings site;
- Unreasonable modeling of mine site base flow and the potential for northward flow through groundwater and the surficial aquifer;
- Use of an inappropriate baseline to determine whether project releases will cause or contribute to exceedances;
- Reliance on uncertain and unverified future contingency management options rather than predicting impacts to water quality from project failure to perform "as expected."

These deficiencies in the FEIS, in addition to violating NEPA regulations, require the Forest Service to reject the federal land exchange as inconsistent with the FLPMA, federal regulations and Forest Plan objectives to protect water quality, fish, and human health in order to serve the public interest.

e. The PolyMet NorthMet project poses substantial risks to human health, particularly children's health.

The Forest Service Draft Record of Decision recognizes that “many people are concerned about the potential effects of the mining project on human health, including the health of children,” particularly health risks related to drinking water and mercury contamination of fish. (DROD 34). The DROD also acknowledges that the federal land exchange decision must consider the future use of the conveyed lands to determine compliance with regulatory requirements for the land exchange and Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks),⁶⁶ which requires each federal agency give high priority to the identification and assessment of environmental health and safety risks to children. (DROD 34). However, the Forest Service relies on the PolyMet NorthMet FEIS to dismiss health concerns, a reliance that is misplaced given the inadequacies discussed in these Objections, WaterLegacy’s Comments on the FEIS, and the exhibits and expert opinions provided in this record.

Factual and expert evidence demonstrates that the NorthMet project would increase methylmercury downstream of the mine and tailings site, creating a substantial and ecologically significant risk in waters including the Partridge, Embarrass and St. Louis Rivers. The FEIS briefly notes that increased methylmercury can harm fish, inhibiting reproduction, (FEIS, 5-467). However, the FEIS fails to discuss the human health risks of consuming fish contaminated with methylmercury.

It is beyond dispute in the medical profession that increasing fish methylmercury in these waters would create human health risks, particularly to fetuses, infants and young children. As Margaret Saracino, M.D., a Duluth child adolescent psychiatrist, summarized in her opinion attached with these comments:

⁶⁶ Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, April 21, 1997, available at <https://www.gpo.gov/fdsys/pkg/FR-1997-04-23/pdf/97-10695.pdf>.

In terms of methylmercury, exposure is largely due to ingestion of fish with high mercury content. Methylmercury builds in the food chain. When pregnant women eat fish high in methylmercury, the fetus is then exposed to this lipophilic heavy metal. The placenta is not protective and the blood brain barrier is not well formed until after age two years, which makes fetuses, infants and young children most vulnerable to methylmercury's neurotoxic effects. Neurons in the developing brain multiply at a rapid rate and are particularly vulnerable to toxic effects of heavy metals, hence brain damage is more likely to occur during this vulnerable time. Neurotoxicity is also transferred to the infant through breast milk. (Saracino 2015, p. 2).

The adverse effects of methylmercury depend on timing and amount of exposure. Methylmercury is a strong toxin that influences enzymes, cell membrane function, causes oxidative stress, lipid peroxidation and mitochondria dysfunction, affects amino acid transport and cellular migration in the developing brain. Exposure in utero can cause motor disturbances, impaired vision, dysesthesia, and tremors. Even lower level exposure can result in lower intelligence, poor concentration, poor memory, speech and language disorders, and decrease in visual spatial skills in children exposed to methylmercury in utero. Fetuses, infants, and young children are four to five times more sensitive to the adverse effects of methylmercury exposure than adults. (*Id.*).

Dr. Saracino explained that neurodevelopmental disorders can be managed, but not cured. (*Id.*, p. 1). In addition to the suffering of exposed individuals and their families, neurodevelopmental disorders resulting from increased methylmercury and lead exposure result in significant costs to families and communities due to needs for occupational therapy, physical therapy, speech and language therapy, special education service, outpatient and in-patient treatment and due to reduction in earning capacity. (*Id.*, pp. 2-3).

The cumulative risks of NorthMet project mercury contamination of fish to the health of infants and children in Minnesota's Lake Superior region are significant. A recent Minnesota Department of Health study found that 1 out of 10 infants in Minnesota's Lake Superior region were born with unsafe levels of mercury in their blood. At a statistically significant level, a greater proportion of Minnesota babies had unsafe mercury in their blood as compared with babies in the Lake Superior region of Wisconsin or Michigan. Mercury levels were also higher in Minnesota in the summer months, suggesting that increased consumption of locally caught fish during the warm months is an important source of pregnant women's mercury exposure.⁶⁷

The FEIS neither analyzed the environmental health risks to infants and children from

⁶⁷ Minnesota Department of Health, Mercury in Newborns in the Lake Superior Basin, <http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/newbornhglsp.html> and Mercury Levels in Blood from Newborns in the Lake Superior Basin GLNPO ID 2007-942 Final Report November 30, 2011, p.p. 10, 15, <http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/glnpo.pdf>.

increased methylmercury contamination of fish nor recognized any of the associated costs to Minnesota families or communities.

The Commissioner of Minnesota's Department of Health, Dr. Ehlinger, identified concerns that the NorthMet project could affect children's health as a result of contamination of drinking water in domestic wells, particularly with respect to manganese and beryllium. Dr. Ehlinger cautioned that Minnesota Risk Assessment Advice limiting manganese levels in drinking water to 100 µg/L for infants and 300 µg/L for children and adults must be applied to NorthMet predictions. "This is important as the maximum 90th percentile probability (P90) concentrations predicted in the 500-year model simulation suggests manganese concentrations in the groundwater in all of the flow paths from the Plant Site will exceed the MDH RAAs, including areas where domestic wells are present." (Ehlinger SDEIS Comment, Exhibit 17, p. 3).

Dr. Ehlinger also recommended that Minnesota's beryllium Health Risk Limit of 0.08 µg/L be applied to NorthMet groundwater, since beryllium concentrations in Plant Site flow paths "are also predicted to exceed the HRL in areas where domestic wells are present." (*Id.*) The FEIS has adopted neither recommendation, and evaluation criteria for Plant Site groundwater contaminants, including manganese and beryllium are still not based on Minnesota criteria to protect health for infants, children and adults. (FEIS 5-191, Table 5.2.2-38).

The FEIS also failed to analyze health risks related to lead or arsenic or to evaluate risks for on-site workers at either the NorthMet mine or tailings site. The FEIS provides no summary of Minnesota Department of Health testing results and, in comparison with the SDEIS, further minimizes the health risks associated with mineral fibers. (compare FEIS, 5-513 to 5-19 with SDEIS, 5-435 to 5-443). As explained in more detail in the attached opinion of John Ipsen, M.D., Ph.D., "the FEIS incompletely addresses particulate air pollution. The analysis provided in the FEIS is inadequate to reasonably address the health risks of the proposed mine – risks to the mineworkers and to people living in the surrounding communities." (Ipsen 2015, p. 2).

As a result of the EIS deficiencies and the human health risks posed by the PolyMet NorthMet sulfide mine project, medical and health organizations and individuals throughout Minnesota have requested a comprehensive and independent health risk and impact assessment be prepared for the project. Excerpts of their letters, attached as Exhibit 18, are provided below:

Minnesota Nurses Association (March 10, 2014)

"The co-lead agencies should conduct and include a health impact assessment (HIA) in the Environmental Impact Statement to fully analyze the public health implications of PolyMet's proposed mine."

Concerned Doctors & Nurses (March 11, 2014)

"We respectfully request that the PolyMet SDEIS be deemed inadequate due to unresolved concerns and insufficient assessment of health risks of the proposal. . . Health Impacts Assessment should include. . . Assessment of cumulative risks of multiple chemicals and exposure routes on vulnerable populations, including infants, children, the elderly and populations who have higher rates of consumption of affected foods, such as fish and wild rice."

Minnesota Public Health Association (July 2014)

"We write to request a comprehensive analysis of the health risks and public health impacts of the PolyMet sulfide mine project before any decisions are made about this controversial project. . . Mercury contamination of fish and impacts on neurotoxicity in the developing fetus as well as in infants, children and adults is a significant public health concern in Minnesota."

Minnesota Medical Association (September 25, 2014)

"On behalf of the Minnesota Medical Association, I am writing to offer support for the request that a comprehensive analysis of the health risks and public health impacts of the PolyMet NorthMet Sulfide Mine Project be conducted. This assessment will assist the state of Minnesota in making an informed decision as to the proposed project, taking into account any potential adverse effects this type of mining may have on the health of Minnesotans."

Concerned Health Professionals and Scientists (October 20, 2014)

"We are concerned that the proposed PolyMet copper-nickel mine project could have significant adverse impacts on human health as a result of pollutants released to air, surface water and drinking water. . . Finally, assessment should be done of the exposures to vulnerable populations, such as infants, children, the elderly and persons who rely for subsistence on fish, wild rice or game species, where pollutants are known to bioaccumulate."

Minnesota Academy of Family Physicians – Lake Superior Chapter (March 9, 2015)

"As family physicians, we have a front row seat to view the health of our patients and our community. We care for infants, elders, and all ages in between. . . We join our colleagues in the fields of medicine, nursing, and public health as well as our state Health Department to advocate for the health of our region. A health risk assessment and a health impact assessment are the next critical steps in understanding both the short and long term consequences that PolyMet's NorthMet project may have on our health."

Minnesota Academy of Family Physicians – Statewide Organization (July 1, 2015)

"The Minnesota Academy of Family Physicians (MAFP) is the largest medical specialty

organization in Minnesota, representing over 3000 family physicians, family medicine residents, and medical students. . . As physicians, our priorities are the health of our patients and the communities we serve. We must be proactive in asking, “How will PolyMet’s NorthMet Project affect the long-term health of our patients and communities?” Health Risk and Health Impact Assessments are needed to answer these questions.”

It is rare for Minnesota’s rather conservative medical community to be united in their concern about the health impacts of a proposed development and the need for a more rigorous assessment of those risks. In the face of evidence of increased mercury contamination of fish and toxic pollutants in drinking water, the PolyMet NorthMet FEIS is inadequate under NEPA and cannot support a determination that the proposed land exchange will serve the public interest and comply with Executive Order 13045, which requires protection of children from health risks. If federal agencies propose to offer up healthy brain development of fetuses, infants and children for the potential economic benefits of the NorthMet open-pit mine, NEPA requires that such a trade-off be rigorous, thorough and fully disclosed to the public.

D. The PolyMet NorthMet project would have significant adverse impacts on wetlands contrary to federal regulations and the public interest.

Federal regulations require that the Forest Service consider the impacts of both the land exchange and the resulting use of federal lands on fish and wildlife habitats and watersheds on the public interest. 36 C.F.R. §254.3(b)(1). Any proposed exchange of Superior National Forest may not substantially conflict with established management objectives on adjacent federal lands, including Indian trust lands. 36 C.F.R. §254.3(b)(2)(ii). The Superior National Forest Plan calls for avoidance of wetlands impacts and compensation for wetlands losses:

“Wetland impacts will be avoided whenever possible. Where impacts are unavoidable, minimize and compensate for loss when undertaking projects.” (Forest Plan, Watershed Health, G-WS-13, p. 2-15)

“Wetlands will be managed to prevent the reduction of their water quality, fish and wildlife habitat, and aesthetic values. Management actions will not reduce water quality within a wetland, or upstream or downstream of a wetland, unless restoration of natural conditions is the primary goal of the activity.” (*Id.*, Watershed Health, G-WS-15, p. 2-15)

The Forest Service Draft Record of Decision fails to consider the impacts of the future use of the federal lands in its discussion of wetlands impacts from the PolyMet NorthMet land

exchange and mining project. The DROD only considers the land exchange itself in concluding that the land exchange “would result in a 505 acre net increase to the federal estate,” and thus conforms to Executive Order 11990 (Protection of Wetlands).⁶⁸ (DROD 37). When the proposed use of the federal lands for which the land exchange is a condition precedent were considered, the net results of the NorthMet land exchange are very different. They include:

Net loss from direct destruction of wetlands: 913.8 acres;
Net less from direct loss and potential indirect impacts to wetlands: 8,608 acres;
Net loss to Partridge River watershed from direct loss and indirect impacts to wetlands: 6,488 acres.⁶⁹

The following sections explain the losses that would result from the proposed NorthMet land exchange and mining project and describe the quality and national importance of wetlands that would be irretrievably destroyed and degraded were the NorthMet project to be approved.

1. Direct wetlands destruction resulting from the PolyMet NorthMet project is contrary to federal regulations and the public interest.

The direct effects of the PolyMet NorthMet project on wetlands are substantial and unprecedented in Minnesota’s modern history. Neither WaterLegacy nor any regulatory staff we’ve asked have identified any single project approved by the St. Paul District of the Army Corps since the Clean Water Act was enacted with a direct wetland destruction approaching the 913.8 acres direct loss that would result from the NorthMet project.

The vast majority of compensatory mitigation for this direct loss is outside the Lake Superior Basin and across the Continental Divide from the impacted wetlands. In addition, effective compensatory replacement of hundreds of acres of high-quality difficult-to-replace coniferous bogs is highly uncertain. Direct wetlands loss from the NorthMet coupled with inadequate proposed mitigation are contrary to the public interest.

Morgan Robertson, Ph.D., who assisted in writing the Federal Mitigation Rule for wetlands under the Clean Water act and has extensive experience with wetlands mitigation, detailed his concerns that proposed mitigation for NorthMet direct wetlands loss would substantially conflict with provisions of the Rule. (Robertson 2015). The PolyMet NorthMet mitigation plan fails to follow a watershed approach. (*Id.*, pp. 9-16, *citing* 33 C.F.R. §

⁶⁸ Executive Order 11990 - Protection of Wetlands May 24, 1977, available at <http://www.archives.gov/federal-register/codification/executive-order/11990.html>

⁶⁹ As explained below, this Partridge River watershed loss is based on GLIFWC’s analysis of drawdown impacts.

332.3(b)(1-6)). The NorthMet plan also provides for out-of-kind mitigation, which is not allowed where a watershed approach has not been used for compensation. (*Id.*, pp. 16-22, citing 33 C.F.R. § 332.3(e)(1)-(2)). Dr. Robertson summarized his analysis of proposed PolyMet NorthMet mitigation, “This proposal is impermissible and no agency discretion stretches far enough to allow this result.” (*Id.*, p.22).

The PolyMet NorthMet compensatory mitigation sites, approved by the Army Corps in January 2015 (Army Corps letter to PolyMet, Jan. 13, 2015, Attachment 6 to Robertson 2015) and described in the FEIS, provide most of the compensatory mitigation for NorthMet impacts not only outside the impacted St. Louis River watershed, but outside the Lake Superior Basin.

