Together with the Wetlands Action Group and the League of Women Voters, Duluth

Comments and Objection on the NorthMet Mine Project Permit to Mine Application

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1.0 EXECUTIVE SUMMARY

Minnesota stands at a crossroads unlike any in our state's history. We are home to the Duluth Complex, a vein of copper-nickel ore that has for decades been ignored as too low grade to be worth the trouble. That all changed in the mid-1990s, and now, much of the mining world is focused on developing this resource. For the first time in our state's history, a proposal to mine copper-nickel in Minnesota has entered the permitting stage. But in the wings, companies like Twin Metals, Antofagasta, Teck, and Kennecott eagerly wait to see how our state plans to regulate this entirely new industry for the next decades. It is no understatement to say that the permitting decisions for PolyMet's NorthMet Mine will reverberate for decades.

No one would deny that the modern world relies on mined materials. But one of the most fundamental challenges facing our state and our country is the challenge of responsibly meeting the needs of today without sacrificing the environmental quality of the future. For our state, this problem is most acute when it comes to copper-nickel mining, for there is also no denying that hardrock mining is a dirty business.[1] When the EPA was asked to determine which industry posed the highest risk of forcing taxpayers to bear the costs of environmental contamination at Superfund sites, they chose the hardrock mining industry as the country's riskiest.[2] There has never been a sulfide ore mine in the U.S. that did not release contaminants into the surrounding area.[3]

Too often mines involve physically enormous facilities operating at the knife's edge of profitability. Historically, business success and environmental safeguards have gone hand in hand, riding the booms and busts of volatile commodity price swings and leaving taxpayers with the bill when the music stops. It is typically only then that the severity of the damage becomes apparent, long after the operating company has vanished into the history books. In Butte, Montana, Anaconda Copper operated the Berkeley Mine for *thirty* years, mining copper from an open pit. Today it is a Superfund site. The sulfides in the open pit turned acidic, and the water in the pit—a 1,780 feet deep, manmade, toxic lake—is now saturated with arsenic, cadmium, cobalt, copper, iron, zinc and lead. When a migrating flock of snow geese landed in the pit lake to rest, thousands died.

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[1] U.S. EPA, Identification of Priority Classes of Facilities for Development of CERCLA Section 108(b) Financial Responsibility Requirements, 74 Fed. Reg. 37,213, 37,215 July 28, 2009 (observing that the metal mining industry is responsible for almost 1/3 of reported releases of toxic chemicals into air, water and land).

[2] *Id.* at 37,215 (noting that "the hardrock mining industry typically operates on a large scale, with releases to the environment and, in some situations, subsequent exposure of humans, organisms, and ecosystems to hazardous substances on a similarly large scale . . . EPA estimates that the hardrock mining industry is responsible for polluting 3,400 miles of streams and 440,000 acres of land.").

[3] Letter from Thomas Tidwell, Chief of Forest Service to Neil Kornze, Director of Bureau of Land Management, U.S. Forest Serv. File Code 2670 (Dec. 14, 2016), attached as Exhibit 1 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.

As the first nonferrous mine in Minnesota's history, the NorthMet mine permits are also the first time that the state's nonferrous mining regulations will ever be applied to a particular project. Simply put, the Conservation Organizations—Minnesota Center for Environmental Advocacy, Center for Biological Diversity, Duluth for Clean Water, Save Our Sky Blue Waters, Friends of the Cloquet Valley State Forest, Save Lake Superior Association, the Minnesota Division of the Izaak Walton League of America, the Sierra Club Northstar Chapter, Wetlands Action Group, and the League of Women Voters Duluth—do not believe that the NorthMet Mine Project, as designed, meets the requirements of Chapter 6132 rules. As a result, the DNR should not move forward with permitting the Project unless the Applicant can revise the Application to resolve the issues highlighted below. The decision facing the DNR is nothing less than whether it accepts the regulations as written and intends to enforce those regulations, or whether it will ignore the applicable law.

The Chapter 6132 rules start with the assumption that the DNR's policy is to "minimize[] to the extent practicable the need for maintenance" through mining practices that "maximize physical, chemical, and biological stabilization of areas disturbed by mining, as opposed to the use of ongoing active treatment technologies." That policy is implemented through the "application of technologies and practices including methods . . . determined . . . based on problem assessment, examination of alternative practices . . . to be the most effective and workable means of achieving reclamation." To that end, reactive mine waste, or waste that is "shown through characterization studies to release substances that adversely impact natural resources," must be disposed of in a way that prevents the release of harmful substances. For mine waste in the tailings basin that is demonstrated to contain harmful substances, a mine project must do two things: (1) "prevent substantially all water from contacting unacceptable substances within the mine waste"; and (2) provide for the collection and treatment of water that drains from the mine waste (see Section 8.0 for discussion of reactive mine waste regulations). Once mining is completed, the regulations are clear that the "mining area shall be closed so that it is stable, free of hazards, minimizes hydrologic impacts, minimizes the release of substances that adversely impact other natural resources, and is maintenance free." All tailings basins must also be drained at closure—the regulations do not allow the permanent impoundment of slurried mine waste (see Section 4.0 for discussion of the dry closure requirement).

All of these things—compliance with reactive waste provisions, drainage of tailings basins, etc.—must be accomplished with methods and practices that are derived from "available technology." An applicant cannot rely on planned pilot testing, for example, to ensure compliance with the reactive waste regulations (see Section 3.0 for discussion of the permit's reliance on future plans). A project can be permitted only if an applicant can demonstrate regulatory compliance for the project as currently proposed, not as it someday might be if things go as planned.

The Application pending before the DNR does not comply with any of these requirements, and it is now incumbent upon the agency to enforce its regulations as they are written to ensure that Minnesotans both now and in the future are protected from financial and environmental harm. These laws were written to permit mining activities that do not place the public health or

natural resources at unnecessary risk. They do not allow mine designs that would place a 900-acre lake 250 feet in the air, held in place with an earthen berm that began construction 50 years ago and is riddled with erosion and animal burrows, on the assumption that such a precarious arrangement will hold for 900 years (see Section 5.0 for discussion of dam safety). Nor do the regulations allow the agency to defer to the Applicant's promises that they will create and fine-tune technologies and practices, currently untested and unproven, to lessen the risks of this uniquely dangerous and outdated mine plan. Recent experience and available science, not to mention common sense, strongly suggest that wishful thinking in mine design will result in unacceptable risks of harm to Minnesotans and the places we love.

2.0 INCORPORATION BY REFERENCE

The Conservation Organizations incorporate by reference the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits submitted to the DNR on October 16, 2017, as well as the Joint Petition of MCEA *et al.* for a Contested Case Hearing on the NorthMet Permit to Mine Application submitted to DNR on February 28, 2018 (hereinafter "Joint Petition"), along with all exhibits to those documents. The Dam Safety Permit Comments and the Petition for a Contested Case Hearing and their exhibits are being submitted with these Comments and Objection, and the Conservation Organizations request that these three documents and the exhibits attached thereto be considered as part of our Comments and Objection on the Permit to Mine Application. Although all of these exhibits are incorporated by reference, the Conservation Organizations make particular note of the six expert reports submitted with the Joint Petition:

- Dr. David Chambers, PhD, University of California, Berkeley. Dr. Chambers is an Engineer and Professional Geophysicist who has provided analysis concerning the inherent safety and stability of upstream dam construction for slurry impoundments as well as the availability of technologies such as filtered or paste tailings to reduce the risks of both dam collapse and perpetual water treatment. Dr. Chambers' report on the Permit to Mine Application is attached as Exhibit 2 to the Joint Petition.

- Mr. Jim Kuipers, P.E., B.S., Montana College of Mineral Science and Technology, Mineral Process Engineering. Mr. Kuipers has over 35 years of experience in mining and environmental process engineering design, operations management, regulatory compliance, waste remediation, reclamation and closure, and financial assurance. Mr. Kuipers has provided analysis and evidence concerning the financial soundness of the financial assurance proposal for the NorthMet Mine Project; best practices in the storage of mine waste in other states, provinces and countries; an analysis of the best available technology for safe and responsible storage of mine waste; and the availability of passive water treatment technologies. Mr. Kuipers' report on the Permit to Mine Application is attached as Exhibit 3 to the Joint Petition. Mr. Kuipers' additional analysis on the financial feasibility of the project is attached as Exhibit 13 to the Joint Petition.

- Dr. Ann Maest, PhD, Princeton University. Dr. Maest is a leading expert in geochemistry and water resources and has provided analysis and evidence concerning the geochemistry of mine impacted water and geochemical characterization of mine waste. Dr. Maest's report on the Permit to Mine Application is attached as Exhibit 4 to the Joint Petition.

- Dr. Michael Malusis, PhD, Colorado State University, M.S.C.E. Colorado State University, B.S.C.E., Bucknell University. Dr. Malusis is a Professor of Civil and Environmental Engineering at Bucknell University specializing in waste containment barriers, the transport of contaminants through soils, and the design and performance of soil-bentonite cutoff walls. Dr. Malusis has provided evidence and analysis evaluating the predicted efficacy of the proposed cutoff walls at the plant site and mine site. Dr. Malusis has also provided analysis evaluating the proposed pilot testing of the bentonite amendment plan to prevent infiltration of oxygen and water into tailings. Dr. Malusis's report on the Permit to Mine Application is attached as Exhibit 5 to the Joint Petition.

- Dr. Glenn Miller, PhD, University of California, Davis, B.S. University of California, Santa Barbara. Dr. Miller is a Professor in the Department of Natural Resources and Environmental Science at the University of Nevada, Reno, specializing in the transport and transformation of organic and inorganic compounds, including the removal of metals and sulfate from effluent streams in mining operations. Dr. Miller has provided analysis and evidence concerning the geochemistry of mining pit lakes and the long-term environmental impact from the water quality conditions of those lakes. Dr. Miller has also provided analysis and evidence detailing the current state of the art for passive water treatment, particularly as applied to the water treatment demands of the NorthMet Mine Project. Dr. Miller's report on the Permit to Mine Application is attached as Exhibit 6 to the Joint Petition.

- Dr. Tom Myers, PhD, M.S., University of Nevada, Reno, B.S. University of Colorado, Boulder. Dr. Myers is a hydrologist who has conducted water modeling to demonstrate the pathways that metals and other constituents will travel at both the tailings basin and the mine site. He has provided evidence and analysis establishing the potential for surface and groundwater contamination for the NorthMet Mine Project. Dr. Myers's report on the NPDES/SDS Permit Application, which is material to the Permit to Mine for reasons described herein, is attached as Exhibit 7 to the Joint Petition.

References to the exhibits attached to the Joint Petition and the Dam Safety Comments will be identified as such herein.

3.0 THE DRAFT PERMIT IS VAGUE AND UNENFORCEABLE

As will be set forth in more detail below, the Permit that the DNR has published for comment suffers from fatal deficiencies. First, the public cannot review and comment on a "permit" that is over 60,000 pages, lacks a mandated term, is written in vague terms, and rests on plans that do not exist. Of equal importance, the DNR cannot enforce such a permit. As a result, the DNR

should address the deficiencies set forth below and renotice the Permit with a term and enforceable conditions that make specific the proposals in the Application. The DNR should attach to that permit clear and concise plans that will govern the construction, operation, closure, and post-closure of the proposed facility, or if such plans must be developed or modified in the future, DNR should establish clear requirements for the content of such plans, a standard for their approval, and a method for public review.

3.1 The Content Of The Application Is Not Clear, Frustrating Public Review

On its website, the DNR states that the "Application and DNR's Draft Special Conditions together are considered the Draft Permit to Mine."[4] The "Draft Special Conditions" are deficient because they fail to impose any specific requirements on the mining operation, as discussed in more detail in Section 3.3-3.5 below. The Application and reference materials, a total of 68,607 pages, suffer from a similar deficiency. The overview "Application" document is supported by eighteen Appendices, some of which involve multiple parts. Some of the attached Appendices describe how the various facility features will be constructed, but some of the Appendices contain preliminary information that was never intended to become part of an enforceable permit, but was instead intended to be "refined" during permitting, as the Application admits in multiple locations.[5]

Appendix 16 to the Application is the Final Environmental Impact Statement and Related Environmental Reports. However, the mining project has changed since it was described in the Final EIS (Appendix 16) so it is not clear what role the Final EIS is intended to play as incorporated into the Permit. Finally, certain Appendices do not actually include the indicated content. For example, Appendix 17, which allegedly contains "workplans," in fact contains only a "Conceptual Plan for Bedrock Groundwater Flow Mitigation" and does not include the "Geotechnical Investigation Work Plan," "Monitoring Wells North of the Mine Site: Installation and Hydrogeologic Monitoring Plan," or "Engineered Wetland Pilot Scale Testing Work Plan" as indicated by the document's title. The text indicates these "workplans" are no longer intended to be part of the Application.[6]

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[4] *See* DNR, *Permit to Mine: PolyMet's NorthMet Mining Project*, http://www.dnr.state.mn.us/polymet/permitting/ptm.html.

[5] *See, e.g.*, Poly Met Mining, Inc., Permit to Mine Application for the NorthMet Project, December 2017 [hereinafter "PTM Appl."] at 4, 31, 156, 427.

[6] Instead of providing the actual 2016/2017 Geotechnical Investigation Work Plan, for example, the appendix provides a statement that "[t]his document is no longer included in the Application. It was previously submitted as part of version 1 of this Application; this document has since been removed from the Application, and the work began at the Plant Site. Agency review (DNR and MPCA) of this work plan was on a separate timeline than this Application." For the "Monitoring Wells North of the Mine Site: Installation and Hydrogeologic Monitoring Plan" the appendix states that "[t]his document is no longer included in the Application. Due to the timing of this work, it is going through agency review (DNR and MPCA) on a separate timeline than this Application." Appendix 17.4 was intended to include the "Engineered Wetlands Pilot Scale Testing Work Plan" but instead consists of a statement that "this

The public cannot review and comment on a permit that is written in vague terms, that includes plans that do not exist, or that includes plans and supporting documents that are out-of-date and no longer part of the proposed project. To ensure that the public is provided the public notice opportunity required by Minn. Stat. § 93.483 and Minn. R. 6132.4000, the DNR must revise and renotice the Permit for comment.

3.2 The Proposed Permit Lacks A Term

Despite the requirement in Minn. Stat. § 93.481, subd. 3, that "[a] permit issued by the commissioner pursuant to this section *shall be granted for the term* determined necessary by the commissioner for the completion of the proposed mining operation, including reclamation or restoration," DNR failed to specify the term of the Permit.[7]

The establishment of a term for the Permit is critical because a permit to mine is "irrevocable during its term" unless the Permittee violates the terms of the Permit.[8] The term protects the public because, should the Permittee fail to complete its operations in accordance with the term established by the Permit, the Permittee would be required to reapply for the Permit and the public would then have an opportunity to review the status of the operation. A specific term is also critically important for financial assurance, to avoid disputes with the Applicant about whether the forfeiture of financial assurance has in fact been triggered by project cessation or abandonment. Because the DNR has not established a term, the Permit is fatally deficient. DNR must therefore establish a term for the Permit and renotice the Permit for public comment.

3.3 The Proposed Permit Does Not Include Specific Permit Requirements In Violation Of Minn. R. ch. 6132

Under Minn. R. 6132.0200, the DNR must issue a permit that contains specific permit requirements that are directed to attain the regulatory goals established by law, including the goals "to control possible adverse environmental effects of nonferrous metallic mineral mining, to preserve natural resources, and to encourage planning of future land utilization." The rule specifies that:

> Because of the unique character of each mining operation and the extreme diversity of the possible types and sizes of operations, *specific permit requirements* shall be established within the framework established by parts 6132.0100 to 6132.5300. *Permit terms and conditions* shall be

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document is no longer included in the Application. Due to the timing of this work, it is going through agency review (DNR and MPCA) on a separate timeline than this Application."

[7] *See also* Minn. R. 6132.0300, subp. 3 ("The term of a permit to mine shall be the period determined necessary by the commissioner for the completion of the proposed mining operation including postclosure maintenance, based on information provided under part 6132.1100").

[8] Minn. Stat. § 93.481, subd. 4.

> directed toward attaining the goals while fulfilling the requirements described in parts 6132.0100 to 6132.5300.[9]

Contrary to these mandatory requirements, the DNR fails to include in the Permit *specific permit requirements* or *terms and conditions* to ensure that the standards and goals in Minn. R. ch. 6132 are met. Instead, the DNR has simply incorporated the Application as the Permit. The Application, however, notes that such specific conditions will be developed or refined during the permitting process.[10] This circularity leads to a fatally deficient regulatory document.

By publishing a permit document that merely incorporates the Application, the DNR has failed to meet the standards required for a permit to mine permit. The DNR must therefore revise the Permit to establish enforceable permit requirements and republish the Permit for public comment.

3.4 The Proposed Permit Allows The Applicant To Develop Plans In The Future, Frustrating Public Review

Instead of incorporating specific plans to address key issues related to the regulation of the mine and its associated facilities, the Permit "Special Conditions" document provides only that the Applicant will develop and submit these plans to the DNR *in the future* ("unincorporated plans"). In many cases, the Permit fails to include detail on what the unincorporated plans should include, or the standard under which the DNR will review these unincorporated plans. In certain cases, these unincorporated plans appear to be intended to authorize changes from the design in the Application. These unincorporated plans include those plans which would contain the practices required by rule 6132.0200 to "reduce impacts to the extent practicable, mitigate unavoidable impacts, and ensure that the mining area is left in a condition that protects natural resources and minimizes to the extent practicable the need for maintenance."

Minnesota Statutes § 93.483 and Minn. R. 6132.4000 exist for the purpose of ensuring that the affected public has an opportunity to be heard regarding the Permit. By requiring the Applicant to develop key plans in the future, the public is deprived of a meaningful opportunity to review those plans to assess—during the one and only permitting proceeding—whether they are sufficient and enforceable. Such a procedure contravenes the law, which is intended to ensure that the public has a meaningful opportunity to review and comment on the Permit.[11] The fact that some of the information will be included in the unincorporated plans may, in certain cases, be contained in various places in the attached Application does not resolve this issue. As noted

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[9] Minn. R. 6132.0200 (emphasis added).
[10] *See, e.g.*, PTM Appl. at 4, 31, 156, 427.
[11] *See Minn. Ctr. for Envtl. Advocacy v. Minn. Pollution Control Agency*, 660 N.W.2d 427 (Minn. Ct. App. 2003) (stormwater management plans must be reviewable); *Waterkeeper All., Inc. v. U.S. Envtl. Prot. Agency*, 399 F.3d 486 (2d Cir. 2005) (nutrient management plans must be reviewable); *see also In re City of Owatonna's NPDES/SDS Proposed Permit Reissuance for the Discharges of Treated Wastewater*, 672 N.W.2d 921, 927 (Minn. Ct. App. 2004) (MPCA's public notice of permit prior to completing modeling indicative of arbitrary decision).

above, the Applicant acknowledges in the Application that the attached plan documents (which have been revised many times) "may be further refined to address specific matters in permitting."[12] However, the DNR has not "refined" the unincorporated plans nor specified how the unincorporated plans are to be revised, and what standard the revisions must meet, as the Conservation Organizations show below. By including the requirements to create the unincorporated plans in the Permit, the DNR has conceded that the unincorporated plans are necessary and important to the regulation of the facility. To ensure that the public has an opportunity to review these unincorporated plans before the Permit is issued and becomes irrevocable, DNR must make these unincorporated plans available today.

The following plans or other submittals are required by the Permit, but are not specifically referenced or provided for public review as part of the Application:

1. Final geographic information system (GIS) data package for the largest footprints planned for each mine feature (Special Conditions part ("part") 17).
2. BIF construction rock workplan (parts 23-25);
3. Tailings basin buttress material workplan (parts 26-28);
4. Modeling and data verification workplan (parts 32-43);
5. Final construction material specifications for construction materials associated with each mine pit, stockpile, tailings basin, and auxiliary facility (parts 38-9);
6. Future waste characterization testing and results work plans (parts 46-8);
7. Performance monitoring for stockpile sumps and mine pit sumps (part 51);
8. Category 1 waste rock containment system and cover design (part 54);
9. Final designs for the cut-off wall for the tailings basin containment system (part 55);
10. Detailed operational plans (part 61);
11. Ore processing deviations showing chemical or physical changes to the tailings proposed in the Application (part 62);
12. Plan for investigation, design, and pilot testing of non-mechanical water treatment systems (Part 65);
13. Northward groundwater flow mitigation plan (part 66);
14. Mine pit bench slope stability plan (part 68);
15. Adaptive water management review process plan (part 80);

[12] PTM Appl. at 4.

16. Verification of East Pit closure workplan (part 82);

17. Mine pit pipeline monitoring and spill response procedures (part 85);

18. Pilot and field scale testing of bentonite amendment of tailings pond line workplan (part 88); and

19. Mitigation of impacts to the FPn62-Northern Rich Spruce Swamp rare natural community (Appendix).

3.5 The Draft Special Conditions Are Not Enforceable As Drafted Or Are Otherwise Deficient

The Permit contains numerous "special conditions" that are not enforceable as drafted and that fail to meet the requirement for specific permit conditions established by Minn. R. 6132.0200. The following conditions are deficient:

- Part 6: "Any Permittee requested modification of a timeline set forth in (i) any special conditions or (ii) any subsequently established schedule, may necessitate a permit amendment."

