**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
REGION 5
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FEB 1 8 2010

REPLY TO THE ATTENTION OF:

E-19J

Colonel Jon L. Christensen
District Engineer
St. Paul District
U.S. Army Corps of Engineers
190 Fifth Street East
St. Paul, Minnesota 55101

Re: NorthMet Project – Draft Environmental Impact Statement
CEQ# 20090387

Dear Colonel Christensen:

The United States Environmental Protection Agency (EPA) has reviewed the NorthMet Project Draft Environmental Impact Statement (DEIS) in accordance with our authorities under Section 309 of the Clean Air Act and the National Environmental Policy Act.

The project, located in St. Louis County, Minnesota, is a copper sulfide ore open pit mine and processing plant. The U.S. Army Corps of Engineers (USACE) is the lead federal agency for this project, which requires a permit pursuant to Section 404 of the Clean Water Act (CWA). USACE is a co-lead with the Minnesota Department of Natural Resources (MDNR), which is preparing an environmental impact statement for compliance with state environmental law. The Fond du Lac Band of Chippewa and the Bois Forte Band of Chippewa are cooperating agencies.

The project is the first non-ferrous mine on the Mesabi Iron Range and includes three open pits and a related hydrometallurgical processing plant which will produce copper metal and precipitates of nickel and platinum group minerals. The processing facilities are located on the old LTV Steel Mining Company (LTVSMC) site, and the PolyMet Corporation proposes to use the existing LTV tailings basin. The mine site is within the Superior National Forest. The U.S. Forest Service has determined that a land exchange or sale is necessary for the mining operation to take place and will prepare a separate DEIS for this action (the USACE NorthMet Project DEIS presumes a successful land exchange). The project is within land ceded by American Indian tribes to the U.S. by treaty, known as the1854 Ceded Territory, upon which tribes exercise reserved rights.

According to the DEIS, all waste rock at the site is acid generating, and acidic water moving through the waste rock and tailings will mobilize metals and sulfates, leaching them into groundwater and surface water. The DEIS projects that water quality standards will be exceeded

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for sulfates and other contaminants and describes mitigation measures that include tailings basin seepage collection, wastewater collection and recycling into process water, and various barrier methods for waste rock, tailings and exposed rock faces. The proposed project would fill approximately 1,000 wetlands acres, largely high quality and forested, and indirectly affect approximately 500 more acres.

Based on our review of the DEIS, EPA has rated the DEIS as Environmentally Unsatisfactory – Inadequate, or EU-3. Environmentally Unsatisfactory (EU) indicates that our review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The numeric portion of the rating indicates the DEIS does not present adequate information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment or EPA identifies reasonably available alternatives which could reduce the environmental impacts of the action. This rating applies to the Proposed Action, the Mine Site Alternative and the Tailings Basin Alternative. Our summary of ratings definitions is enclosed.

EPA has assigned the EU rating because our review of the DEIS determined that the proposed action will result in environmentally unsatisfactory water quality impacts. Specifically, EPA believes that the project will exceed water quality standards because of discharges during the life of the mining operation and on a long-term basis, including the post-closure period. These water quality impacts are largely related to water that contacts acid-generating waste rock and mine faces and to wastewater escaping the tailings basin through seeps and in groundwater. EPA also finds the wetlands mitigation plan environmentally unacceptable because it does not provide mitigation for all impacts to wetlands, particularly for indirect impacts.

EPA has assigned the Inadequate (3) rating to the DEIS because EPA believes that the analyses of the hydrogeological profiles at both the mine and processing sites are inadequate to determine the full extent of impacts or to justify mitigation options. Consequently, we believe that the DEIS likely underestimates water quality impacts and that the project is likely to have additional unmitigated long-term discharges. EPA has identified information gaps relating to groundwater impacts, groundwater-surface water interaction, tailings basin stability and containment, and groundwater discharges to surface water. EPA believes the DEIS should evaluate alternatives to avoid mine pit overflow and explore additional mitigation for discharges and waste rock management, some of which are identified briefly in the document. Furthermore, EPA does not agree with the compensation described for wetlands impacts and proposes alternative mitigation ratios. The DEIS did not provide information on financial assurance, which EPA believes critical to the decision-making process when long-term impacts and mitigation are involved.

We have enclosed detailed comments outlining our issues more completely and offer recommendations as a starting point for discussion. Our main issues are summarized below.

**Water Quality**

EPA determined that the project will result in unacceptable and long-term water quality impacts, which include exceeding water quality standards, releasing unmitigated wastewater

discharges to water bodies (during operation and in the post-closure period), and increasing mercury loadings into the Lake Superior watershed.

EPA believes the information about the project's estimation of acid generation needs to be updated. The project's proposed operation and post-closure management plan for acid-generating waste rock and wastewater is inadequate and needs to be improved. The proposed approaches to manage acid generation are untested or unproven at the proposed scale. EPA believes the tailings basin will contribute to water quality impacts by leaking contaminants into groundwater that may be hydraulically connected to surface water. EPA believes the Environmental Impact Statement (EIS) needs to include adequate hydrogeological and hydrological analyses for the tailings basin and surrounding area and for the mine site. Tailings basin and mine site water management needs to be based on adequate hydrogeological/hydrological information.

**Wetlands**

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

With impacts to over 1,000 acres of wetlands, the DEIS provides incomplete and inadequate compensation for the loss of wetlands and their function. Indirect impacts to wetlands are not completely identified or compensated for in the mitigation plan. EPA also believes that some of the mitigation offered for direct impacts is inadequate, given that the type and function of wetlands impacted is difficult to replace. EPA's preferred mitigation ratios for the project's impacts are described in the attached detailed comments. Insofar as the DEIS for this project is the chief environmental document supporting the issuance of the USACE CWA Section 404 permit, a revised or supplemental DEIS should identify and describe mitigation for all impacts. It should also include wetland monitoring plans and adaptive management plans, especially related to indirect impacts to mine site wetlands. The Section 404(b)(1) Guidelines, 40 CFR Section 230.10(b), prohibit discharges that will result in a violation of the water quality standards. If water quality standards cannot be met in conjunction with this project as described within the DEIS, U.S. EPA would not support the issuance of a permit for this project. If our concerns are not addressed prior to the issuance of the Section 404 permit, EPA may elevate pursuant to Part IV, paragraph 3(a) and 3(b) of the August 1992 CWA Section 404(q) of the Memorandum of Agreement between EPA and the Department of Army.

**Financial Assurance**

Long-term post-closure treatment will be necessary to protect water quality; therefore, EPA believes financial assurance information should have been included in the DEIS. The amount and viability of financial assurance are critical factors in determining the effectiveness of these activities, and EPA believes it is necessary to analyze and disclose financial assurance

factors in the DEIS to determine the significance of the impacts and inform decisions about the project. Financial assurance information includes a description of State and/or federal agency requirements, closure costs, estimated bond amounts needed for each closure and reclamation activity, and how the bonds should be modified should additional temporary, long-term, or perpetual treatment and/or remediation needs be determined during operations.

EPA believes that because of deficiencies in the DEIS, additional information, alternatives, and mitigation measures should be evaluated and made available for public comment in a revised or supplemental DEIS. EPA will continue to work with USACE and the cooperating agencies to resolve the issues we have identified. If we are unable to resolve our concerns, this matter may be a candidate for referral to the Council on Environmental Quality (CEQ) for resolution. We appreciate the opportunity to review the DEIS. Please feel free to contact me at 312-353-2000 or Kenneth Westlake of my staff at 312-886-2910 should you desire a meeting to discuss these comments.