Although out-of-watershed wetlands compensation is not uncommon despite the preference for a watershed approach in the Federal Mitigation Rule, the question of its appropriateness is usually considered at the scale of 8-digit Hydrologic Unit Codes (HUCs), or 6-digit HUCs at most. (Robertson 2015, p. 9). For the PolyMet NorthMet project, 66.5 percent of the compensatory wetlands acreage and 71 percent of the proposed wetlands credits are provided by the Aitkin and Hinckley wetland mitigation sites (FEIS, 5-387, Table 5.2.3-17). These sites are within the Mississippi River Basin, across the Continental Divide from the Lake Superior Basin in which the NorthMet project would be located. (FEIS, 3-28). In this case “there is *no* scale of watershed that encompasses both the impact site and the Aitken and Hinckley sites, as they drain to different oceanic bodies of water.” (Robertson 2015, p. 10).

The proposed mitigation also would not compensate for the wetland types directly impacted by the PolyMet NorthMet project. The NorthMet project would directly impact 537.6 acres of coniferous bogs and open bogs (Type 8 wetlands). (FEIS 5-389, Table 5.2.3-18). Coniferous bogs are difficult-to-replace resources that federal regulations recommend be rehabilitated, enhanced or preserved, rather than restored to decrease the likelihood of unsuccessful mitigation. 33 C.F.R. §332.3(e)(3).

Under the best of circumstances, compensatory mitigation at the Zim Sod site could restore 499.9 acres (439.9 credits) of Type 8 coniferous bog wetlands as compared to 530 acres of direct impacts at the NorthMet site. (FEIS 3-387, Table 5.2.3-17; 5-389, Table 5.2.3-18). This best-case scenario would also markedly underrepresent losses of shallow marsh wetlands (Type 3) and provide a disproportionate number of credits for swamps (Type 7), shrub-carr (Type 6) and sedge meadow (Type 2) wetlands. (Robertson 2015, pp. 17-19).

But, as detailed in PolyMet’s Zim Sod Wetlands Mitigation site proposal (FEIS ref. PolyMet 2014j, Sections 3.0 and 3.1.1) and in Dr. Robertson’s opinion (Robertson 2015, pp. 17-22), successful coniferous bog restoration is highly uncertain; coniferous swamp (Type 7) or sedge meadow (Type 2) wetlands are likely to result from failed restoration of a true bog community. It is likely that if the PolyMet NorthMet plan were to be approved it would result in an outcome where *none* of the 530 acres of the direct impacts on coniferous bog are compensated for in-kind. In this likely scenario, hardwood/coniferous swamp would dominate the mitigation, resulting in a 100% failure to compensate for project impacts on coniferous bog wetlands. (Robertson, 2015, p. 20).

The loss of bog and its replacement with swamp is important ecologically in light of the fact that these two wetlands differ primarily in their hydrology – bogs being rainwater-fed or ombrotrophic and nutrient-poor, swamps being groundwater-fed and nutrient-rich. (*Id.*, pp. 16-17, 20). Direct losses of wetlands from the NorthMet plan are unprecedented, and planned mitigation would be outside the Lake Superior Basin and substantially out-of-kind, contrary to federal regulations and the public interest.

2. NorthMet project indirect wetlands impacts are contrary to the public interest, and the FEIS’ failure to assess and mitigate these impacts violates federal regulations.

NEPA regulations require an analysis of both direct and indirect potential adverse effects of a proposed action. 40 C.F.R. §1502.16 (a), (b). Although the EPA recommended in comments on the PolyMet NorthMet SDEIS that the FEIS “should quantitatively assess all indirect impacts” and “clearly explain proposed measures to minimize and mitigate indirect wetland impacts during the project,” (EPA SDEIS Comment, 2014, p.11, Exhibit 1), the FEIS does neither.

Despite NEPA’s requirements, the FEIS states, “The indirect effects analyses performed for the EIS were not performed to characterize impacts but were done to inform where monitoring should take place.” (FEIS, 5-259). The FEIS acknowledges that the proposed sulfide mine project could indirectly affect up to 7,694.2 acres of wetlands located within and around project sites (FEIS, 5-251), a total of 8,608 acres combining direct and indirect wetlands impacts. When compared to the number of *existing* wetlands acres, potential impacts of the PolyMet NorthMet in the Partridge and Embarrass River watersheds could affect up to 13 percent of the

65,567 remaining acres of wetlands in the combined watersheds. (FEIS, 6-57, Table 6.2.3-3).

Although the FEIS suggests that potential secondary impacts on wetlands cannot be quantified or even reasonably estimated because the information is “unavailable” (FEIS, 5-260), the record doesn’t support this claim. Under NEPA, if information is needed to make a reasoned choice among alternatives, it is only considered to be unavailable if “overall costs of obtaining it are exorbitant or the means to obtain it are not known.” 40 C.F.R. §1502.22(b). If information is on secondary impacts is available, failure to provide it violates NEPA. *Sierra Club v. Van Antwerp*, 709 F. Supp. 2d 1254, 1271-1272 (S.D. Fla. 2009) (By failing to include in the EIS analysis costs of water treatment upgrades - a secondary effect of mining activity needed to evaluate alternatives, the Corps did not comply with NEPA's regulations).

As explained in previous sections discussing predicted water quality violations and mitigation alternative, the FEIS doesn’t justify its failure to quantify the effects of polluted seepage on wetlands. The FEIS merely states that assumptions in PolyMet’s GoldSim modeling of flowpaths did not include water quality impacts to wetlands.

For the critical impact of mine dewatering on wetlands, the FEIS makes no claim that modeling to predict wetlands drawdown would be exorbitant or beyond the state of the art. The FEIS merely states a preference for using the analog method to evaluate wetlands drawdown rather than a model such as MODFLOW (FEIS, 5-257, 5-260) and a preference for using the analog approach rather than a hydrological study, pump test and/or laser test to assess potential groundwater drawdown. (FEIS, A-489 to A-489).

In his comment on the PolyMet NorthMet SDEIS, wetlands expert Brian Branfireun opined that reliance on an analog case to evaluate the potential extent and magnitude of mine dewatering impacts to surface wetlands and streams is unsatisfactory, “given the availability of robust hydrogeological models that could reasonably evaluate potential impact scenarios.” (Branfireun 2014, p. 14). Hydrologist Donald Lee stated both that an analog approach would need to be validated, which hadn’t been done in the SDEIS, and that “MODFLOW has the capability to calculate the effects of pit dewatering providing the appropriate input is incorporated into the model.” He pointed out that selectively rejecting MODFLOW for the purpose of wetlands assessment could call into question the legitimacy of all other EIS analysis of hydrology and water quality. (Lee 2014, p. 12).

MODFLOW has recently been used to update predictions highly relevant to the

assessment of impacts on wetlands from mine drawdown. As described in more detail in WaterLegacy's Comments on the FEIS, PolyMet recently updated its assessment of the hydraulic conductivity of wetland deposits and of Virginia Formation bedrock (FEIS, 5-19, 5-29, Table 5.2.2-7) and revised its estimates of groundwater inflow to the west and east mine pits. (FEIS, 5-111, Table 5.2.2-19). The Co-lead Agencies also recently used MODFLOW to predict the number of inches of downward leakage through wetlands necessary to prevent northward flow as a result of the downhill hydraulic gradient of the Northshore Mine Peter Mitchell Pit. (FEIS, 6-41, MDNR et al 2015c). There is every indication that MODFLOW is a robust, practicable and readily available model for analysis of conductivity, hydrology and flow through mine pits, bedrock, and surficial materials at the NorthMet mine site, the parameters most relevant to determine secondary wetlands drawdown impacts.

Even if one were to assume that an analog method is preferable to using MODFLOW or another hydrological model, there is no logical reason why this would make an evaluation of wetlands drawdown impacts "unavailable." Nothing would have prevented the project proponent or Co-Leads from calibrating the analog approach and providing a quantitative estimate of mine drawdown impacts sufficient for NEPA and the Section 404 process. They chose not to do so.

However, this record *does contain* a quantitative assessment of wetlands drawdown impacts using the Co-Leads' preferred analog approach. An Analysis of Indirect Wetland Impacts from Groundwater Drawdown using a calibrated analog approach was provided by GLIFWC prior to the preparation of the SDEIS in November 2013 and is included in Appendix C of the FEIS. (FEIS, App. C, autop. 2985-3025). Neither the SDEIS nor the FEIS challenged the methodology or conclusions of this analysis.

Calibrating the analog method to other pits on the Iron Range, using the three zones of proximity to mine pits proposed by the Co-Leads, and specifying the level of drawdown, acreage and types of wetlands that would be affected, GLIFWC concluded that wetlands likely to be severely impacted by dewatering totaled 3,188.62 acres in Zone 1 (0 to 1,000 feet), 2,458.12 acres in Zone 2 (1,000 – 2,000 feet) and 273.01 acres in Zone 3 (2,000 – 5,000 feet). Severe indirect impacts to wetlands from mine pit drawdown would total 5,719.75 acres. (FEIS, App. C, autop. 2994). Many of these impacted acres are on federal lands that would be adjacent to the NorthMet mine site under the proposed action. This calibrated analog model provides a reasonable and usable estimate of mine site indirect effects on wetlands.

The FEIS proposes wetlands mitigation for 26.9 acres of mine site wetlands predicted to be lost as the result of fragmentation. (FEIS, ES-37). Making the assumption that mine site wetlands subject to other secondary effects are likely to also be within the 5,720 acres identified by GLIWFC as impacted by dewatering, the FEIS, proposes to provide compensatory mitigation for *less than half of one percent* of the wetlands subject to mine site secondary effects. This level of mitigation conflicts with the Federal Mitigation Rule. 33 U.S.C. §332.3(a), (f).

Direct and indirect impacts to wetlands preclude a determination that the PolyMet NorthMet land exchange and mine project would comply with federal regulations and Forest Plan policies requiring avoidance of wetlands impacts and compensation if impacts are unavoidable. Direct adverse impacts from the NorthMet projects on wetlands are contrary to the public interest.

3. Cumulative wetlands destruction and impairment from the NorthMet project is contrary to the public interest.

EPA comments on the PolyMet NorthMet SDEIS in March 2014 recommended, “The FEIS should include indirect impacts in the analysis of cumulative impacts to wetlands.” (EPA Comment on the SDEIS, 2014, p. 11 Exhibit 1).

The FEIS tables only describe the cumulative losses to wetlands resulting from *direct* destruction of wetlands by the NorthMet project. (FEIS, 6-58, Table 6.2.3-4). For indirect effects, the FEIS says that, “based on the amount of potential indirect wetland effects that could occur from the NorthMet Proposed Action, there could be 0.1 to 12.0 percent cumulatively lost, in addition to the direct wetland impacts assessed, within the Partridge and Embarrass River watersheds.” (FEIS, 6-60). Read quickly, the FEIS seems to suggest that the upper bound of cumulative impacts on wetlands from the NorthMet project would be 12.0 percent. This is not the case.

If both the Partridge and Embarrass River watersheds are aggregated and indirect impacts are considered, the upper bound of cumulative impacts on wetlands is *17 percent*. This is calculated by dividing 11,693 acres of cumulative losses (3,085 acres under the no action alternative and 8,608 acres of loss from the NorthMet project) by the 68,251 pre-settlement wetland acres of both watersheds combined. (See FEIS, 6-56, Table 6.2.3-2; 6-59, Table 6.2.3-5 for pre-settlement and no action alternative wetlands acreage).

However, since most of the losses resulting from both NorthMet project and cumulative impacts are in the Partridge River watershed, this calculation understates the impacts to high quality wetlands in the Partridge River watershed and the Superior National Forest. The FEIS has provided the very lowest bound of Partridge River watershed cumulative impacts on wetlands since pre-settlement days. If the NorthMet project resulted in *no indirect impacts at all* on mine site wetlands, that cumulative impact would be 10 percent. (FEIS, 6-58).

The FEIS does not segregate indirect impacts in the Partridge River watershed from those in the Embarrass River to allow a calculation of the upper bound of the cumulative effects of the NorthMet project on high quality wetlands on and near the mine site. However as explained previously, GLIFWC has provided a reasonable estimate of NorthMet mine dewatering impacts on wetlands which can be used to calculate secondary and cumulative impacts on wetlands in the Partridge River watershed.⁷⁰

Combining GLIFWC's wetland drawdown estimate (5,720 acres), direct wetlands impacts on the Partridge River watershed (768 acres)⁷¹ and losses to the Partridge River watershed under the no action alternative (2,557) and dividing by the pre-settlement acreage of wetlands in the Partridge River (33,601 acres) provides the likely upper bound of cumulative wetlands loss in the Partridge River watershed based on evidence in this record. Under the NorthMet action, cumulative direct and secondary wetland loss and degradation in the Partridge River watershed since pre-settlement days could reach *26.9 percent*.

The Forest Service must reconsider its analysis of losses from the NorthMet land exchange to include the direct, indirect and cumulative destruction and degradation of wetlands impacting the federal land that would be exchanged and adjacent federal land that would remain. These losses are neither acceptable under the public interest test nor consistent with management objectives for the Superior National Forest.

4. Wetlands that would be destroyed and degraded by the PolyMet NorthMet project have values of national importance and should be preserved.

Aquatic resources in the Partridge River watershed and Superior National Forest that would be adversely affected by the NorthMet land exchange and mine project are aquatic

⁷⁰ WaterLegacy's calculation assumes that other indirect impacts at the mine site would also occur within the acreage where drawdown impacts were modeled by GLIFWC, so it may slightly understate impacts.

⁷¹ This direct effects number is used in FEIS, 6-58, Table 6.2.3-4 and 6-59 Table 6.2.3-5; it appears to include 10 acres of direct wetlands impacts in the transportation and utility corridor (see FEIS, 5-266, Table 5.2.3-1).

resources of national importance with high ecological value. The proposed mine site is located within the 100 Mile Swamp and the Upper Partridge River Site. Indirect project impacts on wetlands on and near the NorthMet mine site would affect the 100 Mile Swamp, the Upper Partridge River Site, and the Partridge River Peatlands, all of which have been identified by the Minnesota County Biological Survey (MCBS) as sites of high biodiversity significance. MDNR's Minnesota Biological Survey determined the high biodiversity significance rank of the Hundred Mile Swamp and Partridge River Peatlands sites based on high quality peatlands, while the rank of the Upper Partridge River site was based on the numerous rare species recorded in the site. (See MCBS Map in WaterLegacy SDEIS Comments, Exhibit 30).