  Comment: The Permit condition is deficient because it fails to establish any clear conditions for when a permit amendment is required or when such a timeline change would trigger the DNR's authority to modify the permit under Minn. Stat. § 93.481, subd. 4(c). The DNR must establish clear and enforceable conditions governing when changes to schedules necessitate a formal permit amendment. For example, the DNR could state that any change to a timeline in the permit that is greater than 90 days must be made through a formal application to amend the Permit.

- Part 7: "The DNR will resolve any conflict between or among the [various DNR permits] governing activity in the mining area."

  Comment: The Permit condition is deficient because it fails to establish any clear conditions for how the DNR will resolve conflicts between the permits. The DNR must establish criteria for resolving conflicts. For example, the DNR could state that where there is such a conflict the more stringent condition shall be deemed to be applicable.

- Part 16: "All collected surface water and ground water quality data required by other permits must be submitted to the DNR for review. Data submitted to the MPCA through the Discharge Monitoring Report (DMR) system (or replacement of such system) satisfies this condition."

  Comment: The Permit condition is deficient because it fails to establish when the water-quality data required by other permits must be submitted to the DNR

for review. It is not clear whether the Applicant is required to submit the DMR data to the DNR or whether submittal to the PCA is sufficient.

- Parts 23-25: These parts require the Permittee to submit information in support of the use of BIF rock to the DNR.

  Comment: Although the permit provides that "no BIF construction rock may be used prior to DNR approval," the Permit fails to establish a clear standard for approval of the use of BIF rock.

- Parts 26-28: These parts require the Permittee to prepare a tailings basin buttress material workplan for DNR review and approval no later than 30 days following permit issuance.

  Comment: Although these parts state that no buttress material may be used prior to the DNR's approval, the Permit fails to establish a clear standard for approval of the buttress material. Without a standard, the public has no opportunity to ascertain what the DNR's approval will be grounded on.

- Parts 46-48: These parts require the Permittee to coordinate future waste characterization testing and results with the DNR for review and approval, and to submit workplans to the DNR for review and approval prior to initiation of any such characterization testing or data analysis.

  Comment: The Permit conditions are deficient because they fail to establish any standard for approval of the future waste characterization testing by the DNR.

- Part 52: Final design drawings for facilities listed in Application Table 3-2, and others upon DNR request, must be submitted for DNR review upon completion and no later than 30 days prior to construction of each facility. If deviations from the design drawings contained in the Application yield different footprints, additional impacts, or modified closure plans, then a permit amendment may be required prior to construction.

  Comment: The Permit fails to establish any clear standard for when a permit amendment is required prior to construction as the result of deviations from the design drawings. The condition is further deficient because it neglects to require the Applicant to identify the additional impacts or modified closure plans resulting from the changes to the facilities.

- Part 53: This part requires the Permittee to compare final designs for auxiliary facility refurbishment and estimated contingency reclamation cost from the application and submit the comparison to the DNR for review.

  Comment: The Permit condition is deficient because it fails to establish any deadline for this submittal.

- Part 62. This part requires the Permittee, at least 90 days prior to implementation, report "any deviation from the processing of the ore that would result in chemical or physical changes to the resultant tailings generated compared with the tailings proposed in the application." The provision notes that "any such changes may necessitate a permit amendment."

  Comment: The Permit conditions are deficient because they fail to establish any criteria for when a permit amendment is necessary. For example, the DNR could state that a permit amendment should be required if the changes would result in tailings that are more reactive than described in the application or if the tailings would not be deposited as assumed in the tailings basin with regard to particle distribution.

- Parts 64-65: These parts require the Permittee to develop a plan for investigation, design and pilot testing of non-mechanical water treatment systems and to submit that plan to the DNR for review and approval prior to Mine Year 1. Upon the DNR's approval of the non-mechanical water-treatment plan, the Permittee must provide financial assurance sufficient for the DNR to implement the plan in the event of unplanned closure.

  Comment: The provision requiring the Applicant to develop a plan to investigate non-mechanical treatment systems and the implementation of that plan is only the first step in the development of a non-mechanical water treatment system proposal and is therefore deficient. The Permit should require the Applicant to submit a report on the results of the investigation, including (if the Applicant believes that feasibility has been demonstrated) a proposed engineering design. If this engineering design is approved, the Permit should be amended to include the approved design under the procedures in Minn. R. 6132.4200, subp. 2, item A, with the public having an opportunity to review and comment on the design. The Permit must establish criteria for approval of such a non-mechanical treatment system (i.e., it should be at least as effective as the mechanical treatment system and demonstrated to be "available" technology). The current Permit language is deficient because it assumes that once the pilot testing plan is approved, the system is automatically part of the permit for which financial assurance is required.

- Parts 66-67: These parts require the Permittee to submit a report assessing the potential for northward groundwater flow at the mine site prior to blasting, and states that if the report (or other monitoring data) indicates a reasonable likelihood of northward groundwater flow "then the DNR will require adaptive management or mitigation" that must be approved by the DNR.

  Comment: The Permit condition is deficient because the DNR is not given authority to review and approve the report and because how "adaptive management or mitigation" will be implemented under the Permit is not clear. The Permit should establish the required content for the report, and provide a

standard for approving the report. If the report is approved, and if the information in the report supports the conclusion that there is the potential for a northward groundwater flow, the DNR should require the Applicant to submit a report describing a plan for how such a flow will be mitigated, a standard for approval of the mitigation plan, and provide for a process under which the approved plan will be incorporated into the permit as an amendment. Given the nature of the issue, the DNR should require that these reports also be submitted to the MPCA for its review and approval, and the plans should be incorporated into the Permit through a formal amendment.

- Parts 68-70: These parts require the Permittee to submit a geotechnical slope stability plan 30 days prior to implementation, if the separation of mine pit benches is designed to be greater than the recommendations in the report referenced in the Application.

  Comment: The Permit condition is deficient because the DNR is not given the authority to review and approve the changes to the benches, nor is a standard established for the approval of the changes. The Permit is further deficient because blasting is not prohibited prior to approval of the changes.

- Part 71: This part requires the Permittee to begin installation of the Category 1 waste-rock stockpile cover "once DNR determines that a large enough portion of the stockpile has reached the maximum height of the permanent Category 1 Waste Rock Stockpile." DNR is required to provide a minimum of 1 year's advance notice.

  Comment: The Permit condition is deficient because, although the DNR is given the discretion to determine when the stockpile cover installation needs to begin, the lack of a standard may result in disputes with the Applicant over this requirement. The Permit should include an adequate description of "large enough portion" so that the requirement is clear and enforceable.

- Part 73: This part requires the sealing of exploratory boreholes in the mining area.

  Comment: The Permit condition is deficient because it fails to establish a time for closure of the exploratory boreholes.

- Part 75: This part notes that an "effective fence line of the ambient air boundary will entail various potential access control measures."

  Comment: The Permit condition is deficient because it fails to establish any standards for fencing of the "ambient air boundary" or access control measures.

- Part 77: Upon final design of the emergency spillway required at closure, this part requires the Permittee to submit reclamation cost estimates for

construction and long term maintenance of the emergency spillway required at closure for the tailings basin.

Comment: The Permit condition is deficient because it fails to establish a final date for submittal of the final design of the emergency spillway and because it postpones including such costs in the financial assurance.

- Part 78: This part requires the Permittee to submit final drawings of any auxiliary facilities not shown or discussed in the Application prior to construction and notes that "a permit amendment may be required prior to construction."

  Comment: The Permit condition is deficient because it fails to establish any standard for amendment of the Permit due to the plan to construct additional auxiliary facilities.

- Part 80: This part requires the Permittee to submit to the DNR, for review and approval, a "more detailed and revised adaptive water management review process plan" to be implemented if water quality objectives are not met or if there is an issue with water quantity.

  Comment: The Permit is deficient because it should require this plan to be submitted to both the MPCA and to the DNR for review and approval, due to the MPCA's expertise in water quality treatment. The Permit must provide more detail on what must be included to have an adequate plan, beyond "the process by which the monitoring, modeling, and review cycle will be implemented." For example, the DNR could require that an adaptive water management plan identify specific technologies or management changes that will be explored, including reduced production, in the even that water quality/quantity goals are not being met. The Permit should establish conditions for what happens, including potentially facility closure, if there is a failure of the water quality assumptions, but no technically and financially feasible plan is proposed by the permittee as part of the "adaptive water management review process plan."

- Part 82: This part requires the Permittee to re-verify that the closure plans for the East Pit will "perform as expected" despite the fact that a portion of the East Pit will remain above the water table by submitting a plan to the DNR for review and approval at least 2 years prior to the anticipated start of backfilling the East Pit.

  Comment: The Permit condition is deficient because it fails to state what the Applicant is required to do if the review of the data does not support that the East Pit will meet predicted conditions protective of natural resources, and to be clear about what standards the East Pit closure plan is expected to meet. At the time this re-verification is required, substantial ore will have been mined resulting in the generation of reactive mine waste that will require a different

management strategy. At a minimum, the Permit should specify that the Permittee should be required to submit, for review and approval, alternative waste management plans for any reactive waste that will not be submerged in the East Pit and establish a standard for approval of such plans.

- Part 84: This part provides that "existing legacy auxiliary facility that will not be used . . . will be removed and the sites reclaimed within three years of permit issuance."

  Comment: The Permit condition is deficient because it fails to state who is responsible for the removal of existing legacy auxiliary facilities. If the Applicant is responsible for this removal, the Permit should be revised to state that the Applicant must remove and reclaim these facilities.

- Part 85: This part requires, within 60 days of completion of construction of the MPP, or prior to use, whichever comes first, "the Permittee must provide to the DNR for its review the monitoring plan and spill response procedures." Revisions must also be provided.

  Comment: The Permit condition is deficient because the "60 day" requirement is ambiguous. The Permit language should be revised to clarify that the monitoring plan should be submitted 60 days after the MPP is completed and that the monitoring plan must be *approved* by the DNR prior to use. The Permit fails to indicate whether the DNR will review and approve this plan, or establish a standard for approval of this plan. As recently as 2013, pipeline failures have resulted in significant releases of material in unapproved locations.[13] The Permit should establish adequate conditions for monitoring of the pipelines, including telemetry and daily visual inspections for leaks, and a schedule for visual inspection of the interior conditions of the pipelines and other testing of the integrity of the pipelines. Ideally, these conditions should be part of the Permit, not developed after the fact.

- Part 87: This part requires the Permittee to obtain "DNR approval and any necessary permit amendments for creation of any additional stockpiles prior to disturbance in that portion of the mining area."

  Comment: The Permit condition is deficient because it fails to state a standard for when a permit amendment is needed for creation of an additional stockpile or a procedure for obtaining the DNR's approval.

[13] *See* PCA, *Pipeline, Storage Basin Failures Send Ore Tailings and Road Aggregate into Wetlands; 2 Enforcement Actions Result* (June 24, 2017), https://www.pca.state.mn.us/news/pipeline-storage-basin-failures-send-ore-tailings-and-road-aggregate-wetlands-2-enforcement.

- Part 88: This part requires the Permittee to prepare a "bentonite amendment of tailings pond liner workplan" for the DNR to review and approve no later than 90 days following permit issuance. The workplan must include any bench or field scale work, sampling, and analyses necessary to demonstrate to the DNR that the "tailings amendment with bentonite for the pond bottom will perform as intended to meet all applicable standards, statutes and regulations to be protective of natural resources, and function in perpetuity."

  Comment: The Permit condition is deficient because the standard for approval of the plan is too vague. Specific standards, statutes, and regulations should be referenced, along with the "intended" goal. Why is no similar plan required for the bentonite-amended dams and beaches? The DNR should require all preliminary studies establishing that the bentonite plan is an "available" technology to be completed before the Application is approved and the permit issued.

- Part 90: This part requires the Permittee to submit revised versions of the Fugitive Emissions Control Plans for the mine site and the plant site prior to ground disturbance "in that portion of the mining area."

  Comment: The Permit condition is deficient because it fails to indicate what revisions are required to the identified plans and the standard by which the DNR will determine whether the revisions are adequate. The language regarding "in that portion of the mining area" is ambiguous.

As the result of the above, the Conservation Organizations assert that the Permit does not conform to the law, particularly Minn. R. 6132.0200. the Conservation Organizations therefore request that the DNR deny the Application as drafted, revise the Permit to address the issues set forth above, and renotice the conforming Permit for public comment (if the DNR decides to proceed) because the changes required to the terms of the Permit are substantial and significant. In the alternative, the Conservation Organizations file an Objection and request a contested case hearing on the material issue of whether the Permit as proposed is adequate under the applicable rules, particularly Minn. R. 6132.0200.[14]

[14] In making this comment, the Conservation Organizations do not mean to imply that plans attached to the Permit could never be revised as the mining operation continues and changes become necessary. However, the Permit must establish a process by which such revisions are submitted and a standard for when a revision must be documented in a formal permit amendment subject to future public review.

3.6 It Is Premature To Proceed With Permitting While Federal Environmental Review Is Ongoing

Some of the Conservation Organizations have been pressing the DNR to evaluate alternative mine waste storage practices since 2010.[15] After the Mount Polley Report was released identifying filtered tailings as the best available technology for mine waste storage, the Conservation Organizations have more specifically urged DNR and other agencies to consider filtered tailings and dry closure as an alternative in the environmental review process.[16] Neither of these methods was meaningfully evaluated.[17] The filtered tailings alternative was summarily and wrongfully dismissed, as discussed in Section 7.0. Dry closure was rejected as an alternative over ten years ago and never given serious consideration, despite its widespread acceptance in the industry.[18]

DNR found the environmental impact statement adequate on March 3, 2016.[19] The U.S. Army Corps of Engineers, however, which has responsibility for the Applicant's Section 404 permit under the Clean Water Act, has not made a determination of adequacy with regard to the Final EIS.[20] The federal NEPA process, therefore, has not been completed.[21] For the state to now proceed with permitting before federal environmental review has been completed would unlawfully narrow the alternatives available to the U.S. Army Corps of Engineers, because the refusal to consider dry closure or filtered tailings will foreclose options otherwise available to the federal agency, in violation of NEPA.[22]

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[15] *See, e.g.*, Minnesota Center for Environmental Advocacy, Comments on the Draft Environmental Impact Statement for the NorthMet Project, Feb. 3, 2010.
[16] Conservation Organizations' Comments on the Supplemental Final Environmental Impact Statement for the NorthMet Project, Dec. 21, 2015, at Section 5.0.
[17] Final Environmental Impact Statement for the NorthMet Project at Section 3.2.3.3.4
[18] *See* Section 4.2, *infra*.
[19] MN DNR, Record of Decision in the Matter of the Final Environmental Impact Statement for the PolyMet Mining, Inc., NorthMet Mining Project and Land Exchange, March 3, 2016.
[20] *See* U.S. Army Corps of Engineers, *Corps of Engineers, partners, complete PolyMet Mining EIS*, Nov. 6, 2015, available at http://www.mvp.usace.army.mil/Media/News-Releases/Article/628062/corps-of-engineers-partners-complete-polymet-mining-eis/ (noting that the timeframe for the Army Corps' Record of Decision on the 404 permit, which will include a determination of adequacy for the FEIS, will be dependent on the timing of state permitting processes).
[21] *See Lakes and Parks Alliance of Minneapolis v. FTA*, 91 F. Supp. 3d 1105, 1122 (D. Minn. 2015) (discussing a NEPA violation when a state action could "significantly alter a project's environmental impact" and "eviscerate the federal remedy," rendering the NEPA violation a *fait accompli*).
[22] *Id.* at 1128-29 (D. Minn. 2015) (where an action of one agency narrows or alters the alternatives available to another agency during the environmental review process, that narrowing is itself a NEPA violation giving rise to a cause of action).

4.0 STATE LAW PROHIBITS WET CLOSURES

4.1 State Law Does Not Allow The Perpetual Impoundment Of Slurry Mine Waste As Proposed By The Applicant

At the outset, the Conservation Organizations note that the comments on the NorthMet Dam Safety Permits submitted by MCEA *et al*. on October 16, 2017 address this issue in some detail. Accordingly, and as noted above, these Comments and Objection incorporate by reference those comments along with their attached exhibits.

The DNR's nonferrous regulations—promulgated in the early 1990s—were prescient in at least one critical respect: they are clear that mine waste and water (e.g. tailings slurries) are not to be permanently stored behind a dam.[23] Rather, they require that, at closure, all tailings basins shall be drained. The rule states:

> Within three years after the start of the closure of basins constructed for the purpose of mining or processing, or within a longer period if approved by the commissioner, the permittee shall provide for drainage of the basins and reintegrate the area into the natural watershed.[24]

The DNR's regulations are in accord with industry standards. Australian regulators, overseeing one of the world's largest and most productive mining industries, adopt the same approach in their handbook. Drainage of surface water from tailings basins is described by the Australian handbook as a "leading practice" for tailings management:

> At closure, the [Tailings Storage Facility] would be shaped, and armoured if necessary, for natural surface drainage and to achieve erosion rates similar to those of natural landforms in the area. Leading tailings management practices, including dewatering, tailings disposal in thin layers to facilitate consolidation and drying, good surface water management, and underdrainage and seepage management, where appropriate, result in adequately consolidated, stable tailings. This allows access to the surface for rehabilitation purposes with the minimum delay.[25]

Dry closure of tailings basins is also the practice recommended by the Initiative for Responsible Mining Assurance ("IRMA"). The current version of the IRMA Standards is still in draft form, but currently state:

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[23] Minn. R. 6132.3200, subp. 1, 2(E)(5).
[24] *Id.*
[25] Australian Gov't Dep't of Indus., Innovation and Sci., *Tailings Management*, *Leading Practice Sustainable Development Program for the Mining Industry* 6 (2016) [hereinafter "Tailings Management Handbook"], *available at* https://industry.gov.au/resource/Documents/LPSDP/LPSDP-TailingsHandbook.pdf.

3.3.5 Tailings Impoundments

3.3.5.1. The following requirements shall be implemented at new facilities:

a. Tailings impoundment design and operation shall place safety as the primary consideration; and

b. Tailings impoundment designs shall incorporate liners and/or drainage collection underdrains or systems that can be used to dewater impoundment tailings after closure.

3.3.5.2. Tailings impoundments shall be designed for dry closure. Wet closure of tailings may be considered if it can be demonstrated, through a risk assessment and a failure modes and effects analysis or its equivalent, that wet closure poses less long-term risk to environmental and social considerations than a dry closure.[26]

These standards were formulated with input from representatives from Anglo American, ArcelorMittal, Microsoft, and the United Steelworkers Canada, among others. They are industry crafted and industry supported.[27]

One would be correct in detecting a pattern here: wet covers are a thing of the past, a dangerous relic of a form of mining undertaken before the passage of environmental protection laws. The DNR already knew this when it promulgated Rule 6132.3200. Twenty years after this rule was enacted we found out why this is an important requirement when the tailings dam at Mount Polley suddenly collapsed, instantly releasing a four square kilometer sized tailings pond into Hazeltine Creek and Quesnel Lake, a drinking water source for area residents.[28] The sudden deluge scoured trees from Hazeltine Creek and turned what was a four-foot wide stream into a raging river 150-feet wide.[29] Water sampling showed that the tailings spill contaminated Quesnel Lake with copper, iron, aluminum, and phosphorus.[30]

The incident at the Fundão tailings dam in Brazil was equally catastrophic, but even more horrifying:

> At 3:45PM shouts came over the radio that the dam was collapsing. A cloud of dust had formed over the left abutment, and those closest to the

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[26] Initiative for Responsible Mining Assurance, *IRMA Standard for Responsible Mining (Draft v.2.0)* 202 (2016), *available at* http://www.responsiblemining.net/irma-standard/irma-standard-draft-v2.0.

[27] *See* Initiative for Responsible Mining Assurance, *Governance During Launch Phase and Beyond*, available at http://www.responsiblemining.net/about-irma/irma-governance/.

[28] Justine Hunter, *B.C. Didn't Inspect Mount Polley Mine in 2010, 2011*, Globe and Mail, Oct. 14, 2014.

[29] British Columbia, *Mount Polley Tailings Pond Situation Update* (Aug. 8, 2014), https://news.gov.bc.ca/stories/friday-aug-8---mount-polley-tailings-pond-situation-update.

[30] C. Swan et al., *Impact Assessment Monitoring in the Quesnel Lake Watershed After the Mount Polley Mining Company Tailings Dam Breach, BC Ministry of Environment* (2014), *available at* http://www2.gov.bc.ca/assets/gov/environment/air-land-water/spills-and-environmental-emergencies/docs/mt-polley/sample-monitor/moe_impact_assessment_monitoring_in_quesnel_lake.pdf.