Sincerely,

Richard C Karl for

Bharat Mathur
Acting Regional Administrator

Enclosures: NorthMet Project DEIS Detailed Comments
Summary of Ratings Definitions

cc:
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**EPA DETAILED COMMENTS**
**NORTHMET PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT**

## I. Water Quality

*Synopsis*: The DEIS describes a proposed action that will exceed or have the potential to exceed surface water quality standards in the Partridge River, Embarrass River and downstream in Colby Lake (a drinking water source) and the St. Louis River. EPA also concludes that the DEIS underestimates the potential for waste rock and exposed pit faces to generate acid rock drainage (ARD) and the potential for this drainage to enter the environment. EPA believes that there are water quality impacts that have been unevaluated because of gaps in hydrogeological and hydrological site assessments. Since hydrogeology at the mine site is not well described, EPA is concerned that fate and destination of long-term drainage is unknown. We are concerned that mine operation and closure decisions will be made based on inadequate information. Neither the Tailings Basin Alternative nor the Mine Site Alternative would completely prevent or mitigate impacts to water quality. We have also identified discharges that may require National Pollutant Discharge Elimination System (NPDES) permit coverage in addition to the permit requirements listed in Table 1.1-1 (Government Permit and Approvals). Finally, due to the projected need for long-term water treatment, EPA does not agree with DEIS statements that the Proposed Action could achieve maintenance-free closure.

### A. Mine Site

Acid generation potential

The DEIS underestimates the potential for waste rock to generate ARD. We are aware that mine plans have changed since the tests to evaluate waste rock chemistry and acid generation potential were completed, and it is not clear if relative proportions of the waste rock in the current mine plan will be the same as those used in the waste rock characterization. We question whether the waste rock analyses are still representative of the waste rock that will be generated by the project. For example, we note from supporting technical documents that Unit 7 was not included in the analysis, although it will contribute to the waste rock. In addition, the DEIS states that more extensive characterization of the overburden is needed. (Page 4.1-65, Section 4.1.3.1).

> **Recommendation:** The revised/supplemental DEIS should evaluate whether the waste rock chemistry predictions, waste rock management plans and post-closure needs are taken into consideration in the current mining plans. We further recommend that USACE and the applicant determine what additional tests may be necessary to reflect the current mine plan, then complete those tests.

Acid generation prevention measures

The DEIS analysis relies on unproven measures to limit oxidation of waste rock and assumes full success of these measures. EPA does not believe this assumption is supported, in part because several of the approaches proposed to control ARD (such as compaction, membrane

covers, and lining of pit walls) have not been demonstrated as effective. For example, the East Pit closure cover includes ARD reduction measures that the DEIS admits have not been demonstrated successfully in the U.S. (Section 4.1-16). In addition, the plan to isolate the Category 4 in-situ material (Virginia formation) in the final backfill is not clear, inasmuch as the narrative indicates that four inches of limestone will be placed over this material that will be developed in a steep face. The DEIS also notes that waste rock oxidation will be limited by compaction measures, another unproven approach. Subsequent management plans based on these assumptions may lead to potential water quality impacts. Therefore, EPA believes the DEIS should assume that waste rock will in fact be oxidized and the extent should be predicted.

> **Recommendation:** EPA suggests that the revised/supplemental DEIS model ARD inflows assuming various degrees of effectiveness of covers and other designs. We further recommend analyzing other management strategies to prevent ARD and developing adaptive management options that can address the likely situation that ARD will be generated post-closure from pit walls. Regarding the stockpile liners, we recommend the revised/supplemental DEIS consider measures to protect the permanent stockpile liners from erosion or other surface impacts that could occur over the long term. These liners have potential to be damaged if they are exposed.

Potential mercury generation from waste rock

EPA supports the goals of the 1991 "Binational Program to Restore and Protect the Lake Superior Basin" to establish a Zero Discharge Demonstration Program for critical pollutants (of which mercury is one), and we question whether the waste rock and the project overall have been adequately evaluated for their potential to introduce mercury into the Lake Superior watershed. The DEIS states that results from 36-day batch tests suggest that mercury will be absorbed by minerals in the waste rock (p. 4.1-122). Details of these experiments are not provided, but it is not clear that conditions expected to occur under field conditions were accurately simulated in the batch tests, nor is it established that the time scale under which these tests were conducted is adequate for predictions of long-term mercury behavior. In addition, EPA does not agree that "scientific understanding of mercury methylation and bioaccumulation is limited" (p. 4.1-122). A large body of work has been done on this topic (see, e.g., the references cited in the section discussing mercury methylation beginning on p. 4.1-125).

> **Recommendation:** The revised/supplemental DEIS should include information upon which conclusions regarding mercury behavior at the site were based. Depending on this information, EPA may suggest that the applicant perform additional or more appropriate studies on potential for mercury mobilization.

Waste rock management

According to the DEIS, all waste rock at the site is acid generating. The proponent's plan to segregate waste rock into four categories (based on potential to generate ARD) is a key management approach in reducing the potential for acid generation. Supporting documentation has noted that acid generation in Category 2 waste rock is sensitive to the inclusion of Category 3 and 4 waste rock, meaning that if some proportion of the latter category rock is included in the

Category 2 rock, the resulting overall drainage could be acidic and result in increased metal solubility (Report RS53/42). The DEIS explains that no sampling of the overburden will take place during stripping; instead, field determinations will be relied on for assessing overburden type (p. 4.1-66). Once acid generation begins, it cannot be reversed and will require more extensive management to minimize environmental risks. The DEIS does not describe how successful segregation will be achieved on a real-time basis; therefore, EPA does not have confidence that segregation will happen so as to assure that waste rock is stored properly according to its reactivity in a real-time operational timeframe. EPA is very concerned about the possibility that segregation would fail to separate reactive waste categories effectively to prevent eventual ARD.

> **Recommendation:** Waste rock management needs to be described thoroughly to allow decision-makers to evaluate whether it will sufficiently prevent ARD from entering the aquatic environment. EPA recommends the revised/supplemental DEIS describe how waste rock would be sorted during operation, and how the success of segregation will be determined. We also recommend a discussion of criteria for the field determinations and any plans for quality assurance in these field decisions. We also recommend the revised/supplemental DEIS describe how waste rock management and pits would be adaptively managed should segregation be compromised or ineffective in preventing ARD.
>
> EPA believes Category 1 waste rock should not be used for construction material since it has ARD potential, which could be increased if segregation techniques are not sufficient to prevent mixing.

Wastewater treatment at the mine site

The DEIS does not offer supporting data that the proposed wastewater treatment facility (WWTF) has the capacity to treat all ARD effluent and will be sufficient to address waste rock pile drainage over a long-term timeframe. The proposed WWTF is intended to capture and treat all drainage from waste rock piles and recycle the water into the processing plant, or to discharge treated water into the Partridge River, in the event that process water is not needed. WWTF capacity is not described; therefore, there is inadequate information to know whether it could process all the contaminated stormwater flows during a maximum spring snow melt situation. In addition, the design capacity of the WWTF may be inadequate, since the project plan assumes that pit walls will not generate ARD.

> **Recommendation:** We recommend describing the WWTF further, in particular its capacity relative to anticipated flows. We also recommend using revised ARD assumptions (as described in above comments) to evaluate loading to the WWTF. Management plans should recognize that long-term treatment and discharge will likely be necessary in the post-closure period.

The DEIS proposes an artificial wetland to treat contaminated water at the mine site in perpetuity. Artificial wetlands have successfully treated low flows of acid waters; however, their success has been quite limited in treating flows containing a range of metals. The DEIS does not

demonstrate that this treatment option will be successful in the severe winter environment found at the site or that if the artificial wetland fails how treatment will be accomplished. Other management decisions are contingent on the success of this proposed mitigation measure.

> **Recommendation:** The revised/supplemental DEIS should include information about the operation of the treatment wetlands. The information should include a long-term adaptive management plan for the treatment wetlands, especially with regard to plant maintenance, removal of accumulated metals in the wetland plants and sediment, and monitoring for effectiveness.
>
> Given that the performance history on treatment wetlands of this size and scope is limited, EPA further recommends the revised/supplemental DEIS explore additional alternatives for treating this wastewater.