In comments on the PolyMet NorthMet draft environmental impact statement (DEIS), the EPA made a preliminary determination that impacted Partridge River watershed wetlands are aquatic resources of national importance (ARNI):

EPA finds this project may have substantial and unacceptable adverse impacts on aquatic resources of national importance (ARNI). EPA believes the coniferous and open bogs, comprising a large percentage of the approximately 33,880 total wetland acres, within the Partridge River Watershed to be an ARNI due to the values they provide in terms of unique habitat, biodiversity, downstream water quality, and flood control specifically, to the Lake Superior Watershed and the Great Lakes Basin. (EPA DEIS Comments, Feb. 18, 2010, Attachment 20 to Robertson, 2015)

On the proposed NorthMet mine site, there are 1,298 acres of wetlands, covering approximately 43 percent of the mine site. (FEIS, 4-177). The vast majority (92 percent) of these mine site wetlands are high quality. (FEIS, 4-181). The vegetation types at the mine site are indicative of pre-settlement conditions and lack hydrologic disturbance. (FEIS, Co-Lead Dispositions, autop. 3,114).

On the mine site, 71 percent of the wetlands or approximately 869 acres are coniferous bogs (FEIS, 4-178, Table 4.2.3-2), which are classified under Section 404 regulations as difficult to replace aquatic resources. 33 C.F.R. §332.3(e)(3). Among the mine site wetlands that would be directly destroyed by the NorthMet mine, 67 percent are coniferous bogs and another 9 percent are coniferous swamp wetlands. (FEIS, 5-266, Table 5.2.3-1).

The 100 Mile Swamp and the Upper Partridge River Site, both of which would be directly as well as indirectly impacted by the PolyMet NorthMet mine, are immediately adjacent to the Headwaters Site. Together these important ecological locations form the headwaters of the

St. Louis River, the largest United States tributary to Lake Superior. This spatial relationship is shown in Exhibit 35, a map obtained from the MDNR's report, *An Evaluation of the Ecological Significance of the Headwaters Site*.⁷² This MDNR report explains the significance of this headwater stream region to national and international waters:

The Headwaters Site straddles the continental divide, with water from the Site flowing both east through the Great Lakes to the Atlantic Ocean and north to the Arctic Ocean. Paradoxically, the divide runs through a peatland. Although the peatland appears flat, water flows out of it from all sides, forming the ultimate source of rivers that eventually reach two different oceans. The Site is the headwaters of four rivers: Stony River, Dunka River, South Branch Partridge River, and the St. Louis River, which is the second largest tributary to Lake Superior. (*Id.*, p. 1)

Mine site impacts would affect Partridge River headwaters flowing from this unique Headwaters Site along the Continental Divide. The NorthMet project would shift maintenance of water quality in these headwaters of the Partridge River “from natural systems (i.e., essentially an ecosystem service) to mechanical systems (e.g., the NorthMet Project Proposed Action WWTF and WWTP).” (FEIS, 6-83).

The wetlands at and near the mine site provide unique habitat and biodiversity and sequester carbon and mercury, all of which functions would be impacted by the proposed mine site. These functions operate holistically and affect the St. Louis River watershed and Lake Superior water quality, aquatic life and the wildlife and human beings who drink downstream water and consume downstream fish and plants.

Understanding the ecological context of the mine site as well as the ecological services performed by coniferous bogs and other high quality wooded wetlands, it is clear that the Partridge River wetlands that would be adversely affected by the NorthMet project should be protected from the federal land exchange that would result in their degradation and destruction.

E. Destruction of wildlife habitat and remaining wildlife corridors precludes approval of the PolyMet NorthMet land exchange and mine project.

The Forest Service's authority to approve a discretionary land exchange is constrained by the Endangered Species Act (ESA) of 1973, as amended, 16 U.S.C. §1531 *et seq.* and implementing regulations in Section 50, Part 402 of the Code of Federal Regulations, as well as

⁷² MDNR, *An Evaluation of the Ecological Significance of the Headwaters Site* (March 2007), available at <http://files.dnr.state.mn.us/eco/mcbs/evaluations/lmf/headwaters/headwaters.pdf>.

by statutes and regulations pertaining to federal land exchange. The ESA precludes both federal agency action that would jeopardize the continued existence of any federal threatened or endangered species and federal action that would adversely modify critical habitat for federal listed species. 16 U.S.C. §1536(a)(2). *See Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, 378 F.3d 1059, 1069-74 (9th Cir. 2004).

In determining whether a particular federal agency action would violate the Endangered Species Act, cumulative impacts of state and private activities must be considered. 50 C.F.R. §§402.02, 402.12(f)(4). A federal agency must consider cumulative effects of projects impacting endangered species to determine if they carry “a high risk of degradation when multiplied by many projects and continued over a long time period.” *Pacific Coast Fed’n of Fishermen’s Ass’n, Inc. v. Nat’l Marine Fisheries Service*, 265 F. 3d 1028, 1036 (9th Cir. 2001). Failure to provide a proper analysis of the cumulative effects of mining operations on the habitat of federal listed species invalidates federal action to authorize mining operations. *Nat’l Wildlife Fed’n v. Norton*, 332 F. Supp. 2d 170, 177-179 (D. D. C., 2004)(Finding Biological Opinion arbitrary and capricious and invalidating dredge and fill permit for limestone mine due to failure to consider cumulative impacts on reduction of panther habitat).

In addition to the protection of federal threatened and endangered species under the ESA, the public interest determination for a federal land exchange under FLPMA must consider broader needs for the land for wildlife. 43 U.S.C. §1716(a); 36 C.F.R. §254.3(b)(1). The Superior National Forest Plan provides for the conservation of species and habitats on which federally-listed species depend; preservation of the quality and quantity of management indicator species and indicator habitats; and supporting diverse populations of existing native species. (Forest Plan, Wildlife, D-WL-3(c)-(f), pp. 2-27 to 2-28).

In the Superior National Forest, “Moose is a species of management concern because it is a key prey species for the federally threatened gray wolf and is a very high public interest species with important social, ecological, and economic values and impacts. In addition, recent survey data raise concerns about a declining moose population in northeast Minnesota.”⁷³ Moose are also an iconic species in Minnesota, of particular importance to tribal exercise of usufructuary rights. Moose have been listed by the State of Minnesota as a species of special concern. (FEIS 4-237).

⁷³ U.S.D.A. Forest Service, Management Indicator Habitats, Monitoring Report (2008), 9b.3, available at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5145019.pdf.

The Forest Service DROD fails to comply either with ESA prohibitions or with federal land exchange requirements. The DROD admits that the “NorthMet Mining Project and Land Exchange Proposed Action is likely to adversely affect Canada lynx, Canada lynx critical habitat, the northern long eared bat, the gray wolf, and gray wolf critical habitat.” But the DROD discounts this impact and fails to apply the ESA, stating it is “unlikely that habitat loss and fragmentation resulting from the Project would represent a significant impact to lynx and wolf habitat from a regional perspective.” (DROD 38).

The DROD also acknowledges that lands to the north and west of the federal lands “have been extensively affected over the years by surface mining, including mine pits, waste rock stockpiles, Tailings Basins, processing facilities, railroad grades, and other general mining activities,” (DROD 18). However, the DROD implies that these cumulative impacts devalue the proposed mine site, rather than increasing the priority for mine site habitat preservation. The DROD completely fails to consider cumulative impacts on lynx and wolves of cumulative destruction of habitat and wildlife corridors in the Mesabi Iron Range.

In addition, the Forest Service DROD fails to mention, let alone give full consideration to impacts of NorthMet land exchange and mining project on moose. The need of moose for the federal land habitats, particularly under the cumulative threat of habitat fragmentation and climate change, requires that the NorthMet land exchange and mining project be rejected to serve the public interest.

With respect to habitat, the FEIS acknowledged, “There would be both irreversible and irretrievable loss of federally managed wildlife habitat under the NorthMet Project Proposed Action and Land Exchange Proposed Action.” (FEIS 7-11). It is undisputed that the NorthMet project would adversely modify critical habitat for federal listed species. The lynx, northern long-eared bat and gray wolf are federally listed threatened species that have been sighted on and near the project area. (FEIS App. D, Biological Assessment, ES-2). No critical habitat has yet been designated for the northern long-eared bat, but the Biological Assessment concluded that the NorthMet project would adversely affect approximately 1,719 acres of lynx and wolf critical habitat within the mine site. (*Id.*, ES-3). None of the wetlands mitigation sites are located in critical habitat for the lynx or wolf (*Id.*, ES-2 to ES-3), so the impacts to critical habitat of listed species are unmitigated. The Biological Assessment concluded that effects of the NorthMet project on lynx and gray wolves are not discountable. (*Id.*, ES-3). Under the ESA, the land

exchange that would allow the NorthMet project to adversely impact lynx and gray wolf critical habitat should not be approved.

The cumulative impacts of the NorthMet project and other mining impacts throughout the Mesabi Iron Range on habitats and disruption of wildlife corridors, could jeopardize overall population stability and persistence of the lynx and gray wolf. The FEIS explained,

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. (FEIS 6-74)

The FEIS cited two studies of the few remaining wildlife corridors through the Mesabi Iron Range and Arrowhead Region. In 2006, Emmons and Olivier Resources prepared a report for the MDNR, “*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.*” (FEIS ref. Emmons v. Olivier 2006). This report concluded that wildlife travel through the region is restricted “because of the extensive change to the landscape, including large mine pits, stockpiles, mining infrastructure, regional development associated with the Mesabi Iron Range, and highways.” (*Id.* at 2). Emmons & Olivier identified only 13 remaining wildlife corridors across the 100-mile Mesabi Iron Range. (*Id.* at 51). They concluded that “any future losses to the habitat requirements for these species could be considered significant.” (*Id.* at 52).

Barr Engineering prepared a second study, “*Cumulative Effects Analysis of Wildlife Habitat and Threatened and Endangered Wildlife Species, Keetac Expansion Project,*” in connection with a U.S. Steel mining expansion project. (FEIS ref. Barr 2009a). This Barr Report stated 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. (*Id.* at 4). The Report cautioned, “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.” (*Id.*).

The Barr Report identified 18, rather than 13 remaining wildlife corridors. (*Id.* at 51). Of the 18, Barr predicted, “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 be significantly degraded by future mining plans.” (*Id.* at 56).

The FEIS uses both the Emmons and Olivier and the Barr identification of wildlife corridors, but does not provide a clear quantitative assessment of the cumulative loss and degradation of wildlife corridors under either. Using the Emmons and Olivier formulations, the FEIS finds that the NorthMet project would adversely affect two of the 13 remaining wildlife corridors along the Mesabi Iron range, or more than 15% of the existing corridors in this degraded region. (FEIS 6-74). The FEIS acknowledges that the impacted corridor at the proposed NorthMet mine site was identified as an important corridor by Emmons and Olivier. (FEIS 6-77).

The FEIS applies the Barr listing of 18 remaining corridors to describe cumulative effects on wildlife corridors. (FEIS 6-77 to 6-78, Table 6.2.5-1). Reviewing Table 6.2.5-1 of the FEIS, among the 18 corridors, cumulative effects are slated to result in the direct loss of seven corridors (Wildlife Travel Corridors 3, 5, 6, 9,11,17,18) and to result in habitat isolation at another four corridors (Wildlife Travel Corridors 2, 4, 7, 8). The remaining seven travel corridors would experience some restrictions due to development, reduced corridor width, minimal habitat isolation, and/or increased traffic or noise (Wildlife Travel Corridors 1, 10, 12, 13,14, 15,16). The NorthMet project, in conjunction with reasonably foreseeable cumulative effects, would result in habitat isolation at or direct loss of *61% of the remaining 18 wildlife corridors through the Mesabi Iron Range*. Reasonably foreseeable cumulative effects would adversely affect 100% of these remaining wildlife corridors to some degree.

Neither the Biological Assessment, the Biological Evaluation, nor the Forest Service Draft Record of Decision evaluated cumulative adverse effects of the NorthMet project as a result of loss and degradation of wildlife corridors for lynx and the gray wolf. The cumulative impacts of these losses to federally listed species conflict with the public interest and prevent approval of the NorthMet land exchange under the Endangered Species Act.

The Biological Assessment also concluded that the NorthMet project is likely to adversely affect the northern long-eared bat because of the potential loss of summer roost habitat. (*Id.*, ES-3). This federally listed species is highly vulnerable. The northern long-eared bat

is experiencing a severe and immediate threat to its existence resulting from the infectious disease known as white-nose syndrome. This disease has recently resulted in unprecedented mortality in the northeastern part of the United States, where an estimated 5.7 to 6.7 million bats have died, resulting in a 95% to 99% decline in some New England populations. The pathogen causing this syndrome is known to occur in Minnesota, in the Tower/Soudan Underground Mine State Park, only 15 miles northwest of the NorthMet project area. (*Id.*, 6-70 to 6-71). Given cumulative threats to the northern long-eared bat, additional stressors from the NorthMet project may create a risk of placing the species in jeopardy.

Although moose are not a federally listed species, the protection of this Minnesota state species of special concern is included in the Forest Plan, and full consideration of the needs of moose for federal lands habitat is required under FLPMA and its implementing rules. Moose have been observed at the proposed mine site and federal lands. (FEIS 4-246). The FEIS estimates that a total of 2,785.9 acres of key habitat types for moose would be directly affected by the PolyMet NorthMet project. (FEIS 5-439).

In discussing food sources for gray wolf, the Biological Assessment documented that “moose populations have declined by about 52% in Minnesota since 2010,” (FEIS, App. D., Biological Assessment 6-91). The Biological Assessment explained,

An estimated 8,106 moose occurred in northeastern Minnesota in 2005, 7,890 in 2008, 5,700 in 2010, but only 2,760 moose occurred in January 2013, a 52% decline between 2010 and 2013. Both the cow to calf ratio and the percent calves has exhibited a steady decline over the past 9 years (DelGiudice 2013). (*Id.*, 6-85)

The MDNR has placed a moratorium on moose hunting in Minnesota due to low population numbers (MDNR 2013a). The 1854 Treaty Authority and the Fond du Lac Band have also closed their moose seasons since 2013.⁷⁴

The FEIS acknowledges cumulative threats to the moose: “Habitat fragmentation and loss, climate change, disease, and predation are all potential factors in moose population decline.” (FEIS 5-439, citing MDNR 2013d). Moose are “are fairly intolerant of heat, making thermal cover or access to water important to reduce heat stress” and higher mortality rates could be due to causes “including heat stress or increased parasites.” (FEIS 4-237). The 2009 Report to

⁷⁴ Fond Du Lac Band, Comments on FEIS and CWA §404 Permit for PolyMet (hereinafter “FDL FEIS Comment”), p. 45.

the MDNR by the Minnesota Moose Advisory Committee⁷⁵ and the Center for Biological Diversity and Honor the Earth July 2015 petition to list the moose as an endangered species⁷⁶ emphasize the importance of preserving forested wetlands as a thermal refuge for moose, to reduce the threat of climate change, heat stress, malnutrition and pathogens on moose.