> area designated the "setback" could see cracks forming at the recently-constructed drainage blanket. The slope above them was beginning to undulate "like a wave" as if it were "melting," bringing the dam crest down after it. The tailings that had been solid ground just minutes before transformed into a roiling river, overtopping but not breaching the downstream Santarem Dam, then entering the town of Bento Rodriguez shortly thereafter enroute to its ultimate destination in the sea.[31]

The ensuing deluge destroyed a town and killed 19 people.[32]

After the Mount Polley disaster, the Mount Polley Expert Panel issued a report summarizing what went wrong, and what can be done to prevent such tragedies from occurring in the future. To some extent, the report confirmed what Minnesota regulators already knew, but had not had a chance to put into practice until now. The report found that the best available technology ("BAT") to assure physical stability of the tailings deposit has three components:

> 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.[33]

These principles are simple. They eliminate the risk of tailings dam collapse by reducing the quantity of water in the tailings impoundment, as "the presence of too much water in the impoundment is the fundamental cause" of catastrophic dam failure.[34] The exact mechanism of failure can vary from liquefaction of the tailings to internal or external erosion, but the root cause is the same: too much water.[35] The risk of tailings dam collapse is therefore inherent to slurry impoundments in general. As the Mount Polley Expert Panel Report notes, "Mount Polley has shown the intrinsic hazards associated with dual-purpose impoundments of both water and tailings."[36] But because the root cause is the same, so too are the solutions the

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[31] Fundão Tailings Dam Review Panel, *Report on the Immediate Causes of the Failure of the Fundão Dam* 1 (2016) [hereinafter "Fundão Panel Report"], attached as Ex. 17 to MCEA *et al.*'s comments on the NorthMet Dam Safety Permit and incorporated herein.
[32] Dom Phillips, *Samarco Dam Collapse: One Year On From Brazil's Worst Environmental Disaster*, Guardian, Oct. 15, 2016, *available at* https://www.theguardian.com/sustainable-business/2016/oct/15/samarco-dam-collapse-brazil-worst-environmental-disaster-bhp-billiton-vale-mining.
[33] Independent Expert Engineering Investigation and Review Panel, Report on Mount Polley Tailings Storage Facility Breach at 121 (Jan. 30, 2015), https://www.mountpolleyreviewpanel.ca/sites/default/files/report/ReportonMountPolleyTailingsStorageFacilityBreach.pdf, attached as Ex. 6 to the Comments of MCEA *et al*. on the NorthMet Dam Safety Permits [hereinafter "MPEPR"].
[34] W.J. Rankin, MINERALS, METALS AND SUSTAINABILITY: MEETING FUTURE MATERIAL NEEDS 251 (CSIRO Publishing 2011).
[35] *Id.*
[36] MPEPR at 121.

same—"eliminate water both on and in the tailings: water on the surface, and water contained in the interparticle voids."[37]

The tragedy at Mount Polley sounded the death knell on an already dying practice. What that accident made clear, and what the expert panel report emphasized, was that there is no "tolerable failure rate for tailings dams."[38] Regulators *must* adopt a zero-failure goal in their approach to tailings dams, and since water is the root cause of most failures, eliminating water from tailings impoundments must be the overarching goal of regulation. Just this past fall, the United Nations Environment Programme ("UNEP") adopted this rationale and appealed to regulators to adopt a zero-failure goal:

> The approach to tailings storage facilities must place safety first by making environmental and human safety a priority in management actions and on-the-ground operations. Regulators, industry and communities should adopt a shared zero-failure objective to tailings storage facilities where "safety attributes should be evaluated separately from economic considerations, and cost should not be the determining factor."[39]

In other words, if safety is the top priority, as it should be, then experts are clear that water must be eliminated from tailings impoundments.

Wet covers are not unheard of in the mining industry, but they are the exception to the rule for two reasons: (1) their marginal benefits are hugely outweighed by the increased risks to dam stability, as has been emphasized by the Mount Polley Expert Panel, the UNEP, and IRMA, and (2) they require a very particular set of circumstances to function correctly, without putting natural resources at risk. Water covers are only viable when an assured volume of water is permanently available.[40] "After closure, a permanent water cover requires sufficient natural recharge to maintain the water cover behind a water-retaining dam."[41] The existing LTVSMC tailings basin is currently drying out. Natural recharge by itself, then, is obviously insufficient to maintain a permanent water cover. The Applicant's plan to prevent infiltration of water and oxygen with a wet cover is therefore critically dependent on the successful operation of its bentonite amendment plan and seepage collection and return system, for without a water barrier and active water addition the new tailings basin will dry out just as the old one currently is. As noted below in Section 8.1, the Applicant's plan to reduce infiltration with a layer of

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[37] *Id.* at 120.
[38] *Id.* at 119.
[39] United Nations Env't Programme & Grid Arendal, *Mine Tailings Storage: Safety Is No Accident* 11 (2017) [hereinafter "UNEP Report], available at https://gridarendal-website-live.s3.amazonaws .com/production/documents/:s_document/371/original/RRA_MineTailings_lores.pdf?1510660693.
[40] Australian Gov't Dep't of Indus., Innovation and Sci., *Leading Practice Sustainable Development Program for the Mining Industry* 49 (2016) [hereinafter "Mine Closure Handbook"], *available at* https://industry.gov.au/resource/Documents/LPSDP/LPSDP-MineClosureCompletionHandbook.pdf.
[41] Tailings Management Handbook at 47.

bentonite is both unproven and unlikely to work. The Permit to Mine Application now before the DNR thus poses the worst of all worlds: the maintenance of a permanent tailings lake that severely compromises long term dam stability by using a water retention barrier that is unlikely to work. And a failed attempt at a water cover is an environmental disaster waiting to happen.

In sum, Minnesota Rule 6132.3200 codifies the core rationale of the Mount Polley recommendations, which note that "[i]t can be quickly recognized that water covers run counter to the BAT principles defined in section 9.3.1. The Mount Polley failure shows why physical stability must remain foremost and cannot be compromised."[42] The Mount Polley Expert Panel concluded that "alternatives to water covers should be aggressively pursued."[43] As noted below in Section 4.2 and 7.0, rather than aggressively pursue alternatives to the proposed wet cover, the DNR chose to forego any alternatives analysis whatsoever, contrary to its regulatory mandate.

The DNR's rules and industry standards require a dry closure. Because the proposed mine will not involve a dry closure, it does not meet the standards in the DNR's rule. As a result, the DNR should not issue the Permit and should instead require the Applicant to design the facility with a dry closure. If the DNR does not reject the Application, the Conservation Organizations file an Objection and demand a contested case hearing.

4.2 DNR Ignored Its Mandate To Evaluate Alternatives By Remaining Committed To The Wet Closure Plan For Over A Decade, Despite Clear Warnings From DNR Staff And Its Consultants

Minnesota's nonferrous rules state "it is the policy of the [DNR] that mining be conducted in a manner that will reduce impacts to the extent practicable."[44] This phraseology is repeated throughout the nonferrous rules chapter. Mining must be done on sites that "minimize adverse impacts on natural resources and the public."[45] Heap and dump leaching facilities must be designed and constructed to "minimize the release of substances that adversely impact other natural resources."[46] And a mine must be closed "so that it is stable, free of hazards, minimizes hydrologic impacts, minimizes the release of substances that adversely impact other natural resources, and is maintenance free."[47]

The repeated use of the word "minimize" is no mistake, as it is specifically defined by regulation:

> "Minimize to the extent practicable" means minimize through application of technologies and practices including methods,

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[42] MPEPR at 124.
[43] *Id.* at 125.
[44] Minn. R. 6132.0200.
[45] Minn. R. 6132.2000, subp. 1.
[46] Minn. R. 6132.2600, subp. 1.
[47] Minn. R. 6132.3200, subp. 1.

> specifications, guidelines, standards, and engineering safety factors, developed for and commonly used in mining or in reasonably similar activities. These technologies and practices shall be determined by the commissioner, based on problem assessment, examination of alternative practices, and input from appropriate regulatory authorities, to be the most effective and workable means of achieving reclamation, including being technologically, economically, and practically applicable.[48]

By regulation, in other words, the Commissioner's determination on a permit to mine must be based on an "examination of alternative practices" supporting the proposed design as the "most effective and workable means of achieving reclamation." This examination of alternatives is especially critical for the Application, since issuance of a permit for a nonferrous operation of this nature has never been done before.[49] As a result, the Conservation Organizations assert that it is most appropriate to refer this question to the Office of Administrative Hearings ("OAH") for a determination. Doing so would ensure that this Permit is consistent with the most "effective and workable means of ensuring reclamation" based on industry standards and the standards used in other jurisdictions, in particular those discussed below.[50]

The DNR has also long known that wet closures are inherently risky. DNR's Dam Safety Engineers have for years warned that wet closures pose serious risks to the public and to taxpayers:

> [The] Dam Safety [Division] has numerous concerns with this project because the tailings dams must function properly for an extended period of time – we've heard on the order of 900 years. Our first concern is whether the PolyMet tailings will form a structurally sound base to support the perimeter dams. Our second concern is that the proposed wet cap will significantly increase the potential for a dam failure, and will result in costly monitoring and maintenance over the life of the project (including monitoring costs to DNR for 900 years).[51]

Mr. Sutton urged an exploration into the comparative economics of the long term costs associated with wet versus dry closures:

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[48] Minn. R. 6132.0100, subp. 17.

[49] As the Conservation Organizations note below, the reactive waste rule has an even more stringent standard because it does not use the "minimize to the extent practicable" language is establishing the goal. Minn. R. 6132.2200, subp. 1.

[50] Joint Petition Ex. 3 at 13 (describing the Mining Association of Canada's required Multiple Accounts Analysis for the selection of site-specific BAT for tailings management).

[51] DNR Dam Safety Senior Engineer Dana Dostert, Geotechnical/Geochemical Questions Related to PolyMet Tailings, January 31, 2012, attached as Ex. 10 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits [hereinafter "Geotechnical Questions Memo"].

> I share [the Dam Safety Engineer's] wet closure concern and have additional concerns related to the long term tailings wet closure uncertainties and risks . . . If there is a reasonable risk that wet closure won't prevent oxidation or sulfates for 900 years and if perpetual water collection and treatment will be needed, then why not investigate some dry closure options and compare the long term O&M costs and long term risks of each alternative? Perhaps there is a dry closure alternative that is more economical and less risky when perpetual maintenance O&M are considered. At some point, the cost of the risk will need to be assessed . . . I envision that PolyMet's reclamation plan could work for a while, but don't see how it will function forever without falling apart unless it is continuously maintained; which is a major leap of faith . . . I don't like the wet closure, because it is not a permanent closure. I believe it will eventually fail and release the sulfates.[52]

The DNR's consultants could not be more clear: although "PolyMet's reclamation plan could work for a while," it is difficult to see "how it will function forever without falling apart unless it is continuously maintained, which is a major leap of faith."[53]

Despite the fact that Spectrum was hired by the DNR to provide technical consultation on a matter with which it did not have any experience,[54] these very clear recommendations appear to have been ignored. DNR's response to its consultant's warning is illuminating. In responding to Don Sutton's assertion that the wet closure will fail and release the sulfates, DNR staff replied that Mr. Sutton and EOR were brought in *after* the wet closure plan was chosen.[55] EOR was retained as a consultant in 2007.[56] Even though DNR's consultants were retained to provide analysis of mine waste facility design and closure for the NorthMet Permit to Mine,[57] DNR has been irrevocably committed to wet closure for over a decade even while its consultants have warned against this dangerous practice.

DNR has persisted in this choice despite similar warnings from its own staff, who have expressed concerns that the "proposed wet cap will significantly increase the potential for a dam failure."[58] And throughout the intervening decade in which DNR remained committed to a

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[52] *Id.*
[53] Email from Don Sutton to Dana Dostert (January 23, 2012), attached as Ex. 11 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[54] Geotechnical Questions Memo, *supra* ("Dam Safety has experience with tailings dams that are constructed from the residue from the taconite industry, but has no experience dealing with tailings that will be derived from minerals in the Duluth Complex.").
[55] Email from Jennifer Engstrom (DNR) to Don Sutton, Spectrum Engineering, Feb. 2, 2012, attached as Exhibit 1.
[56] State of Minnesota Professional and Technical Services Contracts, April 26, 2007, with Supplemental Agreements signed in 2008 and 2012, attached as Exhibit 2.
[57] *Id.*
[58] Geotechnical Questions Memo, *supra.*

wet closure, numerous other significant changes were occurring to the mine design, including new liners, seepage collection systems, and water treatment designs.[59] Extensive changes have been ongoing for over eleven years, and yet during all that time DNR's only response to its consultant's warning that the "wet closure will fail" is to reply that the decision has already been made.

This type of pre-determined decisionmaking is exactly what the regulation was designed to avoid. By forcing the commissioner to undergo an alternatives assessment to determine the most effective and workable means of achieving reclamation, the regulations are designed to make the permitting process more responsive and flexible to changing conditions and evolving standards for best practices in mining.

Major mining regulatory authorities around the world have recognized the wisdom of the alternatives assessment approach, and have taken steps to institutionalize its use as Minnesota has. The Australian tailings management handbook is particularly notable for its description of how unsafe tailings design decisions occur, which sheds some light on the current Application's refusal to follow state laws mandating drainage:

> Options for tailings management are *all too often predetermined* due to:
> - engineers and operators relying too heavily on their previous experiences—disregarding new technologies and the particularities of the project
> - limited advice being sought from a limited number of internal and external experts
> - constraints on capital expenditure, often driven by net present value (NPV) accounting in which a high 'discount factor' favours delaying expenditure.[60]

In this case, the decision to use a wet closure has persisted for over a decade, despite internal and external warnings to the contrary.

To combat this tendency to follow well-worn but misguided paths, the Australian handbook lays out key design steps to help ensure alternatives have been meaningfully explored.[61] One of these key steps is to evaluate dewatering options by setting parameters for current and future tailings requirements, analyzing dewatering technologies used at similar mine operations, exploring new technologies, and screening the dewatering options with site water balance and tailings density targets.[62] Rather than undertake this analysis as required by the nonferrous regulations, DNR made a choice to permit a wet closure over a decade ago and refused to waver from that choice, despite strenuous and well-reasoned objections both outside and inside the Department.

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[59] PTM Appl. at Section 6.1.1.
[60] Tailings Management Handbook at 41 (emphasis added).
[61] *Id.*
[62] *Id.*

5.0 THE PROPOSED FTB DAM POSES AN UNACCEPTABLE RISK OF FAILURE

5.1 Upstream Dam Construction Is Inherently Unsafe

As noted above, the Conservation Organizations incorporate by reference the Joint Petition for a Contested Case Hearing and the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits, both of which address this issue in detail.

MCEA and other organizations have been urging the DNR to require an alternative design to upstream dam construction since our comments on the Draft Environmental Impact Statement in 2010. These concerns have been addressed in detail by Dr. Chambers and Mr. Kuipers, whose reports have been attached to the Joint Petition and the Dam Safety Comments. In brief, upstream dam construction is the riskiest but cheapest way to construct a tailings dam. DNR staff appears to share our concerns, and have bluntly concluded that upstream construction is not a good method "for a dam that is required to last for centuries."[63]

The likelihood of dam failure, according to DNR staff, is much more probable than is reflected in the Application documents. When reviewing the Applicant's proposed permit application for the NorthMet Dam Safety Permits, for instance, DNR Dam Safety Engineers Jason Boyle and Dana Dostert commented: "[w]e agree dam breach is unlikely during the 20 years of plant operation but think there is a much higher possibility of dam failure during the indefinite post closure phase. This should be addressed in the documents."[64] PolyMet simply ignored those comments and submitted an application that failed to include or even mention DNR staff's concerns.[65] This is unfortunate, because DNR staff was correct: "statistically there is approximately a 1-in-600 chance of a tailings dam failure in any given year, based on historical performance over the period of record."[66] It is a statistical certainty that the NorthMet tailings dam *will* collapse sometime over the next 600 years.

5.2 The Proposal To Amend The Flotation Tailings Basin Dams With Bentonite Will Reduce Their Stability

The regulation requiring dry closure of tailings basins is bolstered by a number of other provisions in statute and regulation concerning the risk of dam failure. Minnesota Statute § 93.481 requires the Commissioner to determine that the Permit to Mine "complies with lawful requirements," which would include the dam safety requirements that tailings dams be designed and constructed consistent with "current, prudent engineering practice" such that the

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[63] Email from Dana Dostert to Neil Schwanz (Oct. 1, 2010), attached as Ex. 28 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[64] DNR Review of NorthMet Dam Safety Permit Appl.: FTB, Review Comments of Jason Boyle and Dana Dostert, attached as Ex. 9 to the Joint Petition.
[65] The DNR's comment pertained to section 3.5 of the draft permit application. Section 3.5 of the submitted permit application contained no reference to the DNR's concerns about the long-term risk of dam failure. *See* NorthMet Dam Safety Permit Appl. – Flotation Tailings Basin, May 2017, at 9.
[66] MPEPR at 118.

public's health, safety, and welfare is not put at risk.[67] In addition, under the DNR's rules governing mining permits, facilities must be sited and designed to avoid injuries due to dam failure, including injuries due to caving or slope failure.[68] In particular, Minn. R. 6132.2500, subp. 1 establishes the goal that "[t]ailings basins shall be designed, constructed, and operated to be structurally sound, control air emissions, minimize hydrologic impacts, promote progressive reclamation, and enhance the survival and propagation of vegetation." Under Minn. R. 6132.2500, subp. 2, item B(1), an applicant is required to provide a rationale for site selection, with regard to dam safety and characteristics of the site that could affect, or could be affected by, the tailings basin. Finally, Minn. R. 6132.3200, subp. 1 establishes the closure goal that "[t]he mining area shall be closed so that it is stable, free of hazards, minimizes hydrologic impacts, minimizes the release of substances that adversely impact other natural resources, and is maintenance free." MCEA *et al.*'s comments on the NorthMet Dam Safety Permit cover those requirements in detail, and are hereby incorporated herein.

The Project as currently proposed does not provide for drainage of the tailings basin at closure, does not minimize the potential for failure as required by rule, does not comply with lawful requirements to design and construct dams in accordance with current, prudent engineering practice, and closure of the site as proposed does not result in a mining area that is stable and free of hazards and that is maintenance free. As thoroughly described in MCEA *et al.*'s comments on the NorthMet Dam Safety Permit and in the attached report of Dr. Chambers, upstream dam construction "has proven to be the most risky and problematic type of dam construction."[69] As noted in those comments, this unsafe dam design violates state statutes and regulations governing dam safety, as well as the requirement of Minn. Stat. § 93.481 that permits to mine comply with all lawful requirements.

As described above, due to the illegal and unwise wet closure proposal, dam structure is critical. Alarmingly, the Applicant is proposing an untested technique to reduce infiltration of oxygen into the tailings by amending the basin dams with a layer of bentonite. The Applicant claims this bentonite layer will increase slope stability.[70] Based on expert review, the Conservation Organizations disagree with the Applicant's conclusion and indeed believe that bentonite will decrease—not increase—the stability of the dams[71].

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[67] Minn. R. 6115.0410, subp. 8.
[68] Minn. R. 6132.2000, subp. 5, items B and C.
[69] Report of Dr. David Chambers on the NorthMet Permit to Mine Application, attached as Ex. 2 to the Joint Petition.
[70] Barr Eng'g Co., Template for Pilot/Field-Testing of Bentonite Amendment of Tailings 1 (2017) [hereinafter "Bentonite Pilot Plan"] (prepared for PolyMet Mining Co.).
[71] Conservation Organizations also questions whether the proposal will, in fact, function effectively to reduce oxygen and water infiltration. *See* Section 8.1.

Dr. Malusis, an expert on barrier technology, does not agree that the bentonite layers will increase slope stability.[72] In fact, Dr. Malusis notes that the proposed bentonite-amended tailings layers could be susceptible to degradation due to wet-dry cycling, root penetration, animal burrowing, and freeze-thaw cycles.[73] Burying the bentonite-rich barrier under a 30-inch surface layer will not prevent these effects.[74]

The susceptibility of the bentonite-amended slopes to erosion is also an issue. As early as 2012, the DNR consultants warned that the bentonite seal "will exacerbate erosion and slope failure and will eventually fail."[75] On January 23, 2012, the DNR's consultants informed the Commissioner that:

> . . . [T]he bentonite amended dam face and interior slopes will be subject to faster erosion if more precipitation runs off and less infiltrates. This could lead to other erosion problems, especially on the outside, because the slope geometry is geomorphologically unstable and the sandy matrix invite erosion. Can the soil become saturated and slide off the bentonite? I think the bentonite cover will eventually deteriorate due to erosion and plant roots and become ineffective, and that erosion will weaken and destroy the embankments . . . *In my opinion, the reclamation plan is not a stable permanent closure*.[76]

Despite these warnings, the final permit application contains no studies of veneer slope stability of a bentonite amended dam face based on site specific data and no future studies of the dam face are proposed as special conditions of the permit.[77] Dr. Malusis echoes the DNR consultant's concern, noting: "[v]eneer slope stability analyses conducted for the bentonite-amended dam faces are based entirely on shear strength parameters taken from the literature. This is not appropriate for unproven technology being proposed for a wet closure that already has inherently higher risks and uncertainties with respect to dam stability."[78] In other words, rather than measuring the strength of actual bentonite amended tailings, PolyMet used values from the existing literature that it believes to be similar and used that data in the calculation. No updated veneer slope stability analysis using site-specific measure properties is proposed

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[72] Report of Dr. Michael Malusis on the NorthMet Permit to Mine Application, attached as Ex. 5 to the Joint Petition.
[73] *Id.*, cmt. 4.
[74] *Id.*
[75] PolyMet Geotechnical Modeling Work Plan Comments from Donald Sutton, Spectrum Engineering, to Jennifer Engstrom, DNR Senior Engineer – Dam Safety (Feb. 24, 2012), attached as Ex. 23 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[76] Email from Donald Sutton, Spectrum Engineering, to Dana Dostert, DNR Senior Engineer Dam Safety, (Jan. 23, 2012) (emphasis added), attached as Ex. 11 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[77] *See* Dirk Van Zyl *et al.,* Review of PolyMet's Tailings Basin Permit Application at cmt. 8, attached as Exhibit 11 to the Joint Petition.
[78] Joint Petition Ex. 5, cmt. 8.

and no work plan has been implemented to test the efficacy of the bentonite amendment to the dam face.

