NorthMet Mining Project and Land Exchange

Preliminary FEIS Extended Comment Form

Agency: **DNR - Fisheries**

Comment #: **4 and 5 - Edie Evarts**

Comments on: new text about transition from mechanical to non-mechanical treatment

Chapter 3.0 lines 1133-1187: Transition from Mechanical to Non-Mechanical Treatment; Chap. 5.2.2.3.5 Lines 4755-4838: Future Transition from Mechanical to Non-Mechanical Treatment Systems; AND related Adaptive Water Management Plan (AWMP version 9, PolyMet 2015d)

The overview of the transitional approach from mechanical to non-mechanical treatment technologies as presented is highly speculative, particularly in terms of success in development of and timing of installation of a successful system. I am wondering the rationale for this overview, given that it "does not reflect the NorthMet project proposed Action as modeled for predicted impacts in the FEIS" (Chap 3. lines 1134-35). I do understand that there is a need to mention the plan to transition to a non-mechanical system, but without a proven industry standard, there is little to support an estimation of when the system would be implemented and working, or even what the system will consist of. As such, this section could be shortened to explain that testing will be ongoing in an effort to make this transition (without a presumed time frame).

I would suggest omitting Lines 1150-11660 in the Chapter 3 and clarifying what the AWMP contains (or doesn't contain) in Lines 1168-1170. I also would recommend omitting related lines 4781-4783 in Chap 5.2.2.3.5. Detailed explanation follows.

This Transition section infers that the Project proposer will be able to test and then subsequently apply non-mechanical treatment in relatively short-order (i.e. during operations and subsequent to early years of reclamation). Four "steps" are listed for system evaluation (Chap 3. lines 1150-52): local site information collection, laboratory testing, pilot-scale testing, and designing a system for full scale implementation Each of the last three steps requires a degree of success in testing before moving on to the next step which means that there are a number of points where progress may be bogged down, dependent on how the trials go. There is not an industry standard engineered design that is currently applied on the industrial scale that would be required to treat this type of both seepage and discharged water and there is not a discussion (even in the AWMP) that explains how this timeframe is reasonable. In other words, there is little to no basis for predicting *when* such systems will be developed given a wide range of uncertainties because of the experimental nature of the development of these systems. Even the language in the PFEIS reflects this uncertainty: "would likely include two PRBs", "would ideally be located", "locations would be dependent on the final hydraulic plan", "is expected to be …a constructed wetland, a PSB…, and an aeration pond.." (Chap 5.2.2.3.5)

(Chap 3. lines 1150-52) The four steps listed in the "Transition" section also fail to include all the steps that would be needed for evaluation of a non-mechanical treatment system. The "steps list" fails to include any steps for evaluation after "designing a system". The most complex and time-consuming evaluation step will be the installation of the system and *evaluation in place for criteria over time.* Evaluation of effectiveness would likely take many years (likely, decades or more since the lifetime of such systems are unproven). These designs are untested enough that even maintenance needs will require monitoring and evaluation, which is also not mentioned in the section. This short implementation timeframe is repeated in Chap. 5.2.2.3.5 (line 4781-4783) without substantiation as well. These four steps came from the supporting AWMP, and the same criticism applies to this.

(Chap 3, lines 1148) The PFEIS "Transition" overview states that testing would be "for several years" yet the groundwater modeling shows that contaminants from the Tailings basin would not reach peak concentrations in surficial groundwater at the Plant Site property boundary for 150-200 years (Chap 5.02.02 Fig 5.2.2-45, line 3605) so it would likely be impossible to field evaluate the system effectiveness on peak loading levels just a few years after cease of the mine operation. Similarly, the statement (line 1154) that "the quality of the water expected at the Tailings basin in the long term…would start to appear at the toe…" is correct. However, the loading at that point would be very low relative to predictions of peak loading and successful treatment of water by the system at this point would not prove its long-term effectiveness. Even the AVMP mentions that stabilized water quality would not occur until after approximately Mine Year 45 (AVMP Chap 6 p. 115).

(Chap 3, Line 1157). This statement concludes that evaluation would be "accomplished during operations, allowing the non-mechanical water treatment system at the Tailings Basin to be in place shortly after operations are complete...(Chap 3, lines 1157-58)" implies that evaluation of the non-mechanical water treatment would be completed at this point. For the reasons above (lack of important evaluation steps, the timeframe for contaminant movement), complete evaluation seems unlikely in this timeframe and is also not supported in the AWMP.