The FEIS' assertion that loss and fragmentation of moose habitat is not "likely" to affect moose at the population level (FEIS 5-439) is a conclusory statement lacking any scientific basis. The Biological Assessment and Biological Evaluation, which only mentioned decline of moose as a concern for wolf predation and the Forest Service DROD, which failed to consider moose at all, can neither meet the requirements of NEPA nor FLPMA standards to determine public interest for a land exchange. The NorthMet land exchange must be rejected to prevent adverse effects on critical habitat for federally listed species, to prevent cumulative impacts on wildlife corridors for the lynx and gray wolf and to prevent cumulative impacts on northern long-eared bat and moose species already in precipitous decline.

F. Forest Service failure to value ecosystem services prevents a finding that the PolyMet NorthMet land exchange and mine project is in the public interest.

FLPMA only allows exchange of land within the National Forest System if "the Secretary concerned finds that the values and the objectives which Federal lands or interests to be conveyed may serve if retained in Federal ownership are not more than the values of the non-Federal lands or interests and the public objectives they could serve if acquired." 43 U.S.C. §1716(a).

As with any other determination under FLPMA and NEPA, this evaluation must be made based not merely on the exchange of land but on the use to which the federal land will be put. *Ctr. for Biological Diversity v. U.S. Dept of the Interior*, supra, 623 F. 3d at 636; *Nat'l Parks & Conservation Ass'n v. U.S. BLM*, supra, 606 F. 3d at 1071. Federal regulations state that this comparison between the alternative of retaining the federal land and proceeding with the proposed land exchange must evaluate the respective "resource values" and "public objectives." 36 C.F.R. §254.3(b)(2)(i).

⁷⁵ 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 to Conservation Organizations' Comments on the Supplemental Final EIS for the NorthMet Project ("CO Comments on FEIS"), Dec. 21, 2015, and provided herein as Exhibit 40.

⁷⁶ 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 to CO Comments on FEIS, and provided herein as Exhibit 41. 0.

The Forest Service DROD states that “the overall resource values and the public objectives served by the non-Federal lands or interests to be acquired exceed the resource values and the public objectives served by the Federal lands to be conveyed.” (DROD 17). However, this statement is not supported by any quantifiable valuation of ecosystem services. The DROD also fails to consider loss of resources values as a result of proposed use of the federal land for the PolyMet NorthMet open-pit sulfide mine.

Federal Principles and Requirements for valuation of ecosystem services were adopted in March 2013,⁷⁷ and Final Principles, Requirements and Guidelines (PR&G) adopted in December 2014⁷⁸ to provide comprehensive policy and guidance prior to federal investments in water resources or changes in the management of federal assets, including National Forests. The explicit goal of these new federal requirements was to prevent decision-making from being “unnecessarily biased” towards “maximizing net economic development gains” and to encourage “more socially beneficial investments” as a result of an integrated approach. (Principles and Requirements, p. 7).

The PR&G states that federal agencies must provide an explicit list of the services that flow from the area ecosystems and identify those services that are likely to meaningfully change as result of the federal action. (PR&G, pp. 18-19). The goal of an assessment of ecosystem services “is a complete accounting of the costs and benefits” expected from the federal action to determine “whether and how ecosystems at or proximate to the investment sites are impacted relative to a no-change baseline.” (*Id.*, p.21). The PR&G identifies types of ecosystem services to consider and states that to the extent practicable these services “must be quantified in a scientifically valid and accepted way. Whenever appropriate, quantified effects should be monetized.” (*Id.*, p. 22)

On October 7, 2015, a Memorandum for Executive Departments and Agencies was issued directing federal agencies to incorporate ecosystem services decision-making.⁷⁹ The Memorandum highlighted the value of wetlands in providing billions of dollars in flood protection and explained, “Integrating ecosystem services into planning and decision-making can

⁷⁷ Principles and Requirements for Federal Investments in Water Resources (March 2013), pp. 1-2, available at https://www.whitehouse.gov/sites/default/files/final_principles_and_requirements_march_2013.pdf.

⁷⁸ Final Principles, Requirements and Guidelines (“PR&G”) Interagency Guidelines (December 2014), p. 2-3. available at https://www.whitehouse.gov/sites/default/files/docs/prg_interagency_guidelines_12_2014.pdf.

⁷⁹ Shaun Donovan, Director, Office of Management and Budget; Christina Goldfuss, Managing Director, Council on Environmental Quality; John Holdren, Director, Office of Science and Technology Policy, *Memorandum For Executive Departments and Agencies Incorporating Ecosystem Services into Federal Decision Making*, October 7, 2015, available at <https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m-16-01.pdf>

lead to better outcomes, fewer unintended consequences, and more efficient use of taxpayer dollars and other resources.⁸⁰

The Forest Service's Table 2 provides an incomplete and archaic comparison of resource values served by the federal and non-federal lands. Neither this comparison nor the FEIS mention the value of peatlands on the federal lands for carbon sequestration. The Fond du Lac Band, in their FEIS Comments, explain that peatlands sequester more than three times as much carbon per hectare as do other ecosystems. Simple acre-for-acre exchange fails to account for the disproportionate value of mature peatlands to sequester carbon. (FDL FEIS Comments, p. 86).⁸¹

The value of peatlands to the State of Minnesota was also highlighted in a report of the Minnesota Terrestrial Carbon Sequestration Initiative in 2008. Peatlands in Minnesota are the single largest carbon stock in Minnesota, sequestering more than 4 billion metric tons of carbon.⁸² Destruction of 1,000 acres of peatlands, whether from mining or other activities would release approximately 2.7 million metric tons of CO₂ to the atmosphere, *increasing* Minnesota's total annual emissions of CO₂ by 2% over 2005 levels.⁸³ Ecological services valuation is needed to provide compare this difference between federal and non-federal lands.

Further assessment is also required because neither the FEIS nor the DROD evaluate the reduction in resource value of the following net losses to the federal estate:

- Net loss of 6,026 acres of MCBS High Biodiversity Sites (DROD Table 2);
- Net loss of 2,017 acres of mature jack pine and black spruce forest (FEIS, 4-536, Table 4.3.4-4) sought to be *increased* under the Superior National Forest Plan (Forest Plan, Vegetation, O-VG-16, p. 2-24);
- Net loss of 12 populations of 10 endangered or special concern plant species. (FEIS 4-537, Table 4.3.4-5).

In addition, neither the FEIS nor the DROD consider the importance of location in determining resource values. Among the non-federal lands, Tract 1 and Tract 4, representing

⁸⁰ White House Release, Incorporating Natural Infrastructure and Ecosystem Services in Federal Decision-Making, October 7, 2015, available at <https://www.whitehouse.gov/blog/2015/10/07/incorporating-natural-infrastructure-and-ecosystem-services-federal-decision-making>

⁸¹ Citing Silvius, M., Carbon emissions from peatlands, at Wetlands International, available at <http://www.wetlands.org/OurWork/ClimateMitigation/Carbonemissionsfrompeatlands/tabid/2738/AlbumID/11456-89/Default.aspx>

⁸² *The Potential for Terrestrial Carbon Sequestration in Minnesota, A Report to the Department of Natural Resources from the Minnesota Terrestrial Carbon Sequestration Initiative*, February 2008, p. 7, available at <http://files.dnr.state.mn.us/aboutdnr/reports/carbon2008.pdf>

⁸³ *Id.*, p. 7, emphasis in original.

5411.54 acres or 81% of the total non-federal acreage are neither in the St. Louis River watershed nor the Lake Superior Basin. As a result of the land exchange alone, without considering the impacts of the NorthMet mine project, the Lake Superior Basin would lose 1,226 acres of floodplains, 1,584 linear feet of first-order streams; and 21,120 linear feet of second order streams. (FEIS 5-742, Table 5.3.6-2; 7-6, Table 7.2.4-1). Given the significant threat to the St. Louis River watershed from mining and the importance of the St. Louis River for fisheries and international waters, it cannot be assumed that value of water resources in the NorthMet project area is fungible.

Although the DROD includes a list of some of the characteristics of the federal and non-federal lands, any comparison between benefits and losses is incomplete and subjective. An ecosystem services valuation is needed to determine whether the land exchange, even standing alone, reflects comparable resource value.

The need for an ecosystem services valuation is yet more acute to evaluate the loss of resources as a result of the use of the federal lands from the proposed PolyMet NorthMet mine. Earth Economics prepared an ecosystem services valuation of the St. Louis River Watershed in June 2015.⁸⁴ Based on the per acre valuation, GLIFWC analyzed the economic value of losses to wetlands from direct and indirect impacts to wetlands in an October 14, 2015 letter to the Co-Lead Agencies.

Direct destruction of 913 acres of wetlands as a result of the NorthMet project were estimated to result in a loss of \$1,358,089 to \$5,134,185 per year in wetland ecosystem services. Over the 20-year life of the proposed NorthMet project the St. Louis River watershed would lose between \$27,161,780 and \$102,683,700 in wetlands ecosystem services as a result of direct destruction of wetlands alone. (GLIFWC Ecosystem Services Letter, Oct. 15, 2015, p. 2, Table 2, Exhibit 39).

In addition to ecosystem services, wetlands also provide carbon sequestration benefits for which an economic benefit can be calculated. Using the Earth Economics methodology, GLIFWC calculated that loss of directly impacted wetlands would result in between \$30,289,363 and \$44,666,818 of losses in economic value over the next 140 years assuming a 2% discount rate. This economic impact is in addition to the aquatic impacts described in the previous paragraph. (*Id.*, p. 3, Table 7)

⁸⁴ Earth Economics, *The Value of Nature's Benefits in the St. Louis River Watershed*, June 2015, p. 63, Exhibit 36.

Using impact zones based on distance from the mine pits, indirect wetlands impacts could result in millions or tens of millions of dollars in additional losses of wetland ecosystem services. Cautioning that more detailed analysis is needed to reduce the range in these estimated economic impacts, GLIFWC estimated that indirect wetland impacts could result in between \$4,752,615 and \$17,920,694 per year in wetland ecosystem services in Zone 1 and between \$5,301,242 and \$20,025,269 per year in wetland ecosystem services in Zone 2. (*Id.*, pp. 2-3).

The Forest Service is obligated under federal policies, guidelines and a memorandum from the Office of Management and Budget, Council on Environmental Quality, and Office of Science and Technology Policy to quantify ecosystem services benefits and correct the bias that weighs profit from development over benefits to the public. Courts have held that a federal agency decision not to monetize the benefits of carbon emissions reduction was arbitrary and capricious. *Ctr. for Biol. Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F. 3d 1172, 1200 (9th Cir. 2008). An agency “cannot put a thumb on the scale” by undervaluing the benefits of environmental protection. *Id.*, at 1198.

WaterLegacy would also suggest that the Forest Service, in its consideration of the public interest under 36 C.F.R. §254.3(b)(1), should take a closer look at the impacts of proposed mining on “local residents and their economies.” Recent Minnesota experience has demonstrated risks and reduced benefits to communities as a result of the dependence of mining on international commodity prices and trade practices. Northeastern Minnesota has experienced extended layoffs of nearly 2,000 mine workers.⁸⁵ Unemployment insurance payments are running out,⁸⁶ imposing additional potential public costs, and royalty payments from mining companies have been cut.⁸⁷ The Iron Range Resources and Rehabilitation Board (IRRRB) recently rebated a total of \$5,075,000 in taxes to two mining companies.⁸⁸ Pursuant to recent legislation, the utility serving the mining industry has even proposed shifting the costs of mining industry electricity consumption to other business and residential consumers.⁸⁹ These economic

⁸⁵ Jennifer Brooks, On boom-or-bust Iron Range, this downturn feels different, *Star Tribune*, Nov. 28, 2015, available at <http://www.startribune.com/on-boom-or-bust-iron-range-this-downturn-feels-different/357307601/#1>; Dan Kraker, For Iron Range towns, a bad economy gets worse, *MPR News*, Nov. 17, 2015, available at <http://www.mprnews.org/story/2015/11/17/for-iron-range-towns-a-bad-economy-gets-worse>.

⁸⁶ Associated Press, Dayton seeks special session for steelworkers, *MPR News*, Nov. 12, 2015, available at <http://www.mprnews.org/story/2015/11/12/dayton-seeks-special-session-for-steelworkers>.

⁸⁷ *Id.*; see also John Myers, Minnesota cuts royalty rates for mines, *Duluth News Tribune*, Dec. 2, 2015, available at <http://www.duluthnewstribune.com/news/iron-range/3895105-minnesota-cuts-royalty-rates-mines>.

⁸⁸ Cliffs Erie received a total of \$4.39 million. John Myers, No tax rebate for Magnetation, *Duluth News Tribune*, Dec. 22, 2015, available at <http://www.duluthnewstribune.com/business/3908835-irrrb-no-tax-rebate-magnetation>.

⁸⁹ David Shaffer, Consumer groups cool to utility rate hike to help Iron Range mines, pulp mills,

factors, as well as PolyMet's modeling of employment, must be explicitly analyzed and weighed by the Forest Service along with ecosystem resource losses.

G. The proposed PolyMet NorthMet land exchange and mine project conflicts with federal regulations, management objectives for tribal lands, environmental justice and fiduciary obligations to tribes.

The PolyMet NorthMet project area is located on lands acquired by the United States on September 30, 1854, when the Chippewa of Lake Superior ceded ownership of the land to the United State, retaining usufructuary rights. (FEIS 3-1) These lands are 1854 Ceded Territory lands, and any adverse impacts on land use, historical sites, vegetation, aquatic life and wildlife in this Ceded Territory affect tribal resources and treaty rights. The Fond du Lac Reservation and the St. Louis River and estuary are downstream of the NorthMet project. Impacts to water quality, including methylmercury contamination of fish, can affect tribal Reservation rights as well as treaty resources in the Ceded Territory.

The Forest Service has specific legal duties under federal land exchange regulations, the Forest Service Manual and the Superior National Forest Plan to sustain the well-being and culture of Indian people, to facilitate treaty rights in lands ceded to the United States under treaty, and to prevent conflicts with established management objectives on Indian Trust lands. These duties are superimposed on federal obligations under Executive Order to prevent disproportionate adverse environmental impacts on Indian tribes and fiduciary obligations to protect treaty rights and resources.

From WaterLegacy's perspective, nearly every aspect of these obligations has been violated in the PolyMet NorthMet FEIS and in the Forest Service's DROD proposing to approve the NorthMet land exchange. This Section reviews applicable regulations, plans, policies and duties. We then summarize specific concerns. The NorthMet land exchange and mining project would contaminate and degrade adjacent and downstream tribal resources, conflicting with water quality standards, management plans, and environmental justice. Cumulative effects on tribal rights and resources have been improperly characterized and tribal perspectives about their own rights and resource improperly discounted in violation of NEPA and Forest Service policies.