As recently as May 31, 2017, the same DNR consultants again warned that "[p]lacing bentonite on the embankment and interior surfaces will increase the run-off and the erosion rate. The stair-step design is geomorphologically unstable. The methods and assumptions used to place the bentonite to control the infiltration and tailings saturation are unsubstantiated, and wishful thinking . . . I recommend that the embankments be designed using established geomorphologic land reclamation principals. Otherwise there is a high probability that the embankments will eventually fail due to erosion, and catastrophically release the saturated tailings."[79] Given that the DNR's own consultants are not still convinced that the bentonite amendment will be effective in protecting Minnesota's water and still believe that this strategy may actually make the dam less stable, it is surprising to the Conservation Organizations that additional information concerning the bentonite proposal does not exist. Indeed, as discussed in Section 3.4, the DNR allows the Applicant to conduct pilot testing of this proposal many years after the mine is actually under development.

The questionable efficacy of the bentonite amendment as a barrier to prevent damage to Minnesota's environment by limiting oxygen infiltration and the problematic pilot testing timing raises issues of material fact that give rise to this Objection and require a contested case hearing. Furthermore, the warnings from the DNR's consultants that the use of bentonite may actually undermine the long-term stability of the dam should be of the utmost concern to the Commissioner and the public. Elsewhere, we have discussed the effects a catastrophic dam failure would have on Minnesota and its citizens.[80] This project relies on the ability of this dam to stand indefinitely. To adopt an unproven technology that actually makes dam failure *more* likely upon the basis of unsubstantiated benefits would be an absolute abdication of the DNR's responsibility to Minnesotans.

The Permit cannot be issued as proposed. Whether the bentonite amendment will function as proposed is a material issue of fact. To ensure that the bentonite barrier plan does not lead to instability in violation of the standards established by Minn. R. 6132.2500 and Minn. R. 6132.3200, the DNR should not grant this Permit until PolyMet has demonstrated that the bentonite plan will not create instability in the dam structures by conducting appropriate field studies as well as studies that demonstrate the effectiveness of the bentonite amendment as a method to prevent oxygen and water infiltration.[81]

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[79] Email from Don Sutton, Spectrum Engineering, to Cecilio Olivier (EOR) *et al*., (May 31, 2017), attached as Ex. 10 to the Joint Petition. The stair step design remains. PTM Appl., figs. 10-6, 10-11.
[80] *See* Sections 5.1; Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[81] *See* Section 8.1 for full discussion of the questionable efficacy of the bentonite amendment.

6.0 WATER IMPACTED BY MINE FEATURES WILL CONTAIN ARSENIC, LEAD, SULFATES, COPPER AND OTHER CONTAMINANTS FOR CENTURIES

The purpose of the nonferrous rules is to ensure that mining is conducted "in a manner that will reduce impacts to the extent practicable, mitigate unavoidable impacts, and ensure that the mining area is left in a condition that protects natural resources and minimizes to the extent practicable the need for maintenance."[82] This goal is to be accomplished through the use of mine waste management methods that "maximize physical, chemical, and biological stabilization of areas disturbed by mining, as opposed to the use of ongoing active treatment technologies."[83]

The Application and its supporting documents, however, eschew this goal in favor of a plan that would allow the water to become contaminated, but to collect and treat this water in perpetuity. This is described in detail in the reports of Dr. Miller and Dr. Maest.[84] There is no question that the water contacting the tailings basin and waste rock stockpiles will be contaminated. It is this feature that necessitates the need to capture and treat water from these mine features – the project depends on not letting this water escape the plant site and mine site. However, as Dr. Miller and Dr. Maest describe, this condition is unlikely to ever change, and water treatment will be required for centuries.

Water modeling at the plant site shows seepage rates from the tailings basin steady at a little under 2,000 gallons a minute for decades, with no signs of any decline.[85] This seepage will contain levels of sulfate, lead, aluminum, arsenic, cobalt, copper, and other constituents, many of which will be at levels that exceed water quality standards.[86] The water seeping from the south toe of the tailings basin, for instance, will contain over 60 µg/L lead for the next centuries and possibly millenia, compared to EPA's aquatic life standard of 2.5 µg/L.[87] If the seepage collection system should fail for any reason over the next centuries, due to blockage, power loss, equipment failure, operational error, project abandonment or otherwise, the ground and surface waters near the tailings basin will be contaminated with sulfates and heavy metals.

This is equally true for the mine site. The Permit to Mine Application alleges that the cover system for the Cat 1 stockpile will "reduce the flow of water into the stockpile, thus reducing the load of constituents to the West Pit during reclamation, closure and postclosure maintenance."[88] PolyMet's analysis from Barr Engineering, however, directly disputes this presumption. Barr's Technical Memorandum summarizing Non-Mechanical Treatment proposals notes that "[m]odeling indicates that capping of the stockpile will reduce the total

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[82] Minn. R. 6132.0200.
[83] *Id.*
[84] Respectively, Ex. 6 and 4 to the Joint Petition.
[85] NorthMet Project Water Modeling Data Package – Vol. 2 Plant Site, March 13, 2015, at 158.
[86] *See id.* at 170-190.
[87] *Id.* at 186.
[88] PTM Appl. at 289.

flow and increase sulfate and metal concentrations, but will not significantly reduce the amount of sulfate and metals . . . modeling indicates that the Category 1 Waste Rock Stockpile is a major source of sulfate and heavy metals to the West Pit Lake."[89] This contaminated drainage is unlikely to ever stop.[90] And as Dr. Maest argues, the estimates of water quality at the Category 1 stockpile are likely optimistic, because it will be difficult or impossible to accurately separate Category 1 waste rock from higher sulfide rocks.[91] If higher sulfide waste rock gets into the Category 1 stockpile, leachate will be much worse than assumed, because the Category 1 rock has almost no acid neutralization potential.[92]

Compounding this problem is the Applicant's use of concentration caps. The inputs to the water quality models limited how high contamination levels could go. As Dr. Maest notes, these assumptions are baseless, and artificially lower the projected contaminant levels for arsenic, cadmium, cobalt, copper, lead, nickel, selenium and others.[93] If those artificial limits were removed, concentrations of contaminants could be ten times as high as those modeled by the Applicant.[94]

Again, the Applicant presumes that seepage collection will capture the vast majority of this contaminated water over the course of the next hundreds of years. It is unreasonable to assume that the obligation to capture and treat contaminated water forever will be voluntarily undertaken by a private corporation whose sole asset is the mine itself, and which will no longer be producing revenue after twenty years. As Dr. Miller notes, the state should assume that it will be required to operate and maintain water collection and treatment systems for the coming centuries.[95]

Perhaps more importantly, this approach is unlawful under Minnesota's nonferrous rules. The Applicant's overall design is to allow for contamination to occur, but to design systems to prevent that contamination from migrating. But as Dr. Maest observes, "[a]llowing pollution and attempting to remediate the situation does not reflect a pollution prevention approach."[96] This is precisely the point made by the rules' Statement of Need, which notes that an approach that would "merely collect[] contact water and treat[] it in order to meet water quality discharge standards . . . has been rejected."[97]

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[89] Barr Engineering, *Summary of Non-Mechanical Treatment Plans for PolyMet* at 4, May 18, 2016, attached as Exhibit 3.
[90] Report of Dr. Miller on the NorthMet Project Permit to Mine Application, attached as Exhibit 6 to the Joint Petition.
[91] Joint Petition Ex. 4 at 6.
[92] *Id.* at 5-6.
[93] *Id.* at 17.
[94] *Id.* at 18.
[95] Joint Petition Ex. 6 at 1.
[96] Joint Petition Ex. 4 at 21.
[97] Statement of Need, Nonferrous Metallic Mineral Mineland Reclamation Rules at 22, attached as Ex. 31 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.

An example from this Project's own history illustrates this pattern well. Early on in the environmental review process, the Applicant evaluated whether it would be possible to backfill high sulfide waste rock into existing LTVSMC taconite pits owned by PolyMet.[98] The analysis concluded that it was not feasible, because those pits are already discharging mercury by overflowing into the headwaters of Spring Creek in the Lake Superior watershed.[99] Backfilling more waste rock into those pits would increase that discharge of mercury, and would therefore be ineligible for a NPDES discharge permit, since the receiving waters are already mercury impaired.[100] In other words, the mining operations of PolyMet's predecessor—conducted fifty years ago—are now a source of mercury in Lake Superior. LTV Steel is no more, having been undone by metal price swings, but its legacy of water contamination lives on.

This is the decision facing DNR with the NorthMet Permit to Mine. It is known and accepted by all involved that the mine operations will contaminate water. The only question is whether the Applicant will be willing and able to operate water collection and treatment to prevent this water from leaving the mine. From a regulatory perspective, then, the question for DNR is how to prevent PolyMet from becoming the next LTV Steel, leaving behind a legacy of water pollution for centuries after the company is no more. The draft permit does not answer that question with any certainty.

7.0 FILTERED TAILINGS ARE FEASIBLE, WORKABLE, AND ENVIRONMENTALLY PREFERABLE

Throughout this lengthy process, two alternative mine practices have been repeatedly urged by commenters and the DNR's own staff and consultants, but never given serious consideration by either the Applicant or the DNR: dry closure and filtered tailings.[101] Because of the longevity of mine operations, the failure to consider alternative practices and technologies now will have consequences that reverberate for years. Tailings storage design decisions "have profound and often irreversible implications throughout the [mine's] life cycle,"[102] so the DNR will only have one chance to make the right choice.

The use of filtered tailings achieves all the benefits of dewatering at closure, but maintains those benefits over the entire life of mine operations.[103] The Conservation Organizations

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[98] *See* Ex. 5. The author of this memorandum is not identified. It was obtained via a Data Practices Act request made by MCEA to DNR, to obtain documents relating to the NorthMet Project.
[99] *Id.* at 2.
[100] *Id.*
[101] Dry closure and filtered tailings are related but separate. Dry closure refers to dewatering the tailings at closure, as is required by Minnesota law. Filtered tailings, sometimes called dry stacking, simply refers to the practice of dewatering tailings *prior to storage*, rather than at closure. *See* Joint Petition Ex. 3 at 9-14.
[102] Joint Petition Ex. 3 at 13 (quoting MAC Guidelines).
[103] Joint Petition Ex. 3 at 11-12; Michael Davies, et al., *Design of Tailings Dams and Impoundments* 5 (2002) [hereinafter "Davies et al. 2002"] *available at* http://www.infomine.com/library/publications/

addressed the advantages of these technologies and the evidence that they are the current industry standard in MCEA *et al.*'s comments on the NorthMet Dam Safety Permits, which are hereby incorporated herein, and will not repeat those assertions. The Conservation Organizations note, briefly, that as with dry closure, the benefits of filtered tailings are literally textbook:

> The risk of water seepage and physical instability in conventional tailings facilities [e.g. slurry impoundments] can be reduced by good drainage and maintaining little, if any, ponded water. Hence, effective management of water in and around tailings impoundments is an important responsibility of a mine operator. These problems can be virtually eliminated by using paste and dry stack facilities, since these contain little or no water.[104]

The Mount Polley Expert Panel Report builds on this basic thesis, concluding that good tailings management must be based on dewatering tailings in general, and that filtered tailings in particular is a "prime candidate" for the Best Available Technology for tailings storage.[105]

Filtering tailings prior to storage offers several tangible benefits. Not only do filtered tailings facilities eliminate the risk of dam collapse (since no dam is needed), they also allow the tailings to be compacted to limit infiltration of oxygen and water, thereby eliminating the risk of acid development and seepage.[106] Because the tailings have already been dewatered, there is no need for water treatment at closure:[107]

> The lack of a tailings pond, very low (if any) appreciable seepage from the unsaturated tailings mass and general high degree of structural integrity allows dry stacks to present the owner/operator with a comparably straightforward and predictable facility closure in comparison with most conventional impoundments.[108]

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docs/Davies2002b.pdf, attached as Ex. 7 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.; Michael Davies & Stephen Rice, *An Alternative to Conventional Tailing Management – "Dry Stack" Filtered Tailings* (2004) [hereinafter "Davies & Rice 2004], available at http://www.infomine.com/library/publications/docs/Davies2004.pdf, attached as Ex. 8 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.; Michael Davies, *Filtered Dry Stacked Tailings – The Fundamentals, Proceedings Tailings and Mine Waste* (2011) [hereinafter "Davies 2011], available at http://www.infomine.com/library/publications/docs/davies2011.pdf, attached as Ex. 9 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.

[104] W.J. Rankin, Minerals, Metals and Sustainability: Meeting Future Material Needs 252 (CSIRO Publishing 2011).

[105] MPEPR at 122.

[106] Davies 2011 at 8 (noting that "if there is proper compaction and maintenance of target moisture contents, seepage is negligible."); *see also* Joint Petition Ex. 3 at 11.

[107] Davies 2011 at 8; Joint Petition Ex. 3 § 3.

[108] Davies 2011 at 8.

The Conservation Organizations' technical consultant, mine engineer Jim Kuipers, reaches the same conclusion:

> In general, filtered tailings will display a similar geochemical and potential mine influenced water (MIW) discharge characteristics to that of other tailings treatment methods but at a significantly reduced level. No segregation together with compaction and the ability to perform concurrent reclamation, including installation of cover liners if necessary, results in the least potential for the formation and discharge of MIW as compared to the other methods. Filtered tailings can be lined. At closure because there is no supernatant or draindown water, and the TSF using filtered tailings is constructed as a stable landform, there are no transition, active or passive closure phases or associated MIW discharges involved in closure.[109]

The end state of reclamation for dry stack tailings, therefore, is a more natural landscape that minimizes or eliminates oxidation of mine waste and the need for water treatment, while the end state for the proposed tailings facility is a saturated pile of mine waste topped with a 3.5 km^2 lake and held in place by an earthen berm for eternity, with treatment of contaminated water also required for eternity.

The benefits of filtered tailings are not aspirational; they are readily achievable, as filtered tailings are a well-established technology and "there are no overriding technical impediments to more widespread adoption of filtered tailings technology."[110] Filtration in mineral processing has been used for hundreds of years,[111] and their use has recently expanded as tailings storage risk has climbed over the past decades. The Australian Government, overseeing one of the largest mining industries in the world, notes that "there is an increasing worldwide trend towards pre-disposal thickening and filtering of tailings,"[112] and that "[a]n increasing number of mining operations employ dewatering to produce thickened and paste tailings and this is likely to become more widespread in the future."[113] The proposed Rosemont mine in Arizona will use filtered tailings with a capacity of 60,000 tpd, almost double the 31,340 tpd projected to be produced by the proposed NorthMet Mine Project.[114]

Despite the fact that both dry closure and filtered tailings are accepted techniques, the DNR has refused to consider these alternatives for the NorthMet Mine Project. In particular, the DNR and the U.S. Army Corps of Engineers rejected consideration of the filtered tailings technique as an alternative to be examined in the EIS on the grounds that it would not be feasible for this

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[109] Joint Petition Ex. 3 at 11.
[110] MPEPR at 122.
[111] Joint Petition Ex. 3 at 10.
[112] Tailings Management Handbook at 16.
[113] *Id.* at 14.
[114] PTM Appl. at 228.

Project, primarily because dry stacking filtered tailings on an old wet basin is not feasible. The Conservation Organizations disagree. Alcoa's Western Australia Refineries have been dry stacking tailings on formerly wet impoundments since at least 1985.[115] The Conservation Organizations' expert Jim Kuipers affirms that dry stacking on top of a formerly wet basin is not only feasible, but preferable.[116]

> The advantages to the placement of filtered tailings on top of conventional slurry tailings include the ability to store additional filtered tailings within a given footprint area, the use of the filtered tailings combined with dewatering of the underlying tailings to stabilize the underlying tailings by consolidation, and improved conditions for installation of source control measures such as covers.[117]

As described above in Section 4.2, internal and external commenters have identified the dangers of wet closures for years. These concerns would be addressed at closure by draining the tailings basin (as required by the regulations), but also by filtering the tailings prior to storage. Yet there is no evidence that DNR has ever undertaken any serious study of filtered tailings technologies, even despite the clear admonitions from other regulatory authorities that storing mine waste with water is inherently dangerous. This failure to undertake an alternatives assessment that includes both dry closure and filtered tailings is not only unlawful, it is unsound policy.

8.0 THE PROJECT DOES NOT COMPLY WITH THE REACTIVE MINE WASTE REGULATIONS

8.1 The Tailings Basin Design Fails To Meet The Closure Standard For Reactive Mine Waste And Depends On Technology That Is Not Available

Under Minn. R. 6132.2500, subp. 2, item (6), a tailings basin must comply with the requirements of rule 6132.2200, if the tailings basin contains reactive mine waste. The Conservation Organizations assert that the Applicant's closure plan fails to meet the requirements of the DNR's rules governing reactive waste, or, in the alternative, that there is a material issue of fact regarding whether the proposed plan will meet those rules, or whether the technology proposed is "available" as required by Minn. Stat. § 93.481.

There is no material dispute of fact that the tailings that will be deposited in the basin will be "reactive" as defined by Minn. R. 6132.0100, subp. 28 ("waste which is shown through characterization studies to release substances that adversely impact natural resources").[118] As a

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[115] Mine Closure Handbook at 53.
[116] Joint Petition Ex. 3 § 3.C.
[117] *Id.* at 12.
[118] *See* Waste Characterization Data Package NorthMet Project Dated February 13, 2015 and FN 29 above. Based on these statements and others in the Application, The Conservation Organizations assume that

result of this fact, the Applicant has proposed to minimize sulfate use in the flotation process and to deposit tailings as a "bulk tailing" to reduce release rates associated with the courser tails.[119] In addition to these actions, the Applicant proposes to:

- Maintain a pond in closure to minimize oxidation of flotation tailings. In closure, the beaches will cover about 425 acres, and the pond (including wetland area) will cover about 900 acres.

- Amend the surface of the FTB dams and beaches, as well as the bed of the pond in closure, with bentonite to reduce oxygen penetration and minimize oxidation of flotation tailings.

- Install engineered systems at the toe of the FTB dams to collect water that has contacted the tailings and prevent seepage from migrating into the surrounding surficial materials.[120]

The Permit, if issued, would approve these proposals, albeit with further study required.[121]

Consistent with the purpose stated in Minn. R. 6132.0200,[122] the DNR's rules governing reactive waste provide three options for preventing water impacts from reactive mine waste that can be summarized as follows: (1) the waste itself can be modified so that it is no longer reactive; (2) the waste can be stored in an environment such that the waste is no longer reactive; or (3) the waste can be stored in a manner that would permanently prevent substantially all water from moving through or over the mine waste and the design must provide for the collection and disposal of many remaining residual waters that drain from the mine waste in compliance with federal and state standards, i.e., a "dry closure."[123]

The Applicant's plan for closure of the tailings basin involves a conflicting mix of the mandated techniques that does not succeed in achieving the goal of the rule, which is to ensure that the mining area is left in a condition that protects natural resources and minimizes the need for maintenance. No waste will be neutralized to the extent that it is not reactive, not all waste will be protected from oxidation by being maintained in an aqueous environment, and the tailings

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the DNR and the Applicant have conceded that all waste produced by this proposed mining operation is properly classified as "reactive mine waste." If this is not the case, The Conservation Organizations demand a contested case hearing on this issue based on the information in Dr. Maest's report and in the Application itself describing the predicted reactivity of the waste rock and tailings.

[119] *See* Waste Characterization Data Package NorthMet Project (February 13, 2015).

[120] *See id.*

[121] *See* Section 3.4 with regard to legal issues associated with the DNR approval of a Permit where substantive requirements will be developed in future plans.

[122] Minnesota Rule 6132.0200 seeks to ensure that the mining area is left in a condition that protects natural resources and minimizes to the extent practical the need for maintenance, and the rule establishes a preference for "passive reclamation methods."

[123] Minn. R. 6132.2200, subp. 2, item B.

basin (neither the basin floor nor the beaches) will not be protected from infiltration, although that is the goal of the bentonite amendment plan.

The scheme to limit infiltration of water through the waste is particularly questionable. Dr. Malusis observes that "[t]he design percolation rate through the pond bottom based on the current plan is 6.5 inches per year, which is approximately one-fourth of the average annual precipitation rate in the vicinity of the site."[124] This estimate, moreover, is almost certainly low, as the DNR's consultants have noted that 6.5 inches/year "appears to be very low (especially given the uncertainties associated with this methodology)."[125] Even if the Applicant can achieve this percolation rate, which there is abundant reason to doubt, allowing 25% of the annual rainfall to flow through the tailings cannot be construed as "permanently prevent[ing] substantially all water from moving through or over the mine waste."[126] On the contrary, the FTB design allows a great deal of water to move through and over the mine waste. The design is a violation of Minn. R. 6132.2200.