West Pit overflows

The predicted West Pit overflows to an unnamed tributary of the Partridge River will cause serious water quality impacts. The DEIS indicates that arsenic, cobalt, copper, nickel, and selenium would exceed water quality standards (p. 4.1-113). The DEIS notes uncertainty as to whether the West Pit overflow would meet the Great Lakes Initiative standard for mercury (p. 4.1-124). The presumption that the unnamed tributary would "essentially function as a mixing zone" is questionable. Considering that the Partridge River ambient levels for several of these parameters are already high (Table 4.1-24) and, in the case of aluminum, exceed the water quality standard, dilution is not a feasible solution to any West Pit overflows. In addition, many of these constituents will accumulate over time, especially in sediment. Sediment is where the majority of mercury methylation will occur. The results of the deterministic modeling and follow-up uncertainty analysis suggest that "as many as five parameters (i.e., arsenic, cobalt, copper, nickel, and selenium) could exceed surface water quality standards, in addition to relatively high sulfate concentrations."

> **Recommendation:** EPA recommends the revised/supplemental DEIS develop operations and closure alternatives that will avoid or prevent pit overflow. The overflow scenario should include measures that will protect water quality downstream, among them treatment alternatives, a monitoring plan, and adaptive management plans for the overflow. We also recommend further evaluation of whether overflow from the West Pit will meet Lake Superior mercury standards.

Hydrogeology/hydrology assessment and impacts: mine site

The model assumptions and the amount of data used for groundwater modeling at the mine site are inadequate and may not be protective of water quality. The DEIS states that concentrations of several solutes could exceed water quality standards at mine site boundaries. In addition, the DEIS states that firm conclusions cannot be drawn due to conflicts between the results from deterministic modeling and the Uncertainty Analysis at the mine site (p. 4.1-84). Given the DEIS-stated potential for long-term (> 2000 yrs) leaching of solutes from waste rock to groundwater, further evaluation is necessary.

Our issues fall into the following categories:

- Inadequate data collection

  Neither the number of wells (3) nor the frequency of monitoring (once a year in 2005, 2006, and 2009) constitutes adequate characterization of the surficial aquifer.

- Inadequate model assumptions

  The DEIS states "The MODFLOW model was not developed to accurately predict drawdown in the surficial aquifer or the impact, if any, such drawdown would have on adjacent wetlands and surface waters" (p. 4.1-60). Consequently, its use and ability to represent potential impacts due to pit dewatering and maintenance pumping are very limited. Furthermore, given this caveat to using MODFLOW to evaluate the effects of mine pit dewatering on the Partridge River flows, it is not the optimal tool for predicting this information.

  The DEIS assumes the complete effectiveness of unproven anti-oxidation measures for groundwater modeling purposes (see above comments). This is not a conservative approach, and, therefore, modeling results based on this assumption are not credible.

  Several conclusions are provided that refer to groundwater elevation recovery following the closure of the mine. However, the DEIS states, "MnDNR believes that actual hydrogeological characteristics of the project site do not fit the model assumptions of homogeneous porous media flow (uniform vertical and horizontal conductivity) for the bedrock and till layers" (p. 4.1-57). With the potential deficiencies of the model, it is not consistent to provide relatively precise post-closure groundwater recovery elevations and dates of recovery based on the MODFLOW model.

- Insufficient discussion/disclosure of empirical and reference data

  The revised/supplemental DEIS needs to present the available empirical or reference data that was used to assess potential impacts to the adjacent wetlands and surface water bodies. Based on comments in the DEIS, this data appears to include groundwater information and maps from dewatered mines in the area.

  **Recommendations:** The revised/supplemental DEIS should include an adequate hydrogeological and hydrological evaluation of the mine site. EPA maintains that additional data gathering is crucial to assessing impacts. Additional field data may be necessary. Furthermore, the revised/supplemental DEIS should clarify how and why the MODFLOW model is appropriate for use in the mine pit area. We also believe model assumptions should be re-assessed to take into account previous comments on the potential for ARD and less-than-complete success of untested anti-oxidation measures. If models continue to prove uncertain in this area, we suggest re-evaluating groundwater analysis and developing more protective management and mitigation measures. The same applies to the use of the model for evaluating mine dewatering impacts on the Partridge River.

Mine pit water quality and wildlife

EPA recommends that the revised/supplemental DEIS further evaluate the impacts of mine pit water quality on wildlife. The DEIS indicates fencing will be used as a deterrent for potentially sensitive wildlife species; however, aquatic-dependent migratory birds may use the pit lakes as a stopover, exposing wildlife to contaminants. The Endangered Species Act of 1973 (ESA) mandates all federal departments and agencies to conserve listed species and to utilize their authorities in furtherance of the purposes of the ESA. Given the potential for exposure near or at the West Pit, migration potential through the project area should also be considered for endangered species typically using this migration path (e.g., piping plover). Section 4.4.1.1 on page 4.4-1 only addresses federally- and state-listed endangered, threatened and species of special concern that are potentially present in the project area.

> **Recommendation:** We suggest the revised/supplemental DEIS discuss mine pit impacts to migratory birds, whether Federally-listed or not, as well as opportunities to reduce the risk of adverse impacts to tribal members' health due to subsistence consumption of potentially contaminated trust resources.

The DEIS needs to evaluate how ground water exceedences from the mine site may affect downstream fish populations. Groundwater sampling and modeling at the mine site (noted in Table 4.1-5) indicate that data from 9 bedrock wells exceed water quality standards for aluminum, iron, and manganese with occasional exceedances of beryllium, nickel and sulfate. Fish populations located in areas with high metal concentrations often adapt to a water quality level that allows for decent sustained population stability. Often, however, slight increases or decreases in metal loadings can have serious adverse affects.

> **Recommendation:** We recommend the revised/supplemental DEIS determine potential impacts to fish populations in waters downstream of the Mine Site. Water quality standard exceedances that may ultimately affect fish populations should be mitigated.

**B. Plant Site**

Plant site storm water management

Although the DEIS states that the lack of stormwater management facilities could result in increased pollutant loadings to the Partridge River, none are described. The nature of this discharge (construction, industrial) is not described nor is the method of conveyance to surface waters.

> **Recommendation:** We recommend that the revised/supplemental DEIS include information to determine whether and what type of NPDES permit coverage is required at the plant site.

Tailings basin stability

The DEIS does not include a recent, detailed engineering analyses on the structural stability and integrity of the existing LTV tailings basin. Consequently, the stability of the existing tailings basin and its ability to retain the project's additional tailings and processing residues is not known, and this is an unacceptable data gap. The DEIS notes that geotechnical stability studies will be conducted during permitting (Section 4.1.3). These issues should be addressed in the revised/supplemental DEIS. The following issues should be addressed:

- The tailings basins are already leaking.
- The effect of the additional weight of new tailings and process wastes has not been estimated or analyzed.
- The understanding of water flow through the waste is not well understood or described.
- Groundwater data surrounding the tailings basin is scant; the groundwater flow regime is poorly characterized here, as is the potential for groundwater to impact surface water down gradient of the tailings basin.
- NorthMet proposes to dispose of hydrometallurgical wastes in lined cells on top of existing tailing ponds – the integrity of the tailings basin to accommodate this management option is not described.

**Recommendation:** EPA believes that analyzing tailing basin stability is important as part of informed decision-making for this project; clearly, the basin's ability to retain additional mine tailings and hydrometallurgical wastes is crucial to preventing releases to the environment. The revised/supplemental DEIS should include a stability analysis of the tailings basin in its current state and under the project's operating and post-closure conditions. Furthermore, if the basin is found potentially unusable as proposed, another disposal area would need to be evaluated as an alternative as part of the revised/supplemental DEIS.