Star Tribune, Sec. 23, 2015, available at <http://www.startribune.com/consumer-groups-cool-to-utility-rate-hike-to-help-iron-range-mines-pulp-mills/363435741/>. See also Minnesota Citizens Federation Northeast, Comments *In the Matter of Minnesota Power's Petition for Energy-Intensive Trade-Exposes Cost Recovery Rider*, Dec. 21, 2015, attached as Exhibit 42.

Federal regulations state that land exchange proposals shall not be considered if they are inconsistent with land and resource management plans. 36 C.F.R. §§254.3(b)(2)(ii), 254.3(f). The Forest Service Manual (F.S.M.) requires that Forest Service actions “ensure that Forest Service officials, programs, and activities respect tribal self-government and sovereignty and honor tribal rights and interests.” F.S.M. § 1563.02(2). The Forest Service’s programs and activities must be “consistent with and respecting Indian treaty rights and fulfilling the Federal Government’s legally mandated trust responsibility with Tribes,” F.S.M. § 1563.03(3). The Forest Service must interpret treaty rights as the Tribes understood them when treaties were signed and administer “lands subject to off-reservation treaty rights in a manner that protects Tribes’ rights and interests in the resources reserved under treaty.” F.S.M. §1563.01(d). The Superior National Forest Plan provides:

“Lands within the Forest serve to help sustain American Indians’ way of life, cultural integrity, social cohesion, and economic well-being.” (Forest Plan, Tribal Rights, D-TR-1, p. 2-37).

“Superior National Forest facilitates the exercise of the right to hunt, fish and gather as retained by Ojibwe whose homelands were subject to treaty in 1854 and 1866 (10 Stat. 1109 and 14 Stat. 765). Ongoing opportunities for such use and constraints necessary for resource protection are determined in consultation with the following Ojibwe Bands: Fond du Lac, Grand Portage, and Bois Forte.” (*Id.*, D-TR-3, p. 2-37).

“Forest management activities will be conducted in a manner to minimize impacts to the ability of Tribal members to hunt, fish, and gather plants and animals on Forest Service administered lands. (*Id.*, S-TR-3, p. 2-38).

In addition to these management objectives and policies of the Forest Service, the proposed land exchange must comply with applicable tribal resource management plans. Minnesota tribes have a legal right to off-reservation co-management of natural resources to protect usufructuary rights in Ceded Territories. *Minnesota v. Mille Lacs Band of Chippewa Indians*, 526 U.S. 172, 204 (1999). As explained in Fond du Lac Band FEIS Comments and summarized previously, the Fond du Lac Integrated Resource Management Plan (IRMP),⁹⁰ sets off-reservation resource management priorities, including protecting and

⁹⁰ Fond du Lac Band of Lake Superior Chippewa, 2008 Integrated Resource Management Plan. June 19, 2008, available at <http://www.fdlrez.com/RM/downloads/IRMP.pdf>

improving wild rice harvest, improving in-stream habitat for fishing, preserving traditional hunting, fishing and gathering rights in the 1854 and 1837 Ceded Territories, preserving the quality and quantity of wildlife and wildlife habitat in the Ceded Territories, and vigorous environmental protection such as enforcement of water quality standards affecting the Reservation. (FDL FEIS Comments, p. 113).

The Draft Record of Decision to approve the NorthMet land exchange complies neither with the Forest Service Manual nor with the Superior National Forest Plan. The DROD also fails to consider the application of the Fond du Lac Integrated Resource Management Plan to the project area and other affected areas in the Ceded Territories.

The DROD, as explained previously, relies on unsupported assumptions and misleading characterizations in the FEIS to deny increases in mercury contamination of waters and fish tissue and increased water pollution affecting fish and wild rice. The DROD doesn't consider whether the NorthMet project would cause or contribute to exceedance of Reservation water quality standards as discussed previously in Section II.C. At the very least the Forest Service policy of "respecting tribal self-government" should preclude federal action that would result in violation of Reservation standards enacted pursuant to the federal Clean Water Act. It is incumbent on federal agencies to take action with respect to upstream activities to ensure that Reservation water quality standards are met. *See Montana v. U.S. EPA*, 137 F. 3d 1135, 1139 (9th Cir. 1998); *City of Albuquerque v. Browner*, 97 F. 3d 415, 422-424 (10th Cir. 1996); *Wisconsin v. U.S. EPA*, 266 F. 3d 741, 748-749 (7th Cir. 2001).

Federal agencies are also obligated under NEPA to determine environmental justice impacts, including "the potential for multiple exposures or cumulative exposure to human health or environmental hazards in the affected population, as well as historical patterns of exposure to environmental hazards."⁹¹ Executive Order 12898 directs each agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities" on minority populations, low-income populations and federally recognized Indian tribes.⁹² The Forest Service's statement that the NorthMet land exchange and

⁹¹ CEQ, *Environmental Justice: Guidance Under the National Environmental Policy Act* (Dec. 1997), p. 8 http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf

⁹² Executive Order 13045, Apr. 21, 1997, available at <https://www.gpo.gov/fdsys/pkg/FR-1997-04-23/pdf/97-10695.pdf>; Executive Order 12898, February 11, 1994, available at <https://www.archives.gov/federal-register/executive-orders/pdf/12898.pdf>.

mining project would meet the intent of Executive Order 12898 (DROD 34) cannot withstand scrutiny.

The FEIS and DROD fail to identify or address disproportionate impacts on federally recognized Indian tribes from contamination and depletion of subsistence resources, including fish, wild rice, plants used for food and medicine and game species. By virtue of the location of the NorthMet project in Ceded Territories where Lake Superior Chippewa Bands have unique rights, all adverse impacts to lands, waters, ecosystems, plants and animals in the vicinity of the NorthMet project would have disproportionate impacts on federally-recognized Indian tribes.

The Forest Service DROD also fails to discuss fiduciary responsibilities of the Co-Lead Agencies to protect tribal treaty rights in the Ceded Territories, including the NorthMet project area. The “Tribe’s federal reserved fishing rights are accompanied by a corresponding duty on the part of the government to protect those rights.” *Parravano v. Masten*, 70 F. 3d 539, 547 (9th Cir. 1995), *cert. denied* 518 U.S. 1016 (1996); *Kittitas Reclamation Dist. v. Sunnyside Valley Irrigation Dist.*, 763 F.2d 1032, 1035 (9th Cir. 1985) (protecting tribe’s treaty fishing rights by enjoining water withdrawals that would destroy salmon eggs before they could hatch); *United States v. Washington*, 20 F. Supp. 3d 986 (W.D. Wash. 2013)(enjoining state to correct culverts that block salmon passage to fulfill promises made to Tribes when treaties were signed); *Confederated Tribes of the Umatilla Indian Reservation v. Alexander*, 440 F. Supp. 553, 554 (D. Or. 1977)(blocking construction of a dam that would destroy tribal fishing grounds); *United States v. Winans*, 198 U.S. 371, 384 (1905) (rejecting state practice of allowing water wheels for salmon fishing as it would render tribal fishing rights meaningless); *cf. United States v. Adair*, 723 F.2d 1394, 1412-1413(9th Cir. 1983) (“the treaty is not a grant of rights to the Indians, but a grant of rights from them – a reservation of those not granted.”). Fiduciary responsibilities preclude approval of the NorthMet land exchange.

1. The PolyMet NorthMet land exchange and mining project cannot be approved due to contamination, destruction and degradation of tribal resources.

Exercise of tribal rights requires access to natural resources that are not contaminated. This concern is particularly salient for mercury contamination of fish. As explained in Comments of the Grand Portage Band of Chippewa on the NorthMet Project

FEIS and 404 Wetlands Permit (hereinafter “GP FEIS Comments”):

Methylmercury is a potent neurotoxin that disproportionately impacts tribal members health and diminishes usufructuary rights . . . Any increase of methylmercury in the Embarrass River, Partridge River, or St. Louis River watersheds constitutes a significant adverse impact to a critical trust resource. . . Limiting fish consumption, particularly to comply with fish advisories for women of childbearing age and children under 15 years old, represents a huge loss of usufructuary rights. (GP FEIS Comments, p. 55)

The FEIS’ denial of the impacts of the PolyMet NorthMet project on mercury and methylmercury was deconstructed in detail by international mercury and methylmercury expert, Brian Branfireun and in these Objections in Section IIC. As Dr. Branfireun summarized,

I reject as unsupported and without scientific justification, any statement or implication in the FEIS that the proposed NorthMet development would not increase risks of methylmercury production and transport in the Partridge and Embarrass River watersheds, particularly in ombrotrophic wetlands near the mine site and wetlands affecting by tailings site seepage collection, changes to hydrology or atmospheric deposition. . .It is my opinion that the NorthMet development could create a substantial risk of ecologically significant increases in water column and fish methylmercury concentrations in downstream waters, including the St. Louis River. (Branfireun 2015, pp. 26-27)

As explained in Section II.C, the Forest Service draft opinion denying NorthMet impacts to fish mercury concentrations and resultant health risks (DROD 19), like the FEIS on which it was based, are inconsistent with factual evidence, expert evidence and peer-reviewed science.

Increases in fish tissue mercury at the NorthMet project site, in the Partridge and Embarrass River watersheds and downstream in the St. Louis River would significantly degrade tribal usufructuary rights in the Ceded Territories and are likely to cause or contribute to violation of water quality standards in Fond du Lac Reservation waters. Adverse effects from methylmercury in fish would disproportionately impact members of the Fond du Lac and Grand Portage Bands, who are known to consume substantially more fish than the assumed statewide average. (FEIS, 5-591 to 5-592). In Embarrass River watershed lakes, even the small increase from mercury air deposition modeled by PolyMet’s consultants would subject tribal members who rely on fish for subsistence to up to 15 times the EPA assumed safe risk intake level for a pregnant mother or child under the age of 15. (FEIS ref. Barr 2012b, p. 23).

The Reservation’s reach of the St. Louis River is attaining all of its beneficial uses and meeting all applicable water quality standards with the exception of mercury, which exceeds the

Band's human health chronic standard. (FEIS, 5-20). As summarized previously, the Band's water quality standards both limit water column mercury and prohibit water quality degradation which would interfere with or become injurious to existing or designated uses, including fish consumption uses. (Fond du Lac Water Quality Standards, Ord. #12/98 as amended, Sect. 301e.1; Appx. 1, Standards Specific to Designated Use; Sect. 105a.1).

The Fond du Lac Band, emphasized in FEIS Comments, "The Band has repeatedly elevated our concerns for the Proposed Project's ability to be implemented with sufficient environmental controls to meet our downstream Water Quality Standards, both our narrative and nutrient criteria and our antidegradation policy. The St. Louis River is the most significant and utilized fishery resource on the reservation." (FDL FEIS Comment, p. 30). Although St. Louis River waters on the Reservation have been listed by the Minnesota Pollution Control Agency as impaired for mercury in fish tissue for six biennial §303(d) listing cycles, there is still no TMDL plan in place to reduce mercury in fish to safe consumption levels.

Metallic mining pollution from the PolyMet NorthMet project (e.g. cobalt, copper, nickel, lead) that impairs fish and aquatic life would also disproportionately impact tribal subsistence anglers and deplete treaty resources. Specific conductance ionic pollution could also cause or contribute to degradation of Fond du Lac Reservation waters in violation of approved Band water quality standards. Regression analysis performed as part of the Tribal Cooperating Agencies Cumulative Effects Analysis found that concentrations of specific conductance were highest near mine discharge sites, and tended to gradually decrease downstream, remaining above 150 µS/cm at 203 kilometers (126 miles) downstream of the nearest upstream mine discharge site. (FEIS, App. C. Tribal CEA, p. 16, FEIS autop. 3041). Elevated concentrations of specific conductance could persist far downstream in the St. Louis River, as illustrated in Exhibit 29, a map of cumulative mining discharge impacts on specific conductance included as part of the Tribal CEA.

Any impacts to fish in the Ceded Territories are disproportionate to tribes. The U.S. Army Corps recognized in its report on Treaty Rights and Subsistence Fishing in the Great Lakes Basin, "subsistence harvesting is a core value for these bands, and the right to fish and hunt for subsistence is cherished by all, even those who are not presently engaged in the practice. It is

part of the tribes' cultural identity and an indication of their status as sovereign entities."⁹³ The Treaty Rights and Subsistence Fishing report also recognized the need for an integrated view of damage to tribal resources,

Tribal traditions generally include a holistic view of the natural world in which natural features and phenomena are often imbued with a life force and in which the various species and features of the natural world are bound together in a web. Damaging one part damages the whole. (*Id.*, p. 2)

PolyMet NorthMet releases of sulfate and arsenic could adversely affect wild rice and thus disproportionately impact tribes. As discussed previously in Section II.C with respect to water pollution and with respect to health, FEIS models do not allow accurate assessment of sulfate and arsenic increases from the NorthMet project. In addition to increasing cancer risks from drinking water, arsenic can concentrate in wild rice. The FDA has recently tested Minnesota wild rice and has found arsenic levels of 6 µg/L.⁹⁴

Destruction and degradation of bog wetlands, high biodiversity habitats and wildlife that are not federally listed species are likely to have an impact on the health, cultural integrity and economic security of tribes unlike that of any other community. Both the Fond du Lac and Grand Portage Bands have commented on the significance of destruction and loss of coniferous bogs, explaining that "many tribally harvested resources are only available in coniferous bogs (e.g. cranberries, soft-leaved blueberries, sweet flag), and mitigation for coniferous bogs is simply not feasible." (FDL FEIS Comments, p. 117; see also GP FEIS Comments, p. 25). The loss of 6,026 acres of MCBS High Biodiversity Sites also has a different meaning to the Bands. "The ecological term 'biodiversity' equates to 'abundance' and 'subsistence for the Bands.'" (FDL FEIS Comments, p. 117).

Pollution, destruction and degradation of water, fish, wild rice and habitats as a result of the PolyMet NorthMet land exchange and mining project would undermine the Bands' way of life, cultural integrity, and economic well-being and adversely impact, rather than facilitating the exercise of the Bands' treaty rights to hunt, fish and gather. The NorthMet project, by virtue of its location and its many unmitigated impacts, would also result in disproportionate adverse

⁹³ USACE, Treaty Rights and Subsistence Fishing in the U.S. Waters of the Great Lakes, Upper Mississippi River, and Ohio River Basins (June 2012), p. 2 http://glmris.anl.gov/documents/docs/Subsistence_Fishing_Report.pdf

⁹⁴ FDA, Analytical Results from Inorganic Arsenic in Rice and Rice Products Sampling, September 2013. <http://www.fda.gov/downloads/Food/FoodborneIllnessContaminants/Metals/UCM352467.pdf>

effects to Chippewa tribe members. Federal action to approve the land exchange would conflict with federal regulations, the Forest Service Manual, the Superior National Forest Plan, Executive Order 12898 and federal fiduciary responsibilities to protect treaty rights and Reservation waters.