The Applicant cannot escape the conclusion that the project fails to meet the closure standard in Minn. R. 6132.2200 by citing to the scheme to collect and treat the water in the cutoff trench. This method of meeting the closure standard was specifically rejected by the DNR. As stated in the Statement of Need adopted in support of Chapter 6132:

> Another method, that consists of merely collecting contact water and treating it in order the meet water quality discharge standards, without a substantial effort to minimize the amount of water contacting the waste, has been rejected. While this method may provide acceptable results during active operations, when the permittee is present, *the potential for longterm failure of such a system, when the operator is no longer available to correct the situation, is too great.* Because of the necessity to provide a permanent solution to the water quality concerns related to reactive mine wastes, the two required methods of storing these wastes are the only reasonable methods currently available.[127]

This language could not be more clear – the FTB closure design as proposed cannot comply with Minn. R. 6132.2200 because it fails to neutralize the waste, store that waste in an environment that will control reactivity, or prevent infiltration of water through the waste.

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[124] Joint Petition Ex. 5, cmt. 1

[125] *See* Email from Michael Kunz to Michael Liljegren (Oct. 15, 2012) (with attachment), attached as Ex. 24 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.

[126] "In contrast to the proposed approach, dry closure generally achieves much lower percolation rates into the waste, typically less than 5 percent of the average annual precipitation rate and often on the order of a few millimeters per year or less . . . Dry closure would be a much better approach for meeting the intent of Part 6132.2200 Subpart B(2), and DNR should consider making dry closure a permit condition rather than an option for PolyMet to explore at their discretion." Joint Petition Ex. 5, cmt. 1.

[127] DNR, *Nonferrous Metallic Mineral Mineland Reclamation Rules Statement of Need* 22 (1992) (emphasis added), attached as Ex. 31 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.

In addition, the bentonite treatment that the Applicant has proposed is an untried technique that cannot be considered to be "available" within the meaning of Minn. Stat. § 93.481, subd. 2. Indeed, the permit itself required further studies of the bentonite treatment, which amounts to a concession on the part of the DNR that the technology is not "available." DNR's consultants call the proposal a "hail Mary."[128] The plan relies on unproven technology and assumptions that the consultants characterize as "wishful thinking."[129]

Bentonite is a type of clay with low hydraulic conductivity, which allows it to operate as a water barrier. The plan uses 3% bentonite mixed with 97% coarse LTVSMC tailings on the beaches and dam face. Essentially, the Applicant proposes to create a sand-bentonite mixture (since the coarse tailings are predominantly sand-size particles) of 97% coarse, inert material with a very high hydraulic conductivity (on the order of 10^{-3} cm/s) and 3% bentonite, a material that will swell to plug the voids within the sand matrix, thereby lowering the hydraulic conductivity by 1000-fold while (supposedly) maintaining high saturation in the mixture. However, there is insufficient evidence to conclude that bentonite will actually protect the tailings from oxygen infiltration. Dr. Malusis notes that the Applicant provides "no evidence demonstrating that bentonite-amended tailings with a hydraulic conductivity of 10^{-6} cm/s will be effective as an oxygen barrier. Moisture retention testing and unsaturated flow modeling are needed to assess the performance of these layers."[130]

If the bentonite fraction is too low, the bentonite cannot be distributed uniformly to plug enough of the voids. Using a 3% mixture on the beaches and dam face as proposed could result in areas with no bentonite rather than a consistent and reliable infiltration barrier. Minimum bentonite content for these types of barriers is typically at least 7%.[131] At least one study indicates that anything less than 7% is likely leave void spaces with no bentonite.[132] The DNR's Dam Safety team has questioned the adequacy of the bentonite content, stating "[i]s 3% bentonite enough? Seems 5 to 10% is the more common recommendation."[133]

Dr. Malusis notes that the Applicant proposes to use a mixture of 3% bentonite amended tailing based on a *single* questionable laboratory test.[134] Although the Applicant proposes to test this hypothesis in the field, it has not identified any performance criteria and without appropriate performance criteria, there is no measure to determine success. Without being reproduced, there is no scientific reason to believe that the minimal results the Applicant relies on for its

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[128] PolyMet Geotechnical Modeling Work Plan Comments from Donald Sutton, Spectrum Engineering, to Jennifer Engstrom, DNR Senior Engineer – Dam Safety (Feb. 24, 2012), attached as Ex. 23 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[129] Joint Petition Ex. 10.
[130] Dr. Mike Malusis, Comments on Draft Dam Safety Permit 2016-1380 (Flotation Tailings Basin), Updated Permit Appl. Documents, and Outstanding Permit Issues 2 (Oct. 12, 2017), attached as Ex. 4 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[131] Joint Petition Ex. 5, cmt. 7.
[132] *Id.*
[133] Joint Petition Ex. 9 at cmt. 18.
[134] Joint Petition Ex. 5, cmt. 6.

bentonite proposal are anything but a fluke or, as the DNR's consultant said, "wishful thinking."[135]

In addition, if the bentonite does not swell as expected (e.g., due to wet-dry cycling with cation exchange), it will not adequately plug the voids. Dr. Malusis warns that this is a very real possibility. The constituents anticipated to be in the in the pond water and the tailings used to create the bentonite mixture used on the beaches and dam face (e.g., Ba, Ca, Cu, Fe, Mg, Mn, Ni, and Zn) will interact with the bentonite, "potentially causing inadequate bentonite swell during initial hydration or subsequent rehydration after drying in situ. If the swelling is not adequate to plug the voids in the mixture, then the bentonite-amended tailings layer will be a poor water/oxygen barrier."[136] When reviewing the NorthMet Dam Safety Permit, DNR staff noted the same concern, saying:

> Recent literature shows that sodium bentonite can alter to calcium bentonite by cation exchange when there is free chlorine in water. The process takes many years and results in a conversion to calcium bentonite, which has a bigger molecule, expands less and has a much lower permeability. Sodium bentonite can also degrade in environments with free iron. How can we be assured about the long-term performance of the bentonite?[137]

If the DNR itself is not "assured about the long-term performance of the bentonite," then bentonite cannot be relied on by the Applicant to prevent infiltration of water and oxygen into the emplaced tailings, and bentonite cannot be considered an "available technology" for the purpose of meeting the closure standard.

Leaving aside questions about the efficacy of the proposed bentonite barrier, it is unclear how the Applicant proposes to put the bentonite in place on the pond bottom. The three possible methods are subaqueous broadcasting of bentonite granules or pellets, bentonite injection of an unspecified percentage into the existing bottom, or placement of a geosynthetic clay liner ("GCL") over the existing bottom.[138] As noted by the DNR's consultants, "[t]he permit application only lists alternatives for placing the bentonite that will be pilot tested and field tested later."[139] Dr. Malusis notes that all of the "alternatives currently under consideration for the pond bottom are untested and unproven, and could yield actual percolation rates well in excess of 6.5 inches per year."[140] As such, the three methods to apply the bentonite to the pond bottom are not "practical and workable under available technology" as required by Minn. Stat.

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[135] Joint Petition Ex. 10.
[136] Joint Petition Ex. 5, cmts. 2, 4.
[137] Joint Petition Ex. 9, cmt. 19.
[138] PTM Appl. at Appendix 14, Section 3.1.3.2.
[139] Mem. from Dirk Van Zyl et al. to Jason Boyle at 5 (March 10, 2017), attached as Ex. 12 to the Joint Petition.
[140] Joint Petition Ex. 5, cmt. 2.

§ 93.481, subp. 2. None of these methods is supported by "laboratory studies, field case studies of successful use on similar projects, or any other type of feasibility assessment."[141] In fact, the DNR has been given specific information that two of the methods, injection and GCL, are likely to fail.[142] Even the DNR's own consultants conclude "[w]e do not believe [the bentonite amendment] will function as intended, because of the unproven application methods."[143]

Compounding the problem, the DNR appears willing to allow the mine to be fully developed (and indeed entering closure) before the Applicant is actually required to field test its bentonite scheme. [144] The fact that the Applicant must include a Bentonite Pilot Testing Plan ("Testing Plan") with its Application is a tacit admission that its bentonite amendment proposal is not practical and workable under available technology.[145] This Testing Plan does not adequately address the concerns with the bentonite amendment proposal.[146] Some testing will not begin until year 3 of mining and will continue for 4 years. In other words, the tests will not show whether the bentonite amendment plan will be effective until year 7 of mining.[147] The field testing of the application of the bentonite amendment to the pond bottom will not happen

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[141] *Id.*

[142] The DNR has already been informed by other experts that injection is may not be a reliable method for distributing bentonite uniformly. Email from Kim Lapakko, DNR to Dr. Craig Benson (Nov. 29, 2010), attached as Appendix A to Ex. 5. According to the Water Management Plan – Plant (Barr Engineering, Version 7, December 2017, App. 11.3), the GCL option is probably not viable for meeting the design percolation rate." Joint Petition Ex. 5, cmt. 2; *see also* Joint Petition Ex. 11, cmt. 8 ("The effectiveness of injecting bentonite through the pond water is subject to concern with regard to reliability of the infiltration reduction").

[143] Joint Petition Ex. 10.

[144] "Field demonstration of the bentonite amendment of the pond bottom (as described above) will be focused on demonstrating a systematic and repeatable means and method of introducing bentonite to the pond bottom in a relatively uniform manner. This demonstration will necessarily be delayed until FTB Pond closure so as not to interfere with tailings basin operations during the life of the project, and so that the demonstration can be performed by the contractor selected for the bentonite amendment activities at closure. Testing of bentonite amendment can be simulated in the laboratory as soon as an adequate volume of representative tailings samples from the FTB pond bottom can be collected from the FTB, possibly in Mine-Year 2." Bentonite Pilot Plan at 15.

[145] PTM Appl. at 268.

[146] PolyMet's pilot testing template provides only the barest detail. Dr. Malusis previously discussed in his Dam Safety Comments this concern in detail, and we incorporate his prior comments by reference. Notably, the template provides no performance metrics by which PolyMet will determine success or failure. Without specific outcomes, the DNR has no information regarding under what circumstances bentonite amendment will be used. Beyond that, PolyMet has provided no alternative plan should bentonite prove ineffective and/or destructive.

[147] "Pilot/field-testing of bentonite amendment of beaches cannot occur until a section of Flotation Tailings beach can be established on the south crest of the Cell1E/2E splitter dam (tentatively during year-3 of FTB operations). This will provide sufficient time for PolyMet operations personnel to establish and fine-tune their basin operation activities. Once the test zone is established, the available pilot/field-test window to accomplish the pilot/field-test objectives prior the merging of Cells 1E/2E will be about four years." Bentonite Pilot Plan at 15.

until closure.[148] This is inconsistent with what is known as the Observational Method in tailings design, as has been pointed out by both Dr. Malusis and the DNR's consultant.[149]

Because the basin enhancements to prevent infiltration cannot be demonstrated to "permanently prevent substantially all water from moving through or over the mine waste," or otherwise maintain conditions consistent with a dry closure using "available technology," the Permit cannot be issued as proposed. Instead, the DNR should deny the Application and require the Applicant to design and employ a "dry closure" system, or DNR should require the Applicant to demonstrate proof of the bentonite amendment concept prior to the issuance of the Permit. At a minimum, a contested case hearing is necessary to resolve the issue of whether the proposed FTB liners will perform as proposed.

8.2 The Seepage Collection System Will Fail To Perform As Projected

Neither the DNR nor PCA rules provide that a facility designed to hold wastewater can discharge that wastewater into the environment under the assumption that a secondary system will recapture the released pollutants.[150] However, that is exactly the system that the Applicant has proposed for the FTB, which involves a cutoff trench seepage collection system designed to capture pollutants that seep through the bottom and the dikes of the FTB. Arguably, such a system does not meet the requirements of the rules governing reactive mine waste, which "shall be . . . disposed of . . . to prevent the release of substances that result in the adverse impacts on natural resources."[151] Assuming such a system can be permitted at all, the Conservation Organizations question whether the seepage collection system at the FTB will function at the level assumed by the Applicant. Should the seepage collection system fail, the resulting contaminated water would likely result in pollution to nearby waterways.[152]

The Applicant has taken the position that the seepage collection system for the FTB will capture 90% of the seepage from the FTB, relying on a newer modeling exercise conducted by Barr Engineering (2015b). This model was conducted in an attempt to justify the Applicant's previous assumption (in the draft EIS) that the seepage collection system will capture 90% of the groundwater seeping from the FTB. However, in Dr. Myers' estimation, the new model exercise "was biased toward a high estimate of capture efficiency of seepage from the tails."[153] As a result, the modeling information supporting the Application does not confirm that the seepage collection system will capture 90% of the groundwater seeping from the FTB.

The modeled efficiency of the cutoff wall is also questionable if it is not properly designed and constructed. According to experts in design of similar features, the Applicant's design of the

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[148] *Id.*
[149] Joint Petition Ex. 12 at 3.
[150] *See* Minn. R., chs. 6132, 7001.
[151] Minn. R. 6132.2200, subp. 1.
[152] *See generally*, Joint Petition Ex. 7, App. B (describing the different leakage scenarios modeled by Dr. Myers and their potential to cause harm to surrounding waters).
[153] *See* Joint Petition Ex. 7, App. B at 5-6.

cutoff wall is problematic. First, the cutoff wall *must* be keyed into the underlying bedrock. Mr. Kuipers points out that this means that all of the compactable silt and peat layers, including legacy LTVSMC tailings, must be removed before the bottom of the barrier wall is constructed.[154] Dr. Malusis states:

> Specifications generally call for a minimum depth of key into the lower confining unit to ensure an adequate seal that minimizes underseepage. Without a proper key, the assumption of perfect contact between the cutoff wall and the bedrock in the seepage model is probably a poor assumption that will overestimate the actual seepage capture.[155]

With regard to the Applicant's proposed design, "there is no indication that the wall will be keyed into the underlying bedrock."[156] The Conservation Organizations note that in the FEIS, the Applicant describes the cutoff wall as being "keyed into [the] bedrock".[157] In the Application, however, the description of the seepage collection wall is described only as "installed in the existing overburden down to the bedrock."[158] It would appear, based on the description, that the Applicant has actually changed its intended design to make it less effective.[159]

Second, generally accepted design standards require that an "inward head difference or gradient [] be maintained across the entire [barrier] wall."[160] As stated by Dr. Malusis:

> [t]he cutoff wall will be ineffective as a long-term pollution control barrier unless a sufficient inward head difference is maintained in perpetuity to prevent outward advective transport and adequately reduce the outward diffusive flux of miscible contaminants in the groundwater. However, there does not appear to be a commitment to maintaining a particular minimum head difference or gradient at all locations along the wall [in The Applicant's application or in DNR's conditions]. *The*

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[154] Jim Kuipers, "Review of NorthMet Mining Project Dam Safety Permit", Kuipers & Assocs., LLC, 23-24 (Sep. 30, 2017), attached as Ex. 2 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.
[155] Joint Petition Ex. 5, cmt. 10.
[156] Joint Petition Ex. 5, cmt. 10.
[157] *NorthMet Mining Project and Land Exchange Final Environmental Impact Statement*, Minn. Dep't of Natural Resources, U.S. Army Corps of Eng'rs, U.S. Forest Serv. 5-185 (2015).
[158] PTM Appl. at 269.
[159] This conflicting description highlights the problem created by DNR's approval of the Application and supporting documents as the basis for this proposed Permit. The Application includes both the application document, but also the FEIS (App. 16.1). The permit fails to establish what requirement prevails in the event there is a conflict, or something is unclear.
[160] Joint Petition Ex. 5, cmt. 12.

> *magnitude of the inward head difference or gradient that needs to be maintained across the wall should be specified.*[161]

Although the Applicant posits that such an inward gradient will exist, the Applicant has failed to specify the inward head difference of gradient that needs to be maintained.

Because the modeling exercise is tilted towards the desired outcome and the design and construction of the seepage collection system is not consistent with industry practices, the DNR cannot conclude that the seepage collection system will perform as the Applicant suggests. The DNR should not approve the Application on the basis of the information provided. Instead, the DNR should require the Applicant to provide clearer specifications for the cutoff wall and remodel with more accurate (less biased) assumptions. The DNR should only move to issue the Permit if the remodeling demonstrates that the leakage from the seepage collection system will not impact natural resources. The Conservation Organizations therefore file this Objection and request a contested case hearing on whether or not the seepage collection system will function as designed and whether it will meet the requirements of DNR's nonferrous rules.

9.0 MINE WASTE CHARACTERIZATION

9.1 The reactive mine waste the NorthMet project will generate has not been adequately characterized.

The goal of the DNR's mining rules is to reduce or minimize the impact of mining "to the extent practicable."[162] As the phrase is defined, this means that the Permit to Mine must require the application of "technologies and practices including methods, specifications, guidelines, standards, and engineering safety factors, developed for and commonly used in mining or in reasonably similar activities."[163] The DNR has established a more stringent standard for reactive mine waste, which must be "mined, disposed of, and reclaimed *to prevent the release* of substances that result in adverse impacts on natural resources."[164] "Reactive mine waste" means waste that is shown through characterization studies to release substances that adversely impact natural resources.[165] Rule 6132.2200 requires "chemical and physical characterization of mine waste" both before the submission of an application and during the process of mining.[166]

Based on the rules cited above, characterization of mine waste, including reactive mine waste, must be in accordance with commonly used methods, specifications, guidelines, standards, and engineering safety factors developed for and commonly used in mining. However, the

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[161] *Id.*
[162] Minn. R. 6132.0200.
[163] Minn. R. 6132.0100, subp. 17.
[164] Minn. R. 6132.2200, subp. 1 (emphasis added).
[165] Minn. R. 6132.0100, subp. 28.
[166] Minn. R. 6132.2200.

characterization of the mine waste performed for the Permit does not meet those commonly-used guidelines and will not ensure that the Permit meets the more stringent prevention standard established for the mining of reactive mine waste.

MCEA submitted the waste characterization studies in the Application and supporting documents to Dr. Ann S. Maest, PhD, an expert in geochemistry. Based on her analysis, Dr. Maest concluded that:

- The number of samples analyzed for acid-base accounting, whole rock chemistry, and mineralogy is inadequate for waste rock and ore. Only 84 samples were analyzed, and the total should have been over 250. The low number of samples indicates that the possible range, especially the upper range, of sulfide and metal content is not known. Statements that Category 1 wastes will have a sulfide content under 0.12% are therefore unreliable.

- Waste rock and ore samples were not analyzed for neutralization potential (NP), which is used to estimate the potential of a waste to produce acid. A surrogate, percent total carbon, was measured but did not reflect the carbonate content of the materials. Neutralization potential measurements were conducted on all other mined materials (flotation tailings, LTVSMC tailings, metallurgical residue, overburden, and saturated overburden). The NP values of the waste rock and ore are important to know for internal consistency. The limited mineralogic results indicate that waste rock has nearly no ability to neutralize acidic leachate, should it develop in the stockpiles or the pit.[167]

Dr. Maest reached her conclusion regarding the inadequacy of the sample numbers based on accepted industry standards for sampling as set forth in her report.[168] Similarly, her conclusion that the waste rock and ore samples needed to be analyzed for neutralization potential (NP) is based on standards commonly used by mines.[169] Based on industry standards, the method used by the Applicant (which relied on testing for "carbonate" rather than NP) is not reliable unless linked with mineralogic analysis showing that the carbon is associated with a neutralizing carbonate mineral such as calcite or dolomite, which was not performed.[170] This lack of analysis (combined with the inadequacy of the number of samples) undermines key assumptions regarding the leachate that will be generated, particularly for the Category 1 rock, which is to be stored permanently on an unlined site, and creates a material issue of fact with regard to the adequacy of the storage design, as is discussed below.

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[167] Joint Petition Ex. 4 at 1.
[168] *Id.* at 4.
[169] *Id.* at 5.
[170] *Id.* at 6.

Because the characterization of the mine waste performed for the Permit was inadequate with regard to waste rock and ore, the DNR should reject the Application and deny the Permit until sufficient characterization information has been submitted. In the alternative, the Conservation Organizations file this Objection and request that the DNR grant a contested case hearing request on the adequacy of the characterization of the waste rock and ore and the implications of the inadequacy on the facility designs.