Hydrogeology/hydrology assessment and impacts: plant site

The Partridge and Embarrass Rivers already exceed or are close to exceeding water quality standards for some constituents. Section 4.1 of the DEIS describes storm water discharges from the Plant Site (excluding the Tailings Basin). These discharges would be routed to Second Creek, a tributary to the Partridge River. However, the DEIS has not adequately assessed these rivers. For example, the Partridge River flow-data summarized on page 4.1-21 and Table 4.1-12 is outdated (1980 to 1988). The Embarrass River flow data summarized in Table 4.1-17 is extremely old (1942-1964) and for this reason alone is not appropriate for characterizing existing flow conditions.

**Recommendations:** More information is necessary to evaluate impacts to these rivers. We recommend the following. The revised/supplemental DEIS should provide a complete impact analysis of the Partridge River and Embarrass River based on an accurate characterization of their flow and assimilative capacity, under current and project conditions. More data is needed to describe conditions in the downstream lakes. Where current data is lacking, data collection may be warranted. Where historical data is not available, we recommend considering reference data from other similar streams in the area.

The DEIS lacks an adequate groundwater characterization at the tailings basin. There are information gaps related to the extent of existing contamination, potential releases from the project, the groundwater pathway of potential releases, and the potential for contaminated groundwater to impact surface water. As evidence for inadequate analysis, EPA points out the following data deficiencies that should be addressed:

- Some groundwater quality constituents were monitored only one to three times (p. 4.1-12 and 4.1-13, Tables 4.1-6 and 4.1-7), which we believe resulted in an extremely large range of concentrations.
- Some constituents in water from the Tailings Basin and Tailings Basin area have only been measured a few times in the period reported (2001-2004), and this monitoring period and sampling frequency do not constitute adequate characterization (pp. 4.1-12 to 4.1-13, Section 4.1.1.2, Tables 4.1-6 and 4.1-7).
- The number of monitoring points and the sampling frequency of wells downgradient from the LTVSMC Tailings Basin are not adequate to characterize groundwater in this area (p. 4.1-15, Section 4.1.1.2, Table 4.1-8).
- The tailings basin model did not address the potential fate and transport of constituents that would mobilize at higher pH (e.g. antimony and arsenic), of particular concern because the current effluent is higher pH than proposed acidic tailings and mixing effects aren't evaluated.
- Monitoring data relating to the LTVSMC Tailings Basin seeps was not available in the DEIS.
- The extent of on-site contamination from previous operations is not characterized.

Upwelling groundwater beyond the tailings basin barrier will potentially cause exceedences of water quality standards in waters receiving flow from the tailings basin. The DEIS suggests a connection between the tailings basin and surface water. In addition, upwelling flow at the tailings basin may continue past the closure of the tailings basin, requiring continued monitoring and management of surplus water. The DEIS states that current groundwater seepage from the tailings basin to the north toward the Embarrass River exceeds the aquifer flux capacity, resulting in upwelling of groundwater to the surface. This upwelling, in conjunction with the surface seeps, has inundated some wetlands immediately downgradient of the tailings basin. This seepage contains high levels of contaminants, such as aluminum, manganese, lead, and total dissolved solids. Under the proposed action, seepage from the tailings basin and long-term groundwater upwelling will continue. In addition, the surface seepage to Second Creek is expected to continue indefinitely (p. 4.1-56). This upwelling would inundate portions of the wetlands north of the tailings basin and potentially introduce high sulfate concentrations to the wetlands and downstream lakes on the Embarrass River. The Closure Plan does not propose any remediation of groundwater seepage from the tailings basin.

**Recommendations:** We recommend that a revised/supplemental DEIS include adequate information about groundwater flow at the tailings basin and about the contribution of upwelling groundwater to surface water. Adequate information will also include an analysis of existing contamination. We recommend the revised/supplemental DEIS address the potential for metals or other contaminants to mobilize at higher pH (antimony and arsenic) and evaluate how mixing current and project –related tailings may affect contaminant mobility.

If the contaminated flow is directly hydrologically connected to surface water, a NPDES permit would be required for the discharge. The DEIS should evaluate this possibility.

Tailings basin seepage

The DEIS states that surface seeps will continue at the tailings basin during operation and following the closure of the mine. The DEIS does not provide adequate data on the anticipated amount of surface seepage at the tailings basin, because it appears the anticipated surface seepage conditions are based on conditions present in October 2008 (measurements made about seven years after the closure of the LTVSMC mine). DEIS predictions of basin seepage does not account for additional tailings loadings and different chemistry. Furthermore, the expectation that most seeps will dry out is unlikely given the addition of NorthMet's project tailings and process water and changes to the topographic and hydraulic features. Based on the continued seepage over seven years following the closure of the LTVSMC Tailings basin, without additional mitigation, probable seepage will continue following the closure of the NorthMet operations.

**Recommendation:** Further study and justification is needed to validate the conclusion that conditions present in October 2008 will represent conditions when the NorthMet mine is active. EPA believes that a revised/supplemental DEIS should re-evaluate the estimated flow, location or duration of existing and potential future seeps. We also recommend the revised/supplemental DEIS describe the monitoring program that would address seeps, and the alternative remedies needed in the event that continued post-closure seepage does not meet water quality standards.

EPA recommends further evaluation of the plan to use LTVSMC tailings as embankment material. The LTVSMC tailings are thought to be a source of sulfates and arsenic; we recommend modeling the chemical interaction between the chemically-different old and new tailings and evaluating other inert materials.

Data supporting predictions that the proposed seepage collection system would be adequate to capture tailings basin seepage is inadequate. Table 4.1-35 indicates that 2 to 4 percent of the total seepage toward the Embarrass River will be recovered. In addition, the collection system places wells mainly in the area of current seeps, which may not be protective, given that past seepage occurred on the western tailings basin face and that the potential exists for additional seeps on other basin faces. Regarding the seepage recovery trench located to the south of the tailings basin, we note that the tailings basin MODFLOW was not prepared to evaluate the impact of seepage on the adjacent unconsolidated sediments. The proposed location of the recovery trench does not include groundwater monitoring points, so model calibration in this area was not possible.

**Recommendation:** Additional justification needs to be provided ensuring that future mining operations will not result in the west side surface seeps to again become active. Depending on the results of this work, the seepage collection system may need to be enhanced to address these potential seeps. Any potential groundwater recovery system will also need to be evaluated for use along the western boundary of the tailings basin.

Proposed seepage trench placement should be based on or adjusted to provide a more complete understanding or model of area hydrogeology. We recommend more comprehensive monitoring, including installation/expansion of a monitoring well network, around the tailings basin.

The DEIS' finding that the addition of NorthMet tailings to the LTVSMC tailings basin would improve leachate quality is not well supported. The DEIS concludes the effects of interaction between the NorthMet seepage and underlying LTVSMC tailings suggest that the latter will remove certain constituents from the NorthMet leachate. These column experiments were conducted for a limited period of time (~35 weeks; RS46); long-term results may differ significantly. In addition, the results of these experiments assumes that solutes from the NorthMet seepage are sorbed onto hydrous ferric oxide, manganese oxide, and aluminum oxides surfaces, but these are stable only under oxidizing conditions (assumed to be the experimental conditions, as no details of redox controls in the experimental columns were provided). Under the subaqueous conditions that are expected to prevail in the long term at the Mine Site, depletion of oxygen and the onset of reducing conditions will result in dissolution of oxides and the release of sorbed metals. This scenario should be reconciled with the conclusions drawn from the column experiments.

**Recommendation:** Additional support is necessary to confirm the conclusions regarding improved water quality when NorthMet tailings are added to the LTVSMC tailings. We note that these experimental results cannot be interpreted further unless it can be established that the experiments that form the basis of this conclusion accurately simulate long-term behavior of the tailings under *in situ* conditions (i.e., pH, redox conditions, microbial effects, etc.).