2. The NorthMet land exchange and mine project cannot be approved due to inadequate consideration of cumulative impacts on tribal resources and of tribal points of view.

To understand NorthMet project impacts to tribal health, welfare, cultural integrity, economic well-being and treaty rights, tribal perspectives must be given weight and meaning. Despite a patina of consultation with Tribal Cooperating Agencies, the federal Co-Leads seem to have disregarded both the scientific information provided by tribal scientists and the conclusions of tribal representatives speaking for their governments about the adverse impacts to tribal treaty resources and tribal trust lands should the NorthMet project be approved. WaterLegacy has difficulty reconciling the Co-Lead Agencies' willingness to adopt PolyMet's claims, whether they be self-interested reports about a lack of environmental impact or claims about economic infeasibility, while lending no status to representatives speaking for tribal governments.

From our perspective, the FEIS' assessment of the NorthMet project and cumulative impacts on mercury, water quality, health, wetlands, wildlife and habitats all serve to minimize adverse impacts on tribes. The failure of Co-Lead Agencies to provide an objective and rigorous water model for the volume and direction of flow of contaminated seepage from the NorthMet project, to test PolyMet's assumptions for the chemistry and capture of polluted seepage, to consider less environmentally damaging alternatives to the NorthMet project, or to quantify indirect impacts of the project on wetlands all disproportionately impact tribal resources.

In addition, the PolyMet NorthMet record reflects a continuing denial of tribal perspectives in the areas where the Bands have the most salient expertise. The FEIS denied effects of the project for two of the three historic sites identified by tribes as impacted (Spring Mine Lake Sugarbush, BBLV Trail Segment) and proposed no project modifications to address adverse affects to the third site, the Mesabe Widjiu. (FEIS, 5-535, 5-565).

Tribal Cooperating Agencies requested that the FEIS evaluate cumulative impacts from mining on a larger historic district that would encompass multiple impacts on their Ceded Territory (FEIS autop. 3032-3033, Tribal CEA, pp. 7-8), as follows:

The Fond du Lac, Bois Forte, and Grand Portage Bands, as well as the 1854 Treaty Authority (1854) and the Great Lakes Indian Fish & Wildlife Commission (GLIFWC), have consistently advocated for a more robust, comprehensive CEA for the PolyMet NorthMet project and other mining projects. We have observed 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. As we have engaged with the lead federal and state agencies for the environmental review process under NEPA and the tribal consultation process under §106 of the National Historic Preservation Act (NHPA), we have clearly expressed our concerns for the incompleteness and inadequacy of their CEA. (*Id.*, Tribal CEA, p. 3)

The FEIS denied this request, claiming that it was for the Bands’ own good, since use of the Ceded Territory “would actually diminish the significance” of cumulative effects. (FEIS 6-116). The Grand Portage Band hired the University of Minnesota Duluth (“UMD”) and the Natural Resources Research Institute (“NRRI”) to perform the analysis omitted from the FEIS. As summarized in the Grand Portage FEIS Comments, cumulative effects analysis throughout the Ceded Territories identified the most important historic trails for connectivity and heightened the importance of preserving and enhancing wildlife travel corridors across the Iron Range. (GP FEIS Comments, pp. 41-42). The Band explained that the UMD/NRRI analysis found that cumulative wetlands impacts have dramatically increased, with virtually all of the destruction occurring along the Iron Range and in the St. Louis River watershed. (*Id.*, p. 42). Applying the scale of the 1854 Ceded Territories also demonstrated that public access to exercise usufructuary rights has been virtually cut off along the Iron Range (*Id.*).

Not only did neither the FEIS nor the DROD for the federal exchange consider salient cumulative impacts to tribes, the implication of the Forest Service DROD was that federal lands may be of lower value due to limited access and proximity of mining developments. (DROD 13). This view (although it may be quite reasonable for recreation use) does not consider tribal perspectives. As Fond du Lac Comments explain, the fact that mining has occurred nearby “does not lessen the importance of protecting these lands from degradation, but in fact heightens the importance of protecting them from use as a mine.” (FDL FEIS Comments, p. 72).

The land is an important wildlife corridor in a region that has otherwise been the subject of extensive iron ore mining. The history of mining in the region and the adverse environmental impacts from those mines have steadily reduced the Chippewas’ access to critical resources from the natural environment which only serves to make these remaining areas – as well as the resources they contain - all the more valuable. (*Id.*, p.

71).

The FEIS admitted that the land exchange would result in loss of subsistence resources and opportunities on the NorthMet project site, but also an offsetting gain on the non-federal lands. (FEIS 5-779). The DROD also asserted that the land exchange results in a “benefit for hunting and gathering activities.” (DROD 33).

However, the Bands strongly dispute these conclusions regarding their own resources and activities. Their comments state that “greater public access to other federal lands does not in any meaningful way offset the permanent loss of critically important pristine wetlands.” (FDL FEIS Comments, p. 117). Although the land exchange would add acres of wild rice to the federal estate, wild rice waters in the Hay Lake Tract 1 are already accessible to the Bands, so adding this acreage “does not provide additional wild rice harvesting opportunities to Band members in the 1854 Ceded Territories.” (*Id.*, p. 119).

Similarly, the tribal comments on the Biological Assessment and Biological Evaluation highlight the Co-Lead Agencies failure to address tribal concerns about tribal resources. Biological Assessment, Biological Evaluation and FEIS do not adequately discuss impacts to hunting and trapping or to species that are not federally listed or designated as Regional Forester Sensitive Species. (FDL FEIS Comments, pp. 42-43). The most significant deficiency may be the failure to critically analyze potential impacts to moose. (*Id.*, p. 44).

Having rebuffed the Bands’ requests for cumulative effects analysis and the Bands’ concerns about mercury, water quality, wild rice, wetlands, and wildlife, the FEIS and the Forest Service DROD concluded that the PolyMet NorthMet land exchange and mine project “is not likely to significantly reduce overall availability of 1854 Treaty resources that are typically part of subsistence activities in the 1854 Ceded Territory.” (DROD 19, 27). This is a shocking conclusion in light of the clear and consistent opposing views of the Tribal Cooperating Agencies.

The federal Co-Lead Agencies’ failure to assess environmental, health, water quality, wetlands and tribal resource impacts of PolyMet NorthMet project in the FEIS conflicts with their fiduciary obligation to “ensure that Indian treaty rights [are] given full effect.” *Northwest Sea Farms v. U.S. Army Corps of Eng’rs*. 931 F. Supp. 1515, 1520 (W.D. Wash. 1996).

In its DROD, the Forest Service seems to recognize the disproportionate and substantial threat to the Bands from the NorthMet project: “Among the things I think about most is that

while many of us hold these lands dear, for most of us there is, essentially, a homeland somewhere else. For native peoples, there is no other homeland. I recognize that what they risk is different and that is reflected in their grave concern over proposed mining.” (DROD 27). Yet, the DROD proposes that the NorthMet land exchange “best ensures that Band members will continue to have access to and will be able to exercise treaty rights on approximately the same total acreage within the 1854 Ceded Territory.” (*Id.*).

This statement suggests that the Forest Service perceives no option to prevent or significantly minimize NorthMet project impacts. No less than disregard of tribal rights, federal agency failure of will and independence to challenge the PolyMet Mining Company and its proposed NorthMet project violates federal laws and abdicates fiduciary obligations to ensure that Indian treaty rights are given their full protection and effect.

III. Reliance on monitoring and speculative mitigation to justify the PolyMet NorthMet land exchange and mining project is contrary to law and to the public interest.

In reaching its draft decision to approve the PolyMet NorthMet land exchange, the Forest Service relied on conjecture that monitoring would disclose harm, that mitigation would be effective to ameliorate harm, that regulatory agencies would require that mitigation and that funds would be available to implement that mitigation. This speculation cannot justify approval of the NorthMet land exchange or mining project. It is contrary to the letter and spirit of NEPA and is particularly ill-considered given the nature of the PolyMet project and Minnesota’s history of failure to control mining pollution.

The Forest Service DROD states that the FEIS describes “monitoring requirements and potential mitigation measures related to the mining project which will ensure continued compliance with regulatory requirements and future protection of National Forest System resources from mining impacts.” (DROD 10). In response to the specific risk of future northward flow of contaminated seepage from proposed NorthMet mining operations, the Forest Service proposes, “If needed, contingency mitigation can be implemented using this monitoring information to preemptively stop a northward flowpath and prevent its potential impacts.” (DROD 19). As explained below, neither the monitoring nor the contingency mitigation proposed for the NorthMet project would prevent its adverse environmental impacts.

Courts have found that unsupported belief in the success of post-issuance compensatory mitigation provides insufficient protection of water resources from coal-mining waste to comply with the Clean Water Act. *Ky. Riverkeeper, Inc. v. Rowlette*, 714 F. 3d 402, 411-413 (6th Cir. 2013). The failure to evaluate the effectiveness of mitigation plans renders the plan inadequate. “An essential component of a reasonably complete mitigation discussion is an assessment of whether the proposed mitigation measures can be effective.” *S. Fork Band Council of W. Shoshone of Nevada v. U.S. Dep’t of Interior*, 588 F.3d 718, 727 (9th Cir. 2009). “A mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by NEPA.” *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1380 (9th Cir.1998) (disapproving an EIS that lacked an assessment of the effectiveness of the potential mitigation measures); *see also Ohio Valley Environmental Coalition v. Hurst*, 604 F. Supp. 2d 860, 887-889 (S. D. W. Va. 2009) (The mere listing of mitigation measures and processes cannot support a determination that stream loss impacts of coal mining would be minimal). The EPA has disapproved of using “adaptive management” in a mining environmental impact statement as a substitute for the thorough testing and analysis required by NEPA, stating that adaptive measurement “is not a substitute for adequate testing up front, which can influence mine design.” EPA Region IX Comments, re *Genesis Mine Project Draft Environmental Impact Statement (EIS), Elko County, Nevada, CEQ# 20100154*, August 6, 2010, p. 4, attached as Exhibit 43.

The Forest Service “assumes no responsibility for enforcing laws, regulations or policies under the jurisdiction of other governmental agencies.” (DROD 1, 37). The assumption is simply made that this enforcement will take place and that other federal and state agencies will ensure that “legal requirements for the protection of the environment and human health and financial assurance will be met.” (DROD 10). Given Minnesota’s failure to regulate mining pollution and the failure of the FEIS to provide a foundation for future mitigation, the Forest Service’s assumptions are invalid and improperly shirk responsibility to protect the public interest.

A. The NorthMet FEIS inadequately analyzed and failed to mitigate adverse environmental effects including mercury contamination, indirect impacts to wetlands, and tailings and mine site pollution, including northward flow.

Previous Sections of these Objections have highlighted environmental impacts that the FEIS inadequately analyzed and, thus, failed to avoid, minimize and mitigate through the

evaluation and adoption of less environmentally damaging alternatives. Environmental impacts of mercury release and enhanced methylmercury production and transport were deliberately evaded in the FEIS, which failed to model mercury, denied peer-reviewed science related to methylmercury and contrived a scientifically indefensible “mass balance” to avoid an appropriate analysis. These flaws in the FEIS and the virtual certainty of adverse impacts in the highly methylating location proposed for the NorthMet project are detailed in the expert opinion of Brian Branfireun (Branfireun 2015) and Section III.C of these Objections.

Having failed to analyze mercury harms, the FEIS also failed to evaluate alternative tailings disposal, west pit backfill or use of mine site reverse osmosis to avoid, minimize or mitigate these harms.

The FEIS failed to predict the consequences to water quality, aquatic life and human health of the probable failure of collection of contaminated seepage at the permanent, unlined tailings and Category 1 waste rock facilities. As explained in WaterLegacy’s Comments on the FEIS as well as in Section II.B, although the EPA has advised that *failure* of seepage collection is 93% during operations and near certainty in long-term closure, the FEIS failed to analyze either catastrophic or routine failures of seepage capture or to analyze alternatives that would avoid or minimize that risk. As explained in WaterLegacy’s SDEIS and FEIS Comments as well as in expert opinions attached with these Comments, the FEIS made a number of scientifically questionable assumptions about the geohydrology of fractures beneath contaminated sources, the chemistry of contamination sources, and the base flow level of water that would carry these contaminants. Rather than conduct a more rigorous analysis, the FEIS proposed adaptive management and “contingency mitigation.”

The FEIS failed to quantify indirect impacts to wetlands, even when Cooperating Agencies and other experts explained that the models were available and that the MODFLOW model used by PolyMet had performed the functions needed for a mine drawdown analysis. As explained in Section II.B and II.D of these comments, even after GLIFWC quantified impacts, the FEIS failed to analyze alternatives to avoid or minimize indirect wetlands impacts or to provide compensatory mitigation. The FEIS proposed an indeterminate plan for monitoring and theoretical adaptive management or mitigation.

One of the most troubling failures of analysis in the FEIS pertains to the potential for northward flow from the East Pit, where a high-sulfur rock face will be left exposed even after

water covers reactive waste rock placed into the pit. PolyMet predicts (FEIS ref. PolyMet 2015m, Large Table 18, autop. 447) that the East Pit would contain arsenic levels (100 µg/L) 50 times higher than safe drinking water concentrations (2 µg/L) and manganese levels (3,620 µg/L) more than 36 times higher than Minnesota's health risk limit (100 µg/L). Copper levels in the East Pit would reach 12,800 µg/L, more than 2,461 times the chronic surface water quality standard to protect aquatic life (5.2 µg/L),⁹⁵ and nickel levels would reach 42,600 µg/L, more than 1,468 times the aquatic life standard for nickel (29 µg/L). Sulfate levels would reach 3,680 mg/L, 368 times the wild rice sulfate standard. These high levels of contamination would adversely affect water quality under conditions of northward pit seepage.

A more detailed explanation of the risk of northward flow from the East Pit and other mine features is provided in WaterLegacy's Comments on the FEIS. As summarized below, hydraulic conductivity of Virginia Formation rock in the East Pit and beneath the 100 Mile Swamp, the elevations of future mine features, and the common knowledge that water flows downhill demonstrate that contaminated seepage would flow north from the NorthMet mine to the Rainy River Basin under Northshore Mine Peter Mitchell Pit mining and closure plans.