9.2 The Waste Rock Cannot Reliably Be Sorted Into The Proposed Stockpiles.

A key aspect of the NorthMet Mine Project related to the inadequate characterization of wastes is the separation of more reactive wastes from the less-reactive wastes that will be placed in the permanent Category 1 stockpile.[171] The Category 1 stockpile is a permanent stockpile that will eventually be covered, but only after an undefined time of up to 20 years. The Category 1 stockpile will not be on a liner, although there is a system intended to capture surface and groundwater drainage originating from the stockpile. The issue is whether the design of the Category 1 stockpile will "prevent the release of substances that result in adverse impacts on natural resources" under the higher standard applicable to reactive waste if the Applicant cannot successfully separate reactive waste from the less-reactive wastes intended to report to the Category 1 stockpile.[172]

Based on the analysis of the Application by Dr. Maest, the Applicant's assumptions regarding its ability to successfully categorize the Category 1 waste rock generated by the NorthMet Mine Project and control its discharges are questionable. Dr. Maest concludes:

- The consistent separation of Category 1 wastes from wastes and ore with higher sulfide content during operations will be difficult, if not impossible, and this waste management challenge has important implications for water pollution at the mine site.
- No adaptive management plan exists for waste rock management. Given the uncertainties associated with separating the different waste categories and ore, and the potential adverse environmental consequences if more reactive materials are included in lower category wastes, the plan is especially important for wastes reporting to the Category 1 stockpile, which will sit on the land surface in perpetuity.

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[171] As noted above, according to SRK Consulting (2007a, p.ii) all waste categories are considered "reactive" including what is currently defined as Category 1 wastes because all categories produce drainage that would be unsuitable for direct discharge. Based on this statement and others in the Application, The Conservation Organizations assume that the DNR and the Applicant have conceded that all waste produced by this proposed mining operation is properly classified as "reactive mine waste." If this is not the case, The Conservation Organizations demand a contested case hearing on this issue based on the information in Dr. Maest's report and in the Application itself describing the predicted reactivity of the waste rock and tailings.

[172] Minn. R. 6132.2200, subp. 1.

- Incorrect assumptions about acid drainage and contaminant leaching have led to underestimation of the impact of mine water on the environment at and around the mine and plant sites.[173] These include assuming that once wastes go acidic the pH will "recover," ignoring the contribution of secondary salts to leaching of wastes and ore, and incorrect conceptual models about release rates and concentration caps.[174]

Dr. Maest reached these conclusions based on the proximity of the Category 1 waste to more reactive wastes within the zones of the mining area, and the potential for the more reactive wastes to become incorporated into the Category 1 stockpile, where they could contribute to metal leaching.[175] Dr. Maest also reaches these conclusion based in her observation that the total metal content of Category 1 wastes is not notably different than that of the other waste categories of ore, and because the metal content is sometimes higher in the Category 1 waste.[176] Finally, Dr. Maest has concluded that assumptions about pH recovery will not be valid in "field conditions" in the waste rock stockpiles where exposure of "secondary salts" to precipitation will lead to higher releases of metallic pollutants than assumed.[177] This conclusion is based on the data in the Application and on the results of studies of the releases related to the Dunka Mine stockpiles.[178]

Based on Dr. Maest's analysis, there is a material issue of fact with regard to the adequacy of the design of the waste stockpiles, and in particular the Category 1 stockpile. At a minimum, the permit should not be issued until the Applicant has developed an Adaptive Management Plan that identifies the actions required if testing results indicate that wastes have been mixed, an evaluation of the impacts based on monitoring results, mitigation measures to be employed, mine company and agency responsibilities, timelines for actions, and an evaluation of the effectiveness of the mitigation measures employed. If the DNR does not require such a plan prior to issuance of the Permit, the Conservation Organizations file this Objection and request that a contested case hearing should be granted to determine if such a plan or other changes should be required before a permit to mine is issued. These changes might include a more robust liner and containment system for the Category 1 stockpile.

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[173] This issue also includes the adequacy of the plan to mitigate pollutants from the waste rock by placing that rock in the mine pits and flooding (over a period of years) those pits to reduce oxidation of the waste rock. See PTM Appl. at 174-5. If assumptions regarding the generation of pollutants are inaccurate, these mine pits could be significant sources of groundwater pollution. See Joint Petition Ex. 7 at 7.
[174] Joint Petition Ex. 4 at 1-2.
[175] *Id.* at 6-9.
[176] *Id.* at 8.
[177] *Id.* at 11-12.
[178] *Id.* at 12.

10.0 Waste Rock Stockpile Seepage Collection Systems Are Inadequate

Under the DNR's rules governing mining permits, "[s]torage piles must be designed and constructed to minimize hydrologic impacts, enhance the survival and propagation of vegetation, be structurally sound, control erosion, promote progressive reclamation, and recognize the conservation of the mineral resources."[179] In addition, storage piles containing reactive mine waste must also comply with the requirements of Minn. R. 6132.2200.[180] The general standard of the reactive mine waste rule states that "[r]eactive mine waste shall be mined, disposed of, and reclaimed to prevent the release of substances that result in the adverse impacts on natural resources."[181] The reactive mine waste rules include the requirement that "during construction to the extent practicable . . . [the Permittee must] permanently prevent substantially all water from moving through or over the mine waste and provide for the collection and disposal of any remaining residual waters that drain from the mine waste in compliance with federal and state standards."[182] Finally, the nonferrous mining rule includes the concept of minimizing affects "to the extent practicable," which means that the Applicant must use technologies and practices that are developed for and commonly used in mining that are the "most effective and workable means of achieving reclamation, including being technologically, economically, and practically applicable."[183]

10.1 The Controls For The Category 1 Stockpile Will Not Minimize Hydrologic Impacts

As designed, the Category 1 storage pile will be permanent.[184] At some point after its creation (approximately year 14), the Applicant will cover the Category 1 storage pile with a cover system intended to prevent infiltration into the waste rock on a permanent basis.[185] The Category 1 storage pile will not have a liner.[186] To control seepage from the Category 1 storage pile, the Applicant proposes to build a "cutoff wall" with a collection system that will capture the seepage and direct it to treatment.[187] The Applicant has modeled the capture from this system, and has estimated that it will recover of 91% to 99% of the seepage from the waste rock.[188] Whether this system will work as designed is important because, as discussed in Section VI.D.2 of this Petition, the Applicant is unlikely to be able to characterize and segregate less reactive rock successfully, and it is likely that more highly reactive waste rock will be mixed into the Category 1 stockpile. If the safeguards intended to recapture the seepage do not

[179] Minn. R. 6132.2400, subp. 1.
[180] *Id.*, subp. 2(A)(2).
[181] Minn. R. 6132.2200, subp. 1.
[182] *Id.*, subp. 2(B)(2).
[183] Minn. R. 6132.0100, subp. 17.
[184] PTM Appl. at 287.
[185] *Id.* at 289.
[186] *Id.* at 288.
[187] *Id.*
[188] Joint Petition Ex. 5, cmt.10.

operate as designed, there is the potential for pollutants from the Category 1 stockpile to reach the Partridge River, based on the modeling conducted by Dr. Myers.[189]

According to Dr. Chambers, who is an Engineer and Professional Geophysicist, the quality and efficacy of a cutoff wall will depend on:

(1) How well the cutoff wall can be grouted into the fractured bedrock to avoid contaminants moving under the wall in more permeable sediments;

(2) How effective the collection system on the upstream side of the cutoff wall is at removing pressure on this barrier; and,

(3) The permeability contrast between the cutoff wall and the adjacent sediments.[190]

As will be shown below, the construction method and design of the Category 1 storage pile collection system is questionable with regard to each of these elements.

10.2 The Cutoff Wall Will Not Recapture Seepage At Predicted Levels Given Its Construction Method

As noted above, the Applicant is considering construction of the cutoff wall using a construction technique that does not involve digging a trench to bedrock, particularly if this method appears more economical.[191] The Applicant previously planned to construct the proposed cutoff wall using a trenchless in-situ construction technique whereby a mechanical mixer is inserted into the ground along the cutoff wall alignment,[192] but has since been equivocal about the specific methods.[193] For trenchless construction, the mixer 'walks' down the cutoff wall alignment and mixes the soil along the cutoff wall location with bentonite.[194] Both Dr. Chambers and Dr. Malusis identified the trenchless construction method as problematic. Dr. Chambers notes that the trenchless construction process will make it difficult to grout the wall into the fractured bedrock because it will be hard to determine "what is truly at the bedrock interface since no geologic logging or permeability measurements are being

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[189] According to Dr. Myers, if the cutoff is not 100% effective, contaminants will reach the upper part of the Partridge River and will begin to flow south toward the lower reaches of the Partridge River. *See* Joint Petition Ex. 7 at 6.

[190] David Chambers, "Comments on the Final Environmental Impacts Statement (FEIS) NorthMet Mining Project and Land Exchange", Ctr. For Science in Pub. Participation, (Dec. 9, 2015) at 4, attached as Ex. 15 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits [hereinafter "Chambers FEIS Comments"]. The third issue identified by Dr. Chambers seems to have been adequately addressed by the Applicant in the Permit to Mine application. *See* PTM Appl. at 288.

[191] PTM Appl. at 288.

[192] *See* Technical Memorandum from Tom Radue, Bethany Erfourth, and Kristin Alstadt, Barr Eng'g, to PolyMet Mining Inc. (Apr. 19, 2013), *available at* https://www.leg.state.mn.us/docs/2015/other/150681/PFEISref_1/Barr%202013k.pdf.

[193] PTM Appl. at 288.

[194] Technical Memorandum, *supra* note 192.

made[,]"[195] and he warns that "[i]f the mechanical mixer does not reach fractured bedrock, for any reason, a zone of relatively higher permeability for contaminants to escape could be created."[196] Similarly, Dr. Malusis, who is also an expert on waste containment barriers, has expressed concern regarding whether the cutoff wall is adequately "keyed into the underlying bedrock."[197] Dr. Malusis states that, "[w]ithout a proper key, the assumption of perfect contact between the cutoff wall and the bedrock in the seepage model is probably a poor assumption that will overestimate the actual seepage capture."[198] The DNR should not approve the Application unless a construction method is specified that will result in a cutoff wall that is keyed to bedrock and a requirement to have a specified minimum depth of key for the wall.[199] As currently written, the application does not commit the Applicant to "keying" the Category 1 cutoff wall into bedrock. Without such a commitment, Dr. Malusis has warned that the Applicant's current estimation of 91% to 99% of seepage capture "may be optimistic."[200] As this assumption is key to the requirement for the DNR to find that the Permit will "prevent the release of substances that result in the adverse impacts on natural resources" within the meaning of Minn. R. 6132.2200, this issue is material to whether the Permit should be issued. If the DNR does not require the Applicant to modify the application, the Conservation Organizations request a contested case hearing on this issue.

10.3 The Cutoff Wall Will Be Ineffective As A Long-Term Pollution Control Barrier Unless A Sufficient Inward Head Difference Is Maintained

As noted above, Dr. Chambers indicates that the function of the cutoff well will depend on how effective the collection system on the upstream side of the cutoff wall is on removing pressure on the barrier.[201] Dr. Malusis also notes that the function of the cutoff wall is tied to maintaining a sufficient inward head difference is necessary in order for the cutoff wall to function as an effective "long-term pollution control barrier."[202] When installed properly, "a sufficient inward head difference is maintained in perpetuity to prevent outward advective

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[195] Chambers FEIS Comments at 4.
[196] *Id.*
[197] Joint Petition Ex. 5 at 10. The Applicant included a plan to key the barrier wall into the bedrock (FEIS at 5-7). In the application, there is no mention of keying the barrier wall into the bedrock (nor is there any mention in App. 16.17 – Geotechnical Data Package – Volume 3: Stockpiles). Rather, the Applicant simply states that a "supplemental geotechnical investigation at the Mine Site [will be conducted] to gather additional data on subsurface conditions for use in final design of this stockpile and the associated groundwater containment system." PTM Appl. at 287. It would appear that the Applicant is thus changing the design of the storage pile.
[198] Joint Petition Ex. 5, cmt.10.
[199] *Id.*
[200] *Id.*
[201] Chambers FEIS Comments at 5.
[202] Joint Petition Ex. 5, cmt. 12.

transport and adequately reduce the outward diffusive flux of miscible contaminants in the groundwater."[203]

Despite these industry standards, the Application fails to establish a commitment to maintaining a particular minimum head difference or gradient at all locations along the wall, in perpetuity. As the Permit is currently written, there is no way to enforce a standard for the performance of this important aspect of the cutoff wall. The magnitude of the inward head difference or gradient that needs to be maintained across the wall should be specified in the permit, as Dr. Malusis has recommended.[204] If the DNR does not agree that the permit must include this specification, the Conservation Organizations object and request a contested case hearing to determine if the current design "prevents the release of substances that result in the adverse impacts on natural resources" within the meaning of Minn. R. 6132.2200.

10.4 The Category 2/3 Stockpile Liner Is Inadequate to Prevent Contamination

The regulatory standards established by Minn. R. 6132.2200 and 6132.2400 apply also to the Category 2/3 waste rock stockpile proposal. As noted above, the reclamation rules applicable to nonferrous facilities include the goal of minimizing affects "to the extent practicable," which means that the Applicant must use technologies and practices that are developed for and commonly used in mining that are the "most effective and workable means of achieving reclamation, including being technologically, economically, and practically applicable."[205]

Unlike the Category 1 stockpile, the Applicant does propose to place the reactive Category 2/3 waste rock on a liner system. As designed, the proposed liner will be a double liner, comprised of an 80 mil LLDPE geomembrane with 12-inch (minimum) thick compacted soil liner which, the Applicant states, will "limit the downward infiltration of water through the liner system."[206] The Applicant asserts that the composite liners for the Category 2/3 waste rock will be similar to those used for modern heap leach facilities.

If the Applicant intended that the Category 2/3 liner system meet the standard for heap leach facilities, it has failed. As highlighted by Dr. Malusis:

> The Applicant notes that the composite liner systems proposed for these stockpiles are similar to those used for modern heap leach facilities. However, a maximum *k* of 10^{-6} cm/s is recommended for the compacted soil component of heap leach pad liners. While this is the case for the Category 4 stockpile, a maximum hydraulic conductivity of 10^{-5} cm/s is prescribed for the Category 2/3 stockpile liner. *A maximum k of 10^{-6} cm/s*

[203] *Id.*
[204] *Id.*
[205] Minn. R. 6132.0100, subp. 17.
[206] PTM Appl. at 292.

should be specified for both liners, consistent with the standard of practice for heap leach pads.[207]

Dr. Malusis' opinion is bolstered by the fact that the Applicant is unlikely to be able to successfully segregate the waste rock into the discrete categories that it has proposed, as described in Part VI.D.2.

Because the proposed liner does not meet the standard that the Applicant itself appears to feel is warranted, the Category 2/3 waste rock stockpile will not comply with the "to the extent practicable" standard and the DNR cannot conclude that the reclamation will "prevent the release of substances that result in the adverse impacts on natural resources" within the meaning of Minn. R. 6132.2200. As a result, the DNR should require the Applicant to do as Dr. Malusis suggests: place the Category 2/3 waste rock on a liner system that is the equivalent of that used for the Category 4 waste rock. If the DNR does not agree to make this change, the Conservation Organizations object and demand a contested case hearing on this material issue of fact.

11.0 WATER MONITORING PLAN IS INADEQUATE TO DETECT CONTAMINATION

The reactive mine waste rule provides that the reactive mine waste storage facility design shall: "(1) describe all materials, construction, and operating performance specifications and limitations that must be maintained to ensure protection of natural resources; (2) identify monitoring locations to ensure compliance with the design . . . ."[208] They also state that the purpose of regulatory requirements is "to control possible adverse environmental effects of nonferrous metallic mineral mining,"[209] including hydrologic impacts.[210] In addition, tailings basin designs must describe "operating performance specifications and limitations that must be maintained to ensure protection of natural resources," including water.[211] The design of the tailings basin monitoring plan must accordingly demonstrate that it will "minimize hydrological impacts" and "ensure protection of natural resources."[212]

The design of the monitoring system is a key component to ensuring that the mining operation can be conducted safely and consistently with its design. If the monitoring system is inadequate, the Applicant and regulators cannot identify problems in a timely manner. If

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[207] Joint Petition Ex. 5, cmt. 14 (internal citations omitted).
[208] Minn. R. 6132.2200, subp. 2(C)(2); *see also* Minn. R. 6132.2200. Minn. R. 6132.2400, subp. 2, item (4).
[209] Minn. R. § 6132.0200.
[210] Minn. R. § 6132.2500, subp. 1.
[211] Minn. R. § 6132.2500, subp. 2(B)(3).
[212] These requirements are mirrored in the reactive waste rules. Reactive mine waste "shall be mined, disposed of, and reclaimed to prevent the release of substances that result in the adverse impacts on natural resources." Minn. R. § 6132.1300, subp. 1. Minnesota Rules § 6132.2200 subp. 2(C)(2) requires that "[t]he reactive mine waste storage facility design shall . . . describe all materials, construction, and operating performance specifications and limitations that must be maintained to ensure protection of natural resources . . . and identify monitoring locations to ensure compliance with the design."

problems are not detected, mitigation plans and corrective actions cannot be timely implemented, nor can financial assurance needs be accurately calculated.[213]

Dr. Myers, who has worked extensively with hydrologic monitoring systems, reviewed the design of the monitoring systems associated with the Application. Based on Dr. Myers' review, the design of the monitoring system for the waste rock piles will not be adequate to protect natural resources because it will allow for undetected contamination plumes from multiple mine site and plant site sources.[214]

The primary problem that Dr. Myers identified stems from the fact that monitoring locations only warn of a leak if the leak lies within the direct pathway of the monitor.[215] The monitoring wells proposed in the Application are in very close proximity to the stockpiles,[216] and as a result, "detailed modeling of the mine site and the plant site showed that contaminant plumes would miss much of the proposed monitoring."[217] The monitoring wells are quite simply spaced too widely to detect contaminant plumes from the mine operations.[218] His modeling demonstrates that a number of plumes from the mine site and tailings basin will evade detection altogether.[219]

Dr. Myers lists out the four steps necessary for establishing and exercising an adequate monitoring plan:

1. Identify the groundwater dependent ecosystems and wells that should be protected. Determine what is necessary to protect them.
2. Develop a localized conceptual flow model that describes the hydrologic system that supports each groundwater dependent ecosystem and water right. This would be more detailed than conceptual flow model (CFM) used for a large region because broad-scale flows do not describe small features well. For example, some springs may be perched and therefore affected only by nearby local contaminations but larger sinks such as the Partridge River could be supported by groundwater flow from much further away.
3. Implement the more refined CFM to estimate the detailed pathway between the potential sources and sinks. Because the sources could be a large area, such as the entire area beneath the Cat 1 waste rock stockpile,

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[213] Mine Closure Handbook at 54 ("All liners leak to a degree, and the more effective they are the less the tailings will drain and consolidate. Further, liners have a finite life, and will fail following the closure of the TSF, when the resources available to remediate the failure will be limited.").
[214] Joint Petition Ex. 7 at 9, App. A at 17, 21.
[215] *Id.* at 9.
[216] The same issue pertains to the Floatation Tailings Basin. *See id.*
[217] *Id.*
[218] *Id.*
[219] *Id.*

the pathways could be defined as an envelope of paths. This may require numerical modeling or data collection to estimate the paths.

4. Determine the type and location of monitoring that would allow the prediction of changes. For water quality, this means determining the depths to screen the well. Understanding uncertainty should inform these decisions, with more monitoring required where pathways are difficult to estimate.[220]

Because Dr. Myers has demonstrated that there is a substantial chance that the monitoring system that the Applicant proposes to use will fail to find leakage, the Conservation Organizations request that the Applicant implement Dr. Myers' recommendations listed above by requiring the Applicant to create an adequate monitoring system before the Permit is approved. If the DNR does not require the Applicant to undertake such work, the Conservation Organizations object and request that the DNR grant a contested case hearing on this issue, as it constitutes a contested issue of material fact with regard to whether the Application meets the standard for the design of a monitoring system require by Minn. R. 6132.2200.

If there is a release of pollutants into the groundwater or other failure of the FTB, the Applicant is required to inform the DNR and provide immediate corrective action or a corrective action plan.[221] Once a corrective action plan is in place, the Applicant must provide an annual corrective action cost estimate.[222] Monitoring must at least be sufficient to let the Applicant know when the FTB is leaking pollutants into the groundwater and corrective action is required. It must also be sufficient to allow the Applicant to make regular estimates of the true cost of corrective action.

In addition, "[a] contingency reclamation plan including closure and postclosure maintenance shall be submitted with the annual report to identify reclamation activities that would be implemented by the permittee if operations cease in the upcoming calendar year."[223] Financial assurance is adjusted annually in accordance with this annual estimate of reclamation costs, so failure to accurately detect groundwater contamination will produce an underestimate of reclamation costs, which will then make the financial assurance insufficient and not "available when needed."[224]

If one does not know that groundwater is compromised, one cannot correct the problem and one cannot plan proper reclamation of the site. The Applicant's proposal amounts to willful ignorance. The monitoring plan is not adequate to allow the Applicant to fulfill its responsibility to provide corrective action, regular corrective action cost estimates, and contingency reclamation plans as required by the rules.

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[220] *Id.* at 8-9.
[221] Minn. R. 6132.3100, subp. 2.
[222] Minn. R. 6132.1300, subp. 5(C).
[223] *Id.*, subp. 4.
[224] *See* Minn. R. 6132.1200, subp. 5.