Tailings Basin Alternative

The DEIS should include adequate information on the efficacy of the Tailings Basin Alternative to prevent water quality impacts, particularly because hydrogeological information and analysis are inadequate. In addition, the DEIS indicates that this alternative would not remove the possibility of significant groundwater upwelling, particularly after closure.

While the DEIS describes that pumping will occur until no longer needed, it also acknowledges that the total groundwater seepage rate (NorthMet seepage plus residual seepage from Cell 2W) would still significantly exceed aquifer flux capacity during operations and would approximately be four times the aquifer capacity during the post-closure period. Section 4.1-64 states that the total unrecovered groundwater seepage from tailings would be 1600 gallons per minute (gpm) in year 1 and up to 2900 gpm in year 20. A maximum seepage rate of 3800 gpm could be reached in year 20. The DEIS inadequately described how groundwater modeling on unrecovered seepage was conducted and whether unrecovered seepage exceed water quality standards. The levels of sulfate are well above levels that are considered protective of wild rice and will generally lead to increased mercury methylation and higher fish tissue levels of mercury in downstream waters. The Tailings Basin Alternative mitigation measures, as summarized on Page 4.1-162 and in Table 4.1-88, indicates that this option would still significantly increase sulfate loading and reduce assimilative capacity.

The placement of collection wells appears to be based on existing or past seepage incidents, without modeling for future project conditions, and, therefore, may not adequately address seepage. Furthermore, it is unclear whether this alternative would address long-term discharges to groundwater occurring post-closure. The DEIS description of the duration of pumping and long-term goals is open-ended.

**Recommendations:** The revised/supplemental DEIS should also include a discussion of adaptive placement of collection wells, a discussion of long-term performance goals for this alternative, and an analysis of how this alternative will achieve water quality standards. We also suggest including a year-by-year modeling of this seepage to determine if its metal loadings increase over time.

The DEIS indicates that PolyMet is conducting additional sampling to better understand mercury behavior in the Project Area. EPA recommends completing this study and presenting the results and conclusions in the revised/supplemental DEIS, prior to formulating conclusions regarding potential mercury impacts associated with the Tailings Basin Alternative.

Under the Tailings Basin Alternative, groundwater seepage captured by the groundwater recovery system would be discharged, untreated, to the Partridge River. While the DEIS states that the effluent would meet water quality standards, adequate supporting data is not included and this discharge may need to be treated.

**Recommendation:** The Tailings Basin Alternative should include a water quality monitoring program to assess groundwater quality prior to its discharge.

EPA recommends the revised/supplemental DEIS evaluate using a non-discharge alternative for stormwater runoff, if it can be carried out without increasing ground water flow to the pit, as opposed to the direct discharge of stormwater to the river. Benefits can include enhanced recharge to wetland areas, as well as providing groundwater storage and increased base flow during drought periods.

The Tailings Basin Alternative would use a permeable reactive barrier (PRB) to reduce metals loadings (e.g., arsenic, sulfate and antimony). While there is published research on how such barriers may operate, EPA had found no data for the proposed barrier at the commercial scale. EPA also believes the proposed PRB would not address all contaminants because, while microbial sulfate reduction (with added organic substrate) is presented in the DEIS as "the only viable alternative for sulfate removal" (pp 4.1-169 through 4.1-171), the use of zero-valent iron does not appear to address the removal of arsenic and selenium (both oxyanions).

**Recommendation:** The revised/supplemental DEIS should provide more information on the PRB aspect of this alternative, including the proposed design of the PRB and a discussion of the mechanisms invoked for the simultaneous removal of sulfate, arsenic, and selenium. Given the uncertainty of this approach, we recommend the revised/supplemental DEIS evaluate contingency treatment alternatives for metals-

contaminated water if the barrier system were to fail to meet its operating design and describe an approach for adaptive management.

Hydrometallurgical plant and wastes

The uncertainties associated with the design and operation of the hydrometallurgical plant and with management of the hydrometallurgical processing waste disposal cells within the existing tailings basin cell 2W must be addressed.

The proposed hydrometallurgical plant would use selective leaching and precipitation to collect target metals out of solution. While hydrometallurgical processes are currently being used in both the gold and copper sectors, the DEIS states that the proposed hydrometallurgical plant process has not previously been employed on a commercial scale (p. 4.1-95) and that predictions of residue chemistry, settling times, and consolidation are uncertain. The DEIS, however, assumes for all the modeled environmental impacts that this plant will operate as proposed and that all of its wastes or discharges into the environment will meet the expected design parameters. The DEIS does not address the scenario of the plant not operating as designed and if the process may generate an unanticipated range of wastes and discharges that are not described in the DEIS, requiring treatment.

Hydrometallurgical waste disposal into cells within the existing tailings basin are assumed to be fully contained and to cease drainage after 34 years. The project description does not adequately discuss where the drainage is occurring relative to the cells or how it is captured. It appears to indicate some drainage is exiting the cells on a regular basis, but will cease 34 years after operations begin. This assumption seems unlikely, since the area has a positive water balance. In addition, we understand that a lime mixture will be added to reduce process waste acidity. Since the hydrometallurgical waste cell units would be lined but not covered until closed, rain water and snow melt will accumulate in the units, and flows may continue for many years.

**Recommendation:** The revised/supplemental DEIS needs to further clarify information on hydrometallurgical waste drainage, and we recommend adopting a management plan to monitor for drainage and, as necessary, manage drainage beyond year 34 from these cells. The revised/supplemental DEIS should more fully explain how the 34-year limit would be appropriate for hydrometallurgical cell drainage.

**Downstream Water Quality**

Downstream lakes and drinking water sources

The limited amount of monitoring data for Colby Lake and the Whitewater Reservoir are inadequate to accurately evaluate water quality (p. 4.1-37 and Table 4.1-25). The existing high levels of aluminum and mercury in Colby Lake are a concern. Mean levels at this site from available monitoring data exceed the chronic Class 2Bd water quality standard for aluminum, which is 125 ug/L, and the range of data shows significantly high values. Even given the lack of sufficient data, the modeling results show concentrations for several contaminants in Colby Lake

in excess of the water quality standards. Furthermore, the modeling does not appear to evaluate potential mercury impacts. The DEIS acknowledges that there is little water quality information on Whitewater Reservoir. Our review finds the evaluation of water quality impacts in the DEIS to be inadequate.

> **Recommendation:** We recommend collecting adequate additional data for Colby Lake and the Whitewater Reservoir that will support the proposed action will meet water quality standards.

The amount of arsenic predicted to be in Colby Lake is 4.9 ug/L; the standard is 2.0 ug/L (p. 4.1-141). The text describes adjusting the model to achieve lower concentrations, but does not offer the data and reasoning behind the adjustment. Readjusting variables to less conservative inputs still produced a highest predicted arsenic concentration of 1.9 ug/L.

> **Recommendation:** We recommend the revised/supplemental DEIS evaluate mitigation options that will reduce arsenic levels from the proposed action.

Predicted concentrations of other constituents in Colby Lake may call for long-term prevention or management. Predicted elevations of iron, manganese, thallium and sulfate will exceed the wild rice standard of 10 mg/L. Colby Lake is classified as a Class 1B water which only requires disinfection as a treatment for use as a public water supply. This treatment would not successfully address the constituents mentioned above.

Regarding manganese, there are sufficient studies and data currently available to generate a water quality criterion for this chemical. While this has not been done by EPA at the national level, or by the Minnesota Pollution Control Agency at the state level to date, the data are available and are being used by other states to develop criteria. For example, Illinois EPA has a proposed acute aquatic life water quality standard for manganese before the Illinois Pollution Control Board; the proposed standard (which is below 10 mg/l) has a hardness relationship and was developed for 50 mg/L hardness. (At higher hardness levels, the toxicity of manganese is lower and the resulting criterion would therefore be higher.) The hardness in Colby Lake seems to be within a range of 50 mg/L, and manganese would be elevated under project conditions. This information is mentioned here for consideration when discussing possible impacts on aquatic life.