When the SDEIS was released, it did not seem likely that contaminated groundwater would flow north from the East Pit to the Rainy River. That changed in October 2014 when a proposal was submitted by Northshore Mining Co. (Northshore) for a 108-acre expansion into high sulfur rock at the Peter Mitchell Pit. The Environmental Assessment Worksheet (EAW) for the Northshore expansion (Northshore EAW 2014, Exhibit 6) established that Northshore had already removed the pillar within the Peter Mitchell Pit that historically separated the Lake Superior and Rainy River Basins, maintaining the divide only by the placement and operation of pit sumps. (*Id.*, p. 8). The EAW stated that the maximum level of the pit lake at mine closure would be 1,500 feet above mean sea level (AMSL) and that the outfall from the low point at the east end of the Peter Mitchell pit would discharge to the Dunka River in the Rainy River Basin. (*Id.*, p. 5). Barr Engineering maps provided by MDNR in connection with the Northshore expansion (Barr Maps of Current and Post-Closure Pit Stratigraphy, Exhibit 7) showed current Peter Mitchell Pit depth of approximately 1,550 feet AMSL at its lowest point and planned depth upon expansion to less than 1,300 feet AMSL. (*Id.*)

⁹⁵ Standards for copper and nickel are based on background hardness of below 50 mg/L and Minn. R. 7052.0100, Subp. 6.

Not only had the MDNR allowed Northshore to do away with the watershed divide between the Lake Superior and Rainy River Basin. The planned expansion promised a significant increase in the hydraulic gradient from the NorthMet mine site down to the base of the Peter Mitchell Pit and the potential for interBasin transfer of water and contaminants from the Lake Superior Basin to the Rainy River Basin.

Reviewing the expansion and closure plans for the Northshore Mine in conjunction with the NorthMet project, GLIFWC informed the Co-Lead Agencies that “detailed (MODFLOW) and simplistic (MathCad) models predict that a northward contaminant flowpath is probable under likely closure conditions.” (GLIFWC letter to Co-Lead Agencies Northward Flowpath & Modeling, Aug. 11, 2015, Exhibit 8, p. 1). GLIFWC provided attachments and figures with the August 2015 Northward Flowpath letter to illustrate errors in baseflow modeling and the new prediction of northward groundwater flow given expected water levels at closure of the Peter Mitchell Pit. GLIFWC explained that the base of the Peter Mitchell Pit at closure and its surface elevation under long-term reclamation would draw groundwater from NorthMet mine site features, particularly the backfilled East Pit. The saturated East Pit water level at closure (1,592 feet AMSL), the lower Peter Mitchell water level at closure (1,300 feet AMSL), and the lower Peter Mitchell water level in long-term reclamation (1,500 feet AMSL) (*Id.*, p. 4, autop. 13, 27) would create and maintain a hydraulic gradient from the NorthMet project. Water would flow downhill to the Rainy River Basin.

GLIFWC demonstrated that the volume of northward groundwater flow from the East Pit may be quite significant. Preliminary modeling using the PolyMet MODFLOW model suggests that approximately 90% of the post-closure outflow from the NorthMet East Pit would migrate north due to the higher conductivity of the Virginia Formation and Biwabik Iron Formation on the north side of the NorthMet mine site and the lower elevations of the Peter Mitchell Pit at closure (1,300 feet) and over the long-term (1,500 feet) as compared to the Duluth Complex rock and Partridge River elevation (1,548 feet) on the south of the mine site. At closure, when the Peter Mitchell Pit is 1,300 feet deep, northward outflow was estimated at 300 gpm, stabilizing at 75 gpm in long-term closure. (GLIFWC letter to Co-Lead Agencies Discharge from PolyMet East Pit at Closure, Oct. 20, 2015, Exhibit 9).

GLIFWC also analyzed the potential that contaminants in the PolyMet NorthMet mine surficial aquifer would flow northward as a result of the increase in pit depth and future closure

of the Peter Mitchell Pit. Given the proximity of the NorthMet Category 1 stockpile (0.8 miles) and East Pit (1.2 miles) to the Peter Mitchell Pit and the experience with other taconite pits where a cone of depression affecting surficial water can extend 1.4 to 1.5 miles from the pits, preliminary MODFLOW modeling showed northward flow of contaminants at the time of the Peter Mitchell Pit closure. (GLIFWC Northward Flowpath Letter, Exhibit 8, p. 5).

Co-Lead Agencies responded to the potential for northward flow in an Interagency Technical Memorandum on October 12, 2015. (FEIS reference MDNR et al. 2015c). This Memorandum suggested that the PolyMet MODFLOW model used by GLIFWC might need to be adjusted to accurately predict northward flow, but admitted that “the well data and the NorthMet Mine Site MODFLOW model do not exclude the possibility of a future northward bedrock flowpath from the proposed NorthMet pits to the Northshore pits.” (*Id.*, pp.1-2). Without assessing the reasonableness of a “leakage” assumption or the consequences for wetlands if it were to be valid, the Memorandum then hypothesized, “If this leakage rate is large enough, a bedrock groundwater mound would form between the two mines and prevent water from the proposed NorthMet pits from flowing northward to the Northshore pits.” (*Id.*, p. 1) This theory is carried forward in the FEIS. (FEIS, 6-40 to 6-41).

GLIFWC’s analysis suggests that formation of a bedrock groundwater mound at the level necessary to prevent northward flow from the PolyMet NorthMet mine site as a result of the gradient to the expanded Peter Mitchell Pit is “hydrologically impossible.” (GLIFWC Northward Flowpath Letter, Exhibit 8, p. 5). In addition, if the Co-Leads’ theory were plausible and enough water could flow through the 100 Mile Swamp to create a large mound of water in bedrock, statements in PolyMet documents and in the FEIS that there is minimal connection between wetlands and groundwater north of the mine site would all be called into question. (GLIFWC email to MDNR et al. Bedrock-Wetland Connections at PolyMet Mine Site, July 29, 2015, Exhibit 10). The Co-Lead Agencies’ new “leakage” theory would suggest that secondary wetland impacts to the 100 Mile Swamp from NorthMet mine drawdown would be virtually certain and highly damaging.

The indefinite formulation in the Co-Lead Agencies’ Memorandum (MDNR et al. 2015c) and the FEIS (FEIS, 6-40 to 6-41) has allowed project proponents to have it both ways. When it is time to evaluate the adverse impacts of NorthMet mine drawdown on 100 Mile Swamp wetlands, it is asserted that there is little or no connection between wetlands and bedrock

groundwater. Then, when it is time to evaluate the adverse impacts of PolyMet NorthMet pollution flowing north to the Boundary Waters, it is claimed that there is a robust connection, sufficient to form a huge underground mound of water preventing northward flow. This gamesmanship in environmental review has, to date, allowed the Co-Leads to avoid assessment of either mine site wetlands drawdown or northward flow of mine contaminants and to evade consideration of mine site alternatives to avoid or minimize either risk.

B. Proposed monitoring for indirect wetlands impacts of the PolyMet NorthMet project would neither identify nor avoid adverse effects on wetlands and methylmercury contamination.

Despite legal precedent rejecting this approach, what the FEIS has proposed, instead of assessment and up-front avoidance of harm, is a vague prescription of monitoring with the potential for future adaptive management or mitigation. The FEIS' plan to address indirect wetlands is contrary to regulations promulgated under the Clean Water Act Section 404 and would fail to identify, let alone avoid, wetlands degradation and methylmercury contamination.

The FEIS' plans for monitoring and potential subsequent action are vague and indeterminate. Monitoring would be based on wetlands that have a "high likelihood" of indirect effects as result of groundwater drawdown. (FEIS 5-257). "*If* the monitoring were to determine that indirect effects had occurred, additional compensation could be required *if* determined necessary by the permitting agencies." (*Id.*, emphasis added). In the event that monitoring identified "*additional* indirect effects, permit conditions would *likely* include a plan for adaptive management practices to be implemented" and additionally, "compensatory mitigation *may* be required if additional impacts are identified during annual reporting." (*Id.*, emphasis added).

Reviewing this indeterminate language and other PolyMet documents, wetlands mitigation expert Morgan Robertson concluded, "PolyMet is proposing to offer compensatory mitigation to make its project palatable before committing to an estimate of the full extent of its secondary impact, even though doing so is practicable and in fact implicit in their FEIS." (Robertson, 2015, p. 7). Citing the Federal Mitigation Rule for Clean Water Act Section 404 permits (see 33 C.F.R. §332.3(m)) Dr. Robertson explained,

Acknowledging the likelihood of significant impacts and then proposing to measure and compensate for them after permit issuance is not in conformance with regulation. Allowing the full characterization of impact to be discovered later, and compensation

proposed later, is to relieve PolyMet from the duty of finding the LEDPA, and therefore relieve them of some of the risk associated with proposing the impact. This is not the role of regulators. (*Id.*, p. 8)

A closer look at the FEIS and underlying documents also demonstrates that the proposed monitoring plan for the NorthMet project would be designed to avoid recognition of secondary wetlands impacts, particularly in the wetlands of greatest concern, ombrotrophic bogs that would be impacted by drawdown at the NorthMet mine site.

In his report on mercury, methylmercury and wetlands, Brian Branfireun analyzes the FEIS' discussion of ombrotrophic bogs and monitoring for secondary wetlands impacts. (Branfireun 2015, pp. 16-19). Dr. Branfireun concludes that the FEIS' alleged reclassification of ombrotrophic bogs as areas of "low likelihood" of effects misrepresents not only the peer-reviewed scientific literature cited in Dr. Branfireun's prior opinion on the SDEIS (Branfireun 2014), but the analysis of Army Corps' staff (Eggers 2015). Dr. Branfireun explains that monitoring proposed in the FEIS would be based on wetlands considered to have a "high likelihood" of indirect effects, thereby excluding ombrotrophic wetlands, so "The FEIS not only minimizes the risk of drawdown effects on ombrotrophic bogs, but proposes no method to prevent or detect these impacts." (Branfireun 2015, p. 18, citing FEIS 5-303, 5-361). Dr. Branfireun concludes with respect to sensitive bog wetlands, "This and other similar text in the FEIS suggests that there is, in fact, no plan for proactive monitoring to address incremental direct or indirect impacts of the proposed project on wetlands in the area of impact." (Branfireun, 2015, p. 18, referencing FEIS, 5-355).

WaterLegacy's Comments on the FEIS describe the ways in which the FEIS first describes each *potential* secondary effect of the NorthMet project on wetlands and then denies that the effect has been actually recognized or modeled. The bottom line of this analysis is that even the monitoring of secondary wetlands effects proposed by PolyMet and adopted in the FEIS comes with a catch. Potential risks to wetlands are rated based on a system devised by PolyMet, where each different impact factor (several of which have been categorically excluded in the corresponding FEIS discussion) is given a point from 1 up to a maximum of 6 (FEIS, 5-361, PolyMet 2015b). Monitoring is generously proposed, "within all wetlands containing a potential indirect wetland impact factor rating of 3 to 5 and a sampling of those wetlands with factor ratings of 1 or 2." (FEIS, 5-390).

A quick look at the effects of PolyMet's rating system data reveals that PolyMet's monitoring plan for secondary wetlands effects would place only 3% of the 7,694.2 acres of potentially impacted wetlands in a zone where they would be thoroughly monitored. (FEIS, 5-361, Table 5.2.3-15, PolyMet 2015b) Other wetlands would be sampled "based on those wetlands that would have a high likelihood of indirect effects as a result of groundwater drawdown," (FEIS, 5-397). This constraint excludes both ombrotrophic and minerotrophic bogs, which are classified in the FEIS as having a "low likelihood" of impact. (FEIS, 5-279).

The contingent and uncertain nature of future compensation and monitoring proposed in the FEIS would neither trigger post-permit compensatory mitigation nor protect vulnerable wetlands and peatlands.

The damage-now, monitor later approach is particularly problematic for mercury and methylmercury impacts. Dr. Branfireun explains that the monitoring of hydrology proposed would not identify mercury methylation impacts, that the time lag between sulfate deposition and biogeochemical processing would prevent effective monitoring of mercury methylation, and that the approach proposed in the FEIS would preclude adaptive management until after irreversible harm had already occurred:

Even if monitoring were done in ombrotrophic wetlands to evaluate the effects of hydrology on changes in vegetation, that monitoring would not detect changes in mercury methylation impacts. . . Even relatively small changes in water table position and wetting and drying frequency in the ombrotrophic wetlands at the NorthMet mine site have the potential to impact sulfate and methylmercury concentrations of receiving waters. (Branfireun 2015, p. 20).

[T]he project's proposed "adaptive engineering" approach will lead to decades of reactive actions to impaired water quality triggers. Moreover, the release of sulfate and mercury (particularly that which has been atmospherically deposited) from watersheds may occur after a significant lag time associated with sequestration, biogeochemical processing and subsequent release to the downstream environment. This lag time may be at least a decade (and likely multiple decades) in time scale (see Harris et al., 2005; Munthe et al., 2007) indicating that potential impacts may not be revealed in a way that adaptive engineering can manage, resulting in what will effectively be a permanent downstream impairment. (Branfireun 2015, pp. 25-26).

Finally, even if appropriate monitoring for biogeochemical changes in wetlands and sediments near the development were to be designed and implemented (a difficult and complex undertaking requiring collection of baseline data not supplied in the FEIS), it is highly likely that lag times for expression of methylmercury increases, multiple mechanisms of transport, and the likelihood of legacy regeneration of sulfate stored in

the watershed would preclude effective adaptive management prior to irreversible impairment of downstream waters. (Branfireun 2015, p. 28).

PolyMet NorthMet methylmercury production and transport would not only result in irreversible impairment of downstream water quality but also in irreversible harm to the developing brains of fetuses, infants and children. As explained in the opinion of Duluth child psychiatrist, Dr. Margaret Saracino, neurodevelopmental disorders resulting from toxic exposures to methylmercury “are not treatable acute illnesses, but rather are chronic conditions which can only be managed, not cured.” (Saracino 2015, p. 1).

C. Monitoring and a laundry list of unproven mitigation options would not prevent NorthMet pollution of either Lake Superior Basin or Rainy River Basin waters.

As explained previously, the FEIS’ failure to analyze adverse environmental effects and mitigation alternatives so that agencies can make a reasoned decision about whether to permit the project and, if is permitted, which mitigation alternatives to mandate in the permit, violates NEPA and court precedent. The FEIS’ provision of a laundry list of mitigation options that may or may not be effective and may or may not come to pass instead of a NEPA and Clean Water Act analysis of impacts and alternatives may be convenient for a project proponent, but it is dangerous for water quality and the ecosystems and communities that depend on clean water, as well as inconsistent with law.