Dr. Myers' report details the various pathways that contaminant plumes would take, should the seepage collection system fail to collect 100% of the seepage from the tailings basin. Dr. Myers concluded that:

> [Monitoring wells] will show a decrease in concentration due to seepage capture, but they will not show leaks with certainty because they are spaced too far apart. Monitoring wells located midway between the impoundment and the river show contaminants reaching the wells, but do not begin responding for 20 or more years. This shows they would not be good indicators of a leak. Simulated plumes from leaks placed within the simulated tailings basin could miss the monitoring wells (Appendix A, p. 32-60). *This is because the width of the plumes is less than the spacing of the monitoring well.*[225]

The modeling indicates that there need to be more wells if water contamination is to be detected promptly and accurately. For instance, Dr. Myers notes that "[t]here should be more compliance wells along the center of the simulated plumes to increase the chances of detecting plumes."[226] Furthermore, "[t]he variable slopes in the cumulative load curve, both for with and without the cutoff wall, shows the need for at least four surface water monitoring points along the river, at around mile point 6, 8, 10, and 13."[227]

The modeling also shows that the wells need to be placed more effectively. By way of example, Dr. Myers says "[p]roposed monitoring wells on the edge of area between the tailings and the Embarrass River are too far west and east to monitor most plumes emanating from either the entire tailings impoundment or from specific leaks within the impoundment."[228] Because these contaminant plumes move slowly, this monitoring "must continue for hundreds of years after closure, even if the wells show little contamination at closure."[229]

Whether the proposed monitoring plan is adequate to detect a leak from the FTB and whether 150 years of active monitoring is required are questions of material fact. The DNR cannot issue the permit as drafted. The DNR must either require the Applicant to provide an adequate plan for monitoring pollutant discharge or at the least hold a contested case hearing to determine whether the proposed monitoring system is sufficient to allow the Applicant to take required corrective action and provide accurate corrective action cost estimates as required by Minnesota rules.

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[225] Joint Petition Ex. 7 at 11 (emphasis added).
[226] *Id.* at 12.
[227] *Id.* at 57.
[228] *Id.* at 12.
[229] *Id.* at 50.

12.0 FINANCIAL ASSURANCE

Under the DNR's financial assurance rules, financial assurance for reclamation and for corrective action must meet the following criteria:

> A. assurance of funds sufficient to cover the costs estimate under subparts 2 and 3;
> B. assurance that the funds will be available and made payable to the commissioner when needed;
> C. assurance that the funds will be fully valid, binding, and enforceable under state and federal law;
> D. assurance that the funds will not be dischargeable through bankruptcy; and
> E. all terms and conditions of the financial assurance must be approved by the commissioner. The commissioner, in evaluating financial assurance, shall use individuals with documented experience in the analysis. The reasonable cost shall be paid by the applicant.[230]

As described by Mr. Kuipers in his attached report,[231] the total amounts of the financial assurance proposed are significantly improved since the Applicant first submitted its Permit to Mine Application in November of 2016, particularly with regard to the time horizon and the discount rate. At this stage, the most critical aspect of the financial assurance process is to take actionable steps to ensure that those total amounts of financial assurance become durable in the event that the state is forced to assume control of reclamation or the Applicant is unable to access capital markets or make trust fund contributions in the amounts required. The failure to make this financial assurance package durable and enforceable will leave taxpayers exposed to hundreds of millions in public liabilities.

The Conservation Organizations believe there are four matters upon which there is a reasonable basis that facts material to the permit are in dispute. First, the financial assurance proposal provides for a schedule for deposits in the trust fund that fails to ensure the funds will be sufficient and "available and made payable to the commissioner when needed."[232] Second, the estimates for reclamation costs were unreasonably lowered between the initial and revised permit applications by using contractor quotes rather than the industry standard SRCE (Standard Reclamation Cost Estimator) methodology. Third, given the legal complexity of ensuring that financial assurance instruments are protected from being included in a bankruptcy estate, the DNR must require that the final documents be reviewed by an attorney with expertise in both contract and bankruptcy law, as required by Minn. R. 6132.1200, subp. 5(E). Finally, the Conservation Organizations argue that the Applicant does not have the

[230] Minn. R. 6132.1200, subp. 5.
[231] Joint Petition Ex. 3 § 2.
[232] Minn. R. 6132.1200, subp. 5.

necessary capital or access to capital to conduct the mining operations or to fund the financial assurance requirements contained in the Draft Special Conditions, thereby violating Minn. R. 6132.0300.

12.1 The schedule for contributing to the trust fund must be evenly spaced to reduce the risk of project cessation during years in which long term costs would exceed $1.1 billion

Although we are heartened to see the improvements in the financial assurance package, the Conservation Organizations were alarmed to see that the schedule for making deposits into the trust fund for long term water treatment is so heavily back-weighted as to make the entire enterprise almost entirely aspirational. Attachment 2 to the Draft Special Conditions states that for Mine Years 1 through 8, the Applicant must contribute $2 million cash annually to the trust fund for long term costs.[233] This will result in total trust fund contributions of roughly $26 million at the end of Mine Year 8 ($10 million initial contribution + $16 million in annual contributions), to fund a reclamation and long term liability of almost $900 million.[234] Beginning in Mine Year 9, those required contributions increase dramatically. Although the exact amount may vary if larger than expected contributions have been made, assuming that the minimum contributions are made, the Applicant's required contribution in Mine Year 9 would be $55.4 million.[235]

There is no evidence to support the assumption that the Applicant's financial prospects could remotely support such a dramatic ramp-up in contributions. The Applicant's failure to meet those expectations would result in the required funds being neither "sufficient" nor "available" to the Commissioner when needed, in violation of Minn. R. 6132.1200. This can be readily demonstrated by projecting the annual revenues for the proposed mine. Because the DNR has consistently refused to require the Applicant to update its Definitive Feasibility Study (DFS), MCEA commissioned financial assurance expert Jim Kuipers to complete his own DFS for the PolyMet project based on more current metals prices. That analysis, attached as Exhibit 13 to the Joint Petition, demonstrates that the project's peak profitability is in the first four years of production, during the time in which the Applicant's trust fund contributions are trivially low.[236] The Project's revenue generation tapers off exactly when the Applicant's trust fund obligations go vertical. This profitability frontload can also be seen in the Applicant's most recent Technical Report, in which graphs show that the highest copper ore grades will be processed in year 4, followed by a tapering off, and finally, a late stage rebound.

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[233] Draft Special Conditions, Attach. 2 at 4.
[234] Draft Special Conditions, App. A at 2.
[235] Draft Special Conditions, Attach. 2 at 5.
[236] Jim Kuipers, PE, PolyMet NorthMet Mine Economic Analysis (Feb. 23, 2018), attached as Ex. 13 to the Joint Petition for a Contested Case Hearing submitted Feb. 28, 2018.

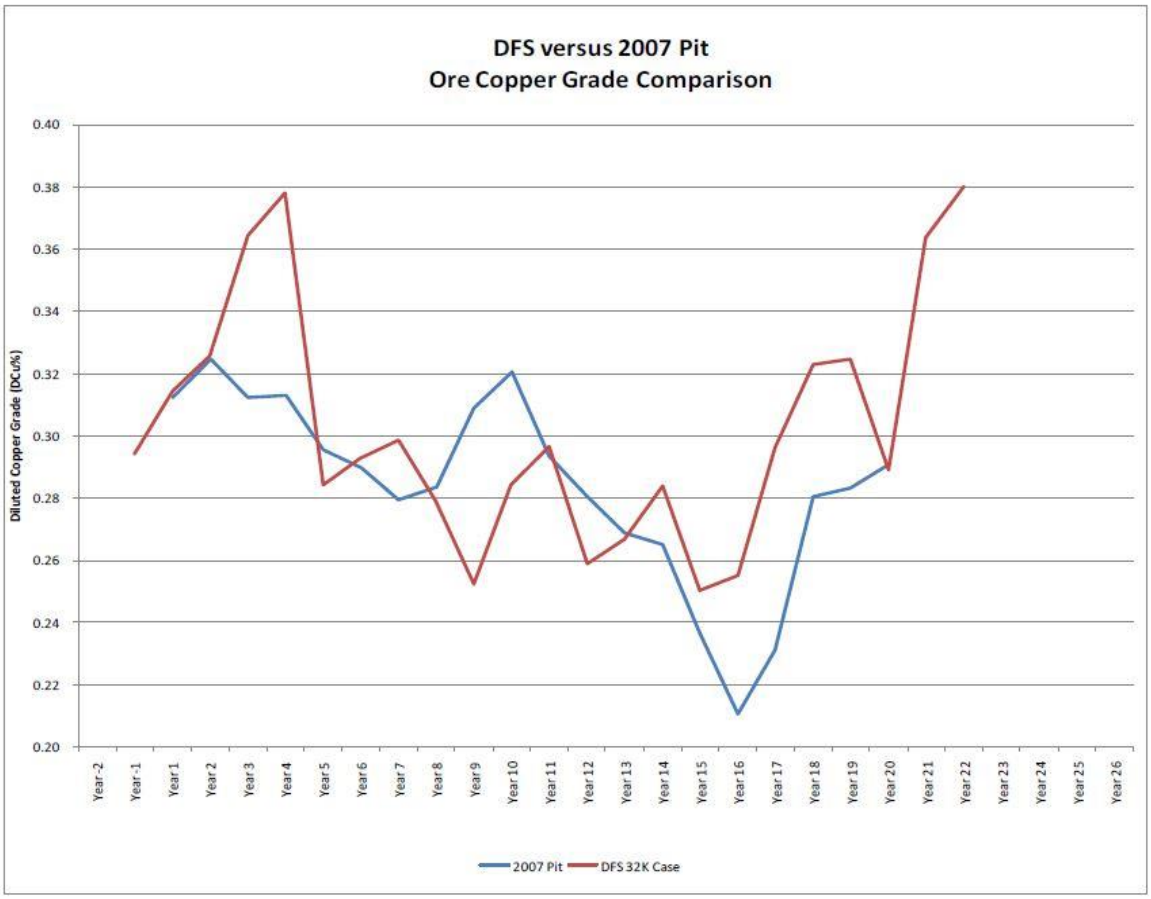

Figure 1: Reproduction of graph from Updated NI 43-101 Technical Report on the NorthMet Deposit, Appendix G, January 14, 2013.

A detailed look at the revenue projections is nothing short of shocking, making it clear that the trust fund contributions are strictly a matter of faith. In Mine Year 9, for instance, 72% of the Applicant's projected income will be dedicated to financial assurance costs, primarily in the form of the ramped up trust fund contributions.[237] The Conservation Organizations find it simply unbelievable to presume that the Applicant will be contributing 72% of their income into a trust fund for the benefit of the state. In Mine Year 15, the Applicant is projected to be *cash flow negative*: the Applicant will not produce enough revenue to pay for its financial assurance obligations.[238]

The financial impact of these obligations is directly relevant to the risk that taxpayers will bear the burden of reclamation and long term water treatment costs. As Mr. Kuipers notes in his analysis, the balloon payment structure for the trust fund contributions "suggests the project is

[237] *Id.* at Table 5.
[238] *Id.*

at a significant risk of cessation beginning" in Mine Year 9, "particularly if metals prices were to become unfavorable."[239] The extent to which metals prices affect the Project's economics can be seen in Exhibit 13's Table 4, which summarizes the projected revenues in a low commodity price environment such as existed in 2006, along with the impact of financial assurance obligations. In a low price market, the Project is cash flow negative for the first five years, and the Internal Rate of Return is reduced to 6.9%, virtually guaranteeing that the Project would be abandoned by investors, leaving the Applicant without any capital to operate the mine.[240]

It is particularly troubling that the severe back-weighting of the trust fund contributions is coupled with the DNR's refusal to require the Applicant to update its DFS, despite DNR's own consultants urging this very concern. In the PolyMet Financials Task 1B Report prepared for DNR by EOR, Spectrum Engineering, and Jardine Lloyd Thompson (JLT), the consultants observed that "access to an updated financial feasibility study and cash flow projections is paramount."[241] This same group recommended that the feasibility study must be updated "to include legacy costs, financial assurances estimates, reclamation costs, and long-term treatment and maintenance costs." [242] The DNR's consultants were clear that educated, responsible decision making on a mining permit containing financial assurance requirements is critically dependent on access to this information, and that without it, the public is at risk:

> The State needs to review this information in order to form an opinion regarding PolyMet's cash flow capacity and to assess how the rate of financial assurance funding would affect the NorthMet's project economics. This is critical to determine the risk of PolyMet not meeting their financial assurance funding obligations.[243]

The DNR chose not to listen to this clear advice. Instead, it issued the Draft Special Conditions, which contain the relevant financial assurance requirements such as the timeline for trust fund contributions, without the benefit of the updated cash flow analysis. Instead, the DNR observed that an updated study was expected to be submitted in March 2018, and that the agency would review that study prior to final decisionmaking.[244]

Such a timeline obviously deprives the public of any meaningful opportunity to comment on an issue that is critical for taxpayers. The Conservation Organizations accordingly reserve the

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[239] *Id.* at 5.
[240] *Id.* at Table 4.
[241] EOR, Jardine Lloyd Thompson, and Spectrum Engineering, *Financial Assurance Review and Evaluation for the NorthMet Mining Project: Phase I – Task 1B Report: PolyMet Financial Capabilities* 3 (2016) [hereinafter "EOR Financial Assurance Review 1B"].
[242] *Id.*
[243] *Id.*
[244] Dan Kraker, *PolyMet Is Nearly Clear to Build Controversial Iron Range Mine*, MPR News, Jan. 5, 2018, *available at* https://www.mprnews.org/story/2018/01/05/dnr-polymet-copper-nickel-mine-draft-permit-iron-range.

right to submit supplemental comments and analysis on this and other issues.[245] The State has effectively delayed the release of its public documents until it is too late to review the record effectively. The public is left to review a financial assurance package that proposes to protect taxpayers by creating a trust fund with most of the funds contributed far into the future at a time when the Applicant's project is at its most marginal, financially speaking. And in undertaking this review, the public has no information in the Draft Special Conditions that would indicate what actions would be taken if the company were unable to make those contributions when needed. Surely, the requirement that financial assurance be both sufficient and available when needed requires more than a leap of faith. Such an approach may bear weight if it were backed up by enforceable permit conditions that mandated permit revocation for failure to make timely and sufficient trust fund contributions, for instance. There is nothing in the Draft Special Conditions that would suggest that the DNR would refuse to issue a permit if the updated feasibility study indicated an inability to contribute to the trust fund in a timely manner. In the absence of such permit conditions, the proposed financial assurance does not comply with Minn. R. 6132.1200.

The Conservation Organizations offer one final example to illustrate the scale of the financial assurance liability laid out in the Draft Special Conditions. According to Attachment 2 to the Draft Special Conditions, "current analysis indicates that the Trust Fund needs $580,000,000 at MY19 to ensure payment of all Long-Term Costs."[246] At a discount rate of 2.9% over a term of 21 years, the net present value of $580,000,000 is roughly $318,000,000. And according to the Applicant's most recent Technical Report, the entire after tax net present value of the NorthMet Mine Project is $649 million.[247] Half of the Project's value, then, is devoted to defraying the expenses to pay for long term water treatment for centuries to come. Given the economic pressure for mining projects to deliver high rates of return to justify the high risks involved, the Conservation Organizations find it unbelievable that the State would effectively take it on faith that the company will contribute to a trust fund in amounts that would render the Project uneconomic.

The project's financial marginality has important implications not just for the risk to taxpayers, but also for the safety of the project itself. As the Conservation Organizations explained in its Comments on the NorthMet Dam Safety Permits:

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[245] The Conservation Organizations note that they have not been dilatory in requesting updated information on financial assurance from the DNR. On November 2, 2017, MCEA submitted a Data Practices Act request for all documents relating to the PolyMet Mine Project generated between March 1, 2016 and November 2, 2017. The DNR did not provide this data until February 20, 2018, 8 days before any contested case hearing petitions are due.

[246] Draft Special Conditions for the NorthMet Mine Project, Attach. 2 ¶ 20.

[247] PolyMet Mining Corp., *Updated NI 43-101 Technical Report on the NorthMet Deposit* 22-6 (2013) (using a less conservative discount rate of 7.5%, which is appropriate considering the high rates of return demanded by investors in mining projects), *available at* http://polymetmining.com/wp-content/uploads/2017/03/2013-Updated-43-101.pdf, attached as Ex. 32 to the Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.

> The pattern of cycling marginal mine operations from active to inactive with commodity boom-bust cycles is the very cause of the 'trend to ever increasing severity and frequency of catastrophic tailings storage facility failures" . . . it is the financial vulnerability of the mine itself that underlies the proximate cause of tailings dam failures. The final precipitating event – the seismic, structural, or hydrological catalyst – is but the final event in a chain beginning with the mine's fragile and marginal economics."[248]

These fragile economics greatly implicate the NorthMet project:

> Very simply, smaller, lower grade mines operated by junior and midsize miners have less cushion. They have to ride too close to the edge of financial viability viz. global metals markets and major producers to try to stay in production. They also have less access to high quality capital markets, paying more and operating under more onerous terms of credit than the top producers.[249]

These circumstances are a reality for the permit application pending before the DNR. It is a low-grade mine operated by a junior miner, and as shown by the financial analysis of Mr. Kuipers, the project is riding so close to the edge of viability that low metals prices will put the project at significant risk of abandonment. If that were to occur, the public would very clearly be at risk, physically and financially. DNR must act to protect the public from that eventuality.

12.2 DNR Must Independently Verify The Applicant's Estimates That Do Not Use Industry Standard SRCE Estimators

Mr. Kuipers observes that the revised reclamation cost estimates have declined from $146M in the initial financial assurance proposal to $114M in the Draft Special Conditions.[250] This decline is due to the switch from using the Standard Reclamation Cost Estimator to using individual contractor estimates for reclamation activities.[251] Because contractors have a built in incentive to underestimate their cost of services in these circumstances, Mr. Kuipers concludes that the reclamation costs are likely underestimated by 25% to 50%.[252] DNR's financial assurance consultants agree, and have observed that the quotes for reclamation contained in the

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[248] Comments of MCEA *et al.* on the NorthMet Dam Safety Permits at 40. (quoting Lindsay Bowker and David Chambers, *In the Dark Shadow of the Supercycle: Tailings Failure Risk & Public Liability Reach All Time Highs*, August 17, 2017, attached as Exhibit 13 to the Comments of MCEA et al. on the NorthMet Dam Safety Permits).
[249] Lindsay Bowker and David Chambers, *In the Dark Shadow of the Supercycle: Tailings Failure Risk & Public Liability Reach All Time Highs* at 13, August 17, 2017, attached as Exhibit 13 to the Comments of MCEA et al. on the NorthMet Dam Safety Permits
[250] Joint Petition Ex. 3 at 6.
[251] *Id.* at 5.
[252] *Id.*

Application are "significantly lower that [*sic*] one may expect by using standard unit costs and contractor's mobilization, profit, administration and bond costs."[253] The Conservation Organizations believe that this deviation from industry standard reclamation cost estimation must be independently verified, and that without this verification, taxpayers will have no assurance that the amount of surety bonds and ILOCs will be sufficient to cover the actual costs of reclamation should the state be forced to assume control of the site.

12.3 All Financial Assurance Instruments Must Be Reviewed By An Attorney With Expertise In Bankruptcy And Contract Law

Mr. Kuipers notes that mining assets, including financial assurance instruments, are routinely bound up in bankruptcy proceedings.[254] In this field of intricate legal complexities, in which a poorly drafted financial assurance instrument may become part of the bankruptcy estate despite the State's best intentions, independent review of all financial assurance instruments is critical to ensure the funds will be available when needed.

12.4 The Applicant Does Not Have The Capital Necessary To Conduct Mining Operations

Lastly, the record before the DNR establishes that the Applicant does not have the capital, or access to capital, necessary to conduct its mining operations, in violation of Minn. R. 6132.0300. The initial, fundamental requirement found in Minnesota's nonferrous mining regulations is that mining may not be conducted without a permit to mine.[255] The same subpart of the same regulation provides that a "person" that obtains a permit "must possess capital and provide financial and operational decision making necessary to conduct the mining operation."[256] The clear intent is that a permit to mine is not available to a company that does not possess sufficient capital to conduct the operation, or does not have the financial wherewithal to follow through with obligations under the mining permit. Obviously, providing adequate financial assurance is a part of "conduct[ing] the mining operation." If an applicant for a permit to mine does not possess sufficient capital or the financial ability to provide adequate financial assurance, a permit to mine may not be granted.

The financial assurance that will be needed to ensure that the Applicant does not pollute surface waters is enormous. The DNR estimates that after 2 years of construction, when mining actually begins, the required amount will be $588 million. At year 11, which is predicted to be the point at which the maximum amount will be needed, the figure is $1.039 billion. Yet, the DNR proposes to grant the Permit to Mine with an initial financial assurance amount of only $75 million, with no assurance that the Applicant will have either the capital or the financial ability to provide $588 million in financial assurance at the start of mining, or $1.039 billion by year 11.

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[253] Email from Cecilio Olivier to Michael Kunz (DNR), March 25, 2017, attached as Exhibit 4.
[254] Joint Petition Ex. 3 at 8.
[255] Minn. R. 6132.0300, subp. 1.
[256] *Id.*

This is precisely the situation that rule 6132.0300, subpart 1 is designed to prevent. The whole idea is that the DNR will not allow a company to start down the road of building a mine if it is not going to have the resources to follow through. Because the Applicant has not submitted, and the DNR has not required, an updated DFS, there is no evidence that the Applicant will be able to provide the financial assurance that will be required 3 or 11 years down the road. The failure to require a DFS before the mine application is deemed complete is counter to the recommendations of the DNR's consulting experts, as noted above.