> **Recommendation:** We recommend the revised/supplemental DEIS address the potential for additional management to prevent contamination to Colby Lake, or additional treatment at the Colby Lake Public Water Supply.

There is no Safe Drinking Water Act maximum contaminant limit (MCL) for aluminum, however, several studies have shown various health effects related to aluminum. Aluminum, iron and manganese are easily removed by certain treatment technologies; however, the DEIS does not specify whether these technologies are in use in the Hoyt Lake public water system (PWS). We understand that the Hoyt Lake PWS uses open basin sedimentation, gravity sand filtration and some form of corrosion control. Although these techniques will help reduce the concentration of these metals, they are not the most effective at making significant reductions. A

discussion of metals removal is needed to determine impacts on the public water systems of Hoyt Lake. It may be adequate to cite the American Water Works Association 2006 survey of 52 utilities that primarily used "conventional treatment" and the effectiveness of this treatment on manganese removal. The average manganese removal was 86%.

> **Recommendation:** The revised/supplemental DEIS should include information to support the DEIS conclusion that there will not be any impacts to the public water system in Hoyt Lakes. An analysis of the water systems treatment removal capabilities, especially for aluminum, should be included to ensure that these contaminants will not be an issue.

Wild rice

The DEIS does not clearly address whether the Minnesota water quality criterion of 10 mg/L for wild rice waters will apply to the project. The DEIS acknowledges that isolated patches of wild rice were found in the Upper Partridge River, a tributary of the St. Louis River. Minn. R. Ch. 7050.0470 designates the St. Louis River as a wild rice water. The DEIS concludes, however, that both the proposed action and the Mine Site Alternative would comply with all surface water quality standards along the Partridge River, though the project may cause sulfates to exceed 10 mg/L.

> **Recommendation:** The revised/supplemental DEIS should clarify the application of the Minnesota wild rice sulfate water quality standards in Minn. R.Ch. 7050.0220 and 7050.0224, given that the DEIS acknowledges the presence of isolated patches of wild rice in the Upper Partridge River, and describe whether sulfates from the project will impact the St. Louis River. We recommend the revised/supplemental DEIS include the 10 mg/L sulfate number within the tables of lists of applicable standards and predicted water quality (Page 4.1-141) and include a discussion of how it applies to on-site and downstream waters potentially affected.

Tribal water quality standards

Reservation lands of the Fond du Lac Band of Minnesota Chippewa are located directly downstream from the mining site along the St. Louis River and have EPA-approved tribal water quality standards. Many of the Tribe's water quality standards are more stringent than Minnesota's standards because the Tribe uses a higher fish consumption rate in the numeric criteria calculations (i.e. 60 grams/day compared to 30 grams/day for Minnesota). The project's potential to affect water quality on the reservation needs to evaluated.

> **Recommendation:** The revised/supplemental DEIS should include the Fond du Lac downstream water quality standards in its discussion of applicable water quality standards and how the standards will be met (pp. 4.1-30 - 4.1-32).

The Grand Portage Band of Minnesota Chippewa, whose reservation is located northeast of the project site, has EPA-approved water quality standards. Many of that Tribe's human health numeric criteria, for example mercury, are calculated using a subsistence fish

consumption rate of 142 grams/day, so any additional mercury (either direct discharges, or indirectly through the sulfate influence on methylation) to Lake Superior may have indirect impacts on the Grand Portage Band and their subsistence resources due to the bioaccumulation of mercury through the food chain. Page 4.5-20 of the DEIS concludes that there will be no incremental risks to recreational or subsistence fishers; however, the fish consumption levels for "recreational" and "subsistence fishers" are not defined. The Grand Portage Band has wildlife mercury standards to protect fish-eating birds (e.g., bald eagles, kingfishers, mergansers, etc.), as well as fish-eating mammals (e.g., otter and mink). The DEIS acknowledges that mercury will be discharged to the Partridge River and may eventually end up in Lake Superior.

> **Recommendation:** The revised/supplemental DEIS should define the subsistence fish consumption levels used to support the DEIS conclusions. It should also consider other Tribes located on Lake Superior that may also be adversely affected by higher mercury levels in fish tissue due to consumption rates higher than the general population (e.g., the Bad River and Red Cliff Reservations in Wisconsin, and the Keweenaw Bay Indian Community's Ontonagon Reservation on the Upper Peninsula of Michigan). We recommend the revised/supplemental DEIS describe how the NorthMet project may contribute to exceedance of the Grand Portage Band's water quality standards for wildlife.

Cumulative Impacts to Water Quality

The water quality analyses in the DEIS mentions existing high constituent baselines (for example, arsenic in Colby Lake) when discussing the reasons that the project will potentially bring the water body nearer to exceeding water quality standards. EPA points out that the purpose of the cumulative impacts assessment is to identify just these instances. However high the baseline, a new project should not contribute an increment that brings the water body to the point of exceeding water quality standards.

> **Recommendation:** We recommend re-evaluating cumulative impacts based on relevant data on project impacts, as noted in the comments in the water quality section above.

## II. Wetlands

*Synopsis*: Insofar as the USACE is using the DEIS to support the CWA Section 404 wetlands fill permit decision, the revised/supplemental DEIS needs to address several wetlands permitting issues, including alternative mine plans, an assessment of wetlands functions, mitigation ratios, and a complete analysis of and mitigation for the indirect impacts to wetlands. EPA has determined that the DEIS does not contain sufficient information to demonstrate compliance with the CWA 404(b)(1) Guidelines (Guidelines). Pursuant to the Guidelines, the applicant bears the burden of clearly demonstrating that the preferred alternative is the least environmentally damaging practicable alternative (LEDPA) that achieves the overall project purpose, minimizes impacts to the aquatic environment to the maximum extent practicable, and does not cause or contribute to significant degradation of waters of the U.S. The Guidelines contain four main requirements (40 CFR 230.10(a) through (d)) and each must be satisfied to comply with Section 404.

Wetland Permitting

In our June 9, 2005 letter the to the District Engineer, EPA reserved its right to elevate our objections to the individual wetlands fill permit for this project, under CWA Section 404(q) due to the potential that this project may result in substantial and unacceptable impacts to aquatic resources of national importance (ARNI). The proposed Mine Site contains approximately 1,300 wetland acres, which are within the Partridge River Watershed, which flows through Colby Lake to the Embarrass River and then to the St. Louis River and Lake Superior. Of these, 73% of the more than 1,100 wetlands acres proposed to be impacted consist of open bog and coniferous bog communities. Other wetland types at the Mine Site are coniferous swamp, alder thicket, hardwood swamp, wet meadow, and some shallow marsh. The wetland functional assessment included in the DEIS indicates that more than 90% of the wetlands to be impacted have Minnesota Rapid Assessment Method (MnRAM) scores corresponding to high vegetative diversity and high overall wetland quality. The DEIS also states that the Minnesota County Biological Survey (MCBS) has identified the Mine Site as having High Biodiversity Significance. For the above reasons, EPA believes the coniferous and open bogs, comprising a large percentage of the approximately 33,880 total wetland acres within the Partridge River Watershed to be an ARNI due to the values they provide in terms of unique habitat, biodiversity, downstream water quality, and flood control.

The lack of information on mining alternatives could be an issue in determining if the proposed mine plan is practicable based on 40 CFR 230.10(a) of the Guidelines. EPA believes that the DEIS does not support the Proposed Action as the least environmentally damaging practicable alternative (LEDPA). EPA is concerned that alternatives exist that would have less adverse impacts to the aquatic environment. The DEIS states that underground mining is not a feasible alternative because it would not be economically viable (Table 3.2-4: Alternatives E7 Underground Mining and Footnote 22), but the DEIS lacks information to justify this statement.