The FEIS acknowledges that the fractures beneath contamination sites “could function as high-permeability conduits for groundwater” or “lead to violation of water quality standards” once the PolyMet NorthMet project is in operation. At that point, if monitoring detects the contaminated seepage, the FEIS proposes that unspecified “contingency mitigation measures would be employed to mitigate the fracture-related effects.” (FEIS, 5-37).

The FEIS identifies several likely failures of proposed tailings seepage collection system: new surface seepage locations may emerge as the tailings basin is developed; tailings pond water quality may be worse than expected; and groundwater or surface water downgradient of the tailings basin may fail to comply with water quality standards. (FEIS, 5-239 to 5-240). As noted previously, such failures may or may not be revealed by monitoring, may be revealed only after irreparable harm has been caused to fish, wild rice or human beings, or may only come to light after mining has ceased and the mining company has declared bankruptcy to minimize liabilities.

The FEIS contains a long list of “contingency mitigation” measures that would not be financially assured or triggered by any specified findings, but might be “appropriate” should monitoring or “refined modeling” demonstrate that they are “needed.” (FEIS, 5-239). Several of these measures pertain to the likely performance failures of engineered systems, such as liners and seepage collection systems. As reflected in WaterLegacy’s Comments on the SDEIS and FEIS, PolyMet’s work plans for the mine site (FEIS ref. Barr 2012c) and plant site (FEIS ref. Barr 2012d) required that performance of engineered systems be modeled as an “uncertain” input. No such modeling with a range of collection assumptions has been done.

References in the FEIS to “refined” modeling and “contingency mitigation” in case water quality was “worse than expected” or as a result of “compliance issues” (FEIS, 5-239 to 5-240) should be setting off klaxons. Rather than conduct an experiment with Minnesota’s environment, the FEIS should require upfront disclosure of a range of probable impacts.

The problematic nature of the “contingency mitigation” approach is underscored by the lack of evidence that mitigation options would be effective. Interception wells often ameliorate pollution at Superfund sites, but not to the degree that would justify creating a new contaminant source. After extensive research, the highest rate of collection of metals pollution that we were able to identify at a Superfund site was 80% at a site using interception wells and active water quality treatment as well as seepage barriers. Even if modeling found pollution and interception wells were required and financed, there is no evidence that the level of seepage control could approach that promised by PolyMet for the FEIS.

The FEIS also suggests that if East Pit or West Pit fractures or faults create conduits for contaminate groundwater, use of grout “would be evaluated” to mitigate polluted seepage from pits. (FEIS, 5-239). However, the cited reference (FEIS ref. PolyMet 2014l) is only a “conceptual plan.” No data is cited to suggest how grout would effectively prevent seepage from a fractured and filled mine pit for an extended period of time, let alone permanently.

The “contingency mitigation” proposed for “Bedrock Northward Flowpath Strategies” exemplifies the folly of this approach. Again, the FEIS proposes that grouting might be used to prevent northward flow even though “its effectiveness at the NorthMet site is uncertain.” (FEIS, 5-240).

The next option on the list is lowering the water level in the East Pit and West Pit below the level (1,500 feet AMSL) of the Northshore Peter Mitchell Pit. (FEIS, 5-241). The

FEIS notes that this option would “require a higher capacity water treatment facility and possibly additional treatment processes entailing additional expense.” (*Id.*) Not mentioned is the fact that the GoldSim model upon which the FEIS relied to assume that contamination would be manageable in the East Pit was based on a Geochemical Uncertainty Analysis stating that exposure of East Pit walls to air would increase sulfate levels by a factor of at least 823 times, with resulting increases in toxic metals leachate. (FEIS, p. A-534 citation to Day, Geochemical Uncertainty Analysis, October 10, 2008, Exhibit 11).⁹⁶ At best, lowering the water level in the East Pit is an improbable mitigation strategy; at worst, it is an additional untenable threat to water quality.

The third item on the contingency mitigation list is a system of groundwater extraction wells, the number, geographic extent and configuration of which are unknown. This unproven option would involve building roads, laying water lines, electrical lines and access pads across the 100 Mile Swamp. (FEIS, 5-242). The final option suggested is to dig an infiltration trench between the mine pits and the Partridge River, construct an undetermined number of wells, water supply lines and roads, ensure recharge water is free of particulates to prevent clogging and artificially create a bedrock groundwater mound. (FEIS, 242-243). The reference cited in the FEIS (Barr 2015b) to suggest this improbable and damaging option might work is an unrelated document that provides no support for this conceptual mitigation concept.

The FEIS states, “The exact type, location, scale, and timing of mitigation measures are not known at this time.” (FEIS, 5-240). They may never be known, may never be feasible, and may never be constructed, particularly since they would first need to be required through regulatory action, and they would not be financially assured. Allowing fantasy mitigation instead of environmental impacts and alternatives assessment for the NorthMet project would neither comply with law, protect the environment nor serve the public interest.

D. Minnesota’s history of failure to reissue expired permits or enforce water quality standards for mining facilities does not support reliance on contingency mitigation.

Although problematic under any circumstances, the FEIS’ plan for monitoring and potential future regulatory requirements of mitigation is particularly unsuitable for the PolyMet

⁹⁶ Although this document is cited in A-534 of the FEIS responses to comments as “Day 2008,” the document on FEIS reference CDs identified as “Day 2008” pertains to other issues. Exhibit 11 was obtained through a Data Practices Act request.

NorthMet project due to Minnesota's history of failed enforcement when mining facilities violate water quality standards. Minnesota has many years of experience monitoring pollution from mining facilities - including those that have gone into bankruptcy leaving a legacy of contamination - yet failing to take regulatory action to reduce pollution and achieve compliance with standards. The level of political pressure placed on Minnesota regulatory agencies by the mining industry and the Minnesota Legislature undermines any potential that contingency management or mitigation will be mandated, particularly if it entails financial cost.

As a result of our ongoing concerns with the failure of protection of water quality from mining pollution, in July 2015 WaterLegacy filed with the EPA a Petition for Withdrawal of Program Delegation from the State of Minnesota for NPDES Permits Related to Mining Facilities (WaterLegacy, NPDES Withdrawal Petition, July 2, 2015, Exhibit 30).⁹⁷ This Petition documents multiple failures of regulatory control of mining pollution by the Minnesota Pollution Control Agency (MPCA), including failure to reissue expired NPDES permits, failure to conduct an analysis to determine whether mining pollutants will result in degradation of Minnesota waters, use of variances and compliance schedules that do not comply with the Clean Water Act and failure to require compliance with permits and violations of water quality standards, even after a Consent Decree has been issued. These lapses have persisted in the face of a Joint Priority Agreement with the EPA in 2013, and even high priority permits which the MPCA agreed would be promptly reissued with appropriate standards have languished.

WaterLegacy would also point out that threats posed by NorthMet pollution could evade federal review under the NPDES permit program. Contamination of residential drinking wells with neurotoxic lead or manganese is beyond the reach of NPDES review. Although the federal land exchange and Section 404 permit must consider this harm, NPDES permits may not govern methylmercury increases from NorthMet sulfate loading and wetlands drawdown. Even if highly polluted seepage from East Pit groundwater contaminates the Rainy River Basin through Peter Mitchell Pit surface discharge, issues of causation and regulatory control would pose barriers to NPDES enforcement.

The contingency mitigation proposed by PolyMet (PolyMet 2015i, PolyMet 2015r) and identified in the FEIS certainly creates less pressure on the Co-Lead Agencies than requiring

⁹⁷ WaterLegacy's Petition for Withdrawal of Program Delegation from the State of Minnesota, the complete 445 pages of Exhibits and a Supplement pertaining to Dunka Mine pollution are available at <http://www2.epa.gov/mn/npdes-petition-program-withdrawal-minnesota>.

independent modeling of impacts or adoption of less environmentally damaging alternatives. But contingency mitigation would provide no reasonable expectation that future pollution of groundwater, contamination of fish or violations of water quality standards would be mitigated to achieve environmental protection and conformity with standards.

E. The NorthMet FEIS provides no foundation to financially assure long-term water quality treatment, let alone contingency mitigation.

Prior to making its final decision on the PolyMet NorthMet land exchange, the Forest Service should recognize that the *only* time in the life cycle of a mine when government agencies have leverage to ensure that alternatives that avoid, minimize and mitigate environmental harm are implemented is before federal actions are taken and permits issued. When a mine is operating, leverage shifts to the mining company, which can threaten closure when asked to pay costs of mitigation, irrespective of its actual profits, particularly if financial assurance hasn't been provided for the mitigation contingency. After a mine closes, bankruptcy is likely, particularly when the mine, like the NorthMet mine, is a limited liability company's only asset.

Unless post-closure contingencies are specifically required to be financially assured up front, the FEIS' repeated insistence that PolyMet "would be held accountable for maintenance and monitoring required under the permit and would not be released from financial assurance until all permit conditions have been met," (e.g. FEIS, 3-5, 3-59, 3-72, 3-127, 3-140), carries no weight. Once an insufficient financial assurance instrument is exhausted and the mine has closed, taxpayers and the public will be unprotected. The FEIS virtually ensures that financial assurance for the PolyMet NorthMet project will be inadequate.⁹⁸ These Objections focus on the deficiencies that would preclude assurance for future protections of water resources.

Despite the high level of public concern about this issue, the FEIS provides no factual foundation from which financial assurance for long-term water quality treatment could be reasonably calculated. The PolyMet NorthMet draft EIS predicted that waste rock stockpile leachate collection would exceed water quality standards for up to 2,000 years. (DEIS, Table 4.1-45, p. 4.1-80, FEIS reference MDNR et al. 2009). By summer of 2013, the Co-Lead Agencies had reduced this number, specifying treatment duration for both the mine site and tailings facility

⁹⁸ WaterLegacy's Comments on the FEIS identify additional financial assurance deficiencies.

“Modeling predicts that treatment activities will be a minimum 200 years at the Mine Site and a minimum of 500 years at the Plant Site. While long-term, these time frames for water treatment are not necessarily perpetual.” (Tribal Comments and Co-Lead Agencies’ Dispositions, Aug. 19, 2013, attached as Exhibit 24).

The FEIS provides no similar foundation from which assurance of water quality treatment could be required. It states that PolyMet would include funds in its financial assurance package to operate mechanical water treatment “for as long as necessary.” (FEIS, 3-81). Although the FEIS admits that the potential *effects* of the PolyMet NorthMet project are “based on *mechanical* treatment that would operate indefinitely” (FEIS, 5-8 emphasis added), the FEIS itemization for the financial assurance package post closure only includes testing and implementation of *non-mechanical* water treatment. (FEIS, 3-81). Although the effectiveness of non-mechanical water treatment has not been demonstrated, in listing post-closure monitoring and maintenance activities that must be financially assured, the FEIS includes no provision for active treatment of mine site or tailings site pollution. (FEIS, 3-141). Minnesota has had experience with post-closure use of non-mechanical water treatment after a treatment plant was closed due to Dunka Mine bankruptcy. It is not positive. Decades later, discharge monitoring reports still reflect multiple violations of water quality standards.⁹⁹ Yet, this cheap and ineffectual plan is the one supported by the FEIS.

The FEIS also provides no basis to financially assure compensation for indirect effects of the NorthMet project on wetlands. Conversations with the St. Paul District of the U.S. Army Corps of Engineers have identified *no instance* where this District has required compensation for indirect wetlands effects after a project is permitted. Even for direct wetlands mitigation, where regulations require assurance until the success of mitigation is well-established (33 C.F.R. §332.3(n)), the FEIS implies support for waiver of financial assurance. (*see e.g.* FEIS, 3-140, 5-256, 5-367, 5-368, 5-369, 5-370). Bogs are difficult to replace resources, and there is a substantial risk that the “experimental” replacement proposed by PolyMet will fail. (Robertson 2015, p. 21, citing PolyMet 2014j).

As for the long list of “contingency mitigation” options discussed to mitigate effects of contaminated seepage either at the PolyMet NorthMet site or flowing northward, the FEIS

⁹⁹ See WaterLegacy Petition for Program Withdrawal in Minnesota Supplemental Petition materials on Dunka Mine, available at <http://www2.epa.gov/mn/npdes-petition-program-withdrawal-minnesota> and Dunka Discharge Monitoring Report summaries in Exhibit 34.

proposes that none of this mitigation would be financially assured until some unspecified future time if “appropriate and approved” by the MDNR and MPCA. (FEIS, 5-239).

Finally, although the FEIS states that financial assurance should fund “corrective actions that may become necessary to address any permit non-compliance” and remediation of sites where “potential pollutants may have been released” (FEIS, 3-140), the FEIS provides no basis to require this type of financial assurance. As detailed in WaterLegacy’s Comments on the FEIS, the FEIS fails to analyze any reasonably foreseeable adverse effects of the failure of engineered systems, whether routine or catastrophic. Recent major dam failures have resulted in an average cost of \$543 million per failure. (Bowker & Chambers, *TSF Failures*, pp. 1-2, Exhibit 19). Even relatively minor spills can result in costly remediation.

Instead of requiring PolyMet to assume the risks of errors in its modeling, overreaching in its promises, and failures to conduct appropriate tests, the FEIS, by failing to provide any foundation for financial assurance of contingency mitigation or corrective action, has effectively externalized these risks to the environment, downstream citizens, tribes with treaty rights and taxpayers. The inadequacies of the NorthMet FEIS along with its proposal for monitoring and speculative mitigation threaten to create a new Superfund site from an ecologically important site in the 1854 Ceded Territory and the Superior National Forest. NEPA was enacted precisely to prevent this scenario from resulting from federal action.

CONCLUSION

On the basis of the foregoing analysis, WaterLegacy’s Comments on the FEIS, and the expert opinions, exhibits, appendices and other materials cited herein, WaterLegacy believes that the only choice consistent with law, policy and the Forest Service’s fiduciary obligations is to select the Environmentally Preferable Alternative of No Action. Under this Alternative, there would be no PolyMet NorthMet Proposed Action or Land Exchange Proposed Action.

In addition to this final No Action decision, WaterLegacy recommends, in order to address the inadequacies of the FEIS and to provide an unbiased and definitive record, that the Forest Service request the following independent and expert analysis for the PolyMet NorthMet proposed action: 1) water modeling by the U. S. Geological Survey to assess base flow, volume and directions of surficial and bedrock flow from the mine site and tailings site, including drawdown impacts on wetlands; 2) evaluation of less environmentally damaging alternatives

including re-assessment of underground mining as well as assessment of mitigation alternatives at the tailings site and mine site; 3) assessment of human health impacts of NorthMet pollution on drinking water and methylmercury contamination of fish by independent experts capable of questioning unsupported assumptions; and 4) assessment of cumulative impacts to tribal rights and resources, considering tribal knowledge and perspectives.

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