The DNR's consultants also strongly caution that the Applicant is unlikely to be able to obtain financial instruments in the amounts that are estimated to be needed in Mine Year 1 and 11:

> [A] key consideration in evaluating the financial assurance funding risks would be to determine the type and amount of financing that PolyMet can realistically obtain by itself (e.g. surety bonds, cash, etc.). Due to numerous mine bond forfeitures that caused considerable losses to the surety industry, it has now become more difficult for mining companies to obtain surety bonds. For a small or new mining company like PolyMet it would be very difficult to obtain a reclamation bond if there is any risk of bankruptcy that would be indicated if the financing or economics are not solid. It would be even more difficult to find a surety willing to guarantee a long-term financial assurance liability unless the project's economics are very strong.[257]

If surety bonds are not available, the consultants found a substantial question as to whether the Applicant would be able to afford the other acceptable forms of financial assurance:

> If a surety bond is not obtainable, then the alternatives become expensive. Certificates of deposit, irrevocable letters of credit, or cash equal to the required dollar amount of the financial assurance require additional up front capital that may not be available and may adversely affect the project economics. The financial assurance should be considered by PolyMet in the mine cash flow and feasibility no matter how it harms the economics.[258]

In other words, the DNR will not require an updated feasibility study to verify that the Applicant will be able to generate revenues sufficient to conduct this mining operation, and the DNR's consultants are clear that the Applicant will not be able to access the capital necessary to fund its financial assurance obligations. The DNR is simply going on faith that the Applicant will be financially able to obtain the financial assurance it will need to begin mining, but proposes to issue the Permit to Mine and allow construction of the infrastructure for mining

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[257] EOR Financial Assurance Review 1B at 2.

[258] EOR, Jardine Lloyd Thompson, and Spectrum Engineering, *Financial Assurance Review and Evaluation for the NorthMet Mining Project: Phase I – Task 1A Report: Financial and Technical Metrics* 23 (2016).

anyway. Because the DNR cannot determine on the current record that the Applicant "possess[es] capital and provide[s] financial and operational decision making necessary to conduct the mining operation," the permit cannot be granted as the record now stands. If the Applicant submits a DFS or any other additional financial information to support its financial viability prior to the issuance of a permit, that evidence must be made available to the parties to a contested case hearing, the issue must be included in the scope of the hearing, and parties must be given the opportunity to submit evidence and arguments in response.

The Conservation Organizations therefore object and request that the preceding disputed issues of material fact be referred to OAH for determination in a contested case proceeding.

13.0 PASSIVE TREATMENT IS UNPROVEN AND UNLIKELY TO WORK

Minnesota Statutes § 93.481, subdivision 2 provides that, in granting the permit, the Commissioner shall determine "that the reclamation or restoration planned for the operation complies with lawful requirements and can be accomplished under available technology and that a proposed reclamation or restoration technique is practical and workable under available technology." Put simply, the Permit to Mine can only be granted if it (1) "complies with lawful requirements"; (2) "can be accomplished under available technology"; and (3) "that a proposed reclamation or restoration technique is practical and workable under available technology."

Chapter 6132 establishes the rules governing nonferrous mines. The policy stated for the Chapter is:

> that mining be conducted in a manner that . . . protects natural resources and minimizes to the extent practicable the need for maintenance. This shall be accomplished . . . through the use of mining, mine waste management, and passive reclamation methods that maximize physical, chemical, and biological stabilization of areas disturbed by mining, as opposed to the use of ongoing active treatment technologies."[259]

In general, the rule part applicable to tailings basins requires that—at closure of the mine—the tailings basin be drained and reintegrated into the "natural watershed" within three years, i.e., a "dry closure."[260] While the rule acknowledges that a longer period of "continued maintenance" might be required to achieve the drainage and reintegration required by Minn. R. 6132.3200, subp. 2(E)(5), the "continued maintenance" rule does not alter the need for compliance with the dry closure standard.[261] Similarly, the rule governing reactive mine waste provides that a reactive waste storage facility must "at closure, permanently prevent substantially all water from moving through or over the mine waste and provide for the

[259] Minn. R. 6132.0200.
[260] Minn. R. 6132.3200, subp. 2(E)(5).
[261] *Id.*, subp. 2(E)(6).

collection and disposal of any remaining residual waters that drain from the mine waste in compliance with federal and state standards."[262]

In violation of the policy favoring "passive reclamation methods" and the rules governing reactive mining waste, the Permit proposes to authorize closure of the FTB in a wet condition requiring permanent active treatment of the water recaptured in the seepage collection system. Similarly, the Permit authorizes the creation of mine pit lakes and the Category 1 waste rock stockpile that will require prolonged water treatment of captured seepage. In recognition of the issue posed by the need for hundreds of years of active treatment after mining concludes, the DNR has included the following requirements in the proposed Special Conditions:

> 64. The Permittee's reclamation plan includes mechanical treatment. To further evaluate the goal of non-mechanical water treatment, the Permittee must develop a plan for investigation, design, and pilot testing of non-mechanical water treatment systems. The Permittee must provide this plan to the DNR for review and approval prior to Mine Year 1.
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> 65. Upon DNR approval of the non-mechanical water treatment system plan, the Permittee must provide financial assurance sufficient for the DNR to implement the plan to evaluate nonmechanical water treatment in the event of unplanned closure.

The Application (Part 15.8) indicates that the Applicant has a plan "for transitioning from mechanical water treatment to nonmechanical treatment technologies after the 20-year mine life."[263] These nonmechanical treatment technologies are envisioned for the Category 1 Stockpile Groundwater Containment System, the West Pit overflow, and FTB seepage capture systems, and the FTB Closure Overflow. The Application states "[n]on-mechanical water treatment technologies are proven methods of water treatment" while acknowledging that these methods need to "be tailored" to site-specific conditions, data which the Applicant promises to collect.[264]

Based on information available to the Conservation Organizations, the Applicant's faith that it will be able to transition to non-mechanical water treatment technologies that will allow the Applicant to effectively "walk away" from the mining site after their establishment is not justified. As a result, the Conservation Organizations assert that the Permit to Mine, and in particular the financial assurance, cannot assume that these non-mechanical technologies will ever be able to substitute for the active-management of the water treatment systems for the hundreds of years that will follow the completion of the 20-year mining period.

As noted above, Dr. Glenn C. Miller is an expert on mine reclamation who has studied passive sulfate reducing systems. In preparing this Petition, the Conservation Organizations asked Dr.

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[262] Minn. R. 6132.2200, subp. 2(B)(2).
[263] PTM Appl. at 446.
[264] *Id.*

Miller to comment on the potential for the NorthMet project to transition to a passive-water treatment technology after the closure of the Project. Dr. Miller believes that the assumption that biological treatment alternatives actually exist and could treat water being discharged from the various contaminated sources from the closed mine is unreasonable.[265] Based on Dr. Miller's extensive experience with such systems, no such system has yet been shown to be sustainable in the long-term.[266] While short-term results may be positive, the treatment efficacy drops off after weeks to months of operating as the available organic reducing sources are consumed and become plugged with metal sulfide and microbial mass.[267] As a result, even these "passive" systems require maintenance (i.e., the removal of the accumulated precipitants and the addition of fresh organic sources) throughout their period of use in order to maintain the desired treatment level. Moreover, Dr. Miller has never observed a system that can reduce sulfate to under 30 mg/L.[268] Finally, as the Applicant itself appears to acknowledge, biological treatment is highly variable, depending on a variety of conditions including temperature, flow, contaminant load, and treatment objectives. It is unknown how the Minnesota environment, with its prolonged cold-weather season (which may lower biological activity) and spring melt conditions (which can lead to by-passing and contaminant flush) will affect outcomes, without a prolonged period of study.[269]

As the result, while the DNR may require the Applicant to study the efficacy of passive waste systems the DNR must recognize that, in all likelihood, these systems will not be able to substitute for the long-term (essentially permanent) operation of the active treatment systems. The DNR must, therefore, ensure that adequate financial assurance funding is available that in no way relies on the potential for such passive remediation systems to substitute fully for the active wastewater treatment systems. To the extent that the permit does not, the Conservation Organizations object and demand a contested case hearing.

14.0 HRF FOUNDATION IS WEAK

The DNR's rules provide that facilities "shall be sited to the extent practicable" to minimize the impact to life and property due to floods, caving, or slope failure is minimized and so that runoff and seepage can be managed to minimize water impacts on surface water and groundwater."[270] While the DNR's siting rule also expresses a preference for siting facilities in "former mining areas" over areas undisturbed by mining, it would misread the rule to conclude that the preference overrides the need to site facilities in a manner that minimizes the potential for impacts resulting from "floods, caving, or slope failure" or that would undermine the criteria for siting facilities where water impacts can best be managed. The DNR's rules governing a mining permit require reactive mine waste to be "mined, disposed of, and

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[265] Joint Petition Ex. 6 at 2-3.
[266] *Id*.
[267] *Id.* at 3.
[268] *Id.* at 2.
[269] *Id.*
[270] Minn. R. 6132.2000.

reclaimed to prevent the release of substances that result in the adverse impacts on natural resources."[271]

The Applicant's proposed Hydrometallurgical Residue Facility ("HRF") will be a "[n]ew double-lined, approximately 90 acre surface impoundment with [a] Leakage Collection System."[272] This new surface impoundment will be sited on top of the former LTVSMC Emergency Basin,[273] which is underlain with old slimes and tailings upon which the HRF is proposed to be built.[274]

The primary concerns with the HRF's foundational stability were described in MCEA *et al.*'s comments on the NorthMet Dam Safety Permits, attached as Exhibit 1. The first concern arises from the fact that the HRF will be sited on an old legacy mining basin, on top of old slimes and tailings that may lead to dam failure. The second concern is that a number of models and tests were either not conducted or conducted in an inadequate manner, thereby minimizing any potential impacts HRF dam failure might have.[275] The DNR must require the Applicant to address these concerns before the Permit is issued. If the DNR does not require the Applicant to resolve these concerns, the Conservation Organizations object and demand that the DNR order a contested case hearing on the adequacy of the stability of the HRF.

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[271] Minn. R. 6132.2200, subp. 1.

[272] Barr Eng'g, NPDES/SDS Permit Appl., Vol. VI, tbl. 1-1, 10 (2017), *available at* https://www.pca.state.mn.us/sites/default/files/wq-wwprm1-50z.pdf. According to the Applicant, it will include a "Drainage collection layer – granular drainage layer and geocomposite drainage net (geocomposite)[;] Upper liner – 80-one thousandth of an inch (mil) linear low density polyethylene (LLDPE) geomembrane[;] leakage collection layer – geocomposite drainage net (geocomposite)[;] Lower liner – 60-mil LLDPE or high density polyethylene (HDPE) above a geosynthetic clay liner (GCL). The lower liner, with two barrier layer components (geomembrane liner and GCL) is commonly referred to as a composite liner." PTM Appl. at 276.

[273] The Emergency Basin was designed to contain taconite tailings discharge from the main LTVSMC Tailings Thickeners in the event of a power failure. Accidental overflows, spillage, and floor drainage from the former LTVSMC Concentrator Building also reached the Emergency Basin. These materials were deposited hydraulically through an underground Emergency Tunnel terminating at the southeast side of the Emergency Basin. . . . Material flowed by gravity into the Emergency Basin and was placed hydraulically. Material in the basin consists of slimes, fine tailings, coarse tailings, and concentrate. *See* PTM Appl., App. 16.16, Geotechnical Data Package – Volume 2: Hydrometallurgical Residue Facility (July 11, 2016) at 5.

[274] PTM Appl. at 263-264, 273-274.

[275] *See* David Chambers, Comments on Draft Dam Safety Permit Number[s] 2016-1380, Flotation Tailings Basin [and] 2016-1383, Hydrometallurgical Residue Facility, Ctr. for Science in Pub. Participation (2017), attached as Ex. 3 to MCEA *et al.*'s comments on NorthMet Dam Safety Permits; *see also* Comments of MCEA *et al.* on the NorthMet Dam Safety Permits.

15.0 OBJECTION

Minnesota's nonferrous regulations allow an organization[276] raising a material issue of fact related to the proposed operation to submit an objection to the commissioner.[277] The objecting organization must:

- demonstrate a reasonable basis underlying the disputed issues of fact,
- provide a statement of the organization's interest in the proposal,
- provide a statement of actions requested from the commissioner, and
- describe the reasons supporting the objection and allegations of disputed fact.[278]

The Conservations Organizations accordingly submit this objection to the draft Permit to Mine for the NorthMet Mine Project. The Comments contained herein constitute the required demonstration of a reasonable basis underling the disputed issues of fact, as well as the required statement of reasons supporting the objection.

15.1 Statements of Interest In The Proposed Mine Operation And Permit

MCEA is a Minnesota nonprofit public interest organization with over 3,000 members and its mission is to use law, science, and research to protect and enhance Minnesota's natural resources, wildlife, and the health of its people. MCEA has program areas in mining and natural resources, and protecting Minnesota's resources from the unsafe development of copper-nickel deposits has been part of MCEA's mission since its inception. MCEA has participated in the administrative processes concerning the NorthMet Mine Project since the first incarnation of the project proposal in the late 2000s, by submitting comments, retaining expert consulting services, and attending and speaking at public hearings. MCEA members live and recreate on lands and waterways that will be impacted by the NorthMet Mine Project. MCEA members use and enjoy these lands, rivers, lakes and streams for recreation, spiritual, cultural, economic, and aesthetic enjoyment. Many members obtain nutrition and sustenance from resources that would be negatively impacted by the project, including fish and wild rice.

The Center for Biological Diversity is a nonprofit conservation organization headquartered in Tucson, Arizona, with offices in a number of states, including an office in Duluth, Minnesota. The Center is a leading organization fighting on behalf of wildlife and wild places, including threatened and endangered species such as the Canada lynx and gray wolf that would be adversely affected by the NorthMet Mine Project. The Center believes that the welfare of human beings is deeply linked to nature —the existence in our world of a vast diversity of wild animals and plants. Because diversity has intrinsic value, and because its loss impoverishes society, the Center works to secure a future for all species, great and small, hovering on the brink of extinction.

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[276] Regulations governing the objection process refer to "persons" making an objection, but that term is defined as including any legal entity. Minn. R. 6132.0100, subp. 25.
[277] Minn. R. 6132.4000, subp. 2.
[278] Minn. R. 6132.4000, subp. 2.

The Center has over 63,000 members, including members who own land and recreate in northeastern Minnesota, including downstream from the proposed NorthMet Mine Project. These members' interests include fishing, canoeing, wild-rice gathering, camping, hiking, and seeking quiet remote places to recreate within the Superior National Forest. These interests would be negatively and potentially permanently impacted if the NorthMet Mine Project is permitted and allowed to proceed. The Center and some of its members have been actively engaged in the NorthMet Mine Project for many years, including submitting detailed comments to state and federal agencies and attending public hearings.

Duluth for Clean Water is a Minnesota nonprofit based in Duluth with volunteers and members around the Duluth area. Its mission is to promote a safe and healthy future for the St. Louis River Watershed, Lake Superior, and the communities downstream. DFCW has participated in the administrative processes concerning the NorthMet Mine proposal by submitting comments, retaining expert consulting services, and attending and speaking at public hearings. DFCW members live downstream from the proposed PolyMet operation. Members drink water and eat fish from, and area businesses depend on, the St. Louis and Lake Superior. The future of Duluth and other downstream communities depends critically on the handling of the NorthMet application.

Save Lake Superior Association (SLSA) is headquartered in Two Harbors, MN with members residing in the three states and a province on Lake Superior's shoreline and watershed. SLSA has about 250 members, many of whom fish and recreate along the North Shore of Lake Superior, in its watershed, and in the St. Louis River estuary. The mission of SLSA is to prevent further degradation of Lake Superior and to promote its rehabilitation. SLSA was formed in 1969 to stop the discharge of taconite tailings into Lake Superior by Reserve Mining Company. This waste material contains many of the same toxins such as mercury and asbestos fibers that would be generated by the mining and processing of sulfide ore by PolyMet. As stakeholders SLSA is concerned about the potential destruction of natural habitat and the pollution of both air and water in the watershed of Lake Superior, and ultimately the Lake itself, should PolyMet be permitted. Lake Superior and its watershed are downwind and downstream from current taconite and proposed sulfide mining, both of which emit these toxic substances. Even now SLSA's members, friends, and families, especially children, must limit their fish consumption due to the continuing pollution. Many are unaware of the danger and continue to consume fish as part of their daily diet. SLSA's members, and others who visit the local parks, streams, trails, shoreline, and the lake itself, are unknowingly exposed to these toxins. The release of more toxins by new mining operations would exponentially increase the pollution of the air we breathe and the water we drink.

Friends of the Cloquet Valley State Forest is a grassroots organization based in Northeastern Minnesota. Its mission is to preserve and protect the natural and cultural heritage of our region. Its members include people who live and work in the forest, subsistence and off grid families, as well as those who participate in entrepreneurship and hold jobs in the community. Its members hunt and fish, primarily for food but also for recreation. Many gather plants, herbs and berries as well. Many have homes that have been devalued because of minerals leasing and feel that their largest investment is being sacrificed for a large corporation's gain. Its members

canoe the rivers, drink from wells and eat the fish in the rivers and lakes. They live in Northeastern Minnesota. They have participated in providing feedback to the project via the hearings and through broadcasting the hearings to people unable to attend as well as offering their written input. The Friends of the Cloquet Valley State Forest hope that sustainable means of living will be fostered in this watery, forested region and that the mining of sulfide laden earth will be postponed until such time as the risks are less long lasting than the rewards for the residents.

Save Our Sky Blue Waters (SOSBW) is a Duluth based grassroots non-profit organization dedicated to protecting the waters, forests, wildlife and local communities of Minnesota's Arrowhead Region. The Arrowhead Region has been known as one of the most magnificent areas of the state, for its majestic forests, wetlands, and waters and because it contains the headwaters of three great watersheds: north to Rainy River, east to Lake Superior, and south to the Mississippi. The protection of these valuable resources is SOSBW's core mission. SOSBW developed in response to proposed copper-nickel sulfide mining and exploration in northeastern Minnesota and has consistently participated at all levels in the ongoing environmental review and approval process involving the proposed PolyMet NorthMet Mine proposal. Protecting the health of the St. Louis River watershed and Lake Superior is a key component of the mission of SOSBW. Save Our Sky Blue Waters' members live, depend upon, enjoy, recreate, fish, eat and gather locally from the lands and waters, and own property in the area that would be adversely impacted by PolyMet's proposed mine.

Wetlands Action Group (WAG) represents citizens of Northeast Minnesota seeking to protect the region's waters, wetlands and watersheds. WAG became active following an improper decision by St. Louis County commissioners in 2006 to enter into an agreement for a wetlands mitigation plan for the PolyMet mine. Legal action by WAG and local citizens nullified this agreement. WAG has continued to follow, make comments, and attend meetings and hearings on the PolyMet proposal along with simultaneous wetland actions set in place to facilitate mining. Its members and supporters depend upon the water, wetlands, forests, and ecological resources of our area, and its mission is to preserve these resources for present and future generations. WAG's members who recreate, fish, eat wild rice, live in this area, or otherwise enjoy the Arrowhead region would be harmed by PolyMet's mine if it were approved.

The Sierra Club is a national nonprofit organization with 67 chapters and more than 830,000 members dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Sierra Club's concerns encompass protecting healthy air, water, lands and climate—and the communities that depend on these resources. The Club's particular interest in this case and the issues which the case concerns stem from the projects' impacts on lands and waters including Lake Superior and its watershed, where our members live and recreate. The North Star Chapter of the Sierra Club has approximately 20,000 members in the state of Minnesota.

15.2 Actions Requested

For the foregoing reasons, the Conservation Organizations request that the commissioner order a contested case hearing to resolve the disputed issues of material fact identified in these Comments and Objection as well as those described in the Joint Petition of MCEA *et al.* for a contested case hearing on the NorthMet Permit to Mine Application. If a contested case hearing is not ordered, the Conservation Organizations request that the commissioner deny the permit application as noncompliant with lawful requirements, for the reasons described above.

16.0 CONCLUSION

The permitting of this Project as currently designed is, in the words of DNR's consultant, a major leap of faith. The permit would require the state to assume without evidence that plans to comply with reactive waste laws with a bentonite barrier will work as intended, even though pilot testing has not even begun. It would place the surface and groundwaters downstream of the mine under the threat of perpetual contamination, with that threat forestalled only by assuming that a private company will have the funds and the will to operate and maintain a vast network of water collection and treatment systems—liners, caps, drainage lines, pipelines, pumps and treatment plants—forever. It would require the state to assume that this private company will protect taxpayers by making a series of balloon payments of $50 million when its revenue is barely able to cover those payments.

But the state is not without a guide in making these determinations. History provides a great deal of instruction, and history would suggest that major leaps of faith in the regulation of the hardrock mining industry almost never end well. The undersigned organizations urge the DNR to choose a different path.

Respectfully submitted,

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