As detailed above, the water quality impacts are also a concern with regard to the Guidelines. In particular, 40 CFR Section 230.10(b), prohibits "discharges that will result in a violation of the water quality standards." If water quality standards cannot be met in conjunction with this project as described within the DEIS (e.g. West Pit Overflow-Page 4.1-113), we would not support the issuance of a permit for this project.

The Guidelines also prohibit a project that causes or contributes to significant degradation of aquatic resources (40 CFR 230.10(c)). Effects contributing to significant degradation include: (1) adverse affects on plankton, fish, shellfish, wildlife, and special aquatic sites (40 CFR 230.10(c)(1)), (2) adverse affects on life stages of aquatic life (40 CFR 230.10(c)(2)), and (3) aquatic ecosystem diversity, productivity, and stability including loss of fish and wildlife habitat (40 CFR 230.10(c)(3)). The DEIS lacks information to justify that the project will not cause or contribute to significant degradation of aquatic resources because (1) even with mitigation some of the proposed mitigation options are unlikely to replace lost aquatic resource functions, and (2) the DEIS underestimates the amount of indirect wetland impacts.

Because much of the wetland impact monitoring and mitigation will be finalized during the permitting process, the revised/supplemental DEIS should include a description of the status of the 404 permit review and, if applicable, further 401 certification review (such as timeline, agency and public participation).

**Recommendations:** We recommend the revised/supplemental DEIS include information about the feasibility and economic viability of underground mining for this project. We recommend resolving water quality concerns prior to the 404 permit review.

Wetland compensation and mitigation

EPA recommends that mitigation for forested and bog wetland types have a minimum ratio of 2:1 for restoration due to the quality of the wetlands, the relative uncertainty of mitigation success, and the extended period of time (decades) that functions associated with forested/bog wetland types will be lost while mitigation areas are establishing themselves. The DEIS presumes a ratio of 1.5:1 and states that the actual replacement ratios required in permitting may exceed the minimum allowed, based on wetland functions and values (Page 4.2-29). Pursuant to 40 CFR Part 230.94, *Compensatory Mitigation for Losses of Aquatic Resources (Mitigation Rule)*, a compensatory mitigation plan must be submitted and approved by the Corps before the District Engineer can issue an Individual CWA section 404 permit. This plan must address a number of critical details regarding mitigation including: clearly articulated project goals and objectives; project site selection criteria; site protection instruments (e.g., conservation easements); detailed quantitative and qualitative baseline information describing both the impact and compensation sites; a detailed discussion of the mitigation project's credit determination methodology and results; a maintenance plan; ecological performance standards used to evaluate the degree to which the compensation projects are replacing lost functions and area; detailed monitoring requirements; a long-term management plan describing necessary long-term stewardship of the compensation sites and who is responsible for performing this stewardship; an adaptive management plan; and financial assurances to ensure project construction, implementation, and long-term management. Compensatory mitigation is intended only for unavoidable impacts after the LEDPA has been determined.

Given the magnitude of direct and indirect impacts, we believe that the revised/supplemental DEIS should include specific information on the wetland mitigation plan for all impacts and describe how the wetlands mitigation plan will address functional replacement. More information is also needed on the proposed on-site wetland mitigation, as well. Currently, the mitigation plan described in the DEIS does not account for functional replacement of the impacted wetlands, which include high quality forested wetland types. The DEIS projects that 175 acres of on-site wetlands will be used for compensation, but few details are outlined in either the DEIS or the referenced *Wetlands Mitigation Plan Supplement*. The DEIS also states that 40 acres of created wetlands would be established within the East Pit, separate from treatment wetlands created to treat effluent from the WWTF. It is not clear how the treatment wetlands would be separated from the mitigation wetlands.

The mitigation plan does not include compensation for the additional 475 acres of wetlands impacts at the mine site that were identified in the DEIS.

**Recommendations:**

- EPA recommends adopting a 2:1 mitigation ratio for restoration, given the relative uncertainty of success and the extended period of time (decades) that functions associated with forested/bog wetland types will be lost while mitigation areas are establishing themselves.

- EPA recommends adding the following in the revised/supplemental DEIS regarding the wetland monitoring plan: when the plan will be developed, how long monitoring will be required, and who will have the opportunity to review the plan.
- We recommend that the wetland mitigation and monitoring plan also include a description of financial assurances that will be established to ensure adequate long-term implementation.
- We recommend the revised/supplemental DEIS describe how the wetlands mitigation plan will address functional replacement.
- The revised/supplemental DEIS should include additional information on the 175-acre on-site compensation (such as wetland type, soil characteristics, and past history of wetland creation on copper mine spoils) to assess its viability.
- We recommend using native seed mixes and weed-free mulch in the on-site wetland mitigation site. (This approach is described only for minimizing direct wetland impacts in the DEIS.)
- We recommend the DEIS address mitigation for the remaining potential 475 acres of wetlands impacts.

Indirect wetlands impacts

The potential for releases of ore and other mine debris and consequent impacts to soil, surface water, groundwater, and wetlands along the rail lines should be quantified and addressed in this document. On page 4.2-21, the text asserts that spillage of ore from rail cars is difficult to estimate. If so, the DEIS should offer information to support the conclusion that predicted impacts to wetlands along the transportation corridor are likely to be insignificant. The discussion of predicted indirect wetland impacts to areas beyond the mine site is based in part on empirical evidence from taconite mines in the area (p. 4.2-20, Section 4.2.3.1). Before the conclusion that little indirect impact is anticipated at the Mine Site can be accepted, additional support should be provided with details of the experience at other sites and in particular how those sites compare to the proposed project.

The procedure used to estimate the area of indirect wetland impacts north of the tailings basin needs further support. The use of this methodology should be supported by its use at other similar open pit mine sites or cited by its use in scientific literature.

The text states that additional wetland vegetation and hydrologic monitoring "would be conducted to determine if any additional indirect wetland impacts would occur" (p. 4.2-25). The conditions under which this additional monitoring will be conducted should be specified.

**Recommendations:** EPA recommends the revised/supplemental DEIS include a complete discussion of indirect impacts to wetlands along rail lines and at the mine site.

The assessments of indirect impacts at the tailings basin and along rail lines should be supported by specific information from other sites, if they are referenced, or by a discussion of methodologies. We recommend describing proposed monitoring.

Groundwater/ wetland interaction: mine site

Page 4.1-5, Section 4.1.1.2, 3rd paragraph: While information gained from the aquifer tests will be important to evaluate potential interaction between the wetlands and the deeper aquifers, these tests may not provide direct evidence on whether wetlands adjacent to the mine pits will be indirectly impacted by mine dewatering activities. The pumping test methodology is not provided in the DEIS. The pumped well will affect groundwater heads in the pumped aquifer; this stress may or may not influence groundwater heads in the wetland sediments. However, conceptually, the ability of the pumping test to evaluate future mining dewatering conditions is not clear. The project is proposed to be an open pit mine, with the overlying unconsolidated material removed to extract the ore – this is conceptually different from the presumed pumping tests where the overlying wetland sediments were present. The open pit would then provide a direct conduit for potential infiltration of wetland sediments adjacent to the pit.

Page 4.1-21, Section 4.1.1.3, 3rd paragraph: The DEIS states that base flow to the Partridge River is low during winter months because of reduced groundwater recharge. This statement appears accurate; however, on page 4.1-5, 1st paragraph, the DEIS cites extremely low seepage rates from wetlands to the underlying surficial aquifer. Does the low base flow during winter, as opposed to more steady base flow conditions, reflect a closer interactive between wetlands, unconsolidated aquifer underlying wetlands, and surface water than expected?

Page 4.2-19, Section 4.2.3.1, 1st and 2nd paragraphs: The distinction between wetlands that are bogs (precipitation-supported) and other communities dependent on groundwater (e.g., swamps) is critical. The assertions in this section regarding the lack of communication between perched bogs and the underlying groundwater require additional support with data from the project area before the conclusion that "no indirect wetland impacts are anticipated at the Mine Site from groundwater quality" can be accepted. Some data and analysis from the site suggests a connection between bedrock aquifers and surficial aquifers, such as the presence of ammonia and nitrates in the deeper aquifer.