(Chap. 5) Lines 1168-70 are an overstatement of the content of the AWMP. There is little to no detail on "up-front preparation, timing, and duration of implementation and potential indirect impacts". The framework for description for each potential system was: purpose, conceptual design, development plan, and financial assurance, which was covered in a few pages. Timeframes are very conceptual, if mentioned at all. Especially lacking is evaluation of impacts. For example, the conceptual plan for treatment of water from the West Pit Overflow would be to release outflow to the watershed for only two months of the year. This was not evaluated and likely would be detrimental to stream habitat and associated fish populations. No mention of potential impacts was in the Plan.

More specific comments on the supporting document, AWMP (PolyMet 2015d), are below and are relevant to the content in the PFEIS. All comments refer to AWMP Chapter 6: Non-mechanical Treatment Systems.

The AWMP presents an incomplete review of Non-Mechanical Treatment Systems (Chapter 6.0, p. 97-117) even within the context of it being a conceptual plan. The document fails to mention most of the shortcomings of or cautions in designing such systems. The following comments are to point out that there are still many uncertainties about these systems, and these are not reflected in the PFEIS or AWMP. In addition, the PFEIS cites the AWMP as outlining the degree of

industry use of such systems. There were very few actual examples of mining industry use and most were small scale of lab based experiments, not industrial installed systems as most would understand it. Reference numbers correspond to those listed within the AVMP. Any italic emphasis is mine.

An examination of the information included in Chapter 6 of the AWMP on Permeable Reactive Barriers (6.1.2.3 PRBs) is placed here as an example of how data was omitted that may have better informed the reader and illustrated that placing a timeframe for implementation of such systems is necessarily speculative. The lack of knowledge on longevity of performance for these barriers was omitted from the summary, as were some of the current issues in their use. The other technologies have similar caveats, information which is often present in source documents but missing from the AVMP description. The quotes that follow are information that was omitted from the AWMP, but come from its listed source references.

According to a Technology Update (Reference 45, 2011), "For ZVI PRBs there is 15 years of laboratory and field experience to draw upon; mulch biowalls have a field history of 8 years. Since 2005, when the previous ITRC guidance was issued, a fair amount of progress has been made on these two media (ZVI and mulch) in understanding the performance, limiting events, or processes that limit the longevity of PRBs. For other emerging reactive media with a shorter history, *longevity projections may have to be made when long-term data i*s available based on scientific judgment and understanding of the media and contaminants (Ref 45, p. 113)."

There is also concern about closing or decommissioning these barriers: "However, there remain hypothetical approaches (to closing) due to the relatively long time most PRBs have operated and the degradative nature of several of the processes involved in most PRBS designed for chlorinated solvents, where the PRB does not become a reservoir for stored contaminants. Few, if any, PRBs have been closed (Ref 45, p. 155)."

And also in this Technology Update, a summary: Perhaps the most important lesson learned is that it is much easier to test the functionality of PRB treatment media under laboratory conditions than it is under field conditions—that is, *uncertainty and heterogeneity in field settings cannot be completely represented in the laboratory, so field designs must incorporate potential uncertainty in the design so that the treatment remains sustainable and functional through a project's life*. Hydraulic failure likely will be the Achilles' heel of any deployment, more often than poor chemical treatment performance (which typically is well established by laboratory studies or past performance of other systems).

The AWMP also states that it presents examples of industry use (AWMP, Sec 6.1.4). However, there was not a single example given that was an industrial installation that was not considered experimental. Here is a summary of the examples with the AVMP references:

6.1.4.1. The sole PRB example was treatment of seepage from 59 acres at 6 gpm, studied for one year (Cadillac Molybdenum Mining, Ref 66).

6.1.4.2 The constructed wetland examples were mainly single contaminant analyses of limited scale: 8.8 acres monitored 8 years for copper reduction in South Carolina (Ref 70), electrical generation by-product of coal combustion leachate removal from in Pennsylvania (Ref 71), nickel removal from nickel sulfide tailings using four small test cells (1 x 1.5 x 10 m^3) in Norway (Ref 72), two pilot-sized wetland cells (6.1 x 30.5 m) were analyzed after 250 days for copper, lead , and zinc removal (Ref 73), and treatment and transport of landfill leachate was

modeled in an engineered wetland system (Ref 74). The only reference presented for a system for sulphur reduction was a bench test report for PolyMet (Ref 75).

6.1.4.3 The sole example of industrial use of a permeable sorptive barrier (PSB) was the example of a lab experiment at Soudan Mine with 1.5 gpm through 55 gallon barrels with media (Reference 64).

Lastly, potential resource impacts have not been assessed as stated in the PFEIS and as noted above. For example, the conceptual plan for the constructed wetland (6.3.2.1) does not consider natural resource impacts in its operation. It should be noted that this supporting document was not subject to either peer review or external review by natural resources agencies.