**Recommendation:** EPA recommends that additional ground water data be collected to adequately evaluate the interconnection between bedrock and the surficial aquifers and wetlands.

## III. Air Emissions

Mercury emissions

The DEIS states that the facility could emit up to 8.3 pounds of mercury per year (p. 4.6-34). Minnesota's Statewide Mercury Total Maximum Daily Load (TMDL) recognizes mercury air emissions as a chief source of depositional mercury to surface waters. In the TMDL implementation plan, MPCA notes a need for mercury emission reductions overall. The DEIS does not, however, discuss plans to control mercury emissions. Current gold mining operations in Nevada currently employ either activated carbon filters or the Boliden chlorine treatment method to essentially remove all elemental mercury from the gas exhaust streams. Nevada gold mines also effectively treat mercury emissions from autoclaves using activated carbon filtration.

> **Recommendation:** We recommend the revised/supplemental DEIS describe mercury mitigation measures for the project.

Cumulative impacts modeling

EPA notes that the air quality modeling presented in the DEIS excluded emissions from the Keetac Taconite Mine and Processing Expansion Project and other proposed projects in the vicinity of the NorthMet project. Tribal cooperating agencies have noted this in several comments in the DEIS.

> **Recommendation:** The air quality modeling to assess cumulative impacts should consider all current and reasonably foreseeable projects in the area. We recommend adding these sources into the model and including the new information in the revised/supplemental DEIS.

## IV. Financial Assurance

Financial assurance should be discussed in a revised or supplemental Draft EIS because it is critical to determining whether all funding will be available and adequate for proper closure, reclamation, and post-closure care can be met by the mining company. Because the amount and viability of financial assurance are critical factors in determining the effectiveness of these activities, EPA believes it is necessary to analyze these factors in the revised/supplemental DEIS to determine the significance of potential impacts and the feasibility of long-term mitigation measures. For example, if appropriate closure, reclamation, and post-closure care measures are significantly under-funded, contamination of surface water and groundwater may not be controlled. EPA believes the adequacy of financial assurance for these activities could make the difference between a project sufficiently managed over the long-term by the site operator, or an unfunded or underfunded contaminated site that becomes a liability for the Federal government and the public, e.g., under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

> **Recommendation:** We recommend USACE ask the mining company to describe adequate financial assurance as part of a revised/supplemental DEIS so that the

information on the feasibility and commitment to long-term controls and/or treatment can be evaluated during the decision-making process. The State requirements for financial assurance should be described in the revised/supplemental DEIS, as well. We recommend that the revised or supplemental DEIS identify the estimated bond amounts needed for each closure and reclamation activity for the proposed project facilities and also discuss whether and how the state can modify the bond during the course of operations if temporary, long-term, or perpetual treatment and/or remediation needs are discovered during operations. We recommend identifying responsible parties for any post-closure cleanup actions should they be necessary, as part of financial assurance.

We recommend the DEIS estimate contingency reclamation cost. While the DEIS acknowledges that Minnesota Rule 6132.1200 requires the mining company to establish financial assurance one year after the beginning of operations, this information is not included in the DEIS. There is no discussion of how NorthMet intends to meet the Minnesota contingency rule, except that it pledges to comply.

EPA suggests the revised/supplemental DEIS include a reasonable determination of contingency closure cost estimates based on the plan of operations.

## V. Other Issues

Asbestos-like minerals

The DEIS does not evaluate the potential for asbestos-like minerals to be released in water effluent or air emissions, although asbestos-like minerals and their health effects are emerging concerns on the Iron Range. Section 4.6.5.1 of the DEIS indicates that asbestos and asbestos-like fibers may be found in the ore deposit. The DEIS concluded that "impact [from asbestos fibers] is of uncertain magnitude." This conclusion is not supported by the analysis, and the potential impacts to air and water quality from this source bear further discussion and quantification.

**Recommendation:** EPA recommends that the revised/supplemental DEIS include an appendix that reevaluates the potential for asbestos-like minerals to be found in the ore deposit. It should discuss an adaptive management approach that includes how the company proposes to monitor, and if necessary, address the potential release of asbestos-like minerals into the environment during operation, closure, and post-closure.

Impacts along rail lines

We recommend quantifying the potential for releases of ore and other mine debris along rail lines between the mine site and processing plant. The revised/supplemental DEIS should describe and address any consequent impacts to soil, surface water, groundwater, and wetlands along the rail lines.

U.S. Forest Service connected action: land transfer

The Mine Site is located within the Superior National Forest. Based on the nature of title to this land, the U.S. Forest Service (USFS) maintains it does not have the authority to make a decision regarding open-pit mining. USFS has indicated access to the mineral body is achievable via a land exchange or sale. Therefore, mining activities cannot take place without the transfer of land from the USFS to PolyMet.

Proposed actions are connected if they are interdependent parts of a larger action and depend on the larger action for their justification (CFR 1508.25). The National Forest land in question would not be transferred out of USFS ownership if not for the nature of the proposed mining project, making the proposed land transfer a connected action. As a connected action, impacts associated with the land transfer should be identified and analyzed as part of this DEIS. EPA finds the DEIS incomplete without the following: 1) a discussion of USFS regulations governing land transfers, 2) an analysis focused on the trade-offs between the two parcels, and 3) information explaining that any decision made by USACE is conditioned upon a successful land exchange between the USFS and PolyMet. Effects to threatened and endangered species, timber production, and recreation are among the issues that should be identified and analyzed for both parcels.

Federal trust responsibilities should also be addressed since the land proposed for the Mine Site is part of tribal 1854 Treaty Ceded Territory. The DEIS should be revised to identify and analyze all impacts to tribes and Tribal trust resources that would result from a land transfer. Issues related to tribal resource availability and tribal access will be particularly important. The following questions should be addressed:

- What will this new parcel(s) contribute to treaty rights or resources?
- What impacts to quality and quantity of tribal trust resources will occur due to a potential land transfer?
- What cumulative impacts to 1854 Treaty Ceded Territory trust resources will occur as a result of this land transfer (for example, impacts to moose movement and habitat quantity and quality over the entire 1854 Treaty Ceded Territory)?

As federal agencies, USACE, USFS, and EPA need to ensure that federal trust responsibilities are adequately addressed in this analysis.

**Recommendation:** We recommend the revised/supplemental DEIS address analysis pertaining to the land transfer with the USFS and impacts to tribal trust resources. The subsequent Final EIS would encompass impacts from all aspects of the proposed project and present a comprehensive, cumulative impacts analysis. This information is necessary to make an informed decision regarding the proposed project.

Impacts in the 1854 Ceded Territory and to tribes practicing reserved rights in the Territory

Insofar as a cumulative impacts study's geographic area need to reflect the geographic range of an individual resource outside a project property line, so should it reflect the geographic range of uses. In this case, the 1854 Ceded Territory functions as a single geographic area of

legal jurisdiction in which tribes may engage in certain practices of cultural heritage and subsistence.

> **Recommendation:** We recommend the revised/supplemental DEIS evaluate and disclose impacts to all media collectively across the 1854 Ceded Territory as a whole. We also recommend removing references to the draft work known as "the Protocol to Assess Expanded Cumulative Impacts to Native Americans." The referenced work is a draft document in development and is neither published by EPA nor publicly available.

## SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION*

**Environmental Impact of the Action**

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impacts. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS sate, this proposal will be recommended for referral to the CEQ.

**Adequacy of the Impact Statement**

Category 1-Adequate

The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alterative and those of the alternatives reasonably available to the project or action. No further analysis or data collecting is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information

The draft EIS does not contain sufficient